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PROSALUD

Manual Environmental Guide

SMALL-SCALE INFRASTRUCTURE BUILDING ACTIVITIES (HOUSING)



MANUAL ENVIRONMENTAL GUIDE

SMALL-SCALE INFRASTRUCTURE
BUILDING ACTIVITIES (HOUSING)

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INFRASTRUCTURE and EXTERNAL MANAGEMENT

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PRESENTATION

The United States Agency for International Development supports health sector projects in Bolivia that aim to improve the general quality of life, provide social well-being and enable better access to health services for the Bolivian population.

Considering that any activity, work or project inevitably has a series of environmental impacts, care must be taken to avoid increasing its consequences, above all in relation to human health.

With these considerations in mind, and with the aim of contributing to and facilitating the process of environmental management in the distinct organizations, we are pleased to present the second version of the series of four environmental manuals, which have been contextualized on the basis of lessons learned — the fruit of these last three years — and complemented in accordance with Regulation CFR 216 and the Regulations of Environmental Law 1333 of the Republic of Bolivia.

The series includes the following manuals:

- Small-scale infrastructure – Construction activities (Renovation and construction of health establishments).
- Small-scale infrastructure – Construction activities (Water and sanitation).
- Small-scale infrastructure – Construction activities (Housing).
- Management of solid waste from hospitals.

As in the first version, these documents will allow the agencies financed by USAID/Bolivia to incorporate environmental measures into the execution of health sector projects, readjusting activities and establishing a series of actions to mitigate the negative impacts generated by activities, works or projects connected to the health programmes in their various phases.

The application of the present manual does not exempt its executor from complying with the legal environmental obligations that exist in Bolivia and that may not have been expressly indicated in this document.

FOREWORD

With the aim of producing the second version of this manual, Partners in Development's Environmental Office has developed a methodological strategy based on three important phases: the gathering of primary information through a questionnaire on lessons learned, with contributions from the users of the first version of the manual; the complementation of the documents with related operative instruments and directed towards compliance with Bolivian environmental regulations; and the validation of the new document through a round of participative workshops.

In the first phase a questionnaire was submitted in which users contributed, with opinions, knowledge and experiences of environmental practices used in their projects, to the application of the manual. This instrument made it possible to identify strong and weak points and was invaluable to the users in implementing the environmental variable and in applying this document.

In the second phase, after an intense period of gathering local technical information, came the design of complementary instruments that were adapted for the national context, above all taking into account the opinions contributed by the users. Once this document was structured, it was possible to proceed to the third phase; the participative. Four workshops were held in the capital cities of Tarija, Cochabamba, Santa Cruz and La Paz, with a total participation of 95 people. In these events the results obtained in the previous phases were presented, which was followed by sessions characterised by a group dynamic, in which the participants contributed and validated information. The aim of this phase was to consolidate the complementation and improvement of the manual.

Results obtained

At the moment of interacting with the users it was confirmed that the main strengths of the first guide were the two first instruments: Social baseline and Environmental baseline, documents that are widely used both directly and indirectly. Therefore these two tools were reinforced and improved, thanks to contributions from the agencies that apply them. In the same way, the users confirmed the importance of having an instrument for preliminary evaluation of the project that contains all the relevant environmental information, in an operative form, before the constructive process begins. This instrument was known as the preliminary project profile in the first version of the guides. For this second version it was complemented and improved. Its name was also changed to make it more readily understood: now it is known as Preliminary project evaluation.

With regard to the mitigation measure tables in the first version of the manual, these were still not exploited or widely used. In the participative process we perceived the need to operate with this information so as to make its application viable. With this in mind the following instruments were proposed:

- Table of environmental indicators.
- Format of environmental mitigation plan.
- Format of Programme of Environmental Execution.
- Format of budgetary assignation form.
- Guide to good environmental practices.
- Description of the emergency plan, format for emergency telephone directory, format of environmental incident report and system of accident prevention signs.
- Description of the contingency plan.
- Format of chronogram for implementing mitigation measures.
- Format of environmental monitoring form.
- Format of environmental management report form.
- Format of environmental management balance form.

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Chapter 1

INTRODUCTION

This document represents a technical and operative tool aimed at strengthening, and above all contributing to an advance in, the process of environmental management in the development projects. It is a complimentary and contextualised instrument related to Heading 22, Part 216 of the United States Code of Federal Regulations (henceforth referred to as Regulation 216), which establishes the process of environmental evaluation for USAID cooperation.

The procedures, roles and responsibilities for putting these regulations into practice are cited in Chapter 200 of the USAID guidelines (ADS 204: Environmental Procedures), whose aim is to guarantee that exogenous factors and environmental values are integrated into the USAID decision-making process.

Similarly, Regulation 216 stipulates that all projects financed by the United States government, through USAID, must include a revision of environmental impact to avoid or diminish any negative impact on the environment and its socio-cultural context.

USAID environmental procedures and instruments are useful in:

- Providing a practical and operative methodology to establish requirements in environmental revision, guaranteeing compliance with these requirements through specific indicators of adaptation and environmental monitoring.
- Ensuring the formal preparation of documentation in order to provide the basis for an evaluation of environmental impact in project design to serve, fundamentally, as monitoring before, during and after the construction phase.
- Promoting an organizational and environmental culture through the incorporation of a standardised, systematic process, aimed at reducing errors and oversights common in environmental design, construction, maintenance and the phase of abandoning these installations.

This manual has been designed to orientate USAID staff and the agencies that receive USAID finance, with regard to the environmental element of the design, realization, supervision, evaluation and application of mitigation measures for the development programmes in specific sectors.

The sector included in the present text was selected on the basis of current project portfolios and mission projections in Latin America and the Caribbean.

It is expected that the process of evaluating environmental impact — applied to the design and realisation of activities — will ensure the success and sustainability of development activities, minimising damage to the environment and repercussions for economic prospects and inherent social and cultural progress.

This second version of the manual considers the following dimensions:

- *Methodology.* Examines procedures for gathering, systematisation and validation of all the information necessary to create this document.
- *Brief description of the sector.* An exposition of the housing sector problematic in Latin America and the Caribbean, this also illustrates the local context, where cooperation emphasises repeatable experiences and lessons learned at national level.
- *Environmental management in infrastructure projects.* Introduces the proposed instruments of environmental management according to their character - preventive, corrective / auxiliary or follow-up, in accordance with the project's different phases (pre-investment, investment, execution and closure).
- *Pre-investment phase.* Sets out the range of impacts (direct, indirect, primary and secondary) that may appear during the development of related projects. It also presents two instruments that are necessary for the socio-environmental management of the projects: the social baseline and the environmental baseline.
- *Investment phase.* Describes potential negative environmental impact, mitigation measures and environmental indicators such as control mechanisms and verification of the project's environmental adaptation. Instruments proposed in this section include the environmental plan, chronogram of environmental execution and the budgetary assignation form, as well as a list of good environmental practices and technical construction specifications.
- *Execution phase.* Contains basic formats for the provision of information related to the chronogram for the implementation of mitigation measures, environmental monitoring and the drawing-up of environmental reports.
- *Closing phase.* Presents an environmental management balance form, which is a checklist aimed at verifying the implementation of operative instruments throughout the entire activity, work or project. It also includes guidelines for the phases of operation, maintenance and forecasted future.
- *Glossary.* Presents a list of terms and their meanings as a conceptual framework for the better understanding of the technical document.
- *References.* Presents the documentation used as support in creating this manual.
- *Appendices.* Contains an appendix with emergency information

2 Chapter 2 METODOLOGÍA

The process of complementation and updating of the manuals covered four phases (see Table 1). The first phase, that of analysis and structuring, includes the collection of localised information from both primary sources (interviews with important actors) and secondary sources such as the manuals themselves, books, newspaper articles, thematic journals, internet publications etc. Similarly, instruments for the collection of technical-environmental information for the financed projects were designed, with the aim of learning from previous lessons and replicable experiences.

| 1ra. phase | 2da. phase | 3ra. phase | 4ta. phase |
|--|---|---|--|
| <p>Analysis and structuring</p> <p>Collection of information and bibliographical revision.</p> <p>Contact with key individuals and development of semi-structured interviews.</p> <p>Drawing-up of:</p> <ul style="list-style-type: none"> - Instruments for collecting outstanding experiences and lessons learned. - Interviews with decisión-makers. - Checklists. | <p>In the field (gathering information in situ)</p> <p>Configuration of the new version of the manuals</p> <p>Visits to projects and key actors.</p> <p>Completion of:</p> <ul style="list-style-type: none"> - Outstanding experience forms for the selected projects. - Interviews with those responsible for the projects. | <p>Validation of the manuals</p> <p>Thematic development workshops:</p> <p>Tarija: Housing.</p> <p>Santa Cruz: Health establishments.</p> <p>Cochabamba: Water and sanitation.</p> <p>La Paz: Health, housing, water and environment sectors.</p> | <p>Synthesis, revision and complementation of the manuals, and their bringing up to date</p> <p>Office work: strengthening of the technical element, processing of information and revision of the text's final structure.</p> |

Table 1. Methodological structure

The documents created to this end are detailed in Table 2; they consider the formulation of questions related to the structure of the manual, its applicability, aspects of improvement, potential for broadening, possibilities for incorporation within company and/or public policies. Also defined was the method of collecting this information based on criteria of accessibility, efficiency and logistical efficacy.

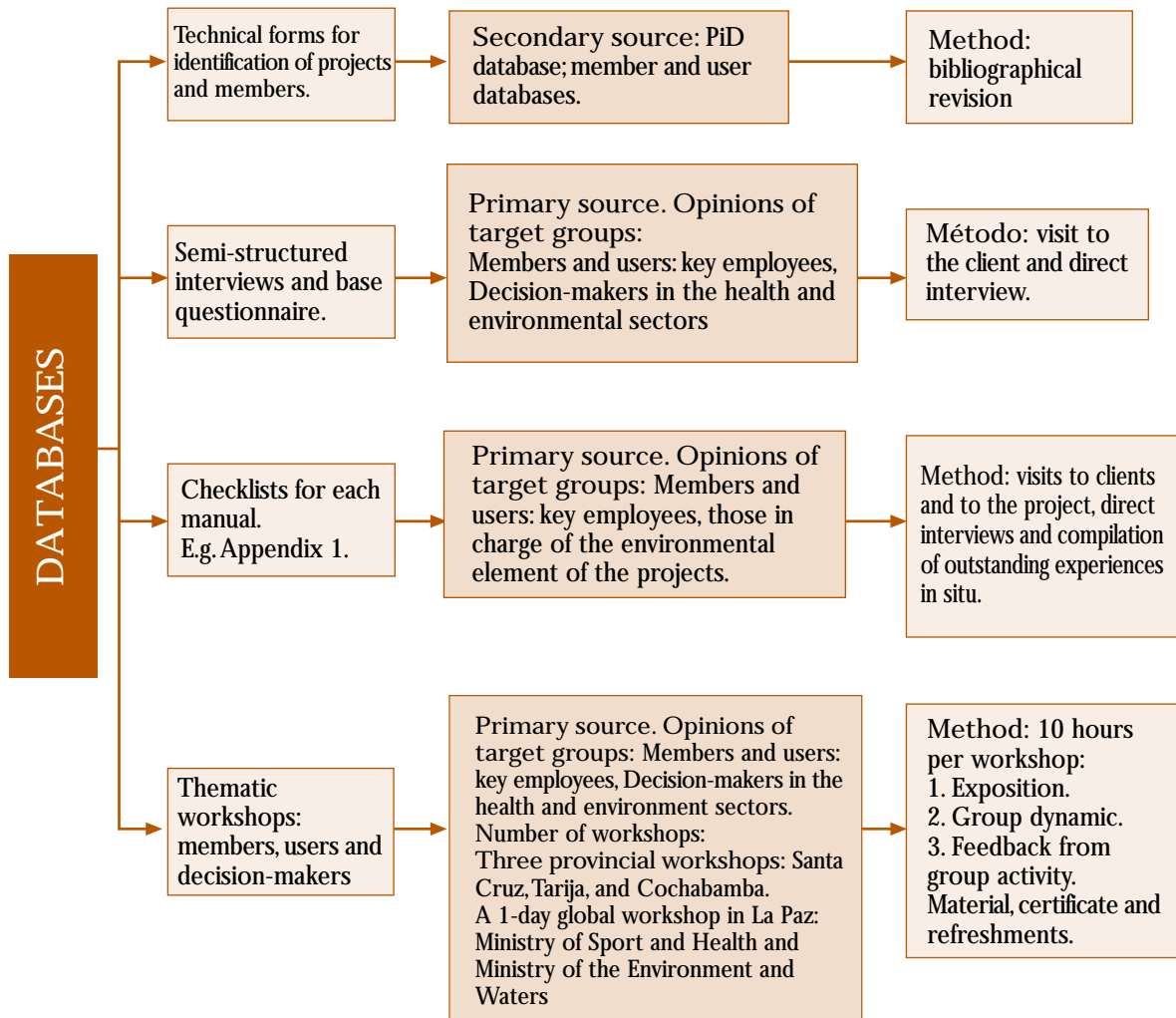


Table 2. Information-gathering instruments

Parallel to the definition of instruments and methods of collection was the configuration of new versions of the manuals. This was followed by the second phase of fieldwork, where technical, social and environmental data was gathered from the projects selected; the outstanding experiences and 'lessons learned' questionnaires were completed with the aim of obtaining information from the users and the manuals' final beneficiaries.

The third phase consisted of the validation of the information and of the results obtained in the field. Finally, the fourth phase includes the systematisation of all the information and the production of the final version of each manual.

2.1. Results

First phase

Two large housing improvement projects were identified:

- By 'living clean' we live healthily (by caring for my home I care for the health of my family) "Construction and improvement of 731 dwellings in the municipalities of Charagua, Gutiérrez and Cabezas in the department of Santa Cruz", Executive institution: Project Concern International.
- Healthy housing: "Improvement of 1,445 dwellings in the communities El Puesto, Sama, Chilcayo, Quebrada Honda, Nuevo Pueblo, Chorcoya Méndez, Alta Gracia, Campanario, Carolina, Corral Grande, Curqui, La Cruce Iscayachi, El Molino, Papa Chacra, San Antonio, San Lorencito, San Roque, Santa Ana, Tres Cruces, Villa Nueva of the Municipality El Puente in the department of Tarija". Executive institution: International Agency Esperanza Bolivia.

Second phase

- The next step was to visit the institutions, conducting interviews and interchanging information on both projects.
- With the collaboration of those responsible for environment in each institution the "outstanding experiences" form was filled in and visits made to the areas of intervention.

Third phase

Thematic workshop: during this phase the validation thematic workshop was conducted in the city of Tarija between the 5th and 6th November 2009.

Method: 10 academic hours over two days.

1. Exposition.
 2. Group work.
 3. Feedback from group activity.
- Provision of materials, certificates and refreshments.

Number of participants: 18 people.

Participating institutions: Project Concern International (PCI), International Agency Esperanza Bolivia (AIEB), PROHABITAT, Habitat for Humanity, School of Environmental Engineers of Cochabamba (CIA-CBBA), School of Environmental Engineers of Santa Cruz (CIAM-SC) and School of Environmental Engineers of Tarija (CIAT), School of Architects of Tarija, Environmental Directorship, Prefecture of the Department of Tarija and Partners in Development (PiD).

Thematic workshop with decision-makers:

Method: 8 academic hours in one day.

1. Exposition.
 2. Group work.
 3. Feedback from group activity.
- Provision of materials, certificates and refreshments.

Number of participants: 30 people.

Participating institutions: Project Concern International (PCI), International Agency Esperanza Bolivia (AIEB), School of Environmental Engineers – Departments of Cochabamba and La Paz, School of Architects of La Paz, Environmental Directorship of the Prefecture of the Department of La Paz, Vice-Ministry of Housing and Basic Services, Vice-Ministry of Health and Promotion, Environmental Quality Directorship of the Municipal Government of La Paz, Environmental Directorship of the Municipal Government of El Alto, Company of Drinking water and Sanitation EPSAS, and Partners in Development (PiD).

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Chapter 3

BRIEF DESCRIPTION OF THE SECTOR

The region of Latin America and the Caribbean (LAC) contains almost 10% of the global population. It is one of the developing regions with most pressing housing needs. Here, housing development processes have expanded from 68.6% in 1980 to 78.9 in 2006¹. Factors of population concentration mean that the greatest problem is overcrowding in the mega-cities and the formation of poverty belts in peripheral zones. Nevertheless there are also deficiencies in rural areas, above all in the access to, and coverage of, basic services.

Currently around 56 million people living in LAC have no electricity, 96 million depend on Biomass for cooking and with regard to standards of living, one in every three inhabitants is found below the poverty line². Concerning access to the liquid element: 128 million people have no sanitation and 92 million lack sufficient water³.

Adapting these variables to the Bolivian context, we observe the same tendency. In the housing sector, with regard to the coverage of services, the rural area is the most depressed: 75% of homes are without electricity and without drinking water or sanitation services⁴. Access to sources of clean and sustainable energy for cooking is, without doubt, a significant factor in determining poverty indexes and reducing health risks. In Bolivia 34% of the population depends on firewood for cooking.

A phenomenon related to the housing sector in Latin American cities, and also present in our country, is socioeconomic segregation:

“...high income groups tend to isolate themselves defensively in self-sufficient neighbourhoods, that contain costly housing services and workplaces, in such a way that they do not need to go into the rest of the city or interact with other social sectors. At the same time, the houses of poor families tend to be located in peripheral areas or areas of high risk, in inferior quality dwellings and with a grave scarcity of services” (ECLAC, 2000).

