



**PUNTLAND EMERGENCY RESPONSE
PROJECT**



FINAL REPORT

**Environmental Impact Assessment
of Berkaads**



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Map of Puntland State of Somalia

This Environmental Impact Assessment Report meant to examine the effects of berkads on the environment in Qardo, Lasqorey, Boocame and Garowe Districts, Puntland state of Somalia, was commissioned by CARE Somalia.

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EXECUTIVE SUMMARY

This study was commissioned by CARE Somali in order to examine the effects of berkads on the environment. The scope of the assignment largely covered the following areas: baseline conditions, legal and policy framework, significant environmental impacts, identification and mitigation of environmental and social impacts associated with berkaads, analysis of alternatives, public and stakeholder consultations.

The methodology involved in this study included: mobilization and planning; desk review of documents; field data collection; project data synthesis; public consultation forum; focus group discussion; consultancy debriefing session. A number of stakeholders from both the government ministries and the community were consulted for their inputs to the study through public meetings and key informant interview. The applied accepted field methodologies for data collection included focus group meetings and discussions, key informant interviews and field visits to the project area.

The assessment involved review and analysis of available data and literature on existing water supplies. Interviews were conducted in Puntland with key players in the water sector. Field visits to some berkaad points was also conducted in Libah-xar, Guudcad in qarddho district karkaar region, Midigalle, Rad in laasqorey district Sanaag region, Dan in Bocame District Sool region , and Ceelwacayseed in Garowe Dsitrict in Nugaal Region Villages to see the condition of the water sources and to interview communities.

The major findings from the study identified from this study identified major environmental and social impacts of berkaads that include: (a) Increase in water borne diseases such as malaria, bilharzia, typhoid and dysentery due to poor water handling practices and contamination of water by animal droppings; (b) Water use conflicts which is common during the dry periods when there is scarcity of water; soil erosion caused by overcrowding of livestock in berkaad areas thus leading to loosening of soil; (c) Loss of bio-diversity due to depletion of vegetation and cutting of grass and trees to cover and fence the berkaads; (d) Human-wildlife conflicts due to competition for water sources between humans and wildlife during the dry periods.

The analysis of these impacts showed that they can be easily mitigated for. Table 1 includes mitigation measures to reduce further the likelihood and magnitude of such impacts.

Table 1: Summary of main mitigation measures

Impact	Mitigation Measures
Increased Spread of Water Borne Diseases	<ul style="list-style-type: none"> - Frequent survey of health records in Health Care Facilities (HCFs) to ascertain the spread of malaria. - Capacity building to equip communities with appropriate technology to manage water sources. These should include training on hygiene standards both at water sources and within homesteads - Fencing of the berkaad sites in order to restrict access of animals into the berkaads. - Roofing of berkaads to reduce evaporation, as well as curbing mosquito breeding and algal development.
Water use conflicts	<ul style="list-style-type: none"> - Promote creation of water users associations (WUAs) to assist in resolution of any conflicts. - Establishment of grievance re-dress mechanism for water use related conflict resolutions based on customary laws. - Alternative water sources should be explored in order to reduce competition over the few existing water sources. This can be in form of boreholes and other rainwater harvesting structures. - Involvement of local leadership in location of berkaad sites
Soil erosion	<ul style="list-style-type: none"> - Restricted livestock access near the berkaads or other water sources in order to reduce depletion of vegetation and loosening of soils around the berkaads. - The design of berkads should incorporate silt traps in order to reduce sediment loads which reduce the water storage capacity. - Promote soil conservation measures in berkaad areas through the use of check dams, gabions and cut-off drains.
Loss of Biodiversity	<ul style="list-style-type: none"> - Livestock watering points should be located away from the berkads. - Promote the use of stones to fence the berkaads instead of using trees to fence the area. - Promote the use of iron sheets in covering of Berkads instead of grass and tree branches. - Berkaads should not be located in the grazing lands.
Human- wildlife conflicts	<ul style="list-style-type: none"> - Restrict movement of wildlife through fencing - Earth dams or water points should be constructed in areas occupied by wild life. This will reduce the movement of wildlife into to the villages in search of water. - Berkaads should be fenced and completely covered to prevent wildlife access to water

In order to ensure the proper mitigation and monitoring of the potential negative environmental and social impacts of the berkaads, an environmental and social management system must be implemented. This management plan shall ensure regular monitoring of impacts and compliance. Some of the proposed means of monitoring of the identified impacts include: frequency of occurrence of waterborne diseases ; health status of local people; water quality measurements; frequency of water use conflicts; erosion/sedimentation loads in berkaads and other water bodies; vegetation degradation rates in berkaad areas; and reported cases of wildlife in the villages. There shall be need for organized record keeping in order documenting monitoring efforts.

The project alternatives considered include the “no project” alternative and alternative water sources. The “no project” alternative would mean the discontinuation of berkaads and result in the area being

retained in its existing form. This is likely to have the greatest implication on fresh water availability during the dry seasons. Thus, this alternative is not recommendable.

On alternative water sources, boreholes are the most recommended source of water in the area. The existing boreholes are sources of sustainable water throughout the year even during the extreme dry spells when there is no water in the berkaads. It is therefore recommended that before drilling of the boreholes there would be need to conduct a hydrogeological survey studies in order locate the most appropriate areas for drilling. Some of other proposed sources of alternative water could be inform of sub-surface water tanks and storage dams. Dams have higher water holding capacities than berkaads and if adopted, they could boost water supply during the dry season.

The study established that Berkaads are important sources of freshwater security for domestic use in households. However, in the long run, dams are more economical than berkaads, considering the cost of water purchased when the latter dry out shortly after the end of the rains for both domestic and livestock use. Dams constructed next to rivers or streams can serve as flood control structures by holding excess water during flood periods, and later releasing the water for use during dry periods.

Recommendations made with respect to the EIA study of berkaads in puntland are as follows:

1. The priority in Puntland should focus not only in establishing new Berkaads points, but on rehabilitating the existing ones in order to reduce the rates of contamination and loss of water through leakage. Rehabilitation can be inform covering with iron sheets or concrete, fencing with stones to restrict access and repairing cracked Berkaads surface to prevent leakages.
2. Personal Berkaads are environmentally sound and sustainable. This is because they are better-managed than communal Berkaads, partly because of limited resources but also due to lack of ownership, and mistrust in public sources. For sustainability of water projects, rural communities should be well-involved into project/s right from inception. Such projects should be community needs-based, rather than donor imposed.
3. Capacity to establish and manage sustainable water sources in Puntland is lacking. Capacity building is required to equip communities with appropriate technology to manage water sources. These should include training on hygiene standards both at water sources and within homesteads.
4. There should be restricted livestock access near the Berkaads or other water sources. This will reduce depletion of vegetation and loosening of soils around the Berkaads.
5. The rate of Berkaad failure is alarming. The high failure rate is attributed to poor construction and maintenance routines. There is a need for development of standard guidelines to be used for location of Berkaads (away from pasture and grazing land), construction and operation of Berkaads in the villages The design of Berkaads should incorporate silt traps in order to reduce sediment loads which reduce the water storage capacity. Customary laws that safe guard the environment should be promoted and integrated into the project design and operation.

6. Berkaads should not be concentrated in one area but rather be dispersed in order to reduce environmental degradation of the area brought about by cumulative impacts.
7. An integrated approach to provision of safe water should be adopted, incorporating other hygiene practices. Covering Berkaad surfaces to protect them from direct infection by human and animal faeces should be promoted. This will reduce the cases of water borne disease which are rampant in the villages. The recommended covering material is iron sheets because of their durability and also to decrease clearance of vegetation as covering media.
8. The combined use of Berkaads by livestock and humans poses evident hygiene risks. Most Berkaads are unprotected, thus increasing the risk of water contamination and accidents leading to death of either humans or animals. This will require the fencing of Berkaads to restrict access. In order to reduce the clearing of trees, Berkaads should be fenced using stone.
9. Women are sidelined in the decision making and management of water sources. Therefore, the community should be sensitized on mainstreaming gender equality in the management of water sources.
10. There is need to explore alternative water sources in Puntland as a way of solving frequent water shortages and water use conflicts during the dry season. The alternative water sources recommended include boreholes and water storage dams.
11. The Operation and Maintenance of the Berkaads should comply with the Best Water Use Practices and the principles of environmental management including the principles of sustainability, intergenerational equity, prevention, precaution, polluter pays and public participation.
12. CARE Somalia and identified government officials are required to strictly adhere to the provided ESMP including the continuous evaluation and adaptation of this plan during the course of Berkaad construction and operation.
13. A complete audit should be undertaken upon decommissioning of berkaads in order to ensure that all the proposed mitigation measures during decommissioning have been complied.

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LIST OF ACRONYMS AND ABBREVIATIONS

CARE	Cooperative for Assistance and Relief Everywhere
ECHO	European Commission Humanitarian Operation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
PERP	Puntland Emergency Response Project
WUA	Water Users Association
MDGs	Millennium Development Goals
WDA	Water Development Agency
PSAWEN	Puntland State for Water, Energy and Natural Resources Corporation

CHAPTER 1: INTRODUCTION

1.1 Background

This Environmental and Impact Assessment (EIA) was primarily aimed at examining the effects of berkaads on the environment. In this regard the environment includes all relevant aspects of the natural and human resources. The study was meant to evaluate the effects on human health, society, the natural environment and on property and will utilize a multi-disciplinary approach.

Berkaads are cemented reservoirs to collect rainfall run-off water whose design were inspired by Engineer Laurance's open water reservoirs (waro/Bali) constructed along the border region with Ethiopia in the 1950s, to open the waterless rich Haud pasture land for extended grazing period for the nomads. There are many complex issues surrounding the use and rehabilitation of berkaads. On one hand, they are said to cause environmental damage when numerous through the spread of village settlements without any government regulation; the Government therefore prefers fewer but larger berkaads. However, bigger berkaads have maintenance problems and the repairs may be beyond the ability of the local community. Berkaads have created serious health problems by extending the mosquito season as an all the year round occurrence and hence the spread of malaria as a major disease in the rural areas as well as posing major sanitation problems. In addition, berkaad construction has often been cited as the source of most rural conflicts. Constructing a berkaad in a common pasture land is the preferred method of turning it into a clan claimed territory and therefore the harbinger of conflicts. *(Source TOR)*

Issues of ownership and water quality also exist and placement of berkaads is also an issue. Whether to construction berkaads in grazing areas or smaller rural settlements is a point of contention. Yet, many villages only get water from these structures. These and many other issues necessitate a study to guide future development of such water points.

It is upon this background that CARE Somalia commissioned this study in order to review different aspects of berkaad use and come with recommendations/guidelines for future use.

1.2 Objectives and Scope of the EIA Study

The main objective of the EIA study was to examine the effects of berkaads on the environment. This included all relevant aspects of the natural and human resources and the evaluation of the effects on human health, society, the natural environment and on property and will utilize a multi-disciplinary approach.

In addition, the EIA was meant to:

- (i) Fulfill the legal requirements, as outlined in the relevant ECHO policies and guidelines and Puntland state legal requirements for s as well as international best practices.
- (ii) Produce a material output that presents a comprehensive background to the project (effects of Berkaad on the environment) and one that will satisfy both CARE and ECHO.
- (iii) Obtain and define the baseline data for comparison during future environmental auditing and monitoring procedures of Berkaad projects;
- (iv) Identify and detail potential positive and negative environmental impacts that occurs as a result of the Berkaad construction and operation;
- (v) Consult all stakeholders and affected people;
- (vi) Formulate recommendations to advice the project proponent (ECHO and CARE) on the appropriate measures needed to reinforce positive impacts and minimize any negative impacts during construction, maintenance and for the period of operation of Berkaads. This will be done to ensure that the project incorporates adequate protection for the environment, and the essential interests of local communities.

