



SALT INVESTMENT S.A.Z.F



Lake Assal Salt Project, Djibouti

Environmental Management Plan



Nov 2008

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Acronyms

DAM	Directorate of Maritime Affaires
EC	Environmental Consultant
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
IMS	Invasive Marine Species
ISERT	Institut Supérieur D'Etudes et de Recherches Scientifiques et Techniques,
MHUEAT	Ministère de l'Habitat, de l'Urbanisme, de l'Environnement et de l'Aménagement du Territoire
OPIC	Overseas Private Investment Corporation
PANE	Plan d'action National pour l'Environnement
NAPB	National Action Plan for Biodiversity
NGO	Non-Government Organisation
RO	Research Officer
SEL	Societe D'Exploitation du Lac

Section

1.0

INTRODUCTION

1.1 Purpose of Environmental Management Plan (EMP)

The main purpose of the Environmental Management Plan (EMP) is to provide a strategy for environmental protection whereby all the activities associated with the SALT INVESTMENT S.A Salt Operation from harvesting and loading, hauling, crushing and packaging, storage, distribution and export, are controlled and monitored. This is to ensure that time and national resources are not wasted and that problems occurring during the salt operations are identified and rectified to prevent damage to the environment.

The present EMP addresses specific impacts identified in the EIA Report and the actions required to mitigate or enhance those impacts. If some issues have been overlooked, the plan must be amended in consultation with the Client and regulatory authorities. The EMP therefore aims to ensure that:

- ❑ salt exploitation activities are managed efficiently and effectively to reduce or avoid negative impacts and enhance positive impacts of the project;
- ❑ the affected communities are better off with the implementation of the salt project;
- ❑ precautions against damage or claims arising from damage are taken timeously;
- ❑ information flow between all responsible persons is optimised to ensure all are aware of their particular responsibilities;
- ❑ involve the local community by employing unskilled and/or skilled labour in the salt project;
- ❑ preserve the integrity of Lake Assal.

In order that the EMP can be effectively implemented, it identifies:

- ❑ mitigation measures to be implemented at each stage of the project;
- ❑ individuals, groups, and government agencies with responsibilities or potential skills for carrying out mitigation actions identified in the impact assessment;
- ❑ guidelines for communication between all parties with responsibilities for implementing the EMP;
- ❑ institutional and training requirements for implementing mitigation measures;
- ❑ a monitoring programme to track project related events and progress in implementing mitigation measures;

The National Action Plan for Biodiversity (2000) requires that a management plan for Lake Assal be developed (see Appendix I – EIA Report) to ensure that salt exploitation and tourism activities can co-exist. The EMP Report for Salt Investment S.A's salt operations should be included in the overall management plan for Project 8.2 in the NAPB. Mitigation measures in the NAPB particularly concerned with the management of salt exploitation activities are to:

- ❑ Create a protected area of 10 kms, starting from the entrance to the lake.
- ❑ Impose a tax (for preservation of the site and quality of life for the people).
- ❑ Establish a plan for plots.
- ❑ Classify Lake Assal as a world heritage site.
- ❑ At the workers site supply enough water, treat used water, and remove solid waste.
- ❑ Stop damages being caused by the extraction and transport of salt;
- ❑ Help to minimise and favour restoration;
- ❑ Develop and put in place sustainable mining practices e.g. rehabilitation of exploited sites, recycling of waste, protection of soil decontamination.

Section

2.0

KEY ENVIRONMENTAL IMPACTS

2.1 Key environmental impacts

The key environmental impacts identified and discussed in the present EIA report were identified by public consultation, site visits and a scoping matrix. The following key issues and potential impacts associated with the Lake Assal Salt Project are:

Key Positive Impacts

- ❑ The salt project will help create jobs and employment;
- ❑ Increase in export potential;
- ❑ Improve the standard of living of the villagers in Assal;
- ❑ The local economy will improve;
- ❑ Services and infrastructure to Lake Assal will improve;
- ❑ Provide a tourist attraction - educational aspect of salt production;
- ❑ Structuring and limitation of salt exploitation to certain areas only;
- ❑ Implementation of environmental management measures to mitigate negative impacts;

Key Negative Impacts

- ❑ Pressure on natural resources, especially water, but also land where erosion may be an issue;
- ❑ Decrease in aesthetic value of certain areas of Lake Assal;
- ❑ Vehicle movements on the lake Assal and between the lake and processing site;
- ❑ Increase in respiratory dust due to vehicle movements and hence health and safety risk;
- ❑ Increase in settlements hence increase in waste and sewage generation;
- ❑ Harsh climatic conditions and floods have a negative impact on the salt project activities.
- ❑ disturbance to the natural environment at lake Assal
- ❑ Increased shipping activity on the marine environment
- ❑ Loss of aesthetics in the Lake Assal and Dankalêlo tourist attraction areas due to salt mining activities (buildings, harvesters, access roads)

2.2 Assessment of significant environmental impacts

The evaluation of potential impacts resulting from the salt project activities includes direct and indirect, temporary and permanent, and cumulative impacts on the environment. The following Table 2.1 summarises the significant biophysical and socio-economic impacts identified for each of the project activities, and then shows an evaluation of their significance after mitigation measures have been applied.

The approach used to assess the significance of the potential impacts and assess the efficacy of mitigation or enhancement measures is to apply significance ratings to each impact based on objective criteria, such as magnitude, extent and duration of that impact, to yield a final evaluation of the significance of impacts before and after mitigation. The application of significance ratings reduces the number of variables which need to be considered by the decision maker, whilst providing pertinent information about the implications of the salt operation at Lake Assal. Table 2.2 summarises the assessment criteria used in this study.

Table 2.2. First step assessment criteria for evaluation of impacts¹

FIRST STEP CRITERION	CATEGORIES
Extent or spatial influence of impact	Local/site specific; Regional; National; International
Magnitude of impact at that spatial scale	<p>High: natural and/or social functions and/or processes are severely altered</p> <p>Medium: natural and/or social functions and/or processes are notably altered</p> <p>Low: natural and/or social functions and/or processes are negligibly or minimally altered</p>
Duration if impact	<p>Short term (ST): 0-5 yrs; Medium term (MT): 5-15 yrs;</p> <p>Long term (LT): 15+ yrs.</p>

¹from Brownlie and Willemse (1996)

Table 2.1. Before and after mitigation of potentially significant environmental impacts during pre-construction, construction and operational phases of the Lake Assal Salt Project.