Urban economic segregation is exacerbated by migratory processes from the countryside to the city. Unfortunately, due to the fact that standards of living in rural areas are lower than in urban areas, peasants abandon their lands without pondering the importance of their crops as sources of agricultural production and export, essential for obtaining foreign currency and for the balance of payments.

1.- *Salud en las Américas: Panorama de la salud en la región (Health in the Americas: an Overview of Health in the Region) 2007, P. 2.*

2.- *Source: BMZ 2004; World Bank Group 2004; IEA 2002c.*

3.- *Panorama general - Perspectivas del Medio Ambiente Mundial (General Panorama - World Environmental Perspectives). PNUMA, 2000.*

4.- *Source: INE - CNPV 2001.*

Fomenting the development of rural housing and its associated infrastructure is a necessary factor in strengthening rural economies, reducing urban migration and satisfying basic critical human needs.

This need is heightened if we take into account that, in general, housing and infrastructure in rural areas tend to be the most affected by natural disasters, civil disturbances and/or diseases.



Elaboración propia

Problemas de la vivienda no saneada, sin distribución espacial



- Refaccionar el techo.
- Emplazar muros divisorios.
- Abrir ventanas.
- Elevar el nivel del piso.

Elaboración propia

Problemas de vivienda no saneada, sin distribución espacial.



Elaboración propia

Vivienda mejorada, con asignación de espacios para funciones vitales.

So, for example “Chagas disease is a parasitosis transmitted in the ambit of marginal housing, through the fecal faeces of a nocturnal bloodsucking insect locally known as vinchuca.

Therefore, attention to improvement plans, provision of services or expansion in the housing sector has collateral benefits in the health sector, by:

- Reducing risks of transmission and contagion of acute diarrheic diseases, gastroenteritis, cholera, Salmonella, skin infections and typhoid, thanks to a water supply that is clean, safe and sustainable.
- Minimising risk factors through contagion by malaria, dengue and yellow fever, diseases transmitted by insects through the inadequate storage of water, deficient or inexistent services for the elimination of excreta and of domestic refuse.
- Paralyzing the foci of infection and multiplication of insects and rodents (carriers and transmitters of Chagas disease), through improvements in the materials used in flooring, roofs and walls that facilitate cleaning and hygiene in the home.
- Reducing the risk of propagation of tuberculosis through overcrowding and poor ventilation inside the house.
- Limiting the proliferation of acute respiratory infections and the risk of accidents and/or burns, through the construction and adequate disposal of domestic spaces and rooms.
- Diminishing cases of psychosocial problems generated by overcrowding manifested in child abuse, violence in the family, incest and/or promiscuity.

4

Capítulo 4

ENVIRONMENTAL MANAGEMENT IN INFRASTRUCTURE PROJECTS

Environmental management is defined as all decisions, whether public or private, made to serve in the protection and improvement of the environment, the preservation of natural resources, and the protection of human health⁵. It embraces all activities, means and techniques oriented toward conserving the elements of ecosystems and the ecological relations between them, above all when alterations appear that are caused by human activities. All environmental management translates into the opportune assignation of material, economic and human resources that are necessary in order to obtain standards or levels of environmental quality previously defined.

The majority of small-scale development activities (housing, water supply, basic sanitation, health establishments and equipment or social installations) imply the realization of certain infrastructure works. Construction includes activities of demolition, clearing and preparation of sites, excavation, displacement and utilization of machinery or equipment, soil classification, levelling, compacting, building of structures, etc. Depending on factors of a physical, biological or sociocultural nature, these labours can come to generate impacts that are detrimental to the quality of the environment concerned and, consequently, affects nearby populations.

Systems of environmental management are centred on the improvement of the environmental behaviour of an institution, company or project in an effort to reduce the contamination generated by its operations. The requisites for delineating and implementing the continual improvement of environmental conditions are:

- The establishment of an environmental policy that expresses institutional commitment to prevent contamination.
- The identification of significant environmental impact, its causes and its classification as favourable or detrimental to the environment.
- The definition of objectives and goals for environmental control throughout these activities.

To this effect, this manual has developed operative instruments related to each one of the project's phases, aimed toward compliance with the norms and environmental regulations existing in the country. According to their character and temporality, the instruments are divided into three groups: preventive, corrective and auxiliary. The first are put into practice when taking on new plans, activities, works or projects (AOP), while the second applies to activities that are in execution or currently functioning. The role of the third group of auxiliary instruments is that of tools or technical resources that enable the first two to develop effectively⁶.

5.- Arenas Muñoz, J.A. (2000): "Diccionario Técnico y Jurídico del Medio Ambiente" (Technical and Legal Environmental Dictionary) p. 440.
6.- Conesa Fernández -Vitoria, V. (1997): "Instrumentos de la Gestión Ambiental en la Empresa" (Instruments of Environmental Management in Companies) P. 72.

The chart “Instruments of environmental management for infrastructure projects” illustrates the types of instruments proposed:

INSTRUMENTS OF ENVIRONMENTAL MANAGEMENT FOR INFRASTRUCTURE PROJECTS

| | Preventive | Corrective | Auxiliary and follow-up |
|--------------------------------------|---|---|--|
| Application: | Before the AOP. | During the execution of the AOP. | According to requirements: before, during and/or at the close of the AOP execution. |
| Of a technical-environmental nature: | <ul style="list-style-type: none"> - Environmental baseline. - Environmental mitigation plan (PMA). - Programme of Environmental Execution (PEA). - List of good environmental practices. - List of technical environmental specifications. - Emergency plan. | <ul style="list-style-type: none"> - Contingency plan. - Corrective actions form. - Environmental incident report form. - Accident report form. | <ul style="list-style-type: none"> - Inductions or training programmes on constructive processes, emergency and contingency plans. - Checklists and verification. - Management report and environmental monitoring (PMA-PEA). |
| Of a social nature: | <ul style="list-style-type: none"> - Social baseline. - Activities of socialization of the project: public consultation, meetings, workshops, etc. | <ul style="list-style-type: none"> - Contingency plan. | <ul style="list-style-type: none"> - Interviews and/or questionnaires for civil organizations. - Training activities: workshops or meetings with focus groups. |
| Of an economic nature: | <ul style="list-style-type: none"> - Budgetary assignation form for environmental management. | <ul style="list-style-type: none"> - Progress and physical-financial execution form. | <ul style="list-style-type: none"> - Progress and physical-financial execution form. - Control of budgetary outlay. |
| For evaluation: | <ul style="list-style-type: none"> - Prior evaluation form. | | <ul style="list-style-type: none"> - At the closing phase: completion evaluation form. - Environmental management balance form. |

As may be observed on the first line, these tools must be applied according to the phase or temporality of the project cycle which, to this end, consists of four phases: pre-investment, investment, execution and closure.

- Pre-investment: begins at the moment that a project idea is conceived and the prefeasibility study is drawn up. It concludes with the design of the technical-economic-social profile, when the decision is made to proceed with the initiative and a request for finance is presented.
- Investment: is under way once finance is authorised. During this phase the most viable alternative is chosen through the analysis of alternatives in economic, technical and environmental terms. Based on these results a final project design is proposed.
- Execution: refers to the phase of construction itself. During this phase materials, tools, work gangs and necessary equipment are moved into place to erect the projected infrastructures.
- Closure: this phase implies the culmination of construction work, and consequently the abandonment of camps and other infrastructure utilized or conditioned for the previous phase. This is a phase of returning the affected environment to a state equal to, or better than, its condition at the beginning of the building activities.

Below we present a list of instruments of environmental management used during project lifecycles:



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Viviendas mejoradas AIEB/USAID - Icla/Chuquisaca (Bolivia)

**ACCOUNT OF PROJECT LIFECYCLES AND THE INSTRUMENT
OF ENVIRONMENTAL MANAGEMENT IN INFRASTRUCTURE PROJECTS**

| Project cycle | Preventive | Corrective | Auxiliary and follow-up |
|----------------|---|--|---|
| PRE-INVESTMENT | <ul style="list-style-type: none"> - Environmental baseline. - Social baseline. | | |
| INVESTMENT | <ul style="list-style-type: none"> - Environmental mitigation plan (PMA) - Programme of Environmental Execution (PEA). - List of good environmental practices. - List of technical environmental specifications. - Emergency plan. - Activities of socialization of the project: public consultation, meetings, workshops, etc. - Budgetary assignation form for environmental management. - Prior evaluation form. | | <ul style="list-style-type: none"> - Interviews and/or questionnaires for civil organizations. |
| EXECUTION | | <ul style="list-style-type: none"> - Contingency plan. - Corrective actions form. - Environmental incident report form. - Accident report form. - Progress and physical-financial execution form. | <ul style="list-style-type: none"> - Talleres o reuniones con grupos focales. - Inducciones o capacitaciones sobre procesos constructivos, planes de emergencia y de contingencias. - Listas de chequeo y verificación. - Informe de gestión y monitoreo ambiental (PMA-PEA). |
| CLOSURE | | | <ul style="list-style-type: none"> - Ficha de evaluación ex post - Ficha de balance de gestión ambiental. |

5

Chapter 5 PRE-INVESTMENT PHASE

According to the guide for preparation of projects of the then Ministry of Housing and Basic services⁷— today the Ministry of Works, Services and Housing— during this phase the project is prepared and evaluated, carrying out market studies, technical, economic, financial and other research that permit the assurance of maximum benefits with minimum costs. The process includes different phases, namely:

5.1. Project idea

During this phase it is fundamental to have a correct diagnostic. The project idea must emerge as a consequence of unsatisfied needs, of action policies, of a development plan or of the need to complement other programmes or projects. It is important to define which needs have to be satisfied and who are the people directly affected (or the beneficiaries). The criteria are based on detection of the problem and identification of alternative solutions.

5.2. Project profile

This document studies all the previous considerations necessary to form a judgement with regard to the technical and economic pertinence and feasibility of carrying out the project idea. It includes preliminary analysis of the technical, environmental and social aspects of the area concerned, as well as evaluation aspects, with emphasis on the identification of pertinent benefits and costs, using estimative figures and attempting to foresee what would happen if the project were not carried out; available data are used, or other information that is easily obtained (without incurring expenses).

In order to draw up the project profile it is important to have a socioeconomic and environmental diagnostic of the area in question. Besides, with the aim of gathering relevant information for the project profile, it is important to complete the social baseline and the environmental baseline that are detailed in the following sections.

5.2.1. Social baseline

Carrying out a social baseline before planning a housing project is especially important, since this has a bearing on the project's sustainability. Knowing the patterns of conduct and the living practices

7.- *Ministerio de Vivienda y Servicios Básicos – Programa de Apoyo a la Aplicación de Políticas en Asentamientos Humanos (1998): “Gestión en obras y servicios municipales”. (Ministry of Housing and Basic Services – Programme of Support for the Application of Policies in Human Settlements (1998): “Management in works and municipal services”) La Paz, Bolivia. Pp. 22-23.*

of the future beneficiary communities will contribute to considerations of the design and planning of zones of intervention and sanitary shields to protect against various diseases. The ethnic communities with high reported rates of migration have, perhaps, lower probabilities of access to housing projects due to their way of life. Changes in these patterns, and the transformation of these migrants into sedentary groups due to “voluntary” or “involuntary” access to stable or safe dwellings, will have its repercussions on the demographic dynamic of this group. These factors must be analysed before making the decision to invest or select a target population, especially because one cannot tell, a priori, whether the impact will be more positive than negative.

Due to the fact that housing activities are highly integrated, above all because their impacts largely depend on the social and economic behaviour of the populations affected, those who design and implement activities must have a baseline that is as complete as possible, outlining the historical, social and environmental conditions of the project area. The format of the form for gathering social information serves to reveal data concerning potential occupants of the new housing and local populations potentially affected. The format of this instrument is found at the end of this section. Note that not all the elements of the survey apply to all the projects or programmes. The survey must be modified according to the needs of the particular activity. Some questions, such as those related to demography or land ownership, can be sensitive and must only be processed if and when the person conducting the survey makes use of his/her better judgement, and as long as official documentation exists to support the information provided by those interviewed.

The survey or baseline must be carried out with the following groups:

- Where specific future occupants are identifiable, this questionnaire must be applied to at least 10% of the beneficiary families, with a minimum of 20 families surveyed, even for small projects. Group interviews are acceptable if there is representation from the communal leadership.
- If specific future occupants are not identifiable, interviews may be conducted with potential representative occupants. If it is not possible to interview them, the survey can be completed with data from an “average” occupant, using the knowledge of experts and/or cooperation agencies that know the area and/or work in similar zones.
- When the project implies “reconstruction after a disaster”, the questions concerning current residence must be changed; instead information must be sought that concerns the previous place of residence of the potential occupant.
- This questionnaire must also be conducted with a representative sample (10 to 20 families) in communities (for example, groups of over 50 houses) within a radius of 1 Km. from the project site. The sample must include representatives of the municipal authorities, members of the board or council for water protection, and teachers. The questionnaire can be answered in groups or individually.

Below the relevant document is presented, along with its instructions for completion.

SOCIAL BASELINE INSTRUCTIONS FOR COMPLETION OF THE SOCIAL BASELINE

The aim of this document is to gather all relevant information of a social nature, related to the project area and to the beneficiary communities. It serves for planning the project design, selecting of the site and organising logistics of emplacement for the building work.

It is important to mention that this form follows established guidelines for community development, which originate at the bases in accordance with identified needs, and is set out for future beneficiaries. The social baseline must be completed by a qualified professional, with professional registration in social or environmental areas. The relevant information may be entered through individual consultations or communal meetings, taking into account the representativeness of those interviewed.

The main objective of this instrument is to contribute to executive institutions in the planning of the project, and in its intervention strategy, prioritising those aspects with socio-environmental relevance and benefits.

The introduction concerns general data for the identification and spatial location of the project. This is followed, in Point 1 (Geographical location) by consultation on the lands adjacent to the beneficiary community, besides the geographical coordinates and the ownership data of those lands where the works will be sited. It is important to ascertain whether any municipal or prefectural territorial planning exists in the area of intervention so as to avoid conflicts over soil use or ownership rights.

The objective of Point 2 (geographical dispersion) is to describe the context in which the project is to be developed; to this effect reference is made to the ordering of human settlements proposed by the Vice-Ministry of Urban Development and Housing⁸, which is based on a categorisation by size (population). In accordance with this document, the ordering by size, analysed in relation to municipal capitals or administrative centres of municipalities, has permitted definition of the following categories by population levels, for the entire national territory, whose description of characteristics is given in the following manner:

- Nuclear communities (under 400 inhabitants)
- Villages (from 401 to 2,000 inhabitants)
- Minor urban centres (from 2,001 a 5,000 inhabitants)
- Minor cities (from 5,001 to 20,000 inhabitants)
- Intermediate cities (from 20,001 to 50,000 inhabitants)
- Major cities (over 50,001 inhabitants)

Nuclear communities:

These are groups of houses or hamlets and small peasant communities, generally linked to agricultural or livestock activities. Their important interrelation with the rural area means mutual

8.- Muñoz M. Vladimír et al (2005). Manual técnico para la elaboración del expediente de asentamientos humanos. Ministerio de Desarrollo Económico, Viceministerio de Desarrollo Urbano y Vivienda (Technical Manual for drawing up the dossier on human settlements. Ministry of Economic Development, Vice-ministry of Urban Development and Housing. La Paz, Bolivia). Pp. 8-11.

influence from and towards the surrounding productive territory, including its dispersed population. They generally have educational facilities and community space, which in some cases allow the identification of primary physical (embryonic) urban structures.

Villages:

These rural localities, a concentration of dwellings and services, contain communal installations and economic dependencies that support agricultural and/or extractive production. Their population is mainly active in agriculture. Rural social relations and economic relations are integrated in agricultural regions, of primary production. In some cases they function as centres of rural supply and storage.

Minor urban centres:

These are populated centres with urban characteristics, able to concentrate population and economic influence, with activities involving transition between rural and urban areas; with relative importance in the system of cities and human settlements, their influence is mainly local.

Minor cities:

These are human settlements in the process of urban spatial consolidation, which maintain influence and interrelation with their dispersed rural hinterland. These are optional centres of micro-regional integration whose occupational pattern is one of family production and of support for production in general.

In the largest of the minor cities, urban spatial structure is small but consolidated. They have their own economic activities and services, despite continued dependence on the countryside and on larger settlements. The pattern of occupation is more diversified; they are influenced by, and exert influence upon, the region as a whole.

Intermediate cities:

Human settlements with a defined urban structure (central nucleus, area of expansion and growth), where social and economic activities are mainly complementary to production, such as commercial functions and services; in some cases there is specialization in productive and administrative activities. The urban occupational pattern is diversified.

Major cities:

These are urban entities that are expansive in both qualitative and quantitative terms. Mainly capital cities where the socioeconomic activities and policies of their region or department are concentrated, they are administrative centres for human settlement subsystems. They represent the urban phenomena of concentration, decentralization and economic specialization, regional and departmental influence, and high absorption of migrant population.

There are also cities in the process of becoming metropolises, due to sometimes extreme

and significant tendencies toward conurbation, as well as to relations of functional and socioeconomic interdependency with other, lesser settlements in their micro-region. They concentrate a fundamental part of the economic activities of the country, both internally and externally. They constitute the basic systemic structure of cities and human settlements, urban-rural and regional-national, through which all the positive and negative processes of urban development are manifested.