The EIA addresses the following issues:

- (i) **Policy framework:** This includes the description of the policy and legal basis within which the project is to be implemented, making reference to relevant ECHO policies and guidelines and Puntland state legal requirements.
- (ii) **Significant environmental impacts** including long term and short term, minor, moderate and severe, direct and indirect, and select the manageable, significant impacts based on magnitude, significance, extent and special sensitivity.
- (iii) **Socio- economic analysis** including the characteristics of the existing location and he impacts of berkaads on the socio-economic environment. The analysis includes the use of land, the main economic activities, governance structures, migratory patterns etc. Analysis also examines traditional usage/management systems for berkaads and those established by aid agencies
- (iv) **Analysis of alternatives** and detailed analysis of the impacts associated with each alternative.
- (ii) **Mitigation plan** for each potential adverse impact showing the plan for mitigation at each stage of the project and cost assessed.

CHAPTER 2: METHODOLOGY AND REPORTING STRUCTURE OF EIA STUDY

2.1 Methodology of EIA Study

2.1.1 *The Approach of EIA Study*

This Environmental Impact Assessment Study was prepared in compliance with ECHO policies and guidelines and Puntland state legal requirements as well as international best practices.

Preparatory meetings were held with key stakeholders at various stages of the assignment. The consultant reviewed existing related legislation and regulations in Puntland. The review of literature was to compliment field survey data. During the site visits, some comprehensive field survey data on the Berkaads and its environs was collected. The field survey was based on pre-determined parameters and acceptable methodologies used in environmental and social impact assessment. Field surveys included observations, public meetings and interviews with key informants, and assessment of extent of environmental degradation and conservation in Qardo, Lasqorey, Boocame and Garowe Districts of Puntland state of Somalia.

The overall objective of the assessment was to get the views and hear the voices of members of the local community on the positive and negative impacts of the Berkaads and suggest possible mitigation measures. The key issues which have been addressed in the assessment include changing social networks, economic opportunities, cultural beliefs and practices, community water supply infrastructural development, emerging scenarios with project and community consultation and participation.

2.1.2 *Mobilization and Planning*

At the commencement of the study, the consultant met with personnel from the proposed project of CARE Somalia to discuss and agree on the scope of work, confirm the consultant understands of the TOR and agree on the proposed methodology. The consultant presented his detailed program of work in order to agree on specific timing for various inputs, progress meetings and reporting dates.

2.1.3 *Desk Review of Documents*

The consultant reviewed all the relevant available documents on project activities and components from the client. The consultant also reviewed all the available and relevant internal environmental guidelines, put in place by CARE Somalia and recognized guidelines and standards.

2.1.4 Field Data Collection

The consultant conducted field visits to Qardo, Lasqorey, Boocame and Garowe Districts to obtain further data and consult with the stakeholders. The consultant established the nature of the surroundings including: existing infrastructure, economic and social set up of the local communities whose normal daily activities are affected by the Berkaads.

During the field study, the consultant collected existing information and administered interviews with a view to determining the environmental impacts on the day to day activities of the community due to the Berkaads in the areas.

2.1.5 Project Data Synthesis

The consultant thereafter interpreted and used the data collected to prepare a comprehensive environmental management plan (EMP) encompassing the potential negative environmental impacts, mitigation measures and monitoring indicators. The EMP is incorporated in this report.

2.1.6 Public Consultation Forum

The consultant organized and convened public consultation meetings in the five villages of Puntland including Qardo, Lasqorey, Boocame and Garowe Districts. Views from the focus group discussions in this fore have been compiled and form part of the main report.

The GPS coordinates of villages visited is as follows:

Table 2: The GPS coordinates of villages visited

Village	Location	Elevation (Altitude)
Midigalle Village	N 10° 40' 59.8", E 048°39' 23.8",	848m
Rad village	N 10° 43' 13.5", E 048°33' 24.5",	893m
Libah-xar	N 09° 29' 18.60", E 049° 23' 25.31"	677m
Gudcad	N 09° 46' 44.10", E 049° 12' 49.50"	677m
Dan	N 08° 09' 14.30", E 047° 40' 37.50"	758m

2.2 Reporting Structure of EIA Study

The scope of this study complied with the provided TOR and also conformed to the provisions for and Puntland state legal requirements. This project report represents the findings of the EIA and contains a description of the project environment, baseline environmental Information, analysis of project alternatives, positive and negative environmental impacts and mitigation measures, an environmental and monitoring management plan (EMMP).

The reporting structure of the Environmental Impact Assessment report is as follows:

- Chapter 1:** Provides an introduction to the project and sets out the background and rationale of the study.
- Chapter 2:** Describes the Methodology and Reporting Structure of EIA Study.
- Chapter 3:** Presents the project setting.
- Chapter 4:** Outlines the environmental policy, legislative and administrative framework in Puntland
- Chapter 5:** Describes the consultations and public participation. The objectives, methodology, a summary of stakeholder's comments
- Chapter 6:** Describes the significant environmental impacts and mitigation measures of the berkaads
- Chapter 7:** Presents an Environmental Management Plan (EMP) showing the negative impacts, mitigation measures, responsibility, monitoring means, frequency of monitoring and cost estimates.
- Chapter 8:** Describes the analysis of alternatives
- Chapter 9:** Presents the conclusions and recommendations of the study.

CHAPTER 3: PROJECT SETTING

This chapter presents a brief account of the environmental and social setting in Puntland, with the purpose of creating an understanding of the general conditions one is likely to find in the project areas.

3.1 Geographical Location

Puntland State is geographically located in the eastern portion of Somalia. It borders with northwest regions of Somaliland in the west, Gulf of Aden in the north, Indian Ocean in the southeast, central regions of Somaliland in the south and Ethiopia in the southwest. The total area of the State of Puntland is 212,510 sq km (roughly one-third of Somalia's geographical area). In 1998, political leaders declared it an autonomous region which in future they hope will be part of a federal united Somalia.



Figure 1: Map of Puntland State

3.2 Climate

The climate of the State of Puntland is semi arid: warm with average daily temperatures range from 27 ° C to 37 ° C. This favours pastoralism as the most effective use of land in most parts of the State.

The most valuable pastures include the Hawd region in the high plateau to the west of Mudug and Sool regions and into Ethiopia and the low Nugal valley. In contrast, it is only along the high mountain ranges of Bari that mild temperatures are experienced. In all other parts, the State generally endures tropical desert heat.

Rainfall is variable and sparse with no one area receiving more than 400mm of rain annually. Therefore, nomads rely primarily on wells as a water source rather than surface water.

There are four main seasons dictated by shifts in wind patterns. Pastoral and agricultural life revolves around these seasons. These are:

- ⇒ Jilal from January to March, the harshest dry season of the year;
- ⇒ Gu is the main rainy season from April to June;
- ⇒ Xagaa from July to September is the second dry season;
- ⇒ Dayr is the shortest and less reliable rainy season, lasting from October to December.

3.3 Natural Resources

Puntland State of Somalia remains one of the very few areas in the world that has vast untapped potential for the discovery of significant reserves of hydrocarbons and world class mineral deposits. The current government of Puntland is focusing on encouraging foreign investors to explore and exploit the vast untapped natural resources of Puntland.

The marine resources are very important; the fish population in Puntland's coastal waters varies in diversity and density. It is known that the prevalent species are large pelagic varieties such as yellow fin tuna, long-tail tuna, bonito, skipjack, and Spanish mackerel, while the main commercial demersal fish are groupers, snappers and sea bream. Large populations of shark and ray are also registered. Commercial populations of inshore spiny lobster (genus *panulirus*), and offshore types of *Puerulus Sewell* and *Puerulus Carinatus* are found at depths of 150-400 metres. The abundance of marine resources, characteristic of Puntland's coastal zones by virtue of its geographical location, has also exposed Puntland's marine resources to the risk of deterioration. These risks are attributed to factors such as an existing marine transport network, over-harvesting carried out by illegal foreign trawlers and increased fishing efforts of the local people of Puntland.

3.4 Administration

The northeast region of Somalia has, since mid-1998, been referred to as the Puntland State of Somalia. The structure of Puntland State consists of the Legislative (House of Representatives), the Judiciary, and the Executive (the President and Vice-President and his nominated Council of Ministers). As stipulated in Article 1 of the Transitional Constitution, Puntland is a part of an anticipated Federal State of Somalia. It is striving for the unity of the Somali people and the creation of a Somali government based on a federal system. The Puntland State consists of the following seven regions: Bari, Nugal, Mudug, Sanaag, Sool, Ayn, and Karkaar.

The capital of the Puntland State of Somalia is Garowe, with an estimated population of 50,000. Other major towns are Bossaso, Galcaio, Las Anod, Qardho, Baran and Buhoodle. The major port of Puntland State of Somalia is Bossaso Port.

3.5 Economy

There are four main sources of revenue in Puntland today: Livestock, frangasance (Maydi), Fishery, Agriculture and Remittance. The population mainly depends, either directly or indirectly, on livestock products for their livelihood. The livestock sector dominates the economy of the Puntland regions. The livestock products not only contribute to the livelihood of the nomads, but are also a substantial portion of the daily food intake of the population living in rural and urban areas. Livestock exports contribute to approximately 80% of foreign exchange earnings, 40% of the GDP and 60% of employment opportunities.

The fishing industry provides direct employment to thousands of people during the eight-month fishing season, as well as indirect employment for people working in restaurants and enterprises. During the fishing season, temporary settlements are created along the coastline where women take goods for sale to earn income. The fishing industry is ranked as the second highest income earner for the population of Puntland, after livestock.

Remittance from the Diaspora has also played a major role in the economy.

Lack of access as a result of poor infrastructure, particularly roads, is inhibiting Socio-economic development in the region. There is an urgent need to build roads and communication facilities so that rural areas do not remain cut off from the rest of the outside world.

Puntland is facing rapid urbanization, which is creating another vulnerable group – the urban poor. This group includes destitute pastoralists, economic migrants and people who are unable to make ends meet through lack of livelihood opportunities. Private sector business remains relatively limited so there are few employment opportunities.

3.6 Population

The population of Puntland State is estimated at 2.4 million, of which 65% are nomadic. The population growth rate of Puntland State is relatively high due to the influx of people from war-torn southern Somalia and from neighbouring countries. Currently, 30% of the Puntland population lives in the fast growing towns of Bossaso, Qardho, Las-Anod, Garowe, and Galcaio. Approximately 70% of the population is below the age of 30.

3.7 Social Aspects

In Puntland the society is organized into clan families. Islam is the religion of Puntland. Virtually all the people are Sunni-Muslims. The official languages are Somali and Arabic. English and Italian are also spoken in Puntland.

Internally Displaced Persons (IDPs) and returnees occupy the major towns particularly Bossaso, Galcaio, Garowe and Qardho. It is estimated that up to 60,000 IDPs are languishing in IDP settlements in the major towns of Puntland with contaminated water and no sanitation facilities, lack of access to basic social services, rampant disease and regular outbreaks of fire/arson. However, there is a very active inter-agency IDP working group consisting of UN agencies, NGOs and local partners who are providing assistance to the Puntland authorities on the provision of humanitarian assistance to IDPs in Bosasso and Garowe, as well looking at the implementation of longer term responses which focus on IDP reintegration.

3.8 Health and Education

Access to health and education is limited. According to UNICEF an estimated 200,000 children (6-14 years) in Puntland are out of school. Mass illiteracy and lack of access means children lack access to opportunities, and if children don't go to school it is more likely they will end up in child labour.

CHAPTER 4: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 General Overview

An earlier study conducted by The World Conservation Union (IUCN) which culminated in the development of a report titled *Country Environmental Profile for Somalia* (August 2006) details the pre-war colonial and post-colonial policies of environmental relevance in Puntland and Somaliland.

The policy and legislative environment in Somaliland and Puntland have shown great progress as both areas have had a longer period of stability as compared to Somalia. While policies may have been developed and approved in Somaliland and Puntland however, these have yet to be translated into legislation. Furthermore, at present in both states, environmental conservation centers on rangeland and drought management.