SITE 1: LAKE ASSAL OPERATIONS (solar ponds, wash dam, salt processing plant)			
Environmental Impacts	*Before mitigation	Mitigation / enhancement measure	*After mitigation
PRE-CONSTRUCTION PHASE			
Damage to the natural environment of Lake Assal	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Undertake Environmental Impact Assessment study 	local / low / ST LOW
Uninformed public and government departments about the Lake Assal Salt Project	national / high / LT HIGH	<ul style="list-style-type: none"> ▪ Ensure sufficient public consultation and that all key stakeholders are aware of the Lake Assal Salt Project. ▪ Undertake public consultation in the projects area of influence to establish any issues and/or concerns of the Salt Project from the local communities. 	national / med / MT MED
Inadequate planning and design of salt operations at the Lake	national / med / LT MED	<ul style="list-style-type: none"> ▪ Salt operations at the lake must be planned and designed with minimal impact on the environment and pressure on natural resources e.g. use of ground water 	national / med / LT MED
Visual and noise impact of inappropriate siting of salt processing plant, wash dam, and work areas	national / high / LT HIGH	<ul style="list-style-type: none"> ▪ Site salt processing plant and wash dam away from tourist areas 	national / med / LT MED
CONSTRUCTION PHASE			
Groundwater contamination by oil, grease, and fuel in equipment areas	local / med / ST MEDIUM	<ul style="list-style-type: none"> ▪ Control collection and recycling of lubricants ▪ Have precautions to avoid accidental spills 	local / low / ST LOW
Movement and presence of vehicles (bulldozers, front-end loaders, trucks) on and around the lake	local / high / ST MEDIUM	<ul style="list-style-type: none"> ▪ Control movement of construction vehicles. ▪ Provide "parking" areas for vehicles not being used at any one time 	local / low / ST LOW
Visual impact of the salt construction activities at the lake to tourist areas	local / high / ST MEDIUM	<ul style="list-style-type: none"> ▪ Minimise construction activities during peak tourist periods. ▪ Ensure site area is organised 	local / low / ST LOW

* FIRST STEP CRITERIA - extent / magnitude / duration (ST, short term; MT, medium term; LT, long term)/ SIGNIFICANCE

		and clear of solid wastes.	
Noise impact of the construction activities at the lake	local / high / ST MEDIUM	<ul style="list-style-type: none"> ▪ Minimise harvesting operations during peak tourism times i.e. weekends 	local / low / ST LOW
Dumping of construction materials / spoil on land adjacent to processing plant activities	local / med / MT MEDIUM	<ul style="list-style-type: none"> ▪ Management of waste materials must be stipulated in the management plan 	local / low / ST LOW
Open borrow pits resulting in negative visual impact and potentially a safety hazard	local / med / MT MEDIUM	<ul style="list-style-type: none"> ▪ Rehabilitate borrow pits to original landscape 	local / low / ST LOW
Risk to health and safety of employees	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Ensure all employees have safety gear – hard hats, gloves, steel-toed boots. ▪ Have emergency procedures in place in case of accidents. 	local / med / ST LOW
OPERATIONAL PHASE			
Groundwater contamination by oil, grease, and fuel in equipment areas	local / med / LT MEDIUM	<ul style="list-style-type: none"> ▪ Control collection and recycling of lubricants ▪ Have precautions to avoid accidental spills 	local / low / ST LOW
Potential pollution of the lake environs by improperly sited latrines, lack of waste disposal facilities at works sites next to lake.	local / med / ST MEDIUM	<ul style="list-style-type: none"> ▪ Ensure adequate facilities provided for workers ▪ Provide waste disposal facilities ▪ Restrict work sites to certain areas 	local / low / ST LOW
Damage and/or loss of protection worthy areas resulting from salt harvesting activities.	national / high / LT HIGH	<ul style="list-style-type: none"> ▪ Minimise salt exploitation area on Lake Assal ▪ Ensure salt production on the lake is sustainable i.e. being replenished at the same rate it is exploited. 	local / low / ST LOW
Movement and presence of vehicles (bulldozers, front-end loaders, trucks) on and around the lake	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Minimise area where harvesting vehicles move around ▪ Provide "parking" areas for vehicles not being used at any one time 	local / low / ST LOW
Air contamination by iodizing and wind blown salt	local / med / ST MED	<ul style="list-style-type: none"> ▪ Monitoring and control of air quality 	local / low / ST LOW
Reduced natural salt regeneration on the lake due to over exploitation of salt layer	regional / high / LT HIGH	<ul style="list-style-type: none"> ▪ Maintain sustainable exploitation of salt layer ▪ Monitor biological aspects of the salt works. 	regional / med / LT MED
Visual impact of the salt operations at the lake to tourist areas	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Locate wash dam and salt processing facility out of sight of the tourists. ▪ Ensure site area is organised 	local / low / LT MED

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		and clear of solid wastes.	
Noise impact of the salt operations at the lake	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Minimise harvesting operations during peak tourism times i.e. weekends 	local / low / LT LOW
Salt washing plant and stockpiling area – generation of waste, oil spillage etc.	local / med / ST MEDIUM	<ul style="list-style-type: none"> ▪ Ensure strict control of waste ▪ Confine work area 	local / low / ST LOW
Health problems associated with working in the lake's environment e.g. wind blown salt	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Ensure all employees have safety gear – hard hats, gloves, steel-toed boots. ▪ Provide protective clothing for workers ▪ Provide health facilities for workers ▪ During windy conditions if air quality deteriorates, ensure workers where face mask. 	local / med / ST LOW
Damage to potential tourism sites – reduce aesthetic value of Lake Assal	national / high / LT HIGH	<ul style="list-style-type: none"> ▪ Ensure that potential tourist sites are provided with appropriate protection or that plans for any new developments are known. ▪ Have a “visitors centre” at the Salt Processing site where tourist can go to learn about the Lake Assal Salt Project. This would include a tour of the beach site as well. 	national / med / LT MED
Positive impact of short and long term employment for locals	local / low / ST LOW	<ul style="list-style-type: none"> ▪ Maximise employment of local labour where possible ▪ Careful attention to the recruitment of workers to ensure it is fair and also does not generate conflict. ▪ Optimise secondary/informal employment opportunities, especially for women ▪ Employ local guides for the “Tourist Centre” who also be able to explain the history of the area. 	local / high / LT HIGH