Point 3 (Climatological characteristics) must be completed with data relevant to the zone's climate.

In Point 4 (Characteristics of the community) general data on the community is found, while Point 5 (Communications media) gives details of the media or existing communications infrastructure. With respect to the road structure, reference was also made to the material set out by the Vice-Ministry of Urban Development and Housing⁹. The term road structure refers to all the routes for vehicular and pedestrian circulation that permit the displacement of people and/or merchandise, both within the populated centre and outside it. The routes that make up the road structure can be classified, for registry purposes, in the following categories:

Primary or principal routes: routes for vehicular traffic that generally connect human settlements, directly or indirectly, with other municipal and departmental centres. These are known as structuring routes, because they are important in the definition of urban structure.

Secondary routes: these are vehicular routes providing the settlement's internal interconnection.

Tertiary routes: this type includes vehicular routes interconnecting zones or deriving from primary and secondary routes within the different urban areas.

Pedestrian streets: designed for pedestrian circulation, within urban zones or neighbourhoods, their dimensions and surface do not permit vehicular traffic.

Other types of route: according to the individual characteristics of human settlement, these may be waterways (rivers, canals, lakes) or railways, and include transport within urban areas, or alternative transport systems such as cable railways or metros.

These data will be useful at the time of organising the logistics and the chronogram for construction and storage of materials.

Point 6 (Basic services) was drawn up with the aim of finding out the current situation regarding the supply of basic services: water, sanitation, energy for cooking, electrical energy and collection of solid waste in the project area. The information gathered in this point will help plan the provision of services as part of the project.

Point 7 (Health services) and Point 8 (Educational services) have been incorporated as means of getting to know the level of social assistance in these two sectors in the project area.

9.- Ibid, p.18.

Points 9 to 14 on the form relate to data concerning the community, its organization, migratory patterns, productive activities and experience in works or similar projects. Documentation of these data will be useful in planning the strategy and pertinence of the intervention.

Finally, in Point 15, there are miscellaneous questions eliciting additional information with environmental relevance.

SOCIAL BASELINE - HOUSING SECTOR
OBTAIN INFORMATION ON COMMUNAL AUTHORITIES
HEALTH SECTOR STAFF AND TEACHERS

| GENERAL DATA | | | |
|--|--|------------|--|
| Name of the project: | | | |
| Type*: | | | |
| Zone, neighbourhood, community or UV ¹⁰ : | | | |
| Municipality: | | | |
| Department: | | | |
| Area of intervention**: | | | |
| Person responsible for completion: | | | |
| Profession: | | Signature: | |
| Professional register: | | Date: | |

** For example improvement, post-disaster reconstruction and/or new construction.*

*** For example urban, rural peripheral*

Carry out a tour of the beneficiary populations. In order to collect information, take note of the representativeness of the entire communal leadership. Be sure to obtain the greatest possible quantity of relevant information for the project strategy.

10- UV: Unidad Vecinal (Neighbourhood Unit).

1. GEOGRAPHICAL RESCUE and CHARACTERISTICS of the TERRAIN

1.1. Indicate the types of area adjacent to the community:

To the north: _____

To the south: _____

To the east: _____

To the west: _____

Geographical coordinates (UTM): _____

Distance to the closest departmental or municipal capital _____

1.2. Is the project located in communal areas or lands that are communal property?

a) YES

b) No

If the reply is affirmative, specify the condition of land ownership:

a) TCO¹¹

b) TCI¹²

c) OTB¹³

1.3. Indicate how many families are owners and how many live as tenants:

| Rights to land ownership | Quantity | Comments |
|---|----------|----------|
| Nº of owner families | | |
| Nº of tenant families | | |
| Nº of families in housing provided by relatives | | |

1.4. Do families have documents proving ownership?

a) Yes

b) No

If so:

What documents? _____

How many families? (For example, 10 out of 30 families) _____

1.5. Will it be necessary to displace people so as to use the land in the construction of new housing?

a) Yes

b) No

11.- TCO: Tierra Comunitaria de Origen.

12.- TCI: Tierra comunitaria Indígena.

13.- OTB: Organización Territorial de Base.

1.10. If the reply is negative, is there a need to draw up, set out or propose a plan as part of the project?

a) Yes

b) No

1.11. Could the project cause social conflicts or clashes of values regarding the proposed use of adjacent land? Is the proposed use in conflict with existing uses, cultural characteristics or current traditions? (For example conflicts over access, control of space, interference with productive sectors, etc.).

a) Yes

b) No

If the reply is affirmative, explain:

2. GEOGRAPHICAL DISPERSION of THE DWELLINGS

2.1. Underline the type of project area:

a) Urban

b) Peripheral

c) Rural

2.2. Indicate which of the following groupings corresponds to the beneficiary community:

- a) Nuclear communities (under 400 inhabitants)
- b) Villages (from 401 to 2,000 inhabitants)
- c) Minor urban centres (from 2,001 to 5,000 inhabitants)
- d) Minor cities (from 5,001 to 20,000 inhabitants)
- e) Intermediate cities (from 20,001 to 50,000 inhabitants)
- f) Major cities (over 50,001 inhabitants)

2.3. Indicate the geographical dispersion of the community¹⁴:

a) Concentrated

b) Dispersed

*14.- A concentrated community is one with contiguous dwellings.
A dispersed community is one in which the distance between dwellings is greater than 100 metres.*

3. CLIMATOLOGICAL CHARACTERISTICS

3.1. Indicate the predominant climate in the community:

- a) Cold b) Temperate c) Hot

3.2. Are there predominant climatic seasons in the community?

- a) Yes b) No

Which? _____

Which is the most critical? (For example the one that causes problems or difficulties in the constructive process, in the management of the project or in its development, etc.).

4. POPULATION CHARACTERISTICS of THE ZONE, NEIGHBOURHOOD or BENEFICIARY COMMUNITY

| Question | Response | Comments |
|--|----------|----------|
| Total population: | | |
| Number of dwellings: | | |
| Number of families: | | |
| Average number of individuals per home | | |
| To which ethnic group does the community belong? | | |
| What is the most commonly-spoken language? | | |
| What religion is practiced in the community? | | |

Source¹⁵:

4.1. Was there a request from the community giving impetus to the project's execution?

- a) Yes b) No

If so, explain the motivation for carrying this proposal forward:

15.- Data corresponding to detailed information from the community; if there has been no contact with official departmental or municipal sources (INE, CNPV, ENDSA, MECOVI, SNIS, etc.); use the most current existing indicators.

4.2. Mark the predominant materials in the community dwellings with a circle:

Walls:

- a) Adobe
- d) Wood

- b) Brick
- e) Other _____

c) Wooden partition

Floor:

- a) Earth
- d) Wood

- b) Brick
- e) Stone

- c) Cement
- f) Other _____

Roof:

- a) Mud and straw
- d) Corrugated iron

- b) Palm
- e) Fibrocement

- c) Tile
- f) Other _____

4.3. Is there any precedent for housing improvement in the community?

a) Yes

b) No

If the reply is affirmative, give details:

| Institution | Was there a community request? | Was there community contribution? | | | N° of participant/beneficiary families |
|-------------|--------------------------------|-----------------------------------|------------|-----------------|--|
| | | Cash (in Bs.) | In kind: | | |
| | | | Days' work | Local materials | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

4.4. If the response to question 4.3 is affirmative, canvas the opinion of the communal authorities, families, teachers and health sector staff with regard to the experience of housing improvements in their community.

4.5. Are there any appropriate places for the establishment of stores for non-local materials? (Take into account communal or old stores).

5. COMMUNICATIONS MEDIA

5.1. Radio communication:

| Question | Response |
|------------------------------------|----------|
| How many radio stations are there? | |
| Who is in charge of them? | |
| What is the frequency? | |
| What are the broadcasting times? | |

5.2. Telephone:

| Question | Response |
|---|----------|
| What is the contact number? | |
| Who is the person to contact? | |
| Is there a public telephone service? | |
| Is there a mobile or cellular telephone signal? What is it? | |

5.3. Transport:

5.3.1. By which mode of transport does one reach the community?

- a) Land b) Air c) River d) Combination

Specify the public transport service used¹⁶:

| Mode of transport | Days of service | Timetable |
|-------------------------------|-----------------|-----------|
| Transport by road, rail, etc: | | |
| Air transport : | | |
| Fluvial : | | |
| Combined transport: | | |

16.- Surface transport by road: pedestrians, bicycles, automobiles and other non-rail vehicles.

Surface transport, material moved by rail.

Aquatic transport: maritime and fluvial.

Combined transport: various modes are used, and merchandise is transferred from one vehicle to another.

5.3.2. What type of road access (road structure) does the community have? (Clarify, in the spaces given, the road surface: for example asphalt, earth, paved road, etc.).

a) Principal _____ b) Secondary _____ c) Tertiary or neighbourhood _____

5.3.3. Is road transport accessible all year round?

a) Yes b) No

If not, indicate accessibility by season good, indifferent or bad):

In the dry season: _____

In the rainy season: _____

6. BASIC SERVICES

6.1. Water supply

6.1.1. Is there any network or system of supply of safe drinking water in the beneficiary community?

a) Yes b) No

6.1.2. If not, what is the current water source supply in the community?

| Communi-ty or popu-lation group | Surface source | | | | Underground source | |
|---------------------------------|----------------|--------|--------|---|--------------------|-----------------|
| | River | Spring | Spring | Other (small res-ervoir, rainwater collection): | Manual well | Perforated well |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

6.1.3. If the service is through a network or distribution system:

| Question | Response | Observations |
|---|----------|--------------|
| How many families benefit? | | |
| Who administrates this service? | | |
| What is the cost? | | |
| Is the service efficient? | | |
| Who carries out maintenance activities? | | |
| Is there any deficiency? for example, the state of the plumbing, etc. | | |

6.1.4. If there are taps indicate whether these are:

- a) Public/communal: N°: _____ Community _____
b) Domestic: N°: _____ Community _____

6.1.5. Indicate whether the water supply is:

- a) Permanent b) Temporary (_____ hours a day)

6.1.6. Does water become scarce during any time of the year?

- a) Yes b) No

If so, during which months, and why?

6.1.7. Has an alternative system been considered for times of drought?

- a) Yes b) No

If the reply is affirmative, give details

6.2. Basic sanitation (toilets and systems for the elimination of excreta)

6.2.1. How many families have a system for disposing of excreta? (For example, 10 out of 30 families)

6.2.2. The modality of disposal of excreta generally used by the community is:

- a) Individual b) Collective

6.2.3. What is the domestic drainage system generally used in the community?

- a) Cesspit b) Pit and septic tank c) Sewer system

d) Other: _____

6.2.4. If it is a latrine, what type?

- a) Dry latrine b) Ecological latrine c) Latrine with water flush

6.2.5. Do the houses have showers?

- a) Yes b) No

If so, how many families enjoy this benefit? (For example, 10 out of 30 families)

6.2.6. Do the houses have sinks?

- a) Yes b) No

If so, how many families enjoy this benefit? (For example, 10 out of 30 families)

6.3. Supply of energy for cooking

6.3.1. Do the houses have a particular space for cooking?

- a) Yes b) No

If so, how many families enjoy this benefit? (For example, 10 out of 30 families)

6.3.2. What source of energy is used by the population for cooking? (mark all those that apply)

- a) Solar b) Biomass: firewood, dung, reeds, dried grass, charcoal, other: _____
c) Kerosene d) Bottled gas e) Electricity f) Domestic gas

If the reply is firewood: _____

How many families use firewood? (For example, 10 out of 30 families) _____

What kind of firewood do they use? (for example, from trees or bushes) _____

Who collects the firewood? _____

Where? _____

Is firewood abundant or scarce? _____

What, on average, is the amount of time or number of days involved in obtaining it? _____

6.3.3. If firewood is used, what kind of stove predominates in the zone?

- a) Stove¹⁷ b) Improved stove¹⁸ c) Clay d) Other _____

6.3.4. Do the dwellings have ovens?

- a) Yes b) No

*17- In certain parts of Bolivia it is also known as concha.
18- There are several types of improved stoves: Lorena, Cecilia, Campana, etc.*

If so, how many families enjoy this benefit? (For example, 10 out of 30 families)

6.3.5. What system of smoke elimination do the houses generally have?

- a) Chimney b) Windows c) Other _____ d) None

6.4. Electricity supply

6.4.1. Is there electric power in the project zone?

- a) Yes b) No c) At times _____

6.4.2. What is the source of electricity generator used in the community? (for example water, diesel, etc.).

6.4.3. How many families does this benefit? (For example, 10 out of 30 families)

Explain how the electricity service works:

6.4.4. Is there a need of an alternative or decentralised system of electric power supply for the dwellings?

- a) Yes b) No

If the reply is affirmative, explain if the project plans some alternative system or generator. Also indicate the conditions of its installation and functioning:

7. HEALTH SERVICES

7.1. Is there any health service?

a) Yes

b) No

7.2. Who is the person responsible? _____

7.3. What are the most common diseases in the community?

a) Chagas

b) Tuberculosis

c) Malaria

d) Diarrhoea

e) Common cold

f) Pneumonia

g) Other _____

7.4. Is there any information on levels of infection (for example epidemiological charts, virus propagation, diarrheic diseases, respiratory infections, etc.).

a) Yes

b) No

If the reply is affirmative, give details

8. EDUCATIONAL SERVICES

8.1. Are there schools in the community?

a) Yes

b) No

If not, indicate the distance from the closest school:

8.2. Up to which grade or level is formal education imparted? _____

8.3. Who is the person responsible? _____

8.4. To what nucleus does s/he belong? _____

8.5. How many teachers are there? _____

8.6. How many pupils are there? _____

9. COMMUNITY ORGANIZATION

9.1. Are there community organizations?

a) Yes

b) No

If these exist, give details:

| Nº | NAME of ORGANIZATION | ACTIVITY MAIN | REPRESENTATIVES | DAY or DATE of MEETING | CONTACT TELEPHONE |
|----|----------------------|---------------|-----------------|------------------------|-------------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

9.2. What type of festivities do local people celebrate, and on what dates? Mention the most important.

| FESTIVITIES | DATE | IMPORTANCE |
|-------------|------|------------|
| | | |
| | | |
| | | |
| | | |
| | | |

10. MIGRATORY PATTERNS

10.1. The migratory patterns of the community are:

a) Permanent

b) Temporary

c) Mixed

10.2. Between last year and the present, how many people have left of the beneficiary community? (migration over a period of 1 year before the survey).

Men (over 15) who migrated: _____

Number of women (over 15) who migrated: _____

Total number of migrating families: _____

10.3. Where did the majority migrate to? _____

10.4. Could the project cause immigration or resettlements from other nearby populations?

a) Yes

b) No

If the reply is affirmative, explain:

11. PRODUCTIVE ACTIVITIES

11.1. What is the most common occupation in this community?

| AREA | % | PRODUCT | IS THE SURPLUS SOLD OFF? | | AVERAGE QUANTITY of COMMERCIALIZATION | AVERAGE ANNUAL INCOME | SUPPORTING ENTITY |
|-----------------------|---|---------|--------------------------|----|---------------------------------------|-----------------------|-------------------|
| | | NAME | YES | NO | | | |
| Agricultural | | | | | | | |
| Livestock | | | | | | | |
| Fishing | | | | | | | |
| Commerce | | | | | | | |
| Service | | | | | | | |
| Crafts | | | | | | | |
| Others (Mining, Etc.) | | | | | | | |

11.2. In terms of work or productive activities, what institutions bring the community members together?

Give details:

| Nº | NAME of INSTITUTION | MAIN REPRESENTATIVES | CONTACT TELEPHONE |
|----|---------------------|----------------------|-------------------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

11.3. What time is available to the community, according to the agricultural calendar?

Describe the time of year when the community is busiest:

- a) Sowing: between the months of _____ and _____. Total _____ months
 b) Harvest: between the months of _____ and _____. Total _____ months
 c) Fishing: between the months of _____ and _____. Total _____ months
 d) Cattle-raising: between the months of _____ and _____. Total _____ months
 e) Crafts: between the months of _____ and _____. Total _____ months

12. SURVEY OF PROJECTS CURRENTLY UNDER WAY

Are there, or have there been, other development cooperation projects carried out in this zone?
 Give details:

| Nº | Name of the project | Name of the institution | Period of execution | Main support activity |
|----|---------------------|-------------------------|---------------------|-----------------------|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

13. EXPERIENCE in COMMUNITY WORKS (other projects)

13.1. Describe the experiences of work in which the community participates or has participated:

| Institution | Type of project | Was there a community request? | Community contribution | | | Women participants % | Period of execution of the project |
|-------------|-----------------|--------------------------------|------------------------|------------|-----------------|----------------------|------------------------------------|
| | | | In cash | In kind | | | |
| | | | | Days' work | Local materials | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

14. IDENTIFICATION of HUMAN RESOURCES

14.1. Describe the human resources existing in the community:

| Trade | Quantity | Names |
|--------------------------------|----------|-------|
| Examples: Builders | | |
| Plumbers | | |
| Builder's assistants | | |
| Electricians | | |
| Health promoters ¹⁹ | | |
| Community PIV ²⁰ | | |
| Other relevant trades | | |

19.- Also known as ACS – Asistente Comunitario de Salud (Community Health Assistant).

20.- PIV: Puestos de Información de Vectores (Vector Information Posts – particularly vinchucas, carriers of Chagas disease).