There is no Environmental Impact Assessment legislation, policies, procedures or guidelines in Somaliland or Puntland. These still need to be established. Guidelines developed by the Somaliland Natural Resources Management Programme are still used and referred to, although these are not formally accepted as national guidelines. (*IUCN-Eastern African Regional Office 2000*)

In Puntland, the ministry dealing with the environment is the Ministry of Agriculture, Livestock and Environment. Following the footsteps of Somaliland, Puntland has established a similar disaster management authority like NERAD known as HADMA (Humanitarian and Disaster Management Activities). But HADMA is not directly involved in environmental related activities, though it does plan to launch a drought mitigation programme, which would look at rangeland management and control of soil erosion and water catch management.

Puntland has a Ministry of Planning which has a 5 year development plan covering livestock, agriculture and the environment. The plan has not yet been published and this process is being supported by the UNDP Somali Project Watch Brief.

4.2 Puntland Green Water Paper

The objective of the Green Water Paper is to set out the policy for the Puntland State for Water, Energy and Natural Resources Corporation, (PSAWEN). PSAWEN is positioned to be the lead technical agency to direct and coordinate sector activities, policy development, guidelines, standards, monitoring and evaluation, surveys, create database, training and advice on

financing. The green paper and the input from a review process must be endorsed by parliament for it to be accepted as a white paper on water policy.

The institutional framework for PSAWEN will involve a range of other agencies, notably provincial and local government as well as other interested parties such as the private sector and NGOs. PSAWEN has the following institutional goals for water supply services:

- ⇒ In the long term, the goal is that services provided to consumers should be based on full cost recovery.
- ⇒ In the medium term, the objective of the government is to support institutional development at local and national and local levels.
- ⇒ In the short term, the immediate goal is to maintain service delivery to build institutions and 'gear' up to achieve medium-term goals.

4.3 Pre-war National Water Policy

Prior to the imposition of colonial rule, each Somali clan was an independent entity, which owned water sources and exercised grazing rights (PSAWEN, 2001). During the colonial and UN Trust Territory period (1880–1960), some systems were started to supply only the small, ruling and wealthy elite of the towns. Since the 1960s, traditional dug wells and reservoirs have been constructed and then controlled by individual families along lineage groups or clans. Drilling of boreholes on a large scale began in the 1970s under the authority of different government agencies.

A national water committee was formed comprising various ministries and general managers of the autonomous Water Development Agency (WDA) and the National Range Agency. One required their approval before constructing a borehole to ensure that strategic and environmental concerns were addressed. There were four autonomous centres in the water sector—Mogadishu, Hargeisa, Kismayo and the WDA—responsible for rural water supply, while responsibility for urban water supply was given to regional authorities. In 1978, the responsibility for the urban water supply was transferred to WDA.

4.4 Somaliland Water Act

The Ministry of Water and Mineral Resources (MWMR) prepared the Draft Water Act for Somaliland in collaboration with UNICEF and the Danish Royal Government. The MWMR is responsible for implementing this water act. Its purpose is to improve water availability and access in a sustainable and equitable way for all types of uses, in a manner that is environmentally safe. The specific objectives are to:

- ⇒ recognize, legitimize, empower, and endorse the Somaliland's customary laws and institutions and Somaliland's traditional leaders in water-related administrative, fiscal, and judicial affairs;
- ⇒ manage water resources and provide water services by implementing and enforcing the Water Code, its laws and regulations;
- ⇒ develop a national water strategy, and translate it into national water plans;
- ⇒ enable multi-disciplinary planning and evaluation of water resources, programs and projects;
- ⇒ coordinate government ministries and autonomous agencies which are concerned with the development and administration of water resources and water rights; and,
- ⇒ Define the rights and obligations of persons, both social and economic, and harmonize them with the general welfare.

4.5 Puntland Rangeland Management Policy

The Rangeland Management Policy is a plan of action or statement with development aims and ideals made by the Puntland government, in respect of the rangelands of the state.

The Puntland Rangeland Policy declares the intention of the state that the rangelands of Puntland are valuable national resources which require good conservation and proper management to secure physical, economic and social benefits for the Puntland population.

The policy paper designates certain categories of land in the state as (Rangelands), to be managed exclusively for the production of livestock consistent with the conservation of related land resources. The policy also:

- ⇒ Lays down broad principles on which rangeland are to be technically managed in achieving the best management objectives.
- ⇒ Indicates other organizational approaches necessary for the effective and efficient management of rangelands. It specifies the desired role the leading ministry should take in handling this management.
- ⇒ Lays down the foundations necessary for the development and expansion of the range management programs, based on indigenous knowledge, research, training sessions and the extension of service.

In general defines the course of action in respect of rangelands and provides necessary guidelines for their conservation, preparation and progressive improvement based on the natural resource management policy of the state.

4.6 Puntland's Millennium Development Goals (MDG's) and Targets

Goal 7 of Puntlands MDG aims at ensuring environmental sustainability through:

- (i) Integrating the principles of sustainable development into country policies and programs and reversing the loss of environment resource.

In order to achieve the targets, the following measures are proposed:

1. Strengthen the capacity of the Ministry of Environment, wildlife and Tourism by:

- ⇒ Enactment of Environmental and Resources management Law;
- ⇒ Establishment Resource Center and library for research and Training;
- ⇒ Enhancing the human resource of the ministry through training and employment.
- ⇒ Create baseline data on vegetation cover and levels of depletion on both land and marine resources.
- ⇒ Publish annual State of the Environment Report

2. Combat Desertification and reverse the loss of environmental resources by:

- ⇒ Initiating public awareness campaign;
- ⇒ Starting urban tree planting programs;
- ⇒ Completely banning production of charcoal in Puntland even for local consumption.
- ⇒ Completely banning cutting of Acacia trees for production of quick lime;
- ⇒ Halt urbanization of traditional grazing lands;
- ⇒ Designate grazing zone free from permanent settlements in each and every region in Puntland;
- ⇒ Implement conservation programs that addresses surface water runoff control, gullies rehabilitation, off-road management, sand dune fixation, and deforestation;

- (ii) Halve, by 2015, the proportion of population without sustainable access to safe drinking water and basic sanitation

The measures proposed in order to achieve the target are as follows:

- ⇒ The link between water and sanitation problems and deteriorating health conditions of urban and rural/nomadic populations should be explored and acted immediately by implementing projects that mitigate their sufferings.

- ⇒ Ensuring community participation in implementing and managing water projects should be highlighted.
- ⇒ Continue building basic water infrastructure both urban and rural communities.
- ⇒ Introduction of more water harvesting techniques on surface water runoff from dry rivers and gullies should be encouraged for rural communities.

4.7 ECHO's water and sanitation policy

ECHO has a number of priorities and policies which influence the type and range of water and sanitation projects that it funds. It is important to understand how these policies may impact upon the design and execution of projects and what is required of partners when executing activities within this policy framework.

Some of the ECHO policies on water and sanitation are as follows:

4.7.1 *Needs-based approaches*

ECHO's policy is to identify and intervene in areas of greatest humanitarian need, both at global and at local levels. For chronic situations, needs are assessed and compared based on global indicators and comprehensive field-level assessments. Resources are measured and directed to the specific sectors (i.e. health, watsan, nutrition, and shelter) and to the affected populations most in need. Water scarcity and the potential impacts that this can have on a region or country, such as increasing the likelihood of conflict, is a factor that ECHO considers to be important when determining resource allocations.

Assessments based on global indicators (ECHO11, ECHO14, ECHO15), as well as on field-level data gathered by staff and partners, are used to direct resources to where they are most needed. For emergencies, this approach is applied predominantly at a sectoral level in the allocation of resources across the health, shelter, food, or watsan sectors. It also informs project strategy, ensuring funding is directed to those most in need and where other donors are less likely to respond, and that is channelled through those partners able to engage rapidly and effectively. Both absolute and relative needs are considered (i.e. needs compared to the "normal" service levels and needs compared to other regions) when making these resource allocation decisions.

4.7.2 *ECHO's forgotten crisis policy*

ECHO pays special attention to “forgotten crises” and forgotten humanitarian needs worldwide (ECHO11, ECHO14, and ECHO15). The implication of this policy has important repercussions for ECHO's funding of water and sanitation projects. Firstly, forgotten crises often occur in countries which are also characterized by high rates of structural poverty, low levels of physical, social, and institutional infrastructure and where water and sanitation needs are critical and widespread. Secondly, this policy has historically shifted the emphasis of ECHO funding towards more protracted, chronic situations. Finally, forgotten crises, by their very definition, tend to lack other significant donor involvement, so partners are inevitably much more reliant on ECHO funding. In those cases where ECHO is involved in crises that are not forgotten and thus “better” funded, the challenge is, more than in other situations, to fund projects that are actually really necessary and avoid overlap of funding with that of other donors. In these cases donor coordination and active on site monitoring in the field is particularly important.

4.7.3 *Disaster preparedness*

ECHO addresses disaster preparedness at the local, or community level, through its Disaster Preparedness funding, DIPECHO (ECHO18); however, there is still much to be done in terms of mainstreaming risk reduction. The concept of disaster preparedness also includes mitigation measures which can, when properly executed, address some of the negative impacts of natural disasters. ECHO considers that disaster mitigation should be incorporated into all aspects and phases of a response to a crisis, following on from the immediate life-saving phase. The overall aim of ECHO's work in disaster preparedness is to see disaster risk reduction approaches incorporated into wider national policy frameworks, covering aspects including planning, zoning, design, and construction standards.

4.7.4 *Results-based focus*

ECHO's Framework Partnership Agreements (ECHO9) stresses the need for partners to focus more on output in terms of results in the assessment of achievement of impact. While adopting a results-based approach can provide a more meaningful measure of the effectiveness of aid, the impacts of water, sanitation, and hygiene interventions are often difficult to measure. Harder still is attributing any measurable change (e.g. a reduction in the prevalence of diarrhoeal disease) to a particular intervention or input, such as a water project, given the number of confounding factors which could influence the changes. This is particularly true given the short time frame of most ECHO-funded projects. Furthermore, a focus on results

has the potential to detract from the importance of the processes such as the level of beneficiary participation and consideration of gender. In spite of these limitations adopting a 'results-based focus' both in the project identification phase, and during subsequent monitoring and evaluation activities, is possible and can be the catalyst for improvements in service delivery. ECHO emphasizes the importance of robust baseline information, developing SMART (Specific, Measurable, Agreed, Realistic, and Time bound) objectives and ensuring sufficient attention is given to measuring achievements against those objectives.

4.7.5 ECHO's policy on Cost recovery

ECHO partners are obliged to ensure that proceeds from the sale of items (e.g. water) produced with ECHO-funded inputs, remain with the intermediate beneficiary (i.e. the owner of the donated resource) "in order to guarantee the sustainability of the project;" further, the subsidy cannot have the objective or the effect of leading to a profit for the recipient†. Not addressing these issues can lead to serious problems; for example, funds generated from the sale of water being diverted for personal, inappropriate, or even illegal uses.

For chronic situations, and in post-acute emergency scenarios where systems are being rehabilitated in a transition to the normal pre-event levels of service, ECHO's policy on cost recovery advocates for the principle that users should cover a proportion of both investment and recurrent costs where this is feasible and in-line with national norms. However, ECHO further recognizes that in some contexts full cost recovery will not be possible.