SITE 2: HAUL ACCESS ROAD (7.5km) (transport of salt from the lake to salt storage beach site)			
Environmental Impacts	*Before mitigation	Mitigation / enhancement measure	*After mitigation
PRE-CONSTRUCTION PHASE			
Location of access road resulting in negative impact on the environment	local / med / LT MED	<ul style="list-style-type: none"> ▪ Locate and design haul road with minimal impact on the environment. 	local / low / ST LOW
Location of access road near tourist routes	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Ensure aesthetic aspects considered in potential tourism development locations 	local / low / ST LOW
CONSTRUCTION PHASE			
Loss and/or destruction of vegetation for access roads.	local / med / LT MED	<ul style="list-style-type: none"> ▪ Minimise loss of vegetation ▪ Revegetate as soon as possible using local species 	local / low / ST LOW
Improper access road construction methods which mar the landscape by leaving soils exposed, causing slips and landslides in steep areas	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Avoid leaving exposed cut and fill areas ▪ Rehabilitate scarred sections as soon as possible ▪ Seed or plant erodible surfaces as soon as possible ▪ Ensure aesthetic aspects considered in potential tourism development locations ▪ Build culverts at dry river bed locations 	local / low / ST LOW
Noise and Vibration: Generation of noise along the road corridor and at ancillary sites, particularly from heavy construction vehicles	local / med / ST MED	<ul style="list-style-type: none"> ▪ Locate work compounds at least 0.5km from settlements. ▪ Maintain machinery and vehicles 	local / low / ST LOW
Generation of dust from high traffic volumes	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Cease operations during periods of dry windy weather, in areas where wind blown dust is causing a nuisance. 	local / low / ST LOW
Disturbance to burial/grave sites	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Ensure access roads and work areas are located away from graves sites ▪ Communities affected by the access road must be consulted as to the whereabouts of any burial sites, as well as other 	local / low / ST LOW

		<p>religious interest sites.</p> <ul style="list-style-type: none"> ▪ Restrict movement of vehicles to existing roads 	
unemployment of locals	<p>local / high / LT HIGH</p>	<ul style="list-style-type: none"> ▪ Maximise employment of local labour during road construction. ▪ Careful attention to the recruitment of workers to ensure it is fair and also does not generate conflict. ▪ Optimise secondary/informal employment opportunities, especially for women 	<p>local / low / ST LOW</p>
Increased risk for road accidents with increased vehicle movements	<p>local / med / LT MED</p>	<ul style="list-style-type: none"> ▪ Install road traffic signs warning of wildlife in the area ▪ Install speed bumps next to settlements 	<p>local / low / ST LOW</p>
OPERATIONAL PHASE			
Increased risk of soil erosion at roadside edges	<p>local / high / LT HIGH</p>	<ul style="list-style-type: none"> ▪ Ensure adequate roadside maintenance of erosion control measures. ▪ Provide for storm water drainage and construct curbing to prevent water erosion onto paved roads. 	<p>local / low / ST LOW</p>
Generation of dust from high traffic volumes on haul road	<p>local / high / MT HIGH</p>	<ul style="list-style-type: none"> ▪ Use alternate methods of dust control (other than water) due to water shortage in the Lake Assal area e.g. applying chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments. Chemical treatment can reduce emissions by 30 to 95 percent e.g. coal soap #10 on fill lines to the water trucks works by providing reduced surface tension of the water. This effect allows water to penetrate into the soil, providing more effective dust control OR RDS-16 is a calcium chloride based product which works by binding the fines in the road surface and drawing moisture from the atmosphere to 	<p>local / low / ST LOW</p>

		<p>replenish the dust control (AKJ Industries, Florida, USA).</p> <ul style="list-style-type: none"> ▪ Limited use of water-absorbing (hygroscopic) salts with watering of road surface, will reduce how often you must water trafficked areas. ▪ High vehicle speed increases the amount of dust stirred up from unpaved roads and lots. Lowering the speed of a vehicle from 45 miles per hour to 35 miles per hour can reduce emissions by up to 22 percent. ▪ Apply surface chemical suppressants to untrafficked areas to form a less erodible soil surface i.e on the shoulder of the road ▪ Upgrade the road by adding surface gravel to reduce the source of dust emission; improving drainage and crown. 	
Increased risk for road accidents with increased vehicle movements	local / med / LT MED	<ul style="list-style-type: none"> ▪ Install road traffic signs warning of wildlife in the area ▪ Install speed bumps next to settlements ▪ Police speed limit of haul trucks on access road 	local / low / ST LOW
Existence of a road across water courses will alter water flow.	regional / med / LT HIGH	<ul style="list-style-type: none"> ▪ Maintain culverts, mitre drains and roadside drains clear of vegetation and debris to avoid damming up of water courses 	local / med / ST LOW
Increased noise level with increased traffic flow	local / med / LT MED	<ul style="list-style-type: none"> ▪ Enforce speed limits. ▪ Improved road surface should reduce noise levels due to more efficient operation of vehicles and less noise from vehicle tyres. 	local / low / LT LOW