15. MISCELLANEOUS

15.1. Indicate, in order of priority, the needs most keenly felt by the community:

Number according to: 1. High priority (short-term)
 2. Medium priority (medium-term)
 3. Low priority (long-term)

- a. _____ Roads.
- b. _____ Irrigation.
- c. _____ School.
- d. _____ Health centre.
- e. _____ Drinking water.
- f. _____ Sanitation.
- g. _____ Housing.
- h. _____ Energy.
- i. _____ Telephone service
- j. _____ Others. _____

15.2. Do you consider any of the following points a problem in your community?
 (Mark all those that apply)

| Problem | YES | NO | Comments and specification of the priority: short term (1 year) / medium term (2-5 years) / long term (over 5 years) |
|---|-----|----|--|
| a. Water scarcity | | | |
| b. Polluted river | | | |
| c. Stagnant water | | | |
| d. Water from contaminated well | | | |
| e. Drains | | | |
| f. Refuse (solid waste) | | | |
| g. Scarcity of firewood | | | |
| h. Deforestation | | | |
| i. Erosion | | | |
| j. Less fertile land | | | |
| k. Fires | | | |
| l. Landslides | | | |
| m. Inundations | | | |
| n. Earthquakes | | | |
| o. Droughts | | | |
| p. Disappearance/reduction of fisheries | | | |
| q. Disappearance/reduction of animals for hunting | | | |
| r. Disease-carrying insects and animals. | | | |

Interviewer's comments or perceptions:

15.3. Are there features of archaeological/historical/cultural value in the community?

- a) Yes b) No c) Don't know / no reply

15.4. Is the project located within any protected area?

- a) Yes b) No

If the reply is affirmative, specify: _____

15.5. Does the community accept, or has it expressed its acceptance, of a water and/or basic sanitation project being carried out in the vicinity?

- a) Yes b) No c) Don't know / no reply

15.6. Consult the families' opinions regarding the benefits of housing improvement projects.

15.7. Consult the families' opinions regarding problems caused by, or threatened by, the housing projects

15.8. Other observations: (include technical perceptions on determining factors in favour of, or against, the building process).

15.9. People interviewed in the community

| Name | Organization | Position | Opinion |
|------|--------------|----------|---------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

5.2.2. Environmental baseline

Knowledge of the environmental characteristics of the project site is also an important factor at the time of planning any housing project. The information to be entered in this document must be compiled in the pre-investment phase and apply to all the projects, without distinctions of scale or context. The model format for this tool is found at the end of this section with its own set of instructions, and incorporates eight relevant components, namely:

- Soil aptitude and uses (previous, current and potential).
- Factors of proximity (to urban areas, protected areas, sites of ecological interest).
- Social vulnerability and natural risks.
- Availability of sources for water supply.
- Physical and topographical characteristics of the soil and subsoil.
- Climate.
- Means of access and road infrastructure in the project zone.
- Infrastructure and social facilities existing in the area.

Having obtained all the information that supports both perspectives (social and environmental) the most viable alternatives must be analysed from the technical, economic and social points of view for the planning of the project's final design.

The document to be filled in is presented below, with its respective set of instructions.

ENVIRONMENTAL BASELINE INSTRUCTIONS for COMPLETION of the ENVIRONMENTAL BASELINE

This document's aim is to gather all the relevant environmental information related to the project area and to the beneficiary communities. Just as the social baseline helps plan the project design, the selection of the site and the organization of the logistics of siting the building work, considering

environmental factors of prevention and mitigation. The environmental baseline must be completed by a qualified individual with professional registration in environmental areas.

The main objective of this instrument is to contribute to executive institutions' planning of the project and strategy of intervention, prioritising the aspects that are relevant and socio-environmentally beneficial.

Begin with general data for the identification and spatial location of the project, before proceeding to enter the characteristics, typology and soil uses. At this point it is necessary to carry out a soil study and document the results relevant to the project

Point 2 (Accessibility) and Point 3 (Factors of proximity) involve consultation on the means of access to the community and the road structure in the project area, useful information for planning the logistics for transporting materials and the forecasted future of the project.

In Point 4 (Physical or environmental threats) data must be entered that is relevant to the zone, its vulnerability to threats, frequency of these threats and possibility of reversing the damage. This information is useful in justifying or changing the selection of the project site.

Point 5 (Topography) requires details on the project placement area landscape. It is essential to devote close attention to the topography of the human settlements and area surrounding them, since the choice of construction sites depends to a large extent on the configuration and properties of the land.

The parameters that must be considered in the adaptation of the slopes for urban use²¹ are:

- Parameter 1: from 0% to 5%, flat terrain, presents no problems regarding the installation of sewerage networks, highways and constructions in general.
- Parameter 2: from 5% to 20%, inclination commonly seen as adequate, because though it presents some difficulties in installations and costs it is considered regular.
- Parameter 3: greater than 20% classed as inadequate due to difficulties in setting out networks and high construction costs; not apt for construction.

It is important to clarify that, in the countryside, there are settlements built on slopes greater than 20%, where infrastructure and road treatment have been nonetheless installed (for example, the mountainsides of La Paz); however, the fact that these exist does not justify the high level of investment involved in installing such services in these settlements.

Depending on how much the land slopes, the density of the fertile soil and the type of vegetation that it may or not receive, the slope also influences the flow of the rivers and in the runoff from surface waters, especially those of pluvial origin.

21. Valenzuela A., Elsa et al (1998). "Aspectos ambientales en el diseño urbano" (*Environmental Aspects in Urban Design*). Ministry of Housing and Basic Sanitation, La Paz, Bolivia, p. 20.

The gradient conditions human use of the soil; agriculture on terrains with a slope steeper than 15% already presents difficulties, not to mention those on irregular lands.

With regard to buildings that extend lengthwise, special attention has to be given to the existing gradient, a rule that also applies in the construction of patios, streets and plazas. The longitudinal axes of buildings must run parallel to the hypsometrical lines (contours of equal height above sea level), when these are found in undulating or mountainous terrains. This solution, besides procuring harmony with the land's configuration, avoids considerable expense on land movement and cementation works (Valenzuela, 1998).

In Point 6 (Climate) data must be included that is relevant to deciding the season in which the project is to be implemented, as well as the orientation of the dwellings.

Point 7 (Basic services), as with the social baseline, this is drawn up with the aim of finding out the current situation and the technical parameters of supplying basic services: water, sanitation, energy for cooking, electric power and service of collection of solid waste in the project area. The information gathered at this point will serve in planning the provision of services as part of the project.

Point 8 (availability of local materials) has been incorporated as a means of finding out the availability in quality and quantity of building materials in the area of intervention. There should also be a description of environmental aspects of the designated supply sites: location, condition before the extraction, proximity to bodies of water, etc.

Point 9 (Ecological value of the environment) seeks to identify sites of interest and habitats of flora and fauna with ecological value, likely to be affected if they are in the proximity of the project.

Point 10 (community participation) is related to data concerning the community and the people that participated in writing this document or contributed information to it.

Finally, Point 11, presents a topographical map of appropriate scale, with relevant socio-environmental information.

ENVIRONMENTAL BASELINE – Sector housing

| GENERAL DATA | | | |
|--|--|------------|--|
| Name of the project: | | | |
| Type*: | | | |
| Zone, neighbourhood, community or UV ²² : | | | |
| Municipality: | | | |
| Department: | | | |
| Area of intervention**: | | | |
| Person responsible for completion: | | | |
| Profession: | | Signature: | |
| professional register: | | Date: | |

** For example improvement, post-disaster reconstruction and/or new construction).*

*** For example urban, rural, peripheral*

Conduct a tour of the beneficiary populations. In order to collect information take note of the representativeness of the whole communal leadership; be sure to obtain the greatest possible quantity of information relevant to the strategy of environmental intervention.

1. CHARACTERISTICS, TYPOLOGY and SOIL USES

1.1. Has any soil study been carried out?

- a) Yes b) No

If the reply is affirmative, describe and explain:

| Information | Data | Observations |
|---|------|---|
| Number of samples taken for the study: | | |
| Type of soil: | | Important parameters for the design of systems for the elimination of excreta. Describe if there is seasonal variation. |
| Permeability: | | |
| Profundity of the aquifer (specify if there is variation in the rainy season and the season of low water levels): | | |
| Gradient: | | |
| Soil firmness or loading capacity: | | |
| Are there surface water courses with seasonal variations and/or subsurface water in the project area? | | Specify depth and location. |

22.- UV: Unidad Vecinal (Neighbourhood Unit).

1.2. If the reply is negative, mark with a circle the type of soil predominant in the community

- a) Lime/clayey b) Gravelly/sandy c) Clayey d) Rocky
 e) Other: _____

Explain and append the reference for this information:

1.3. What is the land use in the project area?

| Land use | Data | Observations |
|--|------|--|
| <p>Previous: Take note of past activities such as disposal of dangerous waste materials, abandoned industrial areas, etc., that may endanger the community.</p> | | |
| <p>Current (at the beginning of the project): The change in the use of the terrain may cause conflicts, for example if the neighbouring community currently uses the terrain for pastureland, for cultivation or as a water source.</p> | | |
| <p>Potential (soil aptitude): Gather data on territorial planning or plans for urban expansion.</p> | | <p>Is the land apt for intended use?</p> |

1.4. Does the community hold any certificate for land use?

- a) Yes b) No

If the reply is affirmative, append documentation.

1.5. Are the lands compatible with the proposed use?

- a) Yes b) No

If the reply is affirmative, explain:

Four horizontal lines for text entry.

1.6. Are there any zoning requirements, permits, licences for use or regulatory norms for the design and construction?

- a) Yes b) No

If the reply is affirmative, explain:

Four horizontal lines for text entry.

2. ACCESSIBILITY

2.1. Indicate the means of access to the project area:

- a) Land b) Fluvial c) Air d) Rail

2.2. Mark the type of road with a circle:

- a) Hardcore b) Earth c) Sand d) Asphalt e) Others (for example paved or cobbled route, etc.)

Approximate breadth in metres

Explain whether the road has any special conditions that may have a bearing on the constructive or operative phase:

2.3. Indicate the distance from the municipal administrative centre, the area of greatest population density, or the centre of operations of the executive institution, to the project site:

- a) In the dry season: From ²³_____ to the project ²⁴_____ Km.
- b) In case of detours, in the rainy season: From _____ to the project _____ Km.
- c) At any time of year, on foot: From _____ to the project _____ Km.

2.4. Indicate during which time of year it is accessible:

- a) Dry b) Rainy c) at all times

2.5. Indicate what types of vehicles may enter:

- a) Small vehicle b) Medium-sized vehicle c) Large vehicle d) Trailer
(..... ton) (..... ton) (..... ton) (..... ton)

2.6. Is there public transport?

- a) Yes b) No

If the reply is affirmative, what does it consist of?

- a) Minibus b) Bus c) Truck d) Other _____

How frequent? _____

2.7. Is there any alternative route to the project?

- a) Yes b) No

23.- Indicate the site of reference, which may be the municipal administrative centre, the headquarters of the executive institution or the population with greatest demographic concentration.

24.- Specify which this is; the municipality? The square? If there are several possibilities, then leave space to be filled.

If the reply is affirmative, explain:

3. PROXIMITY FACTORS

| Installation, habitat or activity | Yes | No | Comments |
|---|-----|----|----------|
| Airport | | | |
| Military zone | | | |
| Protected areas | | | |
| Bodies of water (rivers, lakes, streams) | | | |
| Sites of archaeological / anthropological / cultural / historical value | | | |
| Forested areas | | | |
| Wetlands | | | |
| Tropical rainforests | | | |
| Sites for the protection of endangered / endemic species | | | |
| Ecologically endangered biological corridor | | | |
| Ecologically endangered headwaters | | | |
| Sources for local supply downstream | | | |
| Highly contaminant activity | | | |
| Highly dangerous activity | | | |
| Industrial activity | | | |
| Mining activity | | | |

3.2. Does the land use require the construction or improvement of a road or means of access?

a) Yes

b) No

If the reply is affirmative, explain:

4. PHYSICAL or ENVIRONMENTAL THREATS

| The site is vulnerable to: | N/A | No | YES (levels of vulnerability, frequency and reversibility ²⁵) | | |
|---|-----|----|---|----------|----------|
| | | | High: | Medium: | Low: |
| Inundation | | | F: R: | F: R: | F: R: |
| Avalanches / Landslides | | | | | |
| Earthquakes | | | | | |
| Forest / undergrowth fires | | | | | |
| Droughts | | | | | |
| Contamination by external sources (industry, mining, agriculture, animal-breeding, burning-off) | | | | | |
| Erosion (water, wind) | | | | | |

Note: if medium and high-level threats materialise, it is necessary to select an alternate site for housing construction, or to use effective extenuating measures).

5. TOPOGRAPHY

5.1. Describe the type of topography where the project zone is found:

5.2. If it is a hillside, how steep is the slope?

a) Flat (0-5%)

b) Semi-inclined (5-20%)

d) Steep (20-45%)

25.- Categorisation based on criteria of probability of recurrence or frequency. Write F in the corresponding space. High = more than one a year; medium = once every two years; low = once every five years. Reversibility of damage: write R in the corresponding space. High = irreversible; medium = reversible with high cost; low = reversible with low cost.

6. CLIMATE

| Information | Data | Observations |
|-----------------------------|------|--------------|
| Average temperature | | |
| Number of dry months a year | | |
| Rainfall pattern | | |
| Average annual rainfall | | |
| Predominant wind direction | | |
| Altitude | | |
| Frequency of frosts | | |

Source:

7. BASIC SERVICES

7.1. Water supply (visit the sampling sites)

7.1.1. Is there any network or distribution system of safe drinking water in the beneficiary community?

a) Yes

b) No

7.1.2. If the reply is negative, where does the community's current water supply come from?

| Community or population group | Surface source | | | | Underground source | |
|-------------------------------|----------------|--------|--------|---|--------------------|-----------------|
| | River | Spring | Source | Other: (small reservoir, rainwater collection): | Manual well | Perforated well |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

7.1.3. Does the service operate by network or through a distribution system?

| Question | Response | Observations |
|--|----------|--------------|
| Describe the type of system (e.g. sample, channelling, distribution, storage, treatment, etc.) | | |
| Is the supply temporary or permanent? | | |
| How many families does this benefit? | | |
| Who administers this service? | | |
| What is the cost? | | |
| Is the service efficient? | | |
| Who carries out maintenance? | | |
| Is there any deficiency? (for example the state of the plumbing, etc.) | | |

7.1.4. If there are taps indicate whether these are:

a) Public/communal: N°: _____ Community _____

b) Domestic: N°: _____ Community _____

7.1.5. Does water become scarce during any time of the year?

a) Yes

b) No

If so, during which months, and why?

7.1.6. Indicate the condition in which the water source is found:

Permanent: surface/underground (specify) _____

a) Quantity
(capacity)

b) Use
(Simple observation²⁶) _____

c) Quality: _____

Temporary: surface/underground (specify) _____

26.- Specify the quality by simple observation: the water has no smell, taste or colour. Indicate whether there are any special considerations.

a) Quantity _____ b) Use _____ c) Quality _____
(capacity) (Simple observation) _____

7.1.7. Has an alternative system been considered for times of drought?

a) Yes b) No

If the reply is affirmative, which?

7.2. Basic sanitation (toilets and systems for the elimination of excreta)

7.2.1. Is there any drainage system?

a) Yes b) No

If so, how many families have a system for the elimination of excreta? (For example, 10 out of 30 families)

7.2.2. The modality of disposal of excreta used by the community is, on average:

a) Individual b) Collective

7.2.3. If it is a latrine, what type?

a) Dry latrine b) Ecological latrine c) Latrine with water flush

7.2.4. What is the domestic drainage system generally used in the community?

a) Cesspit b) Pit and septic tank c) Sewer system
d) Other: _____

7.2.5. What are its characteristics and conditions of functionality?

7.2.6. What remodelling activities are planned?

7.2.7. If this is a new project, what is the programmed drainage system?

- a) Cesspit b) Septic tank and cesspit c) Sewer system

7.3. Supply of energy for cooking

7.3.1. Do the dwellings have a particular space for cooking?

- a) Yes b) No

7.3.2. What source of energy is used for cooking? (Mark all that apply)

- a) Solar b) Biomass: firewood, dung, reeds, dried grass, charcoal, other: _____
c) Kerosene d) Bottled gas e) Electricity f) Domestic gas

If the reply is firewood:

What kind of firewood do they use? _____

Who collects the firewood? _____

Where? _____

Is there an abundance or scarcity of firewood? _____

What, on average, is the amount of time or number of days involved in obtaining it? _____

7.3.3. If firewood is used, what type of stove will be employed?

- a) Stove²⁷ b) Improved stove²⁸ c) Clay d) Other _____

27.- In certain parts of Bolivia it is also known as concha.

28.- There are various types of improved stoves: Lorena, Cecilliana, Campana, etc.

7.3.4. What system of smoke elimination is generally found inside the dwellings?

- a) Chimney b) Windows c) Other _____ d) None

7.4. ELECTRIC POWER SUPPLY

7.4.1. Is there electric power in the zone of intervention?

- a) Yes b) No c) At times _____

If the reply is affirmative:

Is the electricity service adequate and able to satisfy demand?

If the reply is negative:

What alternative source of electricity generation will supply the project?