4.8 World Bank Environment Safeguard Policies

Summary of World Bank Safeguards Policies relevant to the development of water Supply Projects in Puntland

Safeguard policy	Description of expectations and activities
OP 4.01 Environmental Assessment	EIA should be conducted for all projects that fall into either World Bank Category A or Category B. Water Supply projects Category B type of projects that require partial ESIA. The development of Berkads in Puntland should be subjected to EIA.
OP 4.36 Forests	Under this policy, the Bank expects governments to have adequate provisions in place for conserving protected areas and critical watersheds, as well as for establishing environmental guidelines and monitoring procedures. The Puntland State of Somalia is committed to undertaking sustainable management and conservation-oriented forestry and Biodiversity.
OP 4.04 Natural Habitats	Under this policy, the conservation of natural habitats and improved land use are essential for long-term sustainable development. The policy requires that a project which has substantial impacts on natural habitat must include appropriate mitigation measures, including direct support for conserving an ecologically similar area. In order to comply, the Puntland state has put in place policies for the protection of range lands.
OD 4.10 Indigenous Peoples	This policy covers local indigenous people or distinct groups who are marginalized in society and who could be adversely affected by the project. The Bank does not support projects that negatively affect these peoples.
OP 4.11 Socio-Cultural Resources	Bank supports the preservation of cultural properties which includes sites with archeological, paleontological, historical, religious or unique natural values. It seeks to avoid impacts on such sites. Again in Puntland sacred sites are protected by customary law.
OP 4.37 Safety of Dams	This policy demands that new dams must be designed and built under the supervision of competent professionals to ensure dam safety. For dams over 15 meters in height, and dams 10 – 15 meters in height which are of concern, e.g. due to large flood handling requirement or location in a zone of high seismicity and /or where foundations and other design features are complex, specific dam safety plans are developed and implemented with a review by an independent panel of experts. For small dams (below 15 meters in height), generic dam safety measures designed by qualified engineers are used. One of the alternative water sources proposed in this study are dams to provide sufficient storage of run-off water in Puntland.
OP 4.07 Water Resources Management	This policy prioritizes the development of a comprehensive framework for designing water resource investments, policies, and institutions; restoration and preservation of aquatic ecosystems against over-exploitation of groundwater and resources; avoidance of water quality problems associated with irrigation investment; and establishment of strong legal and regulatory frameworks to enforce policies. The Puntland State Agency for Water, Energy and Natural Resources (PSAWEN) is responsible for management of water resources in Puntland state.

CHAPTER 5: PUBLIC PARTICIPATION

5.1 Overview

Community consultation and participation ensures that communities and stakeholders are part and parcel of the developments and in so doing assures the sustainable use of resources. It has also demonstrated successfully that projects that go through this process will acquire high level of acceptance and accrue benefits to a wider section of the society.

Public consultations form a useful component for gathering, understanding and establishing impacts of projects determining community and individual preferences and selecting alternatives. Furthermore, through public participation, it is possible to enhance project designs and ensure sustainability of the projects. The proposed project has incorporated public consultations in order to understand the local impacts, needs and thoughts and eventually incorporate them into the final designs and operations of the project.

The main objectives of the public consultation process were to:

- ⇒ Inform all the stakeholders details of the proposed Project before construction;
- ⇒ Collect views on the positive and negative impacts by the stakeholders and how these can be overcome; and
- ⇒ Build stakeholder consensus and acceptance of the proposed project.

The three approaches used for the public consultation included:

- ⇒ Public meetings with community members to discuss the proposed Borehole; and
- ⇒ Administration of questionnaires that were designed to allow various stakeholders to the site to write down their views concerning the proposed development project.
- ⇒ Key informant interviews
- ⇒ Focus group discussions

5.2 Categories of stakeholders consulted

The categories of stakeholders and reasons for consultation are as shown in Table 11 below.

Table 3: Categories of stakeholders and reasons for consultation

Stakeholder Category	Purpose of Consultation
Community members	<ul style="list-style-type: none"> • Inform them of the proposed development; • Discuss expected benefits from proposed project; • Document their concerns about the Berkaads; • Tap into local knowledge for purposes of collecting baseline data and information; • Discuss possible environmental management and mitigation measures.
Relevant government line ministries	<ul style="list-style-type: none"> • To address their policy and regulatory functions presented under the section on impact analysis and mitigation options; • To address their role in implementation of set guidelines and project objectives; • To establish the current level of compliance of the water project • Document their concerns about the water projects; • Discuss possible environmental management and mitigation measures.
Project Proponent	<ul style="list-style-type: none"> • Discuss the rationale for proposed project; • Discuss alternative technologies and related costs.

5.3 Summary Comments from Key Informants

The following is a summary of the key concerns as well as recommendations from the key informants and the community:

(1) Meeting with Abdi Jamaa, Ministry of Environment. Date: July, 27th, 2011.

- ⇒ An Environmental Act developed
- ⇒ Current situation in the project areas:
 - ✓ Grazing lands have been degraded due to overstocking of livestock
 - ✓ Rampant tree felling
 - ✓ Malaria cases in the area are rampant and ranked as highest in the world.
- ⇒ Proposed way forward:
 - ✓ Improved design of the Berkaads
 - ✓ Provision of roofs to prevent contamination of water
 - ✓ Fencing of the Berkaads



Photo 1: Meeting at the Ministry of Environment

- ✓ Consider building many small Berkaads for domestic freshwater supply per household instead of few big ones
- ✓ Construction of dams at seasonal rivers
- ✓ Ensure standardization of Berkaads

(2) *Consultative meeting at Puntland State Agency for Water Energy and Natural Resources (PSAWEN)*

- ⇒ Concerned with rehabilitation and construction of Berkaads
- ⇒ There is no policy in rural areas on construction of Berkaads; the nomads just construct on needs basis
- ⇒ Berkaads are concentrated in Karkar area of Puntland
- ⇒ Erosion in the area is common due to lack of ground cover
- ⇒ Major conflicts are due to competition for Berkaads
- ⇒ There are no cases of conflicts in communal boreholes
- ⇒ Existing 60 boreholes in Puntland are not well distributed
- ⇒ Proposed interventions
 - ✓ Rehabilitate existing Berkaads
 - ✓ Construct Earth Dams in order to cushion acute water shortage during the long dry spells
 - ✓ The distances for drilling Boreholes should be limited to a range of 20km



Photo 2: Consultative meeting at PASAWEN

(3) Public consultation meeting at Libah-xar Village

- ⇒ Reasons why community prefers Berkaads
- ✓ Cheap to construct
 - ✓ Can be done gradually after every 3 months compared to boreholes which are expensive to construct
 - ✓ Increases accessibility to water. Before, the community used to collect at water sources located approximately 110km away using camels
- ⇒ *Berkaads in Libah-Xar Village*



Photo 3: Public consultation meeting at Libah-xar Village



Photo 4: Some of the Berkaads in Libah-Xar Village

- ⇒ Emerging issues on Berkaads in Libah-Xar Village
- ✓ There are 34 functional Berkaads in the area constructed in non grazing sites
 - ✓ Cost of construction is 18,000-20,000 USD
 - ✓ Berkaads are fenced using *Likahades* tree
 - ✓ The areas around the Berkaads are highly degraded
 - ✓ Berkaads are the only sources of fresh water in the area
 - ✓ Customary laws guide the construction of Berkaads. The elders are the decision makers on locating suitable places for a proposed Berkaad.
 - ✓ Berkaads in the village are either owned by individuals or by a group of people who contribute money to build their own.
 - ✓ Water borne diseases are rampant in the village due to drinking of raw water from the Berkaads.

(4) Public consultation meeting at Midigalle Village

- ⇒ The original Berkaad in the village is 12 years old and was constructed through community contributions. The two new Berkaads in the village that were constructed by CARE. These Berkaads can retain water for 3 to 4 months.
- ⇒ The permanent sources of water in the project area are shallow wells through the water is saline.
- ⇒ Elders in the village are the decision makers in location and construction of Berkaads.
- ⇒ The idea of constructing a big dam is not welcomed in the project area.
- ⇒ Negative environmental and social impacts from Berkaads:
 - ✓ They act as mosquito breeding ground
 - ✓ Animals fall in the uncovered Berkaads
 - ✓ Human wild-life conflicts: During dry season, most wild animals invade the area and also spoil the water
 - ✓ The polluted water from Berkaads is a source of diarrheal diseases that are common in the area during the dry season.
- ⇒ Strategies for mitigating the negative impacts:
 - ✓ Communal work to control Gulley erosion through laying of stones
 - ✓ Anyone found felling trees to burn Charcoal is fined 400 USD.

(5) Public consultation meeting at Rad Village

- ⇒ Berkaads are the only sources of water. The residents use water pans during the dry season.
- ⇒ During the dry season, water is fetched from a borehole in Araptimo which is located approximately 70km. Water is bought at the rate of 150 USD per 6m³.
- ⇒ Residents prefer boreholes as sustainable supply of water as compared to Berkaads



Photo 5: Public consultation Meeting at Rad Village

Negative impacts associated with Berkaads:

- ✓ Water contaminated by wildlife who drink water at night and also, some die and decompose inside the Berkaads.
- ✓ The most rampant water borne diseases is diarrhoea due to drinking of contamination water from the Berkaads.
- ✓ Water is of poor taste and colour

⇒ Mitigation of negative impacts from Berkaads:

- ✓ Youth groups mobilized not to cut trees
- ✓ Penalties are imposed on those found felling trees. The offenders have to slaughter a goat

(6) Public consultation meeting at Gudcad Village

- ⇒ The main sources of water in the village are Berkaads and Natural ponds.
- ⇒ Currently, there are 26 Berkaads. First Berkaad was constructed in 1970.
- ⇒ Residents prefer drilling of borehole as sources of drinking water as compared to berkaads.
- ⇒ Berkaads in the village are either owned by individuals or groups.
- ⇒ Elders in the village are the decision makers in location and construction of Berkaads
- ⇒ Problems associated with Berkaads:
 - ✓ Pollution by wild animals and livestock droppings
 - ✓ Contamination of water by decomposing tree branches and grass used to cover the Berkaads
 - ✓ Water borne diseases are rampant
 - ✓ Water use conflicts are experienced during the dry season due to competition for water

(7) Public consultation meeting at Dan Village

- ⇒ There are 80 Berkaads in the village. First Berkaad was constructed in 1964 by Jamaa. Before the construction of Berkaads, the residents used to fetch water at Buhodle, located 50km away.
- ⇒ The residents prefer Berkaads to boreholes and dams.

-
- ⇒ Ownership of Berkaad is per families
 - ⇒ There are no conflicts associated with water use
 - ⇒ Problems associated with Berkaads:
 - ✓ Accidents due to uncovered Berkaads. Has lead to death of children and livestock
 - ✓ Human wild life conflicts: During dry season, most wild animals invade the area and also spoil the water. Some of the wildlife fall into water and die, thus, decomposing and causing contamination of water.
 - ✓ Cases of water borne diseases are rampant in the area.
 - ✓ Contamination of water by animal droppings
 - ✓ Loss of water due to seepage in cracked walls

(8) Public consultation meeting at Naceysed Village

- ⇒ CARE constructed one Berkaad and are in the process of rehabilitating more
- ⇒ There are 6 Berkaads in the area. Two of them are well covered. First Berkaad was constructed in 2000. Initially, the water was fetched in an area located 20km away.
- ⇒ Water in the Berkaads last for 1 to 2 months. During the dry season, residents fetch water at Tarman area where water is bought at 50 USD per 50Gallons.
- ⇒ Local Guidelines for siting Berkaads:
 - ✓ Proximity to other Berkaads
 - ✓ Water channels and drainage
 - ✓ Permission sought from community elders in order tom build new Berkaads
- ⇒ Problems associated with Berkaads:
 - ✓ Accidents: Animals fall and die in water
 - ✓ Contamination of water through decomposing animal carcasses and tree leaves
 - ✓ Water borne diseases: malaria and diarrhoea
 - ✓ Loss of water due to seepage in cracked walls
- ⇒ Proposed solutions:
 - ✓ Covering of all existing Berkaads
 - ✓ Fencing of Berkaads using stones and fixing with a door
 - ✓ Keeping livestock away from the Berkaads.

CHAPTER 6: SIGNIFICANT ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 Overview

This chapter largely focuses on the significant impacts from construction and operation of the Berkaads, which includes development of the access road, site preparation and construction. Along the identified impacts, related mitigation measures have also been presented under section 6.3

Impacts to the environment could be positive or negative, direct or indirect, reversible or irreversible. The extent of environmental impact is determined by its significance, adversity, temporary or permanent, long-term or short-term, localized or widespread. Some impact mitigation has already been proactively addressed in the design while others would be undertaken through considered incorporation in the implementation of the project and guided by the Environmental Management Plan (EMP) developed under this report.