SITE 3: MAINTENANCE AND STAFF HOUSING (equipment, vehicle maintenance, staff housing)			
Environmental Impacts	*Before mitigation	Mitigation / enhancement measure	*After mitigation
PRE-CONSTRUCTION PHASE			
Negative impact on aesthetics of natural landscape	local / med / LT MED	<ul style="list-style-type: none"> ▪ Locate and design staff housing with minimal impact on the landscape. 	local / low / ST LOW
Existing site with old and broken machinery, vehicles etc. left lying around	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Clean up existing site ▪ 	local / low / ST LOW
Inadequate drainage design causing localised pollution		<ul style="list-style-type: none"> ▪ Locate equipment and buildings appropriately and install drainage to avoid localised pollution (e.g. concrete mixers, employees accommodation, stores, laboratories/workshop). 	
Waste disposal sites	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Locate solid waste disposal site away from buildings and people and plan regular waste removal 	local / low / ST LOW
CONSTRUCTION PHASE			
Loss and/or destruction of natural areas outside the existing fenced maintenance building site	local / med / LT MED	<ul style="list-style-type: none"> ▪ Confine construction activities to the demarcated maintenance/staff building area. 	local / low / ST LOW
Sewage and sanitation	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Ensure adequate sewage and sanitation management for construction workers. ▪ The Contractor must provide suitable sanitary arrangements at the construction personnel. A minimum of 1 toilet will be provided per 15 persons at each working area. The Contractor must maintain, keep clean, neat and hygienic all site sanitation facilities 	local / low / ST LOW
Solid waste disposal	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Manage solid waste disposal 	local / low / ST LOW
Washing of vehicles with local water supplies without catch trays	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Use recycled water to clean vehicles and use catch trays underneath to catch runoff 	local / low / ST LOW

Unemployment of locals	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Maximise employment of local labour during construction of buildings. ▪ Careful attention to the recruitment of workers to ensure it is fair and also does not generate conflict. ▪ Optimise secondary/informal employment opportunities, especially for women 	local / low / ST LOW
The presence of construction camps attracts market opportunists with informal roadside shops which are poorly managed in terms of health regulations and waste disposal.	local / med / MT MED	<ul style="list-style-type: none"> ▪ Identify suitable sites for the establishment of small shops and other facilities servicing the construction camp. 	local / low / ST LOW
OPERATIONAL PHASE			
Pollution of groundwater supplies	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Specific drainage is required around fuel depots and ablution blocks to prevent runoff affecting groundwater. 	local / low / ST LOW
Servicing of vehicles outside the vehicle maintenance building in oils and lubricants penetrating soil surface	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ All vehicles must be serviced in a designated area inside the maintenance building ▪ Catch trays must be installed 	local / low / ST LOW
Oil or petrol spills at fuel depot	local / med / LT MED	<ul style="list-style-type: none"> ▪ In the event of an oil/petrol spill, the spill must be cleaned up immediately and deposited at a registered landfill site 	local / low / ST LOW
Spread of STD's and other diseases	local / med / LT MED	<ul style="list-style-type: none"> ▪ Enlist the help of the local Health Centre to undertake workshops on STD's and AIDS Awareness for the workers ▪ Ensure the contract workers are aware of local health facilities ▪ Employ local communities living next to the maintenance site, so family structure is maintained 	local / low / ST LOW
Indiscriminate disposal of waste around camp site	local / med / LT MED	<ul style="list-style-type: none"> ▪ Designate restricted places for eating in working areas, and provide adequate refuse bins 	local / low / ST LOW
Pressure on local water resources	local / med / LT MED	<ul style="list-style-type: none"> ▪ Water for drinking purposes must be imported to the site. ▪ Use recycled water for 	local / low / ST LOW

SITE 4: SALT STORAGE AND SHIP LOADING BEACH SITE			
Environmental Impacts	*Before mitigation	Mitigation / enhancement measure	*After mitigation
PRE-CONSTRUCTION PHASE			
Reduce the aesthetics of the Ghoubbet beach area	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Locate and design salt storage area away from tourist beach site. 	local / low / LT LOW
Damage to potential archaeological and cultural sites	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Ensure public consultation identifies archaeological and cultural sites in the project area. ▪ Locate any buildings/operations to do with the salt project away from sensitive areas. 	local / med / ST LOW
Damage and pollution to the marine environment	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Plan ship loading facility with minimal impact on the marine environment. ▪ Appoint environmentally conscious shipping company. ▪ Locate desalination plant with minimal impact on the marine environment 	local / low / LT LOW
CONSTRUCTION PHASE			
Increased construction vehicle traffic affecting local tourism	local / high / ST HIGH	<ul style="list-style-type: none"> ▪ Ensure construction vehicles only operate on weekdays ▪ Put in place and police speed limits. 	local / med / ST MED
Sedimentation of the marine environment when constructing the dyke and levelling at the beach storage area	local / high / ST HIGH	<ul style="list-style-type: none"> ▪ Restrict building of the dyke to low tide periods only. ▪ Install temporary berms to prevent spillage of building materials into the sea. ▪ Restrict building activities during very windy conditions 	local / low / ST LOW
Increased noise levels due to construction vehicles, affecting tourism	local / high / ST HIGH	<ul style="list-style-type: none"> ▪ Restrict vehicle movement to weekdays 	local / low / ST LOW
Spillage of cement in the sea whilst building of jetty pylons and sea anchors	local / high / ST HIGH	<ul style="list-style-type: none"> ▪ Restrict building of jetty to calm sea conditions to minimise risk of cement spillage 	local / low / ST LOW
Waste disposal on site	local / high / ST	<ul style="list-style-type: none"> ▪ Allocate eating areas for 	local / low / ST

* FIRST STEP CRITERIA - extent / magnitude / duration (ST, short term; MT, medium term; LT, long term)/ SIGNIFICANCE