7.4.2. What is the installed capacity of the alternative generator and what are the characteristics of the system?

Explain the relation between the alternative source and the housing's electricity demand:

If the reply is affirmative, describe where.

7.5.6. If the reply is negative, describe or identify potential areas for disposing of rubble:

8. AVAILABILITY of LOCAL MATERIALS

Use the following tables according to the existence of supply sites for local materials (visit the designated supply sites, to verify their quantity and quality):

8.1. Sand

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.2. Hard core

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.3. Stone

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

Other materials:

8.4. Cane

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.5. Joists or tree trunks (wood)

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.6. Prickly pear (cactus) stalks

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.7. Clay

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.8. Earth

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.9. Straw

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.10. Water for construction

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|-----------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.11. Other material (for example, bamboo)

| N° | Name of the zone/community or ranch | Availability | | | Indicate the place from which the material will be brought | | |
|----|-------------------------------------|----------------------|--------------------------------------|----------------------|--|-------------------|------------------------|
| | | Existence (Yes) (No) | Quantity (sufficient) (insufficient) | Quality (good) (bad) | Name of the place | Distance (in Km.) | Cost (in Bs/ quantity) |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

8.12. Environmental aspects of the designated supply sites:

8.12.1. Is it necessary to obtain any permits or municipal authorisation?

a) Yes

b) No

If the reply is affirmative, explain what permits and where they should be obtained:

(If the permits have already been obtained, include a photocopy in the appendices).

8.12.2. Mention the environmental measures to be taken into account before the extraction:

8.13. Indicate the sources of supplies of no local material near to the project site:

| Material | Location of the source | Distance to the area of project | Type of transport available and approximate time |
|----------|------------------------|---------------------------------|--|
| | | | |
| | | | |
| | | | |
| | | | |

9. ECOLOGICAL VALUE of the ENVIRONMENT

9.1. Describe the flora:

| COMMON NAME | SCIENTIFIC NAME | ZONE | USE |
|-------------|-----------------|------|-----|
| | | | |
| | | | |
| | | | |
| | | | |

9.2. Indicate forestry resources existing within a 2 Km. radius of the project zone:

| | | Forestry Resources | | |
|--------------------------|-------------------------------------|--|------------------------|--------------|
| Timber-yielding species: | Distance from zones of exploitation | Type of exploitation (intensive/extensive) | Institution or project | Observations |
| | | | | |
| | | | | |
| | | | | |

9.3. Mention the importance of forestry resources (species) for the protection and the conservation of basins:

9.4. Explain the ecological value of the flora, or the environmental service it provides in the project zone: (the protective function of the vegetation cover, rarity of ecosystems, presence of endemic species, diversity of species)

9.5. Mention the principal species of vertebrates with economic value:

| COMMON NAME | NAME SCIENTIFIC | ZONE | ECONOMIC IMPORTANCE |
|-------------|-----------------|------|---------------------|
|-------------|-----------------|------|---------------------|

a) Mammals:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

b) Birds:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

c) Fish:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

d) Reptiles:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

9.6. Indicate whether endemic species are present²⁹:

| COMMON NAME | NAME SCIENTIFIC | ZONE | ECONOMIC IMPORTANCE |
|-------------|-----------------|------|---------------------|
|-------------|-----------------|------|---------------------|

a) Mammals:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

b) Birds:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

29.- The term endemic species refers to those that are particular to a place, with ecological value for natural equilibrium.

| COMMON NAME | NAME SCIENTIFIC | ZONE | ECONOMIC IMPORTANCE |
|-------------|-----------------|------|---------------------|
|-------------|-----------------|------|---------------------|

c) Fish:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

d) Reptiles:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

9.7. Indicate whether there are endangered species:

| COMMON NAME | NAME SCIENTIFIC | ZONE | ECONOMIC IMPORTANCE |
|-------------|-----------------|------|---------------------|
|-------------|-----------------|------|---------------------|

a) Mammals:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

b) Birds:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

c) Fish:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

d) Reptiles:

| | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |

9.8. To what extent could the project cause damage to the flora and fauna in the environment?

10. COMMUNITY PARTICIPATION

10.1. People interviewed in the community for the environmental baseline:
(Name and community organization)

11. TOPOGRAPHICAL MAP

Include a map of the project area (depending on the magnitude of the project select the appropriate scale, that shows with sufficient detail the bodies of water, hydrographical basins and sub-basins, existing settlements and infrastructure, or activities identified as “matters of proximity” which must be clearly identified).

5.3. Prefeasibility study

This is also known as a pre-project: it is where the benefits and costs identified above should be measured. In the environmental component the potential environmental impact must be estimated, besides analysis of conditioning elements such as size and location, as well as the institutional and juridical aspects which will provide the project’s framework. In accordance with Bolivian environmental legislation (Law 1333 and its regulations), this phase corresponds to the completion of the environmental form relevant to the activity, work or project, the objective of which is to identify and quantify the environmental impact and set out the necessary mitigation measures. Below are presented some guidelines and lists of potential environmental impacts that will orientate the identification and quantification of impacts in the environmental form.

5.3.1. Construction activities: potential environmental impacts and their causes

In activities related to housing construction there are two fundamental characteristics that are largely responsible for impact on the environment:

New Housing — as opposed to the improvement of the existing housing — is normally not built on lands already used for this end. Generally these houses are located on cultivable land or on terrains still in their natural state; this means a change in soil use that does not always take into

account the aptitude of the land. The exception to the rule is reconstruction after natural disasters, such as in-situ recuperation (“brownfield”).

Situating the housing in virgin territory means altering the area’s natural equilibrium by introducing the waste materials and pressure on resources that inevitably accompany human presence.

If building new settlements, reconstructed housing will cause the same level of impact. However, the final impact of this housing may become much more significant, since its presence tends to attract economic activity as well as additional settlements. The logic in this respect is related to the pre-existence of certain territorial ordering and new roads or social installations.

As such, environmental impact and the effects of the original project on environmental health can increase. Such impact may prove positive or negative, depending on its magnitude and above all on its inherent synergetic effects.

Construction activities have impacts related to the generation of waste materials, a product of human activities and of the demands for natural resources to satisfy vital functions. Among the most significant impacts are:

- Destruction of important ecological, archaeological and historical areas. This can be caused by the preparation of the terrain for housing construction and associated with the infrastructure itself, or by a later exploitation of the terrain and other resources by the inhabitants.
- Deforestation is produced by 1) preparation of the terrain for construction and associated infrastructure (for example roads); 2) displacement of the terrain by the inhabitants for agricultural ends; or 3) the excessive gathering of firewood by inhabitants, whether for domestic purposes or for small-scale charcoal production.
- Contamination of soils, of surface and underground waters, by unplanned and controlled domestic discharges, and by irrational generation and disposal of solid waste.
- Soil erosion during the construction of housing and access routes, which result in changes in soil use, destruction or displacement of cultivable land and sedimentation in riverbeds or bodies of water (contamination by particles).

Impacts of construction

The process of construction in itself also causes a series of impacts on the environment, which can be seen in the following table:

Environmental impact of building work

| IMPACT | CAUSE |
|--|--|
| Soil erosion | <p>When the land is left bare (or barren) after the site has been cleared, levelled, filled and / or compacted, it tends to erode through water or wind, and this is aggravated if the land slopes. Erosion can also be associated with the establishment of roads or other means of access, or with the exploitation of quarries or provisional zones providing building materials.</p> <p>The same applies to the movement of earth in substantial excavations, on inappropriate and above all unauthorised sites.</p> |
| Contamination of waters | <p>Alterations in the quality of the waters, when water currents become receptors or dumps for discarded earth (product of the levelling of terrains).</p> <p>Maintenance of machinery on the site (oil changes, gas, washing) affecting surface waters and subterraneous aquifers.</p> <p>Lack of adequate sanitary installations for construction workers on the project site.</p> |
| Contamination of waters Air pollution (through generation of particles) | Removal of soil cover in building means of access, quarries, provisional zones and construction sites, causing dust and particles in the air. |
| Air pollution (through generation of noise) | Construction techniques and the use of machinery for the various building activities. |
| Air pollution (through generation of emissions) | Use of machinery for different construction activities. |
| Exhaustion or destruction of resources | <p>The use or irrational exploitation of local natural resources, such as sand and stones from riverbeds, quarries or provisional zones.</p> <p>Extraction of timber from nearby forests for construction or fire-bricks.</p> |
| Landslides | <p>Loss of stability on hillsides due to removal of vegetation cover.</p> <p>Waterlogging due to altered drainage patterns.</p> <p>Erroneous location of provisional zones.</p> |
| Visual contamination | <p>Waste materials from construction (including refuse produced by workers) that are not correctly disposed of.</p> <p>Alterations in the landscape (“scarring”) associated with quarries and provisional zones for building materials.</p> |

In general, the consequences of these impacts persist even after construction has terminated. It is difficult for eroded land to recuperate its fertility and physical-chemical properties, and contaminated riverbeds recuperate very slowly.

Impacts of the built environment

As detailed previously, the activities associated with housing construction create and change the built environment for its inhabitants.

Deficiently planned and constructed settlements or housing may create inappropriate conditions for environmental health, with grave environmental consequences that are detrimental to the health of both the existing population and new inhabitants.

Factors related to environmental health include:

- o Dangers to health due to inadequate or deficient installations (water, sewerage and solid waste) bringing a greater incidence of diseases, either of fecal-oral transmission, or else transmitted by vectors (such as insects and animals).
- o Risk to residents from possible natural dangers (for example, landslides and floods).
- o Risk to residents from human activity near the site, including highly contaminant industrial operations such as mining, agriculture or military operations.
- o Formation of stagnant water, due to deficiently constructed drainage systems, or abandoned provisional zones, with an associated increase in diseases transmitted by vectors.
- o Unhealthy internal conditions through inadequate design of dwellings or through the building materials used (for example, creating internal conditions that are either very hot or very cold, inadequate or insufficient ventilation for heating or cooking).

Impacts on environmental resources

The creation of a housing settlement can also affect the environmental resources available for the area's existing population:

- o An increase in competition for the water supply, forestry resources (including firewood and hunting) and/or the agricultural terrain due to the influx of new inhabitants.
- o Loss or reduction in access to resources or to agricultural lands, as a result of the stripping of lands for the project itself, changes in land ownership, etc.
- o Deterioration in the land and, especially downstream, of water resources.

Finally, the new housing development may pressurise the existing population with regard to the resources available in the built environment. Examples of this are transport systems, schools and overburdened health centres.

The evaluation of environmental impact requires knowledge of the baseline situation; in other words, the impacts of the proposed project must be evaluated in relation to what might happen if the project did not exist. In the case of new housing developments, the baseline evaluation can be a particularly difficult proposal.

The construction of new housing may bring the abandonment of existing settlements. However, the alternative to planned housing developments can be unplanned settlement. Hence the selection of the site in accordance with soil aptitude plays a decisive role.

5.3.2. Specific guidelines for the sector

The previous section gives details of the gamut of environmental impact that housing projects may generate if they are not adequately planned. Below is a close examination of factors in construction, particularly design, aimed at minimizing these impacts towards an improvement in the environmental health of beneficiary communities.

The design of the housing, structural characteristics, types of building materials, access to basic services, maintenance and the distribution of appropriate spaces (bedrooms, toilets and kitchens), are variables that play important roles in protection against contagious diseases.

The dwelling must adapt to the climatic conditions of the place and to the economic and sociocultural characteristics of the target populations.

Housing infrastructure on the Altiplano differs from that implemented in the valleys or plains. Likewise, there are notable differences between agricultural/livestock-raising communities and others whose way of life is of subsistence (gathering, collection and fishing). To this must be added the general perception or aspiration to a “better house”, or a “new home”, significant and influential factors not always reflected as a housing need or as favourable to family health.

The following table illustrates the decisive elements in planning projects for this sector:

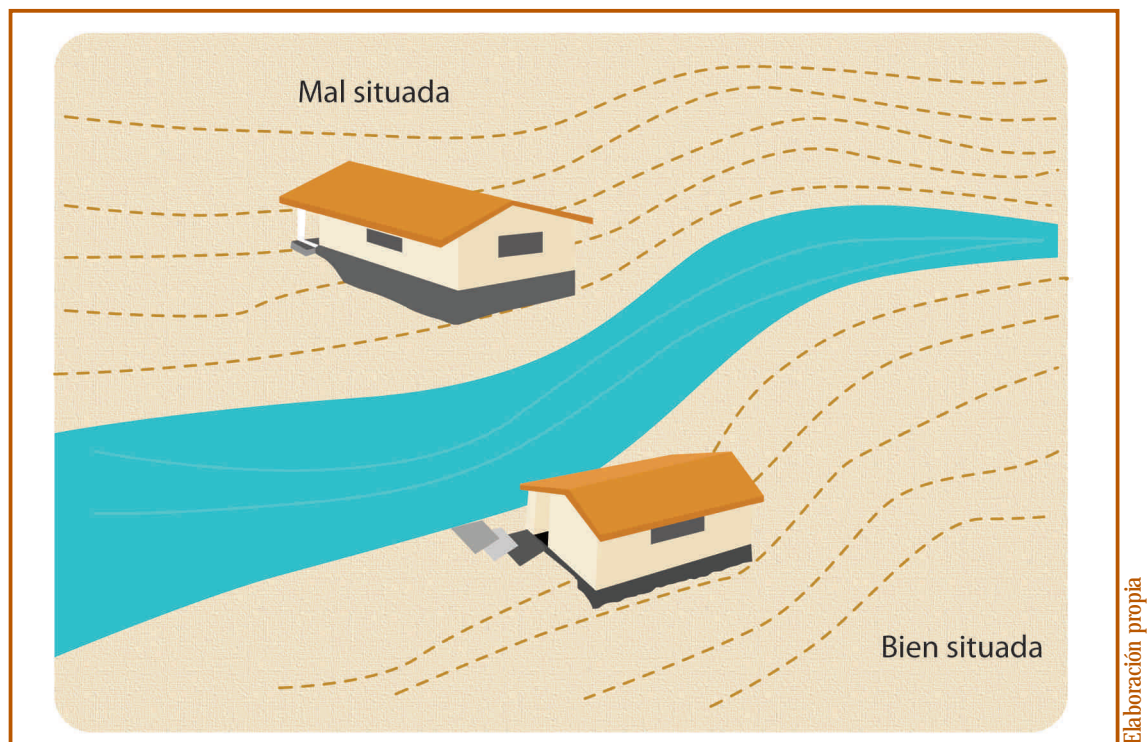
IMPORTANT ASPECTS OF PLANNING AND DESIGN

| | | |
|------------------------|---|---|
| Land ownership | → | It is necessary to be informed of ownership rights to the land and legal stipulations concerning land use and territorial planning. Some examples are the TCO, protected areas, areas of urban expansion, or of expansion in agriculture, livestock, forestry, industrial parks, etc. |
| Site selection | → | Register data on changes in land use, reconstruction in situ or relocation of housing estates, topography, relief, soil types and aptitudes, depth of the freatic level, risk of natural disasters, solar orientation and constant ventilation, etc. |
| Demarcation of space | → | The Project must define housing models in accordance with climatic characteristics, incorporating into housing design responses to basic human needs, such as eating, sleeping, shelter, answering calls of nature and feeling protected. |
| Building materials | → | With operative ends it is recommendable to conduct a survey and tour of the Project zone, so as to visualize options for storing local materials and access to transport. Environmental factors must be incorporated into the use of designated supply sites. |
| Planning of services | → | As far as possible, it is important to construct dwellings that incorporate all the basic services, or foresee their future installation. For example, running water, bathrooms, drains or systems adapted for the rural-domestic drainage and electricity-energy supply. |
| Community organization | → | A complete “community development” plan must be developed, which involves the generation of local capacities in the management of basic services, adaptation to change, community leadership and advice, informal education, prevention of ill-health, etc. |

Regarding this last point, it will also be necessary to think about the provision of “social services”. These may include community advice for the adapting to a change of housing and learning to live in a community; aid services in the formation of trusts, boards, councils-committees for the protection of water; territorial base organizations; construction-oriented educational services for building, the use and maintenance of kitchens, latrines, ecological toilets, water storage, health and nutrition; and programmes of work evaluation, which include training in operation, maintenance and repairs.

In modalities of execution that incorporate the “self-construction” pattern, it will be necessary to watch over the creation of a coordinating committee or functional group, with the technical, organizational and administrative capacity to guarantee the logistical requirements that each family needs to build its own housing. Ideally, the committee must include a representative of the executive NGO, community and OTB representatives, and representatives of local schools, a social worker and a municipal authority.

The implementation phase will require management of a “Programme of supervision and monitoring” including visits to the site, surveys and quality tests of the installations, with the aim of ensuring the correct execution of the constructive work.



Localización o sitio adecuado para construcción de vivienda.

5.4. Feasibility study

This phase must focus on the detailed study of the most convenient alternative, considered viable in the previous phase. It will be necessary to measure and evaluate the benefits and costs of the project as precisely as possible. The feasibility study must be a profound analysis and study of all the variables that affect the project, advancing towards its optimization and therefore including factors relating to the physical work (location, size), the expenditure programme and the organization for setting the activity in motion.

5.4.1. Preliminary evaluation of the project

Once the final design of the project is finalised, the next step is to complete the project's preliminary evaluation form, the aim of which is to make sure all the environmental aspects have been considered within that design and in the constructive planning. Those responsible for the execution must adjust the project so that it addresses the critical problems identified in the environmental impact lists. If these adjustments to the project design are not made, as a response to the preoccupations identified, then the whole process of environmental evaluation lacks any sense.