6.2 Assessing the significant impacts

In assessing the assessing the significance of impacts, the five factors considered are:

1. Relationship of the impact to **temporal** scales – the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
2. Relationship of the impact to **spatial** scales – the spatial scale defines the physical extent of the impact.
3. The severity of the impact – the **severity/beneficial** scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party. The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation', but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.
4. The **likelihood** of the impact occurs – the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to

occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

- Each criterion is ranked with scores assigned as presented in Table 4-1 to determine the overall **significance** of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood are then read off the matrix presented in Table 4-2, to determine the overall significance of the impact. The overall significance is either negative or positive. On the basis of information gathered during the study, the potential environmental impacts identified with respect to the project are tabulated below.

Table 4: Ranking of Evaluation Criteria

EFFECT	Temporal Scale		Score	
	Short term	Less than 5 years	1	
	Medium term	Between 5 and 20 years	2	
	Long Term	Between 20 and 40 years (a generation) and from a human perspective almost permanent.	3	
	Permanent	Over 40 years and resulting in a permanent and lasting change that will always be there	4	
	Spatial Scale			
	Localized	At localized scale and a few hectares in extent	1	
	Study area	The proposed site and its immediate environs	2	
	Regional	District and Provincial level	3	
	National	Country	3	
	International	Internationally	4	
	*	Severity	Benefit	
	Slight / Slight Beneficial	Slight impacts on the affected system(s) or party(ies).	Slightly beneficial to the affected system(s) or party(ies).	1
	Moderate / Moderate Beneficial	Moderate impacts on the affected system(s) or party (ies).	An impact of real benefit to the affected system(s) or party(ies)	2
Severe / Beneficial	Severe impacts on the affected system(s) or party(ies).	A substantial benefit to the affected system(s) or party (ies).	4	
Very Severe / Very Beneficial	Very severe change to the affected system(s) or party(ies).	A very substantial benefit to the affected system(s) or party (ies).	8	
LIKELIHOOD	Likelihood			
	Unlikely	The likelihood of these impacts occurring is slight	1	
	May Occur	The likelihood of these impacts occurring is possible	2	
	Probable	The likelihood of these impacts occurring is probable	3	
	Definite	The likelihood is that this impact will definitely occur	4	

* In certain cases it may not be possible to determine the severity of an impact thus it may be determined: Don't now/can't know

		EFFECT															
LIKELIHOOD		3	4	5	6	7	8	9	10	11	12	13	14	15	16		
	1	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
	2	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
	3	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
	4	7	8	9	10	11	12	13	14	15	16	17	18	19	20		

Table 5: Ranking matrix to provide an Environmental Significance

Environmental Significance		Negative	Positive
LOW	An acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent development. These impacts will result in either Positive or negative medium to short term effects on the social and/or natural environment	4-7	4-7
MODERATE	Social environment and result in severe negative or beneficial effects. An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which, in conjunction with other impacts may prevent its implementation. These impacts will usually result in either positive or negative medium to long term effect on the social and/or natural environment.	8-11	8-11
HIGH	A serious impact which. These impacts would be considered by society as constituting a major and usually long term change to the natural and/or social environment and result in severe negative or beneficial effects.	12-15	12-15
VERY HIGH	A very serious impact which may be sufficient by itself to prevent the implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects or very beneficial effects.	16-20	16-20

The **environmental significance** scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of especially a social nature need to reflect the values of the affected society.

Cumulative Impacts

Cumulative Impacts affect the significance ranking of an impact because it considers the impact in terms of both on-site and off-site sources. For example, the noise generated by an activity (onsite) may result in a value which is within the World Bank Noise Standards for residential areas. Activities in the surrounding area may also create noise, resulting in levels also within the World Bank Standards. If both on-site and off-site activities take place simultaneously, the total noise level at the specified receptor may exceed the World Bank Standards. For this reason it is important to consider impacts in terms of their cumulative nature.

Seasonality

Although seasonality is not considered in the ranking of the significance, it may influence the evaluation during various times of year. As seasonality will only influence certain impacts, it will only be considered for these, with management measures being imposed accordingly (i.e. dust suppression measures being implemented during the dry season).

Prioritizing

The evaluation of the impacts, as described above is used to prioritize which impacts require mitigation measures. Beneficial impacts do not require mitigation and therefore do not require prioritization.

Negative impacts that are ranked as being of "**VERY HIGH**" and "**HIGH**" significance will be investigated further to determine how the impact can be minimized or what alternative activities or mitigation measures can be implemented. These impacts may also assist decision makers i.e. lots of **HIGH** negative impacts may bring about a negative decision.

For impacts identified as having a negative impact of "**MODERATE**" significance, it is standard practice to investigate alternate activities and/or mitigation measures. The most effective and practical mitigations measures will then be proposed.

For impacts ranked as "**LOW**" significance, no investigations or alternatives will be considered. Possible management measures will be investigated to ensure that the impacts remain of low significance.

6.3 Positive impacts of Berkaads

6.3.1 *Source of fresh water*

During the dry seasons, berkaads are the main sources of fresh water for domestic use. Though boreholes are considered as permanent sources of water, most of them are saline and thus water is not fit for consumption.

6.3.2 *Improved well-being of women and children*

At the household level, women and children bear the burden of fetching water. Other than the time spent in getting water from long distances, these practices has far reaching consequences on their health and well being.

Water accessibility at homesteads would translate to time saving by the women. Time saved thus would be invested in other engagements that could bring financial benefits to the family. Children also bear the brunt of water borne diseases while women are tied down to provide nursing care to the sick family members. With availability of water in berkaads all these negative impacts are reversed in the villages.

6.3.3 *Berkaads as a tool of Water Resource Management*

Berkaad as a mechanism for surface runoff water harvesting and conservation is a better alternative to groundwater abstraction. Berkaads as surface runoff catchment helps balance between water re-charge and extraction by reducing rely on groundwater. Berkaads also although smaller in storage capacity act to improve water storage capacity and sustain water stocks over some duration, hence reducing the impacts of drought to some extent.

6.4 Negative impacts of Berkaads

6.4.1 *Increased Spread of Water Borne Diseases*

The berkaads act as breeding sites for mosquito larvae and thus contributing to outbreak of malaria. The berkaads extend the mosquito season as an all the year round occurrence and hence the spread of malaria as a major disease in the villages.

Sharing of water sources by animals and human beings is a common practice in Puntland, posing hygiene risks. Most berkaads are unprotected, thus increasing the risk of water contamination inform of animal wastes. During the visit to the berkaads, livestock droppings were noted in most uncovered berkaads. During rainy seasons human and livestock wastes are washed into un-protected water sources, increasing incidences of water-borne diseases like bilharzia, typhoid and dysentery.

The impact of disease spread will be long term for as long as the berkaads contain water which are habits for disease vectors. The scale and severity is also moderately high and can be

severe especially in children under 5 years and pregnant mothers who are vulnerable to malaria and other water related diseases. General contamination of water possesses significant negative impacts across the age divide in the area.

The scope of the impact will initially be localized but transmission of the disease is likely to extend the scope beyond the area



Photos showing a Berkad contaminated with livestock Droppings (source of water contamination) and a well covered Berkaad to reduce contamination.

Some of the proposed mitigation measures include:

- ⇒ The Ministry of Health should frequent survey of health records in Health Care Facilities (HCFs) to ascertain the spread of malaria. This data should then be used to develop a malaria prevention project within villages that could include use of Insecticide Treated Nets, Indoor Residual Spraying among others.
- ⇒ Capacity building is required to equip communities with appropriate technology to manage water sources. These should include training on hygiene standards both at water sources and within homesteads
- ⇒ Fence the berkaad sites in order to restrict access of animals into the berkaads.
- ⇒ Roofing of berkaads to reduce evaporation, as well as curbing mosquito breeding and algal development.

The overall significance of the impact without mitigation would be **HIGH** but with mitigation would be **LOW**.

6.4.2 Water use conflicts

Water use conflicts are common during the dry periods when there is reduced water in the berkaads. This is due to competition for water use among the residents.

The impacts of water use conflicts are short term especially during the dry season when the area is shortage of water in the villages. The scope of the impact can be localized and can spread to other areas if not mitigated.

Some of the proposed mitigation measures include:

- ⇒ There should be creation of water users associations (WUAs) who will assist in resolution of any conflicts.
- ⇒ There should be establishment of grievance re-dress mechanism for water use related conflict resolutions based on customary laws.
- ⇒ Alternative water sources should be explored in order to reduce competition over the few existing water sources. This can be in form of boreholes and other rainwater harvesting structures.
- ⇒ CARE should involve local leadership in location of berkaad sites in order to ensure acceptable allocation of berkaads.

The overall significance of the impact without mitigation would be **VERY HIGH** but with mitigation would be **LOW**.

6.4.3 Soil erosion

There is significant environmental degradation in the areas surrounding the Berkaads due to the overcrowding of livestock and people while fetching and drinking water. This has led to complete depletion of surrounding vegetation thus leaving the soils bare. In flat areas removal of fine particles by selective erosion may course an increase of coarser

particles of the sand fraction (sandification). Wind erosion which is common during the long dry periods has led to erosion of top soil. During the rainy season, the loosened soils are washed into the berkaads thus increasing the rates of sediment loads that lead reduced storage capacity of water. Location of several berkaads in one place also

To minimize the impact of soils erosion, the following mitigation measures are proposed:

- ⇒ There should be restricted livestock access near the berkaads or other water sources. This will reduce depletion of vegetation and loosening of soils around the berkaads.



Gulley erosion near a Berkaad due to overgrowing of livestock

- ⇒ The design of berkaads should incorporate silt traps in order to reduce sediment loads which reduce the water storage capacity.
- ⇒ Promote soil conservation measures in berkaad areas through the use of check dams, gabions and cut-off drains.

The overall significance of the impact without mitigation would be **VERY HIGH** but with mitigation would be **MODERATE**.

6.4.4 Loss of Biodiversity

During drought periods, surface water resources in pasture areas dry up. Pastoralists have to move to areas near berkaads with their livestock, usually resulting in environmental degradation around water points due to the large numbers of livestock concentrated in a limited area. Secondly, most berkaads are covered with grass (*dur*) and fenced with tree branches. This leads to clearing of vegetation and thus the loss of natural vegetation.



Berkaads covered and fenced using tree branches and grass

The proposed mitigation measures would include:

- ⇒ Livestock watering points should be located away from the berkaads.
- ⇒ Promote the use of stones to fence the berkaads instead of using trees to fence the area.
- ⇒ Promote the use of iron sheets in covering of Berkaads instead of grass and tree branches.
- ⇒ Berkaads should not be located in the grazing lands.

6.4.5 Human- wildlife conflicts

Due to water shortage during the dry season, there is competition for water sources from wildlife that move to the berkaad areas in search of water. Wild animals are potential sources of insecurity in the villages during the dry seasons when there is extreme water shortage. They are also potential sources of water contamination in the berkaads. The scale and severity is high, localized and could be long term.



Fenced berkaad with a lockable gate to restrict access

Some of the proposed mitigation measures include:

- ⇒ Restrict movement of wildlife through fencing
- ⇒ Earth dams or water points should be constructed in areas occupied by wild life. This will reduce the movement of wildlife into to the villages in search of water.
- ⇒ Berkaads should be fenced and completely covered to prevent wildlife access to water.
- ⇒ The overall significance of the impact without mitigation would be HIGH but with mitigation would be LOW.

6.5 Project Impacts during Decommissioning

The objective of discussing the decommissioning phase in this Report is to ensure that the Proponent shall have available, suitable guidelines on how to make the place occupied by the Berkaad will return to equivalent or better than its original condition upon closure or stoppage .

Negative Impacts

When a berkaads is put out of service, the following negative impacts are expected.