	HIGH	<p>construction staff and install bins for local refuse disposal.</p> <ul style="list-style-type: none"> ▪ Ensure regular removal of waste to a designated waste disposal site 	LOW
Sewage and sanitation on site	local / high / ST HIGH	<ul style="list-style-type: none"> ▪ Ensure adequate latrines on site. ▪ Ensure regular removal of latrines 	local / low / ST LOW
Pressure on local water resources	local / high / ST HIGH	<ul style="list-style-type: none"> ▪ Import potable water for construction workers. ▪ Use recycled water for construction use. 	local / low / ST LOW
OPERATIONAL PHASE			
Decrease in air quality due to wind blown dust and salt from salt storage area, affected health of workers	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Monitor air quality at salt storage area ▪ Ensure salt is adequately covered and protected from wind. 	local / low / LT LOW
Salt being delivered via haul roads, increased traffic on main road to the beach	regional/ med / LT HIGH	<ul style="list-style-type: none"> ▪ Transport salt during non-peak times. ▪ Police speed limits of haul trucks 	local / low / LT LOW
Increased noise levels from salt operations on the beach	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Limit peak loading activities to weekdays. ▪ Monitor noise levels and determine if tourist are affected 	local / low / LT LOW
Sedimentation of the marine environment	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Maintain dyke structure and beach graded area so that there is no sedimentation into the marine environment. 	local / low / LT LOW
Spillage of salt from conveyor system	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Maintain operation of conveyor system to prevent salt spillage. ▪ Ensure bulk salt is adequately secured. 	local / low / LT LOW
Pressure on local water resources	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ All ships to use their own imported potable water resource whilst docked. ▪ Water from desalination plant to be used only for salt operations and to supply locals. 	local / low / LT LOW
Pollution of marine environment from ships whilst docked (oils, fuel, sewage, ballast water)	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Involve Djibouti Port in management of ships. ▪ Have penalties in place for ships leaking fuel and oil into marine environment. ▪ No sewage or waste disposal from the ships is allowed whilst docked in the Ghoubbet. ▪ Ensure ballast water origin is 	local / low / LT LOW

		from local marine waters.	
Ships sailing in the Ghoubbet having a negative impact on the whale sharks or any marine fauna in the bay		<ul style="list-style-type: none"> ▪ Strict navigational routes which avoid the locations frequented by the whale sharks. 	
Shipping loading activities impacting on local tourist beach.	local / high / MT HIGH	<ul style="list-style-type: none"> ▪ Ensure minimal pollution by shipping activities. Ensure Dankelo beach (Plate 4.10d) is cleaned up before ship loading activities start so that salt operations are not blamed for beach pollution. ▪ Ensure jetty/port does not interfere with existing and proposed tourist facilities in the bay ▪ Restrict ship loading to weekdays when tourist and/or locals are using the Dankelo beach. 	local / low / LT LOW
Negative impact of salt operations on tourism	local / high / LT HIGH	<ul style="list-style-type: none"> ▪ Help with beach cleanup operation at tourist beach – which is already polluted by visitors to the beach. ▪ Include salt storage and ship loading activities in the “visitors centre” tours for educational purposes. 	local / low / LT LOW
Shipping opportunities	regional/ med / LT HIGH	<ul style="list-style-type: none"> ▪ Contract out local tugs to facilitate the ships for loading. ▪ Appoint environmentally conscious shipping company 	local / high/ LT HIGH
Increased economy	Local / med / LT HIGH	<ul style="list-style-type: none"> ▪ Ensure percentage of profits of the Lake Assal Salt Project remain in Djibouti so the local economy benefits in the long run. ▪ Assist local government in building of a clinic, school, and mosque in the study area. 	regional / high/ LT HIGH
Job creation for potential distributors	regional/ med / LT HIGH	<ul style="list-style-type: none"> ▪ Maximise opportunities for locals in the export of salt products 	local / low / LT LOW

Section

3.0

RESPONSIBILITIES, CAPACITY BUILDING
AND TRAINING REQUIREMENTS

3.1 Responsibilities

The main individuals and/or parties responsible for implementation of the Lake Assal Salt Project EMP are:

- The Client** - Salt Investment S.A/Hardtech;
- SEL** - Societe D'Exploitation du Lac.
- The Contractor** – to be appointed;
- The Supervising Consultant** – Salt Investment S.A, Hardtech;
- Research Officer (RO)** – a person qualified in chemistry and biology of salt ponds, employed fulltime by Salt Investment S.A, Hardtech.
- Environmental Consultant (EC)** – Geographic Environmental Solutions
- The Environmental Control Officer (ECO)** - an independent qualified environmental consultant (to be appointed by the Client) OR an environmental officer from the MHUEAT ;
- Djibouti's Environmental Authority (MHUEAT)** - Ministère de l'Habitat, de l'Urbanisme, de l'Environnement et de l'Aménagement du Territoire (MHUEAT)
- Djibouti Port Authority**
- The Directorate of Maritime Affaires (DAM)** is in charge of prevention and prohibition of all violations of national and international legislation concerning marine pollution and maritime traffic

The roles and responsibilities of each individual / party are summarised in Table 3.1. Channels of communication between the various individuals / parties are shown in Figure 3.1.

Table 3.1. Roles and responsibilities of each individual and/or party in the implementation of the Lake Assal Salt Project EMP.

PARTY	ROLE	RESPONSIBILITY & ACCOUNTABILITY
Client Salt Investment S.A/Hardtech	The Clients bears the ultimate responsibility for the project in Djibouti, and is thus responsible for environmental performance.	<ul style="list-style-type: none"> <input type="checkbox"/> Must be informed of environmental issues and impacts of the salt project (existing and projected) and the resultant effect that such activities have on the environment. <input type="checkbox"/> Will be responsible for control and management of all their salt exploitation activities.
SEL Societe D'Exploitation du Lac.	Existing salt exploiter	<ul style="list-style-type: none"> <input type="checkbox"/> Cleanup of old salt processing site <input type="checkbox"/> Ensure no pollution at Lake Assal SEL concession area <input type="checkbox"/> Not build additional pier/jetty at beach – export salt via road to Ethiopia

Environmental Consultant (EC) Geographic Environmental Solutions	Undertake Environmental Impact Assessment and Environmental Management Plan	<input type="checkbox"/> To complete EIA and EMP reports <input type="checkbox"/> Ensure overall compliance of EMP <input type="checkbox"/> Undertake periodic environmental audits
Environmental Control Officer (ECO)	The ECO is to monitor the implementation of the CMP as well as to identify potentially detrimental impacts not identified in the CMP.	<input type="checkbox"/> Brief the Contractor about the requirements of the CMP; <input type="checkbox"/> Provide technical advice relating to environmental issues to the Project Manager. <input type="checkbox"/> Undertake periodic audits of the effectiveness of the environmental specifications on the site; <input type="checkbox"/> Keep a record of activities on site with a site diary and site photographs. <input type="checkbox"/> Monitor the biology and chemistry of the salt ponds. <input type="checkbox"/> Ensure an archaeologist is appointed PRIOR to construction to clarify location of important archaeological sites.
Supervising Consultant Salt Investment S.A, Hardtech	Oversees / supervises the daily implementation of the contract.	<input type="checkbox"/> Enforcing the environmental specifications (as contained in the EMP report) on site;
Research Officer (RO)	Monitors, collects and analyses data	<input type="checkbox"/> Monitor daily changes in climate, and changes in the salt pond's biology and chemistry.
Environment Authority MHUEAT	National Environmental Enforcing Agent	<input type="checkbox"/> Enforcement of environmental regulations <input type="checkbox"/> Enforcing EMP Compliance
Djibouti Port Authority	National port authority	<input type="checkbox"/> Monitor any shipping activities related to the salt project
The Directorate of Maritime Affaires (DAM)	Maritime Legislation	<input type="checkbox"/> is in charge of prevention and prohibition of all violations of national and international legislation concerning marine pollution and maritime traffic