The document is presented below to be filled in according to its particular set of instructions.

PRELIMINARY PROJECT EVALUATION INSTRUCTIONS for COMPLETING THE PRELIMINARY PROJECT EVALUATION

This document must be completed by the staff responsible for the environmental element of the project, with professional registration in environmental areas, and revised by the environmental supervisor and/or environmental supervision of the works.

It contains general information on the project's final design, a description of the proposed housing modules, questions on the modality of construction, anticipated protection measures, the basic services planned as part of the project, their management once the constructive phase is completed, the social services promoted or initiated depending on the environment to be constructed, and the most important component, that of the identification of environmental impact.

For each identified environmental impact it is important to propose an appropriate mitigation measure, a plan for its implementation and a chronogram for its execution and monitoring.

Finally, there is a set of conclusions and recommendations that should be completed by the environmental supervisor and/or the works consultant. This will depend on the organic structure of the project and of the counterpart.

ENVIRONMENTAL PROJECT EVALUATION

| GENERAL DATA | |
|--|---------|
| Name of the project: | |
| Type*: | |
| Zone, neighbourhood, community or UV ³⁰ : | |
| Municipality: | |
| Department: | |
| Area of intervention**: | |
| Objective of the project: | |
| Applicant, managing or motivating institution: | |
| Financial institution: | |
| Person responsible for completion: | |
| Profession: | Signed: |
| Professional register: | Date: |

* For example improvement, post-disaster reconstruction and/or new construction.

** For example urban, rural, peripheral.

1. BASIC CHARACTERISTICS

| General information on the project | Data | Comments |
|---|------|----------|
| Total area of intervention of the project | | |
| Number of beneficiary communities, ranches, zones, neighbourhoods or UV | | |
| Number of beneficiary families | | |
| People per dwelling on average | | |
| Number of dwellings improved | | |
| Number of new dwellings | | |
| Average surface of the dwellings (type of model proposed) | | |
| Demand of water per dwelling on average | | |

2. GENERAL DESCRIPTION of FUNCTIONAL LIVING SPACES

In the following table, mention the materials that are used in the finish and installation of the functional spaces of the housing:

| Rooms | Kitchen | Toilets | Sitting rooms | Patio or terrace | Pantry | Others: |
|-------|---------|---------|---------------|------------------|--------|------------------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

30- UV: Unidad Vecinal (Neighbourhood Unit).

2.1. What modality of construction will the project follow?

- a) Assisted self-construction
- b) Delegated construction (contractor)
- c) Direct construction

2.2. If not self-construction, where will the staff come from?

2.3. If delegated or direct construction, where will the workers/camps be located?

2.4. Will local employment be generated?

- a) Yes
- b) No

If the reply is affirmative, expand:

2.5. Will the construction programme coincide with the local productive season?
(Agriculture, fishing, commerce, crafts, etc.)

- a) Yes
- b) No

If the reply is affirmative, expand:

2.6. Have plans been made regarding activities to prepare the terrain?

2.7. What construction activities will be carried out? (For example installation of camps, redesign, excavation, slab-laying, building of walls, electrical installations, sanitary, demolition, etc.)

2.8. What prevention/protection measures will be put in place in activities of preparation, demolition, excavation or construction for the protection of the environment and of the worker?

| Phases of construction | Prevention/protection measures |
|------------------------|--------------------------------|
| Demolition | <hr/> <hr/> |
| Excavation | <hr/> <hr/> |
| Construction | <hr/> <hr/> |
| Rough work | <hr/> <hr/> |
| Finish work | <hr/> <hr/> |

2.9. In the case of direct or delegated construction: what actions or elements related to occupational health and industrial safety will the construction workers receive?

3. BASIC SERVICES

3.1. Water supply and sanitation

| Water and sanitation | Existing | Planned | Comments |
|--|----------|---------|----------|
| Type of source (surface or underground): | | | |
| Location on site of the tap or faucet: | | | |
| Daily capacity of the source (litres/inhabitant): | | | |
| Seasonal variation of the sources (summer /winter): | | | |
| System of storage (pits, tanks, etc.): | | | |
| Treatment system (physical, chemical and biological processes): | | | |
| Water quality (characteristics including bacteriological, physical-organoleptics, physical-chemical) ³¹ : | | | |
| Distribution system (ramified network, closed network): | | | |
| System of sanitation / sanitary installations: | | | |
| System of sanitation of pluvial installations: | | | |
| Treatment system of sewage to adapt the quality of the discharge to the permissible limits ³² : | | | |
| What is the receptor body and the use made of it? | | | |

3.1.1. If installations are to be built for the water supply and basic sanitation, have they been designed in accordance with the manual “Water and Sanitation”³³?

a) Yes

b) No

If the reply is negative, please specify the measures and adaptation times:

31.- In accordance with NB 512.

32.- Refer to Law 1.333, its regulations and existing national norms.

33.- Environmental Manual “Guide to small-scale infrastructure: Water and sanitation”.

3.2. Supply of energy for cooking

| Services | Existing | Planned | Comments |
|--|----------|---------|----------|
| Infrastructure for cooking (types of kitchen, types of oven) | | | |
| Sources of energy for cooking (gas, electricity) | | | |
| Projection of energy demand over five years (gas, electricity) | | | |

3.3. Supply of electric power

| Services | Existing | Planned | Comments |
|---|----------|---------|----------|
| Services for electricity generator: (Type of source: solar panel, diesel generator, wind generator, micro-hydroelectric, etc.) | | | |
| Capacity of the source: (kW or kWh, depending on the individual case) | | | |
| Availability of the service: (24/7, only in the afternoon/at night, only when raining, only when sunny, only when windy, only if there is fuel, etc.) | | | |

3.4. Domestic solid waste

| Services planned | Existing | Planned | Comments |
|-------------------------------|----------|---------|--|
| Type of previous treatment | | | |
| Means of collection/transport | | | In case of there being no external transport of solid waste, how will the community manage this? |
| Final disposal of rubble | | | |
| Means of final disposal | | | |

4. MANAGEMENT of BASIC SERVICES

Indicate the institution that administers, or will administer in the future, each of the planned services; how will they be financed, what will be the annual cost and how will sustainability be guaranteed?

| | Drinking water | Sanitation | Electricity | Solid waste |
|---|--|---|---|---|
| Financed by: | Government: local, municipal, regional, national. Community: CAP/EPAS/ ONG ³⁴ Private company | Government: local, municipal, regional, national. Community: CAPSA/EPAS/ Cooperative NGO Private company | Government: local, municipal, regional, national. Community: CAPSA/EPAS/ Cooperative NGO Private company | Government: local, municipal, regional, national. Community: CAPSA/EPAS/ Cooperative NGO Private company |
| Service administered by: | | | | |
| Future cost of the service (on average): | | | | |
| Service operated by/checked by: | | | | |
| Service repaired and maintained by/checked by | | | | |
| Relevant data for expansion of the service: | | | | |
| Aspects of sustainability of the service: | | | | |

34.- CAP: Cooperativa de Agua Potable (Drinking Water Cooperative). EPAS: Empresa Pública Social de Agua y Sanitación (Social Public Water and Sanitation Company). NGO: Non-Governmental Organization

5. SOCIAL SERVICES ACCORDING to the ENVIRONMENT TO BE BUILT

5.1. Educational services

| Information | Data | Comments |
|--|------|----------|
| Current number of children of school age: | | |
| Estimated number of children of school age (five years): | | |
| Proximity to the nearest school: | | |
| Capacity of the nearest school: | | |
| Does the project include the construction of a school? | | |
| Is there a need to rebuild or remodel the school? | | |
| Is there a need to extend the school? | | |
| Will it be necessary to construct future schools? | | |
| Is there a need for human resources for the school? | | |
| What equipment does the school require? | | |

5.2. Health services

| Information | Data | Comments |
|---|------|----------|
| Proximity of the nearest health centre: | | |
| Type of attention at the health service: | | |
| Capacity of the nearest health centre: | | |
| Does the project include the construction of a health centre? | | |
| Is there a need to reconstruct or remodel the health centre? | | |
| Is there a need to build an extension to the health centre? | | |
| Is there a need to construct future health centres? | | |
| Is there a need for human resources at the health centre? | | |
| What equipment does the health centre require? | | |

6. IDENTIFICATION of ENVIRONMENTAL IMPACT

If the reply is “no”, there is no need for further action. For each important impact a mitigation measure and recommendation must be implemented.

| Questions related to the generation of direct or indirect impacts in the operation phase | YES (important negative impact) | NO | N/A | Mitigation measure |
|--|-------------------------------------|----|-----|--------------------|
| Will the project have foreseeable impacts for endangered or endemic species? | | | | |
| Will it cause deforestation, loss of habitat or biodiversity? | | | | |
| Is there any dangerous or highly contaminating activity being carried out, or that may be predicted, in surrounding areas? | | | | |
| Could past use of the terrain endanger future populations or the project? | | | | |
| Does the site have any moderate or high risk of natural dangers or threats (earthquakes, hurricanes, etc.)? | | | | |
| Have any problems of waterlogging or floods been identified? | | | | |
| Have any problems of soil instability and threats of landslides been identified? | | | | |
| Are there risks of wind or water erosion? Have measures been planned? | | | | |
| Will the activities cause water contamination? | | | | |
| Will the project generate gases, dust and pollutant particles to a degree that will have negative effects on health? | | | | |
| Only for the construction phase | | | | |
| Will it be necessary to create or rehabilitate an adequate means of access such as a road? | | | | |
| Will it be necessary to build infrastructure for electrical transmission /generation? | | | | |
| Will it be necessary to construct a water supply and treatment infrastructure? | | | | |
| Will it be necessary to build infrastructure for the treatment of solid waste? | | | | |
| Will it be necessary to build additional areas of social infrastructure? Which? | | | | |

| Questions related to constructive design and the selection of materials | YES | NO | N/A | Comments |
|---|-----|----|-----|----------|
| Are the construction materials adequate for average climatic conditions? | | | | |
| Have environmental factors been considered for the exploitation of designated supply sites of materials? | | | | |
| Have environmental factors been considered for the abandonment of designated material supply sites? | | | | |
| Will fuels or dangerous toxic substances be kept in the stores? | | | | |
| If the reply is affirmative, have protection and training measures been considered for operatives and beneficiaries? | | | | |
| Will the occupants of the dwellings be comfortable in the summer and winter seasons? | | | | |
| Has the predominant wind direction been taken into account in the design of the housing of the project? | | | | |
| Has the predominant wind direction been taken into account in the design of waste material disposal systems, discharges and/or sewerage (black waters)? | | | | |
| Exclusively for housing development areas | | | | |
| Does design and layout include the following elements, of a type and quantity that comply with the relevant norms? | | | | |
| Internal routes | | | | |
| Green areas | | | | |
| Social and recreation areas | | | | |
| Have prevention measures been taken against the danger of fires, floods, landslides, earthquakes, etc? | | | | |
| Are there transport needs? | | | | |
| Does the design consider future extension? (includes population growth, extension to individual houses and connections to future services) | | | | |
| Is the design of the house consistent with that of other housing projects existing in the area?* | | | | |

**Social problems may arise from differences in the quality of the housing and the services provided.*

| Questions related to the generation of impacts in the design or the planning of services | YES | NO | N/A | Comments |
|---|-----|----|-----|------------------------------------|
| WATER | | | | |
| Does the proposed drinking water system satisfy the requirements of the current population and the estimated future population? | | | | |
| If the reply is no, are there water sources available? | | | | Add results of the water analysis. |
| Does quality of the drinking water comply with national norms? | | | | |
| Does the water supply system include protective barriers or other measures against possible sources of contamination? | | | | |
| Are beneficiaries informed of protection measures for the water source supply? If not, will the beneficiaries be trained? | | | | |
| Has a system of elimination of excreta and domestic discharges been designed for the site? | | | | |
| Are beneficiaries informed in the operation and maintenance of a sanitation system? If not, will the beneficiaries be trained? | | | | |
| ELECTRIC POWER and ENERGY FOR COOKING | | | | |
| Has the source of electricity been taken into account in the design and layout of the project? | | | | |
| Are beneficiaries informed in matters of electrical power supply? If not, will the beneficiaries be trained? | | | | |
| Is the availability of cooking fuel proportional to existing demand? | | | | |
| Are beneficiaries informed in matters of protection from the risk of respiratory diseases from atmospheric pollution? If not, will they be trained? | | | | |
| SOLID WASTE | | | | |
| Has a system for the elimination of solid waste been designed? | | | | |
| Are beneficiaries informed in matters of correct disposal of solid waste? If not, will the beneficiaries be trained? | | | | |

Key questions: post-construction administration

During the operation phase of a health establishment project, long-term impacts (positive or negative) may develop—for the beneficiaries, surrounding communities and the environment. Time and attention must be devoted to ensuring that the project has a long-lasting positive effect in the area. Mark the response that is most appropriate to the characteristics of the project. For each “No” it is recommended that a clear response plan be designed and ready to implement before the health establishment is officially handed over to the beneficiaries.

| Questions related to the organization | YES | NO | N/A | Comments |
|--|-----|----|-----|----------|
| Will there be a functioning management structure in the community before the houses are occupied? | | | | |
| Will installations (toilets, drinking water, grey waters and solid waste) be ready for use when the establishment begins to operate? | | | | |
| Will there be any kind of training for the project population with regard to the use of these sanitary installations? | | | | |
| Have those responsible for the operation and maintenance of the installations been identified and trained | | | | |
| Has any system of basic invoicing been established? | | | | |
| Have those responsible for the invoicing system been identified and trained? | | | | |

5.1. What indirect effects or impacts might the project have?

| Indirect impact | Means of mitigation | Comments |
|-----------------|---------------------|----------|
| | | |
| | | |

7. CONCLUSIONS and RECOMMENDATIONS EMERGING from the EVALUATION

7.1. Conclusions

7.2. Recommendations



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6 Chapter 6 INVESTMENT PHASE

This is where all the actions contributing to the project’s physical execution are carried out. At this point two phases are developed:

Adjustment phase: here the architectural and engineering aspects are consolidated: final details such as the availability and characteristics of the terrain must be considered, as well as the content and dimensions of the programme in terms of needs and requirements for space and technical conditions. Regarding the environmental component, as the relevant environmental impact is already identified, it is necessary to proceed to define the aspects of mitigation and environmental monitoring to be implemented in the execution phase.

Execution phase: in which the project materialises physically, with the construction of the property defined in the study of the project and the installation of necessary machines and equipment. Conditions and characteristics resulting from previous studies must be respected in the execution.

6.1. Aspects of mitigation and environmental monitoring for housing projects

Selection of the site

| Potential negative impact | Environmental considerations and mitigation measures | Environmental indicators |
|--|---|--|
| 1. Changes in the pattern of land use. | 1.1. Before selecting the site: make sure that the current use of the terrain on the proposed site is not critical or very different, and that the building activities can be carried out on an adjacent piece of land which does not imply altering or displacing social or productive activities. | <ul style="list-style-type: none"> - Previous use. - Current use. - Future use. - Aptitude of soil uses. - Plan of soil uses. - Ecological or agro-ecological zoning. - Biological corridors. - Property rights. |

| Potential negative impact | Environmental considerations and mitigation measures | Environmental indicators |
|---|---|---|
| 2. Destruction of important ecological, archaeological or historical sites. | <p>2.1. Before selecting the site, evaluate the area of intervention to verify that its biodiversity, and conservation of endangered or endemic species, or fragile ecosystems, are not adversely affected.</p> <p>An alternative site must be used if the area is identified as ecologically critical.</p> | |
| 3. Soil and water contamination through black waters and solid waste. | <p>3.1. Before selecting the definitive site, conduct a study of the soils. Based on the results and the historical conditions of underground and surface waters, plan collection and treatment systems for solid waste and elimination of excreta. Plan the installation of systems of black water and waste elimination that are adequate to the terrain, to the needs of the beneficiaries and appropriate to the climate.</p> <p>Avoid, where possible, the use of toxic products.</p> <p>Install basic sanitation systems (latrines, septic tanks and water filters). Administer and operate treatment plants. Improve the drainage systems.</p> | <ul style="list-style-type: none"> - Study of soils. - Aquifer. - Permeability of the soil. - Appropriate systems. |
| 4. Risk to residents from possible natural dangers. | <p>4.1. Before selecting the project site make sure that it is not located in an area prone to landslides or floods, with a slope of more than 20%, or low-lying areas probably with a high degree of deforestation and clearance.</p> <p>If the site is in an area subject to natural dangers an alternative site must be used, or appropriate mitigation measures taken, to minimise the risk (if this is inevitable).</p> | <ul style="list-style-type: none"> - Gradient. - Relief. - Presence of threats. - Frequency of threats. - Duration of threats. - Study of soils. - Preventive measures. - Protective measures. - Adaptation measures. - Percentage of vegetation. |
| 5. Risks to the residents due to human activity close to the site. | <p>5.1. Before selecting the site, ensure the project will not be located within the area of influence (normally a radius of 1 Km.) of sources of contamination/dangers, including factories, mines, military bases, etc.</p> <p>Make sure that the project is not downwind from the source of contamination.</p> <p>Identify sources of noise or acoustic contamination.</p> <p>Use alternative sites if the risk to future residents is high.</p> | <ul style="list-style-type: none"> - Plan of soil uses. - Proximity data. - Account of wind direction and orientation of the housing. |