1. Shortage of fresh water due to closure of the berkaads
2. Soil erosion will occur as a result of opening up previously firm ground to remove buried materials
3. Visual impacts are anticipated as a result of demolition of the berkaads
4. Generation of waste material that include concrete rubble, steel and disused pipes and fittings
5. Risk of accidents and hazards

Mitigation Measures

1. CARE Somali to prepare communities for a transition strategy when decommissioning
2. Develop alternative water sources.

3. Plant grass and other native vegetation along soil filled sites.
4. Maintain soil conservation works until the site stabilizes.
5. Carry out landscaping works to rehabilitate the open sites.
6. Safe disposal of waste materials such as concrete rubble, iron sheets, steel and disused pipes and fittings.
7. Secure all unsafe and potentially dangerous berkaad areas.
8. Fence off all unsafe and potentially dangerous areas previously occupied by berkaads.

Table 6: Summary table of impacts of Berkaads

IMPACTS	WITHOUT MITIGATION					WITH MITIGATION		
	TEMPORAL	SPATIAL	SEVERITY	LIKELIHOOD	SIGNIFICANCE	SEVERITY	LIKELIHOOD	SIGNIFICANCE
	<ul style="list-style-type: none"> ✓ Short term <5 yrs ✓ Medium term 5- 20 yrs ✓ Long term 20-40 yrs ✓ Permanent 40 yrs+ 	<ul style="list-style-type: none"> ✓ Localized ✓ Study Area ✓ Regional ✓ National ✓ International 	<ul style="list-style-type: none"> ✓ Very Severe ✓ Severe ✓ Moderately Severe ✓ Slight ✓ No effect 	<ul style="list-style-type: none"> ✓ Very unlikely ✓ Unlikely to occur ✓ May occur ✓ Definitely occurs 	<ul style="list-style-type: none"> ✓ Very High ✓ High ✓ Moderate ✓ Low ✓ No significance ✓ Don't know 	<ul style="list-style-type: none"> ✓ Very Severe ✓ Severe ✓ Moderately Severe ✓ Slight ✓ No effect 	<ul style="list-style-type: none"> ✓ Very unlikely ✓ Unlikely to occur ✓ May occur ✓ Will definitely occur 	<ul style="list-style-type: none"> ✓ Very High ✓ High ✓ Moderate ✓ Low ✓ No significance ✓ Don't know
Water use conflicts	Short term	Localized	Moderately severe	Definitely occurs	Moderate	Slight	May occur	Low
Increased Spread of Water Borne Diseases	Short Term	Localized	Very Severe	Definitely occurs	High	Moderately severe	May occur	Low
Soil erosion	Long Term	Localized	Very severe	Definitely occurs	Very high	Slight	May occur	Low
Loss of Biodiversity	Long Term	Localized	Very Severe	Definitely occurs	Very high	Moderately severe	May occur	low
Human- wildlife conflicts	Short term	Localized	Moderately Severe	Definitely occurs	Moderate	Slight	May occur	Low

CHAPTER 7: ENVIRONMENTAL MANAGEMENT PLAN

The purpose of the Environmental and Social Management Plan (ESMP) for the berkaads is to provide mitigation measures for the significant negative environmental impacts. The objectives of the ESMP are:

- ⇒ To clearly show how to manage the negative impacts while enhancing the positive ones to ensure a project that is economically, socially and environmentally sustainable.
- ⇒ To provide evidence of practical and achievable plans for the management of the berkaads.
- ⇒ To provide the Proponent and the relevant Lead Agencies with a framework to confirm compliance with relevant laws and regulations.
- ⇒ To provide community with evidence of the management of the berkaads in an environmentally and socially acceptable manner.

Environmental monitoring is an applied research and analysis activity to support cost-effective and timely assessment of the status and trends in environmental and social conditions in response to different project activities. Also, it is necessary to assess the project performance against the desired mitigation measures, and compliance with the regulations and standards in order to protect people's health and safety, and the environment health and performance. Monitoring activities should be applied to direct monitoring indicators whenever applicable.

Indirect indicators can be monitored instead of direct ones whenever it would provide acceptable indication of the occurrence of specific impacts and/or compliance with provisions of the ESMP.

Table 7: Environmental and Social Management Plan

Environmental/ Social Impact	Mitigation Measures	Responsibility for Mitigation	Means of monitoring	Frequency of Monitoring	Estimated Cost (USD)
Increased Spread of Water Borne Diseases	<ul style="list-style-type: none"> ✓ The Ministry of Health should frequent survey of health records in Health Care Facilities (HCFs) to ascertain the spread of malaria. This data should then be used to develop a malaria prevention project within villages that could include use of Insecticide Treated Nets, Indoor Residual Spraying among others. ✓ Capacity building is required to equip communities with appropriate technology to manage water sources. These should include training on hygiene standards both at water sources and within homesteads ✓ Fence the berkad sites in order to restrict access of animals into the berkaads. ✓ Roofing of berkads to reduce evaporation, as well as curbing mosquito breeding and algal development. 	<ul style="list-style-type: none"> ✓ Ministry of Health ✓ Health workers ✓ CARE somali 	<ul style="list-style-type: none"> ✓ Frequency of occurrence of waterborne diseases ✓ Health status of local people ✓ Water quality measurements. 	Weekly and monthly	50,000
Water use conflicts	<ul style="list-style-type: none"> ✓ Promote creation of water users associations (WUAs) to assist in resolution of any conflicts. ✓ There should be establishment of grievance re-dress mechanism for water use related conflict resolutions based on customary laws. ✓ Alternative water sources should be explored in order to reduce competition over the few existing water sources. This can be in form of boreholes and other rainwater harvesting structures. ✓ CARE should involve local leadership in location of berkaad sites in order to ensure acceptable allocation of berkaads 	<ul style="list-style-type: none"> ✓ WUAs ✓ Elders 	<ul style="list-style-type: none"> ✓ Frequency of conflicts 	Daily and weekly	20,000

Environmental/ Social Impact	Mitigation Measures	Responsibility for Mitigation	Means of monitoring	Frequency of Monitoring	Estimated Cost (USD)
Soil erosion	<ul style="list-style-type: none"> ✓ There should be restricted livestock access near the berkaads or other water sources. This will reduce depletion of vegetation and loosening of soils around the berkaads. ✓ The design of berkads should incorporate silt traps in order to reduce sediment loads which reduce the water storage capacity. ✓ Promote soil conservation measures in berkaad areas through the use of check dams, gabions and cut-off drains. 	<ul style="list-style-type: none"> ✓ Agricultural Extension officers ✓ WUAs 	✓ Erosion/Sedimentation loads in berkaads and other water bodies	Monthly and quarterly	30,000
Loss of Biodiversity	<ul style="list-style-type: none"> ✓ Livestock watering points should be located away from the berkads. ✓ Promote the use of stones to fence the berkaads instead of using trees to fence the area. ✓ Promote the use of iron sheets in covering of Berkads instead of using grass and tree branches. ✓ Berkaads should not be located in the grazing lands. 	<ul style="list-style-type: none"> ✓ WUAs ✓ Ministry of Environment ✓ CARE Somali 	✓ vegetation degradation rates in the project area	Quarterly	30,000
Human- wildlife conflicts	<ul style="list-style-type: none"> ✓ Restrict movement of wildlife through fencing ✓ Earth dams or water points should be constructed in areas occupied by wild life. This will reduce the movement of wildlife into to the villages in search of water. ✓ Berkaads should be fenced and completely covered to prevent wildlife access to water. 	<ul style="list-style-type: none"> ✓ Wild life department ✓ Forestry Department ✓ CARE Somali 	✓ Reported cases of wildlife in the villages	Weekly	5,000

Environmental and Social Impact	Mitigation Measures	Responsibility for Mitigation	Monitoring Means	Frequency of Monitoring	Estimated Cost (USD)
PROJECT DECOMMISSIONING PHASE					
Sudden closure of berkaad sources due to an exit strategy	<ul style="list-style-type: none"> ✓ CARE Somali to prepare communities for a transition strategy when de-commissioning ✓ Develop alternative water sources. 	<ul style="list-style-type: none"> ✓ CARE Somali 	<ul style="list-style-type: none"> ✓ Water shortages 	Monthly	5,000
Soil erosion	<ul style="list-style-type: none"> ✓ Plant grass and other native vegetation along soil filled sites. ✓ Maintain soil conservation works until the site stabilizes. 	<ul style="list-style-type: none"> ✓ CARE Somali ✓ Contractor 	<ul style="list-style-type: none"> ✓ Erosion/sedimentation loads in the project area and downstream of the rivers 	Monthly	10,000
Visual impacts	<ul style="list-style-type: none"> ✓ Carry out landscaping works to rehabilitate the open sites. 	<ul style="list-style-type: none"> ✓ WUA ✓ CARE Somali ✓ Contractor 	<ul style="list-style-type: none"> ✓ Visual inspection 	Weekly	10,000
Generation of waste material	<ul style="list-style-type: none"> ✓ Safe disposal of waste materials such as concrete rubble, iron sheets, steel and disused pipes and fittings. 	<ul style="list-style-type: none"> ✓ CARE Somali ✓ Contractor 	<ul style="list-style-type: none"> ✓ Measurement of waste streams generated and disposed. 	Daily	5,000
Risk of accidents and hazards	<ul style="list-style-type: none"> ✓ Secure all unsafe and potentially dangerous berkaad areas ✓ Fence off all unsafe and potentially dangerous areas previously occupied by berkaads 	<ul style="list-style-type: none"> ✓ WUA ✓ CARE Somali ✓ Contractor 	<ul style="list-style-type: none"> ✓ Inspect all workers to ensure that they have their PPE on. ✓ Frequency of incidents/accidents and fatalities 	Daily	5,000

CHAPTER 8: ANALYSIS OF PROJECT ALTERNATIVES

This chapter draws information from the current state of Berkaads to analyze alternatives for the provision of additional water in the villages. It addresses alternatives at the following levels of analysis:

- ⇒ No action alternative
- ⇒ Options for Water Supply

8.1 The no action alternative

Under the 'No Project' alternative, the proponent would not carry any additional construction works and rehabilitation of the Berkaads; the anticipated impacts resulting from commissioning and operation of the development as Berkaads would not occur. Additionally, the resultant socio-cultural/economic benefits that would be created by the proposed development would also be foregone.

These include:

- ⇒ Contribution to the flora, fauna and micro-climate
- ⇒ Accessibility to fresh drinking water
- ⇒ Improved well-being of women and children

8.2 Alternative water sources

Due to the frequent acute water shortage in the area the dry season, the alternative water sources proposed include the following:

8.2.1 *Drilling of Boreholes*

Boreholes are the most recommended source of water in the area. The existing boreholes are sources of sustainable water throughout the year even during the extreme dry spells when there is no water in the Berkaads. Most residents interviewed proposed drilling of boreholes as a priority in the villages.

Before drilling of the boreholes there would be need to conduct a hydrogeological survey studies in order locate the most appropriate areas for drilling. This will increase the chances of locating sites of appropriate water availability at appropriate depths.

Some of other requirements could involve the use of modernize technologies in borehole drilling and operation, for better performance. This would involve:

- ⇒ Effective prospecting techniques (such as geophysics).

- ⇒ Efficient drilling techniques applicable to karstic aquifers and marly beds.
- ⇒ Detailed borehole descriptions, including geophysical borehole logging.
- ⇒ Correct well finishing, including right positioning of screens, well-calculated filter screens, use of plastic casings and screens if possible, and good grouting of upper layers.
- ⇒ Use of corrosion-resistant materials and other anti-corrosion measures.
- ⇒ Training of drilling teams and operators on installation, operation and maintenance of boreholes and pumps.
- ⇒ Standardization of construction, and operation of boreholes and related equipment.
- ⇒ Production of simple manuals for operation, maintenance and monitoring.

For sustainable operation of the modernized borehole, there must be demand for water for livestock in sufficient quantities to offset borehole running costs. Fees levied must also be adequate to cover pump and generator depreciation and repair, which is seldom the case. Alternatively, there must be sufficient financial capacity within the community to levy the necessary costs for pump and generator replacement through fundraising. The operation of boreholes should also be delegated to a small group of individuals for better accountability.