3.2 Capacity Building and Training Requirements

The Feasibility Study for Salt Investment S.A Salt Project has included a budget for training on the correct and safe operating procedures and to train a technical team to maintain the plant and equipment. Equipment manuals will be supplied and the supplier data sheets translated into French.

There is a capacity building need for environmental compliance monitoring in the National Environmental Enforcing Agent. For a management plan to be successful, compliance monitoring is essential. Meetings with the environmental authority will be necessary in order to establish what capacity building and training is needed to undertake environmental monitoring on site.

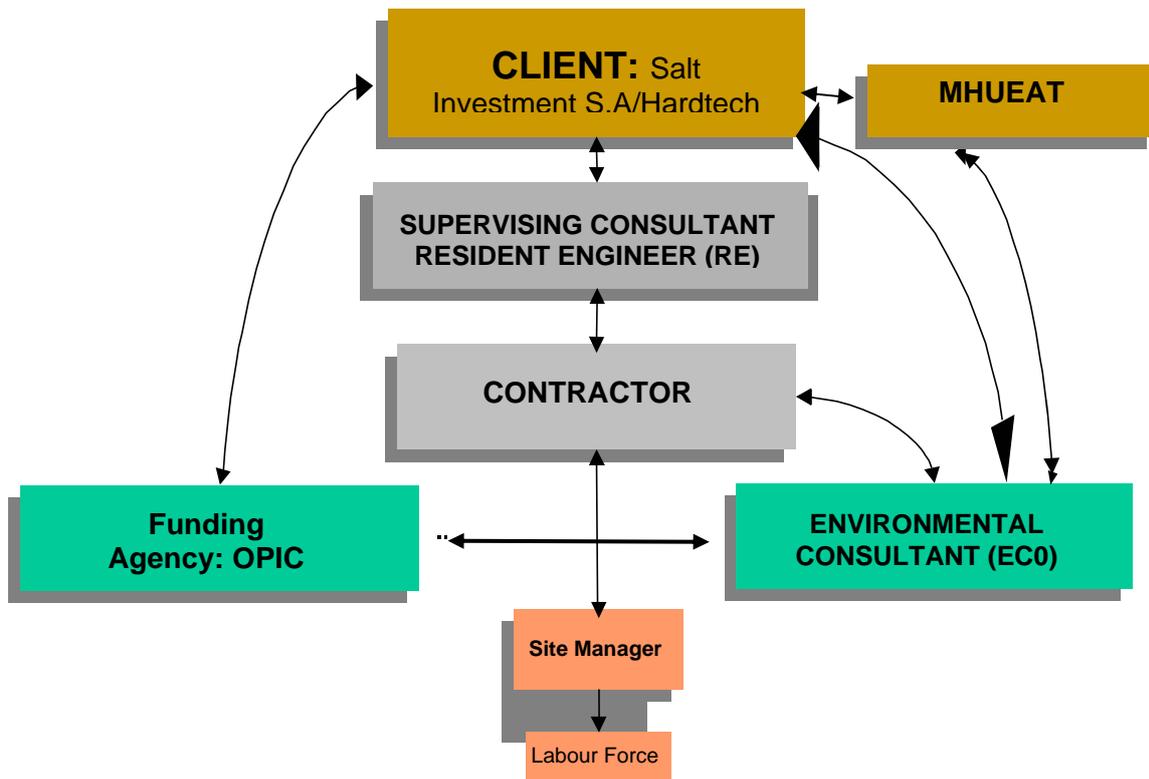


Figure 3.1. Channels of communication between individuals / parties responsible for the implementation of the EMP.

3.3 Monitoring, reporting procedures and documentation

It is important and necessary that monitoring of environmental issues of all salt operation activities is undertaken. The main purpose of monitoring is to ensure that the prescribed mitigation measures / actions in the EMP are complied with.

Whilst many of the anticipated environmental impacts have been identified in the EIA, there are other impacts expected during construction of any new structures and operational stages of the project which need to be addressed through appropriate mitigation measures.

Compliance with the EMP should be measured by means of periodic environmental audits. It is recommended that the first Environmental Audit be undertaken after the first year of the salt operations to assess whether the anticipated environmental impacts are actually occurring and being mitigated accordingly. The results of monitoring site visits are to be submitted to the environmental authority in the form of an Environmental Audit (EA) Report.

The ECO will be responsible for monitoring the environmental impacts of the project during construction and operational phases. Project Compliance Reports (PCRs) must be submitted periodically to the Environmental Consultant to ensure compliance (Appendix I).

The Research Officer (RO) will be responsible for ongoing monitoring of the salt works – Lake Assal salt regeneration, air quality, water quality, or any environmental variable that needs to be monitored.

Section

4.0

EMP IMPLEMENTATION GUIDELINES

The following section describes the main activities necessary to mitigate and/or enhance the potentially significant environmental and socio-economic impacts during implementation of each phase of the Lake Assal Salt Project. Because of the dynamic and constantly evolving nature of the present legal, institutional and administrative structure in Djibouti, this document will need to be periodically reviewed and updated to ensure that the consequences of the salt project are incorporated into the current EMP.