| Potential negative impact | Environmental considerations and mitigation measures | Environmental indicators |
|--|--|--|
| 6. Excessive use and pressure on existing installations, such as schools and health centres. | <p>6.1. Before selecting the site, take note of possible future impacts (overloading or overcrowding) that construction or extension of the housing infrastructure may cause to educational services and health.</p> <p>If needed, include alternatives in the project design to minimise this pressure (extension, remodelling, construction of new educational and/or health centres).</p> | <ul style="list-style-type: none"> - Shortcomings in educational or health infrastructure. - Projected growth rates in migration, expansion and population. |
| 7. Deforestation to allow implementation of the project. | <p>7.1. If the project area is dense forest, or forms part of a critical habitat, an alternative site must be found.</p> <p>If deforestation activities arise because of housing expansion, an area one-and-a-half times the size the deforested area must be created and maintained. The location and final use will be established in coordination with the local municipal authorities.</p> <p>For each tree felled in a separate area of trees, plant 20, no later than six months after the residents have moved.</p> | <ul style="list-style-type: none"> - Surface deforested/to be deforested/to be reforested/to be revegetated. - Plan of soil uses. - Soil aptitude. - Availability of water (precipitation, proximity to bodies of water or basins). - Relation of vegetation cover/ hydrographic basin. |
| 8. Excessive use of firewood as fuel and a source of energy for cooking. | <p>8.1. It is necessary to stimulate alternative sources of energy such as gas, electricity and solar energy.</p> <p>If the residents cook with firewood, ensure they all use improved kitchens.</p> <p>If firewood is a predominant source of energy, include the planting of plots of trees to provide firewood, using local species in the layout and in the project design.</p> | <ul style="list-style-type: none"> - N° of efficient new/improved kitchens. - Percentage of use of energy sources. - Surface apt for storage of firewood. - Works of repositioning or revegetation. |
| 9. The houses are not apt for the climatic conditions and the occupants' well-being. | <p>9.1. Make sure that the design of the dwelling, the proposed building materials and the accommodation of windows and doors take into account local climatic conditions in the hot and cold seasons, and seasonal variations such as precipitations and winds. If possible utilize local materials.</p> <p>Take note of drainage systems and runoff, pitched roofs, etc.</p> | <ul style="list-style-type: none"> - Percentage of local materials. - Percentage of introduced materials. - Wind direction and orientation of the sun. - Construction design. - N° and capacity of stores. - N° and type of designated material supply sites. - Environmental management: before /during/after extraction from designated supply sites. |
| 10. Inadequate ventilation. | <p>10.1. The design of the housing must ensure adequate ventilation, in accordance with the potential heat and the sources of cooking fuel that will be used in the house.</p> | <ul style="list-style-type: none"> - Direction and velocity of the wind. - N° of efficient kitchens. - Surface of the kitchen. - N° of windows. - N° of doors. - Design adapted to the climate. |

| Potential negative impact | Environmental considerations and mitigation measures | Environmental indicators |
|---|---|---|
| 11. Inadequate attention to the type and location of the site for the disposal of solid waste. | 11.1. Prepare, implement and train for a management plan for the elimination of solid waste, including technology and finance for maintenance and elimination, before the resident occupies the house. | <ul style="list-style-type: none"> - Plan of management. - N° of workshops of training. - N° of trainers. - N° trained. - Design and cost of the system. |
| 12. Health dangers due to lack of sanitary installations (water, black waters and disposal of solid waste). | <p>12.1. Sanitary installations must be included in the project design.</p> <p>Make sure that that all the sanitary installations are installed and working at the time the occupants move in.</p> | <ul style="list-style-type: none"> - Water system. - Laboratory tests of water quality. - System of sanitation. - Hydraulic tests. - Permeability of the terrain. - Useful life of the installations. - Capacity of the supply source. - Monitoring of water quality. |
| 13. Unreliable or unsafe drinking water supply. | <p>13.1. Make sure the location of the supply systems and their technological design minimise health dangers.</p> <p>Conduct occasional tests to verify the quality of the water, checking especially for coliform bacteria and arsenic, a highly carcinogenic parameter.</p> | |
| 14. Inadequate use of environmental resources and sanitation within the project. | <p>14.1. If applicable, the executive NGO must provide environmental and sanitation training to all the residents, before they move house. The training must include environmental education for children, the adequate rearing of domestic animals, reforestation in green areas, and adequate sanitary use and maintenance.</p> <p>Use some system to detect water leaks, consider using a system to reuse grey waters.</p> <p>Zoning and design, according to the orientation of spaces and demand.</p> <p>Promote the adequate use and conservation of water.</p> <p>Promote the construction and use of the improved kitchen.</p> <p>Carry out administration or management of the plots of trees providing firewood for fuel.</p> | <ul style="list-style-type: none"> - Training plan. - N° of workshops/meetings. - N° of inductions. - N° of trainers. - N° trained. - Themes dealt with. - N° of demonstration events. - Field practices. |

| Potential negative impact | Environmental considerations and mitigation measures | Environmental indicators |
|---|--|---|
| 15. Erosion during construction of housing and means of access. | 15.1. Soil conservation measures must be included in the design and be implemented during construction. The exact measure depends on the site and of the gravity of the impact. | <ul style="list-style-type: none"> - Physical, biological and structural barriers. - Gutters, agricultural retaining ditches, containing walls, gabions, etc. |
| 16. Social impacts in and around the project site. | <p>16.1. Before the project design, a social diagnostic of the beneficiaries (baseline families) and the communities around the proposed site must be implemented. If social conflict is too pronounced, an alternative site must be selected.</p> <p>Community development programmes must be implemented in each community, before or during the construction process.</p> | <ul style="list-style-type: none"> - Social baseline. - Community development. - Community organization. - Generation of capacities. - Community leadership. |
| 17. Lack of compliance with mitigation measures. | <p>17.1. Obligatory agreements must be out into effect, signed by the cooperation organizations that collaborate with the project before it begins.</p> <p>Each NGO must have a plan of environmental management to ensure compliance with the mitigation measures. Conduct an independent evaluation of the plan that will be carried out every year.</p> | <ul style="list-style-type: none"> - Percentage of local /municipal counterpart. - List of activities and responsibilities of the counterpart. - Chronogram of execution. - Plan of environmental management. |



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CONSTRUCTION

| Potential negative impact | Environmental considerations and mitigation measures | Environmental indicators |
|--|---|--|
| 1. Risk of injury to the construction workers and local inhabitants. | <p>1.1. Ensure the workers have the appropriate safety equipment and follow safety norms, including the use of safety ropes, safe use of explosives, protection against noise and dust, boots and gloves.</p> <p>Make sure that holes are covered or that access is restricted during construction.</p> <p>Excavate and refill ditches rapidly.</p> <p>Check hillsides to avoid landslides and subsidence.</p> <p>Construct appropriate drainage systems.</p> | <ul style="list-style-type: none"> - List of personal protection equipment (EPP). - Minuted reception/handing over of EPP. - System of construction, information and prevention signs. - Closure of the construction site. - Sanitary ID cards. - Duration of the excavations. - Cracking of the terrain. |
| 2. Interruption of local transport. | <p>2.1. Plan construction for days or hours of low traffic; organise construction so as to distribute/reduce the impacts of the road closure. Carry out the work in a way that permits at least one-way, alternate transit (half the road width).</p> | <ul style="list-style-type: none"> - Duration of road closure. - Route planning. - Alternate routes. - Public communication. - Opportune transport of materials. |
| 3. Cause noise. | <p>3.1. Use less noisy construction techniques, including a work timetable that reduces impact.</p> | <ul style="list-style-type: none"> - List of personal protection equipment (EPP). - Minuted reception/handing over of EPP. |
| 4. Produce dust or mud. | <p>4.1. For constructions in urban areas undertaken by contractors/subcontractors or construction companies: sprinkle water to avoid dust. Cover the construction sand with a canvas or plastic sheet to prevent the wind blowing it around the city. Drain muddy areas. Plan the cleaning of the area, excavations and similar activities to avoid extreme conditions, whether of humidity or dryness.</p> <p>Redesign or replace noisy equipment.</p> <p>Use silencers and vibration reducers.</p> <p>Of occupational and environmental noise must be controlled and checked in accordance with regulations concerning atmospheric contamination in Law 1333 (source, receptor, trajectory of propagation).</p> | <ul style="list-style-type: none"> - System of construction, information and prevention signs. - Closure of the construction site. - Sanitary ID cards. - Duration of the excavations. - Cracking of the terrain. - Work timetable. - Use of canvas or cover. |

| | | |
|---|--|--|
| 5. Form breeding-grounds for disease vectors. | <p>5.1. Dig and refill the ditches rapidly, and plan the appropriate final disposal of demolition rubble, far from streams or water courses. Optimise the movement of earth.</p> <p>Use materials that generate little residue; reuse building materials or use recycled material.</p> | <ul style="list-style-type: none"> - Duration of the excavations. - Instructions on opening and closing ditches. |
| 6. Cause erosion. | 6.1. Soil conservation measures must be included in the design and implemented during the construction. The exact measure will depend on the site and the severity of the impact. Install vegetation barriers to trap sediment. Revegetate affected areas. | <ul style="list-style-type: none"> - Physical, biological and structural barriers, gutters, agricultural retaining ditches, containing walls, gabions, etc. |
| 7. Lack of compliance with mitigation measures. | <p>7.1. Reach binding agreements between the organizations that collaborate on the project before beginning.</p> <p>Each executive organization must have an environmental plan to ensure conformity with mitigation measures. Conduct an annual independent evaluation of the plan.</p> | <ul style="list-style-type: none"> - Percentage of local counterpart/municipal. - List of activities and responsibilities of the counterpart. - Chronogram of execution. - Plan of environmental management. |

INHABITATION

| Potential negative impact | Environmental considerations and mitigation measures | Environmental indicators |
|--|---|--|
| 1. Inadequate practices among beneficiaries. | 1.1. If applicable, the executive organization must provide environmental and sanitary training for all the beneficiaries before they move house, including: environmental education for children, care for domestic animals, reforestation of green areas, appropriate use and maintenance of latrines, social interaction in housing projects, appropriate use and conservation of water, improved kitchen construction and use, etc. | <ul style="list-style-type: none"> - Training plan. - N° of workshops/meetings. - N° of inductions. - N° of trainers. - N° trained. - N° of demonstration events. - Field practices. - Forecasted future. - Posterior evaluation. |

6.2. Environmental mitigation plan

This document is similar to that stipulated in Environmental Law 1333 and is made up of a group of measures, works or actions, to be carried out with the aim of preventing, reducing, remediating or compensating for the negative effects previously identified. This instrument will contain, at least, a description of the mitigation measures, a chronogram of implementation and the estimated cost of corrective and preventive measures applicable to all the phases. Below details are given of all the mitigation and prevention measures that may be applied for each environmental factor, as applicable and relevant.

This list should be seen as a menu of mitigation measures that must be adapted in accordance with the context of the project.

Environmental factor: SOIL

| Prevention or mitigation measure | Cost | Responsible | Programmed (date) | Observations |
|--|------|-------------|-------------------|--------------|
| Collect documentation on land property rights | | | | |
| Draw up a thematic map of soil uses, zones of intervention, economic activities, proximity to sites of social, economic and ecological interest, etc. | | | | |
| Conduct a soil study for the ends foreseen. | | | | |
| Conduct an inspection of the terrain, collecting in situ data on slope/relief. | | | | |
| Draw up a chart of the presence of geophysical and environmental threats that includes: type, duration, frequency, impact, preventive measures, corrective measures and adaptation measures. | | | | |
| Draw up a descriptive thematic map of: surface deforested/to be deforested/to be reforested/to be revegetated. Include a plan of soil uses and hydrographical basins of interest. | | | | |
| Design and implement soil conservation measures: physical, biological, structural barriers, gutters, agricultural retaining ditches, containing walls, gabions, etc. | | | | |
| For excavations, control and minimize the duration time of works and apply protective measures to avoid falls. Ditches or unprotected open holes must not be left. | | | | |
| Other relevant measures. | | | | |
| Partial budget (SOIL) | | | | |

Environmental factor: WATER

| Prevention or mitigation measure | Cost | Responsible | Programmed (date) | Observations |
|--|------|-------------|-------------------|--------------|
| Conduct an analysis or study of the profundity of the aquifer. | | | | |
| Reset and redefine the final design of the water collection system. | | | | |
| Conduct laboratory tests and analysis of water quality, using the minimum parameters established in norm NB 512. | | | | |
| Conduct hydraulic tests of the water system. | | | | |
| Project and define the useful life and capacity of the water supply installations. | | | | |
| Re-draw and redefine the final design of the system of domestic discharges (consider soil data, annual precipitation, average precipitation, rainfall patterns). | | | | |
| Conduct hydraulic tests of the drainage system. | | | | |
| Project and define the useful life and capacity of the sanitary installations. | | | | |
| Other relevant measures. | | | | |
| Partial budget (WATER) | | | | |

Environmental factor: AIR

| Prevention or mitigation measure | Cost | Responsible | Programmed (date) | Observations |
|---|------|-------------|-------------------|--------------|
| Buy and use canvas sheets to cover building sand and materials, and protect it from inclement weather. | | | | |
| Gather data in situ on the orientation of the housing/direction of winds and factors relative to ventilation. | | | | |
| Carry out periodic maintenance of the vehicles used in the project. | | | | |
| Avoid the use of old or outdated machinery which is contaminant or energy-inefficient. | | | | |
| If using heavy construction machinery (grinders, bulldozers, excavators, etc.), control the work timetable of to avoid prolonged disturbance for local residents. Provide personnel with protective equipment such as ear-defenders, goggles and helmets. | | | | |
| Other relevant measures. | | | | |
| Partial budget (AIR) | | | | |

Environmental factor: FLORA and FAUNA

| Prevention or mitigation measure | Cost | Responsible | Programmed (date) | Observations |
|---|------|-------------|-------------------|--------------|
| Train personnel in good environmental practices and in protection of flora and fauna. | | | | |
| If applicable, draw up a revegetation and reforestation plan. | | | | |
| Other relevant measures. | | | | |
| Partial budget (FyF) | | | | |

ENVIRONMENTAL FACTORS: SOCIOECONOMIC and SOCIOCULTURAL

| Prevention or mitigation measure | Cost | Responsible | Programmed (date) | Observations |
|--|------|-------------|-------------------|--------------|
| Collect data on the educational sector: N° of schools, N° of rooms, conditions of infrastructure, proximity to the project, type of services, teacher / pupil relations, pupils/rooms, deficiencies and limitations. | | | | |
| Collect data on health sector: N° of centres, N° of rooms, conditions of infrastructure, proximity to the project, type of services, list of most frequent diseases, N° of doctors, deficiencies and limitations. | | | | |
| Gather demographic data: birth rate, mortality, fertility, migration, growth, urban expansion, etc. | | | | |
| Manage the logistics and implementation of show homes. | | | | |
| Collect information on the number and requirements of efficient / improved kitchens, type of energy source and percentage of use, thematic map of the radius of firewood collection, potential areas of reforestation or revegetation. | | | | |
| Design a community development plan that includes social organization and community leadership. | | | | |
| Design a training plan with organization of: N° of workshops/meetings, N° of inductions, N° of trainers, N° trained, themes dealt with, N° of demonstration events, field practices. | | | | |
| Other relevant measures. | | | | |
| Partial budget (SE and SC) | | | | |

Environmental factor: ENVIRONMENTAL SECURITY and SAFETY AT WORK

| Prevention or mitigation measure | Cost | Responsible | Programmed (date) | Observations |
|--|------|-------------|-------------------|--------------|
| If applicable, above all for contractors or construction companies: define the list and the budget for the purchase of personal protection equipment (EPP: helmet, overalls, boots, ear-protectors, goggles, harnesses, lifelines, first-aid kit). | | | | |
| Acquire the PPE and define a strategy for provision to personnel. Draw up provision lists or registers. | | | | |
| Handing of EPP to staff. | | | | |
| Implement an informative, preventive and protective system of signs, within and outside the work (works posters). | | | | |
| Demarcate and enclose or fence off the site perimeter; use corrugated iron, resistant fabric, bars, belts, etc. | | | | |
| Develop training or induction programmes for staff in matters of environmental security, safety at work and accident prevention. | | | | |
| Implement a strategy of communication with the local residents concerning the risks and dangers of the building work. | | | | |
| Draw up and implement an emergency plan. | | | | |
| Draw up a contingency plan. | | | | |
| Other relevant measures. | | | | |
| Partial budget (SAySL) | | | | |

ENVIRONMENTAL FACTOR: MANAGEMENT OF MATERIAL SUPPLY SITES AND STORES

| Prevention or mitigation measure | Cost | Responsible | Programmed (date) | Observations |
|--|------|-------------|-------------------|--------------|
| Identify the supply site and surface, collect data on proximity, conditions, general characteristics, etc. | | | | |
| Draw up a table of supplies of local and introduced materials with exact data on origin, programmed and utilised quantification. | | | | |
| If applicable, gather data on municipal authorisation requirements for intervention in supply sites. | | | | |
| Make a list of security and protection measures before, during and after the extraction of materials. | | | | |
| Quantify the percentage of generation of rubble, waste materials and refuse from construction within the project. | | | | |
| Define and locate the most appropriate sites for the final disposal of rubble and leftover building materials. If applicable, request municipal authorisation. | | | | |
| Identify the location of the stores, their surface area, collect data on proximity, conditions and general characteristics, etc. | | | | |
| Train those in charge of stores. | | | | |
| Take precautions and security measures if storing fuels | | | | |
| Other relevant measures. | | | | |
| Partial budget (GBP) | | | | |

6.3. Programme of Environmental Execution

Once the environmental plan is structured and the corresponding budget assigned, proceed to draw up a table of application and environmental follow-up. The examples given in the following table presents a format indicating the measure, the environmental factor concerned and those responsible for guaranteeing its compliance in qualitative and quantitative terms. Note that the written measures are simply examples, since each agency must define its own environmental measures according to its priority, its levels of applicability and its budgetary capacity.