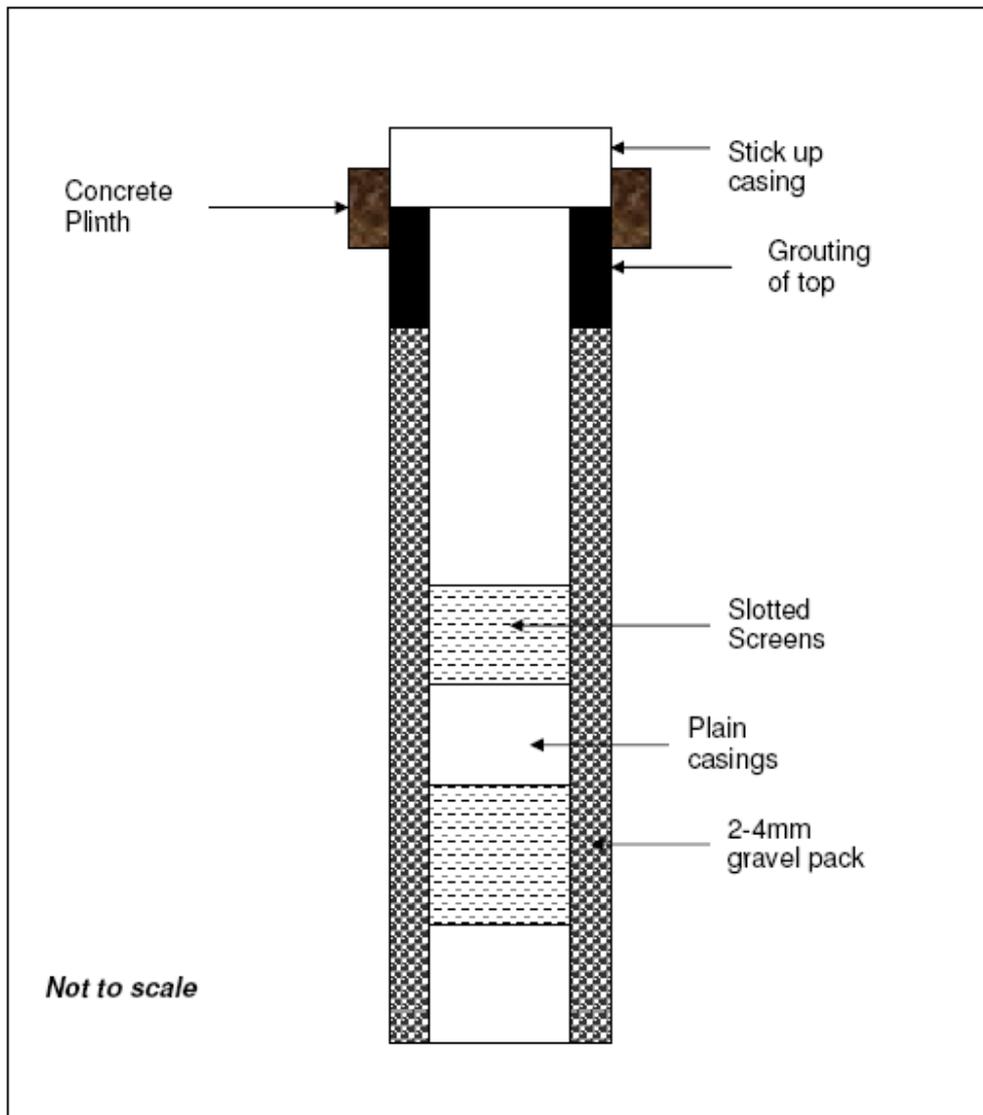


Figure 2: A schematic diagram of a borehole

8.2.1 Construction of Sub-Surface Domestic Water Tanks

Sub-surface water tanks of sufficient capacity could be constructed of bricks/stones or lined with butyl rubber membranes. Where possible a well constructed metallic roof structure of side dimensions of 5m x 20m could be put in place with a gutter and down pipe to drain rainwater into either of the tanks. The butyl rubber lined tank is much cheaper to construct. However it must include a well reinforced metallic cover to prevent livestock, wildlife, children and mosquitoes from accessing the water directly. The water could also be treated with chlorine directly before use.



A rectangular pit constructed for rain water storage. It could be lined with a butyl rubber membrane to meet domestic water requirements in the households.

8.2.1 Water Storage Dams.

Dams have higher water holding capacities than *Berkaads*. If adopted, they could boost rural water supply during the dry season. Dams are however uncommon in Puntland, partly due to high construction costs but also due to the permeable lithology in many parts of the region. Current technology in development and use of dams needs to be improved for enhanced water supply and hygiene. Thorough assessments need to be made to identify sites for potential dam construction with minimum water loss due to seepage. Annual evaporation rates in Northern Somalia are also quite high, about 3 000 mm, and need to be considered when identifying suitable dam sites.

For dams to be sustainable, proper design and site investigation are necessary. Proper soil tests should be done to determine their permeability. Sites involving minimal earth-moving are more suitable since they save on earth-moving costs. Other factors to consider are:

- ⇒ Dam depths should be high enough to compensate for evaporation and leakage losses while retaining enough water to serve the intended purpose.
- ⇒ Walls are well-compacted with properly designed spillways to avoid dam failure.
- ⇒ Dams are well protected to prevent direct access by animals, for hygiene purposes.

In the long run, dams are more economical than *Beerkaads*, considering the cost of water purchased when the latter dry out shortly after the end of the rains. Dams constructed next to rivers or streams can serve as flood control structures by holding excess water during flood periods, and later releasing the water for use during dry periods.

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

A comprehensive Environmental Impact Assessment study of Berkaads in Puntland showed that Berkaads are major sources of fresh water during the dry spells in all the villages visited. Most identified significant environmental impacts of the Berkaads on the natural environment are all very localized and confined mostly to the precincts of the villages. Waterborne diseases, water use conflicts, soil erosion, loss of biodiversity and human-wildlife conflicts that occur can be effectively alleviated if all the proposed mitigation measures are put in place.

Provided the Berkaads are implemented with due attention to the mitigation and management measures outlined, the Berkaads will have a positive impact on both the bio-physical and socio-economic environment of the area.

9.2 Recommendations

Recommendations made with respect to the EIA study of Berkaads in Puntland are as follows:

14. The priority in Puntland should focus not only in establishing new Berkaads points, but on rehabilitating the existing ones in order to reduce the rates of contamination and loss of water through leakage. Rehabilitation can be inform covering with iron sheets or concrete, fencing with stones to restrict access and repairing cracked Berkaads surface to prevent leakages.
15. Personal Berkaads are environmentally sound and sustainable. This is because they are better-managed than communal Berkaads, partly because of limited resources but also due to lack of ownership, and mistrust in public sources. For sustainability of water projects, rural communities should be well-involved into project/s right from inception. Such projects should be community needs-based, rather than donor imposed.
16. Capacity to establish and manage sustainable water sources in Puntland is lacking. Capacity building is required to equip communities with appropriate technology to manage water sources. These should include training on hygiene standards both at water sources and within homesteads.

17. There should be restricted livestock access near the Berkaads or other water sources. This will reduce depletion of vegetation and loosening of soils around the Berkaads.
18. The rate of Berkaad failure is alarming. The high failure rate is attributed to poor construction and maintenance routines. There is a need for development of standard guidelines to be used for location of Berkaads (away from pasture and grazing land), construction and operation of Berkaads in the villages. The design of Berkaads should incorporate silt traps in order to reduce sediment loads which reduce the water storage capacity. Customary laws that safe guard the environment should be promoted and integrated into the project design and operation.
19. Berkaads should not be concentrated in one area but rather be dispersed in order to reduce environmental degradation of the area brought about by cumulative impacts.
20. An integrated approach to provision of safe water should be adopted, incorporating other hygiene practices. Covering Berkaad surfaces to protect them from direct infection by human and animal faeces should be promoted. This will reduce the cases of water borne disease which are rampant in the villages. The recommended covering material is iron sheets because of their durability and also to decrease clearance of vegetation as covering media.
21. The combined use of Berkaads by livestock and humans poses evident hygiene risks. Most Berkaads are unprotected, thus increasing the risk of water contamination and accidents leading to death of either humans or animals. This will require the fencing of Berkaads to restrict access. In order to reduce the clearing of trees, Berkaads should be fenced using stone.
22. Women are sidelined in the decision making and management of water sources. Therefore, the community should be sensitized on mainstreaming gender equality in the management of water sources.
23. There is need to explore alternative water sources in Puntland as a way of solving frequent water shortages and water use conflicts during the dry season. The alternative water sources recommended include boreholes and water storage dams.
24. The Operation and Maintenance of the Berkaads should comply with the Best Water Use Practices and the principles of environmental management including the principles of

- sustainability, intergenerational equity, prevention, precaution, polluter pays and public participation.
25. CARE Somalia and identified government officials are required to strictly adhere to the provided ESMP including the continuous evaluation and adaptation of this plan during the course of Berkaad construction and operation.
 26. A complete audit should be undertaken upon decommissioning of berkaads in order to ensure that all the proposed mitigation measures during decommissioning have been complied.

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APPENDICES

APPENDIX A: PHOTOS TAKEN DURING THE SITE VISIT TO PUNTLAND



Berkaad fenced with a stone perimeter wall



Berkaad with damaged roof



Cracked base of the berkaad leading to seepage of water



Silt deposits in a berkaad due to erosion from the surrounding area



Berkaad covered with tree branches and grass (*Dur*)



Berkaad contaminated with camel droppings



A well covered berkaad done by CARE in midigale village



Group Photo taken after the final public consultation forum at EL Ceelwacayseed village during the EIA study

APPENDIX B: TERMS OF REFERENCE

1. Summary: Terms of Reference

Title	Environmental Impact Assessment
Purpose	Examine the effects of berkaads on the environment
Expected fee	Budget allocation
Start date	Upon signing the contract
Reporting to	Emergency Coordinator
PN/FC	SOM091/SO480
Contract agreement N ^o	ECHO/SOM/BUD/2010/01012

Project information summary

Title of the Action: Puntland Emergency Response Project (PERP)

Area of intervention: Qardo, Lasqorey, Boocame and Garowe districts, Puntland,

Target population: 85,599 people (14, 266HH)

2. Background:

Berkads are cemented reservoirs to collect rainfall run-off water whose design were inspired by Engineer Laurance's open water reservoirs (*waro*) constructed along the border region with Ethiopia in the 1950s, to open the waterless rich Haud pasture land for extended grazing period for the nomads¹. The practice spread like wild fire and is now a common feature across Somalia. It provided a temporary solution to availability of water for the nomadic population at the cost of a host of negative impacts. There are many complex issues surrounding the use and rehabilitation of *berkads*. On one hand, they are said to cause environmental damage when numerous through the spread of village settlements without any government regulation; the Government therefore prefers fewer but larger *berkads*. However, bigger *berkads* have maintenance problems and the repairs may be beyond the ability of the local community. *Berkads* have created serious health problems by extending the mosquito season as an all the year round occurrence and hence the spread of malaria as a major disease in the rural areas as well as posing major sanitation problems. In addition, *berkad* construction has often been cited as the source of most rural conflicts. Constructing a *berkad* in a common pasture land is the preferred method of turning it into a clan claimed territory and therefore the harbinger of conflicts.

Issues of ownership and water quality also exist and placement of *berkads* is also an issue. Whether to construction *berkads* in grazing areas or smaller rural settlements is a point of contention. Yet, many

¹ Need to Address Pastoral Land Degradation and Increasing Rural Conflict in Somaliland. ISG, Feb 2011. http://soradi.org/index.php?option=com_content&view=article&id=90:-need-to-address-pastoral-land-degradation-and-increasing-rural-conflicts-in-somaliland-&catid=34:conference&Itemid=54. Accessed 3rd March 2011

villages only get water from these structures. These and many other issues necessitate a study to guide future development of such water points. The aim of the proposed study is to thus to review different aspects of *berkad* use and come with recommendations/guidelines for future use.