The main aspects of the salt project which require mitigation/ enhancement action were as follows:

- (1) community development in terms of employment, education and water availability
- (2) damage to the Lake Assal environment
- (3) impact of salt activities on tourism
- (4) shipping activities in the Ghoubbet bay and the impact on the marine environment
- (5) increased traffic due to haul trucks between the lake and the beach sites

Table 4.1 summaries before and after mitigation of potentially significant environmental impacts during pre-construction, construction and operational phases of the Lake Assal Salt Project.

Table 4.1. Implementation guidelines for each of the activities associated with Salt Investment S.A. Salt Project during pre-construction, construction and operational phases

SITE 1: LAKE ASSAL OPERATIONS (solar ponds, wash dam, salt processing plant)			
Environmental Impacts	Mitigation / enhancement measure	Implementing Authority¹	Monitoring Authority¹
PRE-CONSTRUCTION PHASE			
Damage to the natural environment of Lake Assal	<ul style="list-style-type: none"> ▪ Undertake Environmental Impact Assessment study 	CLIENT	EC
Uninformed public and government departments about the Lake Assal Salt Project	<ul style="list-style-type: none"> ▪ Ensure sufficient public consultation and that all key stakeholders are aware of the Lake Assal Salt Project. ▪ Undertake public consultation in the projects area of influence to establish any issues and/or concerns of the Salt Project from the local communities. 	CLIENT	EC
Inadequate planning and design of salt operations at the Lake	<ul style="list-style-type: none"> ▪ Salt operations at the lake must be planned and designed with minimal impact on the environment and pressure on natural resources e.g. use of ground water 	CLIENT	EC
Visual and noise impact of inappropriate siting of salt processing plant, wash dam, and work areas	<ul style="list-style-type: none"> ▪ Site salt processing plant and wash dam away from tourist areas 	CLIENT	EC
CONSTRUCTION PHASE			
Groundwater contamination by oil, grease, and fuel in equipment areas	<ul style="list-style-type: none"> ▪ Control collection and recycling of lubricants ▪ Have precautions to avoid accidental spills 	CLIENT & CONTRACTOR	ECO & MHUEAT
Movement and presence of vehicles (bulldozers, front-end loaders, trucks) on and around the lake	<ul style="list-style-type: none"> ▪ Control movement of construction vehicles. ▪ Provide "parking" areas for vehicles not being used at any one time 	CLIENT & CONTRACTOR	ECO & MHUEAT
Visual impact of the salt construction activities at the lake to tourist areas	<ul style="list-style-type: none"> ▪ Minimise construction activities during peak tourist periods. ▪ Ensure site area is organised and clear of solid wastes. 	CLIENT & CONTRACTOR	ECO & MHUEAT
Noise impact of construction activities at the lake	<ul style="list-style-type: none"> ▪ Minimise harvesting operations during peak tourism times i.e. weekends 	CLIENT & CONTRACTOR	ECO & MHUEAT

¹Client – Salt Investment S.A. / Hardtech; EC – Environmental Consultant; ECO – Environmental Control Officer; RO – Research Officer; MHUEAT – Environmental Authority; DAM – Directorate of Maritime Affaires; SEL - Societe D'Exploitation du Lac.

Dumping of construction materials / spoil on land adjacent to processing plant activities	<ul style="list-style-type: none"> ▪ Management of waste materials must be stipulated in the management plan 	CLIENT & CONTRACTOR	ECO & MHUEAT
Open borrow pits resulting in negative visual impact and potentially a safety hazard	<ul style="list-style-type: none"> ▪ Rehabilitate borrow pits to original landscape 	CLIENT & CONTRACTOR	ECO & MHUEAT
Risk to health and safety of employees	<ul style="list-style-type: none"> ▪ Ensure all employees have safety gear – hard hats, gloves, steel-toed boots. ▪ Have emergency procedures in place in case of accidents. 	CLIENT & CONTRACTOR	ECO & MHUEAT
OPERATIONAL PHASE			
Groundwater contamination by oil, grease, and fuel in equipment areas	<ul style="list-style-type: none"> ▪ Control collection and recycling of lubricants ▪ Have precautions to avoid accidental spills 	CLIENT & SEL	ECO & MHUEAT
Potential pollution of the lake environs by improperly sited latrines, lack of waste disposal facilities at works sites next to lake.	<ul style="list-style-type: none"> ▪ Ensure adequate facilities provided for workers ▪ Provide waste disposal facilities ▪ Restrict work sites to certain areas 	CLIENT & SEL	ECO & MHUEAT
Damage and/or loss of protection worthy areas resulting from salt harvesting activities.	<ul style="list-style-type: none"> ▪ Minimise salt exploitation area on Lake Assal ▪ Ensure salt production on the lake is sustainable i.e. being replenished at the same rate it is exploited. 	CLIENT & SEL	ECO & MHUEAT
Movement and presence of vehicles (bulldozers, front-end loaders, trucks) on and around the lake	<ul style="list-style-type: none"> ▪ Minimise area where harvesting vehicles move around ▪ Provide "parking" areas for vehicles not being used at any one time 	CLIENT & SEL	ECO & MHUEAT
Air contamination by iodizing and wind blown salt	<ul style="list-style-type: none"> ▪ Monitoring and control of air quality 	CLIENT & SEL	ECO & MHUEAT
Reduced natural salt regeneration on the lake due to over exploitation of salt layer	<ul style="list-style-type: none"> ▪ Maintain sustainable exploitation of salt layer ▪ Monitor biological aspects of the salt works. 	CLIENT & SEL	ECO & MHUEAT
Visual impact of the salt operations at the lake to tourist areas	<ul style="list-style-type: none"> ▪ Locate wash dam and salt processing facility out of sight of the tourists. ▪ Ensure site area is organised and clear of solid wastes. 	CLIENT & SEL	ECO & MHUEAT
Noise impact of the salt operations at the lake	<ul style="list-style-type: none"> ▪ Minimise harvesting operations during peak tourism times i.e. weekends 	CLIENT & SEL	ECO & MHUEAT
Salt washing plant and stockpiling area – generation of waste, oil spillage etc.	<ul style="list-style-type: none"> ▪ Ensure strict control of waste ▪ Confine work area 	CLIENT & SEL	ECO & MHUEAT