Environmental factor: SOIL

| Measure | Programmed (date) | Executed (date) | Responsible for execution | Responsible for supervision | Responsible for inspection |
|-----------------------------|-------------------|-----------------|---------------------------|-----------------------------|----------------------------|
| Carry out a study of soils. | | | | | |
| | | | | | |

Environmental factor: WATER

| Measure | Programmed (date) | Executed (date) | Responsible for execution | Responsible for supervision | Responsible for inspection |
|---------|-------------------|-----------------|---------------------------|-----------------------------|----------------------------|
| | | | | | |
| | | | | | |
| | | | | | |

Environmental factor: AIR

| Measure | Programmed (date) | Executed (date) | Responsible for execution | Responsible for supervision | Responsible for inspection |
|---------|-------------------|-----------------|---------------------------|-----------------------------|----------------------------|
| | | | | | |
| | | | | | |
| | | | | | |

Environmental factor: FLORA and FAUNA

| Measure | Programmed (date) | Executed (date) | Responsible for execution | Responsible for supervision | Responsible for inspection |
|---------|-------------------|-----------------|---------------------------|-----------------------------|----------------------------|
| | | | | | |
| | | | | | |
| | | | | | |

Environmental factor: SOCIOECONOMIC and SOCIOCULTURAL

| Measure | Programmed (date) | Executed (date) | Responsible for execution | Responsible for supervision | Responsible for inspection |
|----------------|-------------------|-----------------|---------------------------|-----------------------------|----------------------------|
| | | | | | |
| | | | | | |

Environmental factor: ENVIRONMENTAL SECURITY and SAFETY AT WORK

| Measure | Programmed (date) | Executed (date) | Responsible for execution | Responsible for supervision | Responsible for inspection |
|----------------|-------------------|-----------------|---------------------------|-----------------------------|----------------------------|
| | | | | | |
| | | | | | |

ENVIRONMENTAL FACTOR: MANAGEMENT of MATERIAL SUPPLY SITES and STORES

| Measure | Programmed (date) | Executed (date) | Responsible for execution | Responsible for supervision | Responsible for inspection |
|----------------|-------------------|-----------------|---------------------------|-----------------------------|----------------------------|
| | | | | | |
| | | | | | |

6.4. Budgetary assignation

The aim of this form is to document budgets, according to budgetary assignations and programming outlay

| Item | Budget (Bs.) | Mode of finance | |
|---------------------------------------|--------------|-----------------|-----------------------|
| | | Financed (%) | Local counterpart (%) |
| Soil | | | |
| Water | | | |
| Air | | | |
| Flora and fauna | | | |
| Socioeconomic and sociocultural | | | |
| Environmental and work security | | | |
| Management of designated supply sites | | | |
| RR.HH. | | | |
| Operational costs | | | |
| General expenditure | | | |
| Budget total | | | |

6.5. Emergency plan

An emergency plan is the integral response that involves an entire institution, with the commitment of directives and employees in permanent action to respond opportunely and effectively in activities corresponding to the moments before, during and after an emergency.

| EMERGENCIES AT WORK | |
|--|--|
| INCIDENT | ACCIDENT |
| A work incident is an unplanned event in which an object is damaged without causing injury to personnel or damage to infrastructure. | A work accident is an unplanned and uncontrolled event which may result in injury to personnel or damage to objects or infrastructure. |

| EMERGENCIES AT WORK | |
|--|--|
| INCIDENT | ACCIDENT |
| An environmental incident is an event or situation in which a contaminant is introduced into the environment accidentally, intentionally or through negligence, altering and harming the quality of some natural resource or the quality of life of the citizenry. | An environmental accident is an unexpected and undesirable event that has a direct or indirect effect on the health and security of the population, or has a severe impact on the environment. |

In order to develop an emergency plan it is necessary to have prior knowledge of the possible effects to which the project, work or activity is vulnerable. Once the risks are known the procedure is to evaluate them and determine the zones that may be affected, as well as the number of people threatened by the risk.

The objective of the emergency plan is to define procedures by which to act in case of disaster or collective threat, and to develop skills and conditions in the people that permit them to respond rapidly and in a coordinated manner when faced with an emergency. The objectives of the emergency plan are:

- Avoid or minimise injury and losses that may be caused to employees and third parties.
- Avoid or minimise damages that may be caused to the property and installations.
- Avoid or minimise harm that may be caused to the community as a consequence of the interruption of activities and services.
- Contain and control emergencies so as to re-establish the operation (production).
- Avoid or minimise economic losses.

6.6. Contingency plan

These are plans that public and private institutions, and the citizenry, must act upon so as to handle emergencies, as soon as the presence is detected, or the possibility is noticed, of a given phenomenon considered dangerous for the normality of life of a territory, activity, work or project.

The objectives of the contingency plan are to:

- Analyse, evaluate and prevent risks in the building activities.
- Avoid or mitigate injury that emergencies may cause to personnel and third parties.
- Avoid or minimise the impact of accidents on health and the environment.
- Reduce or minimise economic losses and damages to the infrastructure of the project.
- Train staff permanently in risk prevention and offer training to act in response to emergency situations.

Make known the procedures to be followed during emergency response operations-

In order to meet these objectives it is necessary to carry out or prepare the following:

1. Organise first aid and rescue brigades to deal with fires, spills, leaks, floods, landslides, intense rains, strong winds, etc.
2. Draw up a list of protective equipment. Some examples: 12 Kg portable extinguishers, with external cartridge, type ABC, loaded and up to date, cylindrical sand containers, first aid kit, alarms, sirens, whistles, emergency lights, fluorescent and fire-resistant uniforms, masks, oxygen cylinders, signs for evacuation routes, ropes, torches/flashlights, absorbent barriers, oleophilic fabric, stretchers or equipment for rescuing the injured, etc.
3. Design a communication system to deal with emergencies. Some examples: types of alert signal and alarms to be used in each case, according to the means available: if sirens, bells or prolonged whistles are heard, they indicate an alert. The sounds of sirens, bells, short-burst whistles and intermittent whistles, are alarm signals.



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Chapter 7 EXECUTION PHASE

As mentioned previously, it is during this phase that the project materialises physically. Here, the property defined in the project study is constructed, machines are installed and the necessary equipment put in place. The conditions and characteristics established in previous studies must be respected in the project execution.

7.1. Chronogram of implementation of mitigation measures

The executive institutions must programme the implementation of environmental mitigation measures for each of the environmental factors, in accordance with the work's constructive planning. The following format is a base example to represent this process and above all to visualise the needs for control and environmental monitoring.

| Nº | Mitigation measures | Period of execution (in months) | | | | | | | | | | | | | |
|----|---|---------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1 | Soil: | | | | | | | | | | | | | | |
| 2 | Air: | | | | | | | | | | | | | | |
| 3 | Flora and Fauna: | | | | | | | | | | | | | | |
| 4 | Water: | | | | | | | | | | | | | | |
| 5 | Environmental Security and Safety At Work: | | | | | | | | | | | | | | |
| 6 | Socioeconomic And Sociocultural: | | | | | | | | | | | | | | |
| 7 | Management Of Designated Supply Sites And Stores: | | | | | | | | | | | | | | |

The marked boxes refer to the programming of environmental monitoring or environmental supervision, with the corresponding submission of reports.

7.2. Environmental monitoring and follow-up

The checklist inserted below is also a form that must be adapted and filled in by each executive institution, with the aim of documenting and evaluating compliance in the implementation of environmental measures, as well as their quality and efficiency.

**Checklist
ENVIRONMENTAL MONITORING**

Project:
Place:
Date:
Period of the report:
Drawn up by:

| Nº | Mitigation measures | YES | NO | NA | Comments or recommendations |
|----|---|-----|----|----|-----------------------------|
| 1 | Soil: | | | | |
| 2 | Air: | | | | |
| 3 | Flora and Fauna: | | | | |
| 4 | Water: | | | | |
| 5 | Environmental Security and Safety At Work: | | | | |
| 6 | Socioeconomic And Sociocultural: | | | | |
| 7 | Management Of Supply Sites And Stores: | | | | |
| | Total | | | | |
| | Percentage Of Compliance: | | | | |

1. general summary of environmental monitoring:

2. verification mechanisms enclosed:

| | | | |
|-------------------------------------|--------------------|-------------|--------------------|
| Person environmentally responsible: | Director of works: | Supervisor: | General inspector: |
|-------------------------------------|--------------------|-------------|--------------------|

7.3. Environmental management report

The person responsible for the environment will draw up monthly reports on the application of the programmed mitigation measures and their follow-up. The format of the report will depend on each executive agency; however it will have to contain, as a minimum, the following points:

1. General information.
2. Brief description of the month's activities.
3. Compliance with prevention and mitigation measures.
4. Verification mechanisms and photographs.
5. Other identified environmental impact.
6. Corrective and preventive actions.
7. Conclusions and recommendations.



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Chapter 8 CLOSING PHASE

8.1. Balance of environmental management

This document contains all the instruments of environmental management to be applied from the beginning of the constructive phase to its culmination. It serves to evaluate the degree of compliance and institutionalisation of the environmental component in infrastructure projects.

BALANCE of ENVIRONMENTAL MANAGEMENT

Project:
Place:
Date:
Period of the report:
Drawn up by:

| Nº | Instruments of management | YES | NO | NA | Comments or recommendations |
|----|---|-----|----|----|-----------------------------|
| 1 | Social baseline | | | | |
| 2 | Environmental baseline | | | | |
| 3 | Preliminary evaluation of the project | | | | |
| 4 | Programme of prevention and mitigation | | | | |
| 5 | Plan of environmental application and follow-up | | | | |
| 6 | Budgetary assignation form | | | | |
| 7 | Guide to good environmental practices | | | | |
| 8 | Technical environmental specifications | | | | |
| 9 | Emergency plan | | | | |
| 10 | Contingency plan | | | | |
| 11 | Environmental monitoring | | | | |
| 12 | Environmental management report | | | | |
| 13 | Total | | | | |
| | Percentage of compliance | | | | |

1. general summary of the environmental management of the executive institution:

2. verification mechanisms enclosed:

Person environmentally responsible:

Director of works:

Supervisor:

General inspector:

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Chapter 9 GLOSSARY

Alert: A warning given of the possible occurrence of a disaster or emergency, with the aim of allowing rescue organisms to activate action procedures previously established in contingency plans, and so that the threatened population can take specific precautions if faced with the imminent occurrence of a dangerous event.

Threat: The external factor of risk, represented by the potential occurrence of a natural event, or one generated by human activity, that can be manifested in a specific place with a given intensity and duration.

Environmental quality: The degree to which the current or foreseeable state of some basic component permits the environment adequately to perform the system functions that govern and condition the possibilities of life on Earth. This degree cannot be quantified, only qualified on the basis of a value judgement.

Emergency: A situation created by the real or probable imminent presence of a potentially dangerous phenomenon, one which has already emerged, is emerging or may arise, producing grave damages or alterations in the normal living conditions in a geographically-determined area.

Endemic species: An endemic species is one that only exists in a given geographical zone, of variable size, but generally restricted in comparison to the size of the areas inhabited by comparable species.

Environmental evaluation: This is an integrated process aimed at evaluating the conditions and tendencies of the environment using vigilance, the interchange of information, research, evaluation and revision. The results of these efforts will serve as a basis for later policy decisions to be followed (PNUMA, 1977).

Habitat: The physical place, such as a desert, forest or tree, where a plant or animal lives and which is usually described by its physical characteristics. It is the residence, place or area where an organism lives with all its factors; it may also include the immediate surroundings that occupy this space. It is the natural ambience for an organism, the place where it grows, is normally found or naturally inhabits. It is the vital space occupied by a species or individual, taking into account the group of environmental conditions which act upon it, such as microclimate, soil and biotic factors.

It is made up of a group of elements (both physicochemical and biotic) that constitute the "environment" of an organism or of a population; this is habitat in the "broad" sense, similar to (or having similar tendencies to) environment. However, in ecology it is often used in a restricted sense, referring in particular to the physical-chemical (abiotic) environment. It is not a synonym for "ecological niche". It is a zone or part of an ecosystem that contains all the living conditions that a given species needs to survive; a situation (or a combination of ecological factors) where a plant or animal lives.

Negative impact: Environmental impact whose effect is manifested in loss of value in various categories: natural, aesthetic-cultural, landscape, ecological productivity or increase in damages deriving from contamination, erosion, silting and other environmental risks in discord with the ecological-geographic structure, the character and the personality of a given zone.

Mitigation measures: A group of actions involving prevention, control, attenuation, restoration and compensation of negative environmental impact. These measures must accompany the development of a project, ensuring the sustainable use of natural resources and protection for the environment. The mitigation measures may be implemented before, during or after the execution of the project or action.

Emergency plan: A plan that is formulated upon the identification of the existence of a risk high enough to affect normal life in a given area, due to the presence of a dangerous phenomenon of natural, human, technological or environmental origin.

Contingency plan: Plans that must be acted upon by public and private institutions, and the citizenry in order to handle emergencies as soon as the presence is detected, or the probable presence is announced, of a given phenomenon that is considered dangerous for normal life in a given area.

Risk: the probability that an event exceeds a specific value of social, environmental and economic damage in a certain place and during a given time. Whenever certain factors are present in a place (threat-vulnerability) the possibility exists that the risk will become reality.

Vulnerability: the internal risk factor of a subject, object or system exposed to a threat, which corresponds to its intrinsic propensity for damage, because there is a weakness or incapacity to resist the phenomenon.

10

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APPENDICES

APPENDIX 1:

Emergency telephone directory:

| Emergency service | Location/Address | Contact telephone numbers |
|--------------------|---|---------------------------|
| Fire Service | Alarm centre | |
| | Station 1 | |
| | Station 2 | |
| Police | 110 | |
| | PAC (Citizens' Aid Police) | |
| | Local Radio Patrol | |
| | Private physical security | |
| | Neighbourhood security | |
| Vigilance | Night Watchman Service | |
| Public services | Drinking water and sewage | |
| | Electric power | |
| | Refuse collection | |
| | Local, national and international telephone service | |
| | Maintenance of equipment | |
| Health services | Red Cross | |
| | Medical insurance | |
| | Hospital | |
| | Clinic | |
| | Health centre | |
| Municipal services | Civil defence | |
| | Emergencies and natural disasters | |
| | Basins authority / directorship | |
| Other services | Navy | |
| | Air Force | |

APPENDIX 2:
Incident report

Date/time of the incident: _____

Date/time of the report: _____

Place of the incident: orientation/distance: _____

Origin of the report: _____

Contacts: Telephone: _____ Fax: _____

Nature and origin of the incident: _____

Confirmed: Yes / No _____

Dangerous substances used at the place: _____

If people were injured, state how many and how seriously: _____

Identification and position in the surroundings: _____

Nature and degree of damage: _____

Samples taken /Photographs: _____ Agency/Organization: _____

Details of the situation: _____

Contacts: telephone: _____ Fax: _____

Action(s) taken: _____

Details of equipment used: _____

Additional information: _____

APPENDIX 3:

Example of contingency plan for the operation phase

| Possible Problem | Alert Signal | Actions to be Taken | Observations |
|--|--------------------------|---|---|
| Spills of contaminants (fuels, oils and chemical or organic products) into the soil. | Occurrence of the event. | <p>Extraction of contaminated soil with sand.</p> <p>Disposal in containers and labelling.</p> <p>Move for disposal at authorised dump, or for eventual reuse.</p> <p>Fill in the excavation with clean material.</p> | <p>A specially designated and conditioned place should be prepared for carrying out repair and maintenance of the plant's equipment and the group generator.</p> <p>For accidental spills of fuel or discarded oils, the group generator's design should make provisions for their collection and extraction, so as to dispose of these materials in sealed recipients at places authorised to take this type of waste.</p> |

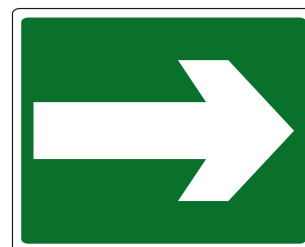
APPENDIX 4:
System of signs for accident prevention

SAFETY COLOURS
CHART 1



| COLOR DE SEGURIDAD | FORMA GEOMETRICA | | |
|--------------------|------------------|-------------------------|---|
| | CÍRCULO | TRIÁNGULO EQUILÁTERO | RECTÁNGULO O CUADRADO |
| ROJO | PROHIBICIÓN. | | EQUIPO DE LUCHA CONTRA INCENDIOS. |
| AMARILLO | | ATENCIÓN PELIGRO. | |
| VERDE | | | ZONA DE SEGURIDAD, SALIDA DE SOCORRO, DISPOSITIVOS DE SOCORRO, PRIMEROS AUXILIOS. |
| AZUL | OBLIGACIÓN. | | INFORMACIÓN O INSTRUCCIÓN |

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