3. Purpose and Objectives:

The study has been commissioned to examine the effects of berkaads on the environment. In this regard the environment includes all relevant aspects of the natural and human resources. The study will evaluate the effects on human health, society, the natural environment and on property and will utilize a multi-disciplinary approach. The assessment objectives are as follows:

4. Issues to be addressed

i) Policy framework: This section of the Report will describe the policy and legal basis within which the project is to be implemented, making reference to relevant ECHO policies and guidelines and Puntland state legal requirements for s.

ii) Significant environmental impacts: The study will provide an exhaustive list of all impacts including long term and short term, minor, moderate and severe, direct and indirect, and select the manageable, significant impacts based on magnitude, significance, extent and special sensitivity. For the purpose of this assessment, magnitude will refer to the amount of change to be created by the impact, this should be quantified to the extent possible. Significance here will refer to the actual effects on human health and the natural environment, both physical and biological and will look beyond magnitude while extent will refer to the area to be affected. Where impacts cannot be quantified, the study will provide qualitative analysis of the said impacts.

iii) Socio- economic analysis: The socio-economic characteristics of the existing location should be identified. The impacts of berkaads on the socio-economic environment should then be analyzed. The analysis should include the use of land, the main economic activities, governance structures, migratory patterns etc. Analysis should also examine traditional usage/management systems for berkaads and those established by aid agencies, this should include a comparison of the two and the resultant impacts of each system. Impacts should be categorized in terms of positive and negative, examples of negative impacts are conflicts between users; positive impacts include higher water quality. Special attention should be given to the effect of berkaads on conflict over resources and on women's access to water.

iv) Analysis of alternatives: Based on the impacts identified above, the study should identify possible alternatives and provide a detailed analysis of the impacts associated with each alternative. For example, if the project were to be sited elsewhere, the impacts associated should be reviewed and the associated mitigation action and costs defined. Each alternative should be evaluated in respect of its potential environmental impact and capital and operating costs. The environmental losses and gains must be combined with the economic costs and benefits to give the full picture for each alternative. An analysis of the "no action" alternative should also be included.

vii) Mitigation plan: For each potential adverse impact the plan for its mitigation at each stage of the project should be documented and its cost assessed. In the case of beneficial impacts it should be demonstrated how these can be maximized.

5. Methodology

Quantitative analysis of the possible impacts and the alternatives should use a variety of approaches specific to s, for example, checklists, matrices, networks and map overlays. Qualitative analysis should be participatory in its focus and should also utilize a variety of tools including focus group discussions with the project beneficiaries and other stakeholders.

In planning for field engagements, the consultant will be expected to liaise with the field contact in the local offices on the ground. In addition, the consultant is expected to be innovative, creative and focused in methodological elaboration. In data collection, the consultant should ensure that a variety of field sources are used including but not limited to holding consultations and discussions with;

- Programme staff in Nairobi for briefing
- Project staff in the field
- Other members of the WASH cluster in Puntland
- Local Authorities
- Line ministries/agencies
- Community representatives and project beneficiaries
- CARE's local partners
- International Agencies on the ground

The consultant should also make every effort to include local knowledge and expertise in the environmental methodology. Local perceptions of the environment should be included in the computations in the quantifying of impacts, identification of alternatives etc. Communities should also be involved in the review of the findings.

6. Expertise Required

The consultant should have the following expertise:

- Minimum of 10 years professional experience in developing countries, including previous experience working in Somalia;
- University degree in Environment, Natural Resource Management or other related subject;
- Demonstrable experience in conducting s
- Be conversant with community based water and infra-structure management systems
- Have a good understanding of Somalia and its history, and the resulting impact this may have on the working environment.
- Have an understanding of operating conditions in an insecure environment
- Have excellent analytical and writing skills
- Be willing to travel extensively in the working areas of the project.
- Fluent in English (both reading and writing).
- Understanding of the Somali language is an advantage

7. Work plan:

Under the direct supervision of the Emergency coordinator, the consultant will undertake the following tasks;

#	Tasks	Duration (days)
1.	Literature review	2
2.	Briefing meeting with Nairobi Programme staff	1
3.	Selection and preparation of methodology and tools	2
4.	Training of the enumerators	2
5.	Data collection	4
6.	Data entry, processing and cleaning and statistical analysis	4
7	Presentation of findings to CARE and representatives of the public	1
8	Incorporation of feedback and report writing	2
9	Submission of draft report to CARE	1
10	Feedback from CARE	2
11	Incorporation of feedback and submission of final report	2
	Total	23

8. Outputs and deliverables

The report should contain the following sections:

- Executive summary
- Policy, legal and administrative framework
- Significant environmental impacts
- Socio-economic analysis of impacts
- Identification and analysis of alternatives
- Mitigation action/Mitigation management plan
- List of references
- Appendices including:
 - Reference documents, photographs, unpublished data
 - List of respondents
 - Terms of Reference
 - Consulting team composition
 - Notes of Public Consultation sessions

The report should also include a short, non-technical summary for stakeholders.

The final report and a summary power point presentation of the findings should be submitted to CARE in both hard and soft-copy in MS-Word before or at the expiry of the contract period.

9. Assignment Duration:

This assignment will be carried out in a total of 23 days

10. Remuneration:

The Consultant is requested to quote his/her price for the assignment including all the Enumerators involved in this exercise. The consultant should also mention when he/she will be available to carry out this assignment

11. Responsibilities of the Client – CARE Somalia:

In support to the consultant to undertake the assignment, CARE Somalia will;

- Pay the entire consultancy fee (as per the contract) after the submission and acceptance of the study report, outputs and attachments. **The consultant will be paid subject to the completion of the study and the report in a satisfactory manner and acceptance by both CARE and ECHO.** This payment will also be taxed in accordance with the Kenyan Government laws, exact amounts will be specified in the contract.
- CARE Somalia, Emergency Coordinator, to provide the consultant with the certificate of work completion.
- Assign a field assistant while in the field for interpretation, if necessary.
- Cater for transport and upkeep as well as other related logistics to and from the field in Somalia, including transport while in the field.
- Facilitate access to relevant offices in the field through prior arrangements and consultations.
- Facilitate access to relevant resource materials in the course of undertaking this assignment.

12. Consultant's Responsibilities:

The consultant under this assignment will;

- Make his/herself available for the assignment
- Provide copies of his/her travel documents to CARE.
- Commit him/her to the completion of a fully satisfactory end product within the agreed time frame.

APPENDIX C: LIST OF PARTICIPANTS DURING THE PUBLIC CONSULTATION MEETING

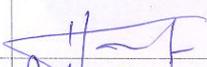
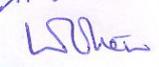
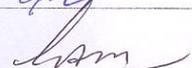
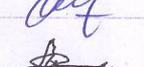
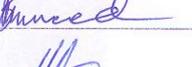
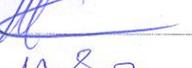
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CARE SOMALIA: STUDY OF BERKAADS IMPACT ON THE ENVIRONMENT

ENVIRONMENTAL IMPACT ASSESSMENT: PUBLIC CONSULTATION FORM

ENVIRONMENTAL ASSESSOR: Mr. Haroub Ahmed

Location: P.S.A. office - Garowe

Name	Signature	ID No.	DESIGNATION / TEL NO
1. Haroub AHMED			Environmentalist
2. Ahmed Omar Jama			CARE SPD
3. PETER WAKA			WASH ADVISOR
4. Eng. Ali Nurad			Project Engineer
5. Eng. Abdi Hassan			PSAWEN
6. Faysal Max'ed Muir			PSAWEN
7. Ahmed Yasar Farah			BARSAWEN
8. Ali Jama Farah			PSAWEN
9. Abdi Mahad Ali			PSAWEN
10. Yaasin Ibraahim waq			PSAWEN
11. Abdi Said Osman			PSAWEN

Public Consultations: Impacts of Berkaads on environment

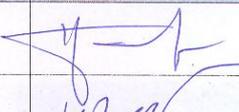
Date: 28/6/2011

CARE SOMALIA: STUDY OF BERKAADS IMPACT ON THE ENVIRONMENT

ENVIRONMENTAL IMPACT ASSESSMENT: PUBLIC CONSULTATION FORM

ENVIRONMENTAL ASSESSOR: Mr. Haroub Ahmed

Location: Lipah-xay village - Qudus District
 Time: 9.40 pm

Name	Signature	ID No. DESIGNATION
1. Haroub Ahmed		Environmentalist
2. Ali Barre Osman		Youth group
3. Alkadir Ali Barre		Youth group
4. Abdi Mahid Mahid Cabdi		Elder
5. Adan Ali Nur		Elder
6. Abdi Muse Fereh		C/municipal chairman
7. Ali Nur Mahid		Project Engineer
8. Ahmed Omar Jama		CARE SPD

Public Consultations: Impacts of Berkaads on environment

Date: 02/7/2011

CARE SOMALIA: STUDY OF BERKAADS IMPACT ON THE ENVIRONMENT

ENVIRONMENTAL IMPACT ASSESSMENT: PUBLIC CONSULTATION FORM

ENVIRONMENTAL ASSESSOR: Mr. Haroub Ahmed

Location: El-waceyed

Name	Signature	ID No.
1) ALI Nur Moh'ud		Project Engineer CARE
2) Farah Jama		PA's vice chairman
3) Halima Moh'ud Phurao		PA's committee →
4) Hafida Moh'ud Abdi		village committee →
5) muse Moh'ud Yusuf		village committee →
6) Abdikafi Moh'ud Shirey		committee →
7) Ahmed Omar Jama		S'PO SARC
8) Ahmad Hussein Moh'ud		PO CARE
Haroub Ahmed		Environmentalist

Public Consultations: Impacts of Berkaads on environment

Date: 22/6/2011

CARE SOMALIA: STUDY OF BERKAADS IMPACT ON THE ENVIRONMENT

ENVIRONMENTAL IMPACT ASSESSMENT: PUBLIC CONSULTATION FORM

ENVIRONMENTAL ASSESSOR: Mr. Haroub Ahmed

Location: Mindigalle
Buran Basqorey district - 10.00am

Name	Signature	ID No. Designation
1. Haroub Ahmed	[Signature]	Environmentalist.
2. Ali Nur Mohud	[Signature]	Project Engineer.
3. Ahmed Omar	[Signature]	SPD CARE (PEEP)
4. Subayr Elkaabi	[Signature]	Mindigalle village
5. Shugsi Elkaabi (F)	[Signature]	"
6. Elcasus maxmuud	[Signature]	"
7. Kamari Farrah Maxud	[Signature]	"
8. Cabdi Abshir Xaafi	[Signature]	"
9. Elraxman Cali Farax	[Signature]	"
10. El yuusuf Elkaraan	[Signature]	"
11.		
12.		
13.		
14.		

Public Consultations: Impacts of Berkaads on environment

Date: 30/6/2011

CARE SOMALIA: STUDY OF BERKAADS IMPACT ON THE ENVIRONMENT

ENVIRONMENTAL IMPACT ASSESSMENT: PUBLIC CONSULTATION FORM

ENVIRONMENTAL ASSESSOR: Mr. Haroub Ahmed

Location: Berkaad Village
Qandlo Suburb
Berkaad Region

Name	Signature	ID No.	Designation
1. Haroub Ahmed	[Signature]		Environmentalist
2. Ali Nur Abdir	[Signature]		Project Engineer
3. Umar Abdirahman	[Signature]		Vice chair - PAS
4. Harub Mohamed Samad	[Signature]		
5. Farhiyo Ali Nur	[Signature]		
6. Asho Said Abdi			
7. Idris Kari Ali Yusuf			
8. Ahmed Omar Jama	[Signature]		CARE SPD (PERP)

Pastoral Association Committee

APPENDIX D: CURRENT DESIGN OF BERKAAD USED BY CARE