<p>Health problems associated with working in the lake's environment e.g. wind blown salt</p>	<ul style="list-style-type: none"> ▪ Ensure all employees have safety gear – hard hats, gloves, steel-toed boots. ▪ Provide protective clothing for workers ▪ Provide health facilities for workers ▪ During windy conditions if air quality deteriorates, ensure workers wear face mask. 	<p align="center">CLIENT & SEL</p>	<p align="center">ECO & MHUEAT</p>
<p>Damage to potential tourism sites – reduce aesthetic value of Lake Assal</p>	<ul style="list-style-type: none"> ▪ Ensure that potential tourist sites are provided with appropriate protection or that plans for any new developments are known. ▪ Have a “visitors centre” at the Salt Processing site where tourist can go to learn about the Lake Assal Salt Project. This would include a tour of the beach site as well. 	<p align="center">CLIENT & SEL</p>	<p align="center">ECO & MHUEAT</p>
<p>Positive impact of short and long term employment for locals</p>	<ul style="list-style-type: none"> ▪ Maximise employment of local labour where possible ▪ Careful attention to the recruitment of workers to ensure it is fair and also does not generate conflict. ▪ Optimise secondary/informal employment opportunities, especially for women ▪ Employ local guides for the “Tourist Centre” who also be able to explain the history of the area. 	<p align="center">CLIENT & SEL</p>	<p align="center">ECO & MHUEAT</p>

SITE 2: HAUL ACCESS ROAD (7.5km) (transport of salt from the lake to salt storage beach site)			
Environmental Impacts	Mitigation / enhancement measure	Implementing Authority ²	Monitoring Authority ²
PRE-CONSTRUCTION PHASE			
Location of access road resulting in negative impact on the environment	<ul style="list-style-type: none"> ▪ Locate and design haul road with minimal impact on the environment. 	CLIENT	EC
Location of access road near tourist routes	<ul style="list-style-type: none"> ▪ Ensure aesthetic aspects considered in potential tourism development locations 	CLIENT	EC
CONSTRUCTION PHASE			
Loss and/or destruction of vegetation for access roads.	<ul style="list-style-type: none"> ▪ Minimise loss of vegetation ▪ Revegetate as soon as possible using local species 	CLIENT & CONTRACTOR	ECO & MHUEAT
Improper access road construction methods which mar the landscape by leaving soils exposed, causing slips and landslides in steep areas	<ul style="list-style-type: none"> ▪ Avoid leaving exposed cut and fill areas ▪ Rehabilitate scarred sections as soon as possible ▪ Seed or plant erodible surfaces as soon as possible ▪ Ensure aesthetic aspects considered in potential tourism development locations ▪ Build culverts at dry river bed locations 	CLIENT & CONTRACTOR	ECO & MHUEAT
Noise and Vibration: Generation of noise along the road corridor and at ancillary sites, particularly from heavy construction vehicles	<ul style="list-style-type: none"> ▪ Locate work compounds at least 0.5km from settlements. ▪ Maintain machinery and vehicles 	CLIENT & CONTRACTOR	ECO & MHUEAT
Generation of dust from high traffic volumes	<ul style="list-style-type: none"> ▪ Cease operations during periods of dry windy weather, in areas where wind blown dust is causing a nuisance. 	CLIENT & CONTRACTOR	ECO & MHUEAT
Disturbance to burial/grave sites	<ul style="list-style-type: none"> ▪ Ensure access roads and work areas are located away from graves sites ▪ Communities affected by the access road must be consulted as to the 	CLIENT & CONTRACTOR	ECO & MHUEAT

²Client – Salt Investment S.A. / Hardtech; EC – Environmental Consultant; ECO – Environmental Control Officer; RO – Research Officer; MHUEAT – Environmental Authority; DAM – Directorate of Maritime Affaires; SEL - Societe D'Exploitation du Lac.

	<p>whereabouts of any burial sites, as well as other religious interest sites.</p> <ul style="list-style-type: none"> ▪ Restrict movement of vehicles to existing roads 		
unemployment of locals	<ul style="list-style-type: none"> ▪ Maximise employment of local labour during road construction. ▪ Careful attention to the recruitment of workers to ensure it is fair and also does not generate conflict. ▪ Optimise secondary/informal employment opportunities, especially for women 	CLIENT & CONTRACTOR	ECO & MHUEAT
Increased risk for road accidents with increased vehicle movements	<ul style="list-style-type: none"> ▪ Install road traffic signs warning of wildlife in the area ▪ Install speed bumps next to settlements 	CLIENT & CONTRACTOR	ECO & MHUEAT
OPERATIONAL PHASE			
Increased risk of soil erosion at roadside edges	<ul style="list-style-type: none"> ▪ Ensure adequate roadside maintenance of erosion control measures. ▪ Provide for storm water drainage and construct curbing to prevent water erosion onto paved roads. 	CLIENT	ECO & MHUEAT
Generation of dust from high traffic volumes on haul road	<ul style="list-style-type: none"> ▪ Use alternate methods of dust control (other than water) due to water shortage in the Lake Assal area e.g. applying chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments. Chemical treatment can reduce emissions by 30 to 95 percent e.g. coal soap #10 on fill lines to the water trucks works by providing reduced surface tension of the water. This effect allows water to penetrate into the soil, providing more effective dust control OR RDS-16 is a calcium chloride based product which works by binding the fines in the road surface and drawing moisture from the atmosphere to replenish the dust control (AKJ Industries, Florida, USA). ▪ Limited use of water-absorbing (hygroscopic) salts with watering of road surface, will reduce how often 	CLIENT	ECO & MHUEAT

	<p>you must water trafficked areas.</p> <ul style="list-style-type: none"> ▪ High vehicle speed increases the amount of dust stirred up from unpaved roads and lots. Lowering the speed of a vehicle from 45 miles per hour to 35 miles per hour can reduce emissions by up to 22 percent. ▪ Apply surface chemical suppressants to untrafficked areas to form a less erodible soil surface i.e on the shoulder of the road ▪ Upgrade the road by adding surface gravel to reduce the source of dust emission; improving drainage and crown. 		
Increased risk for road accidents with increased vehicle movements	<ul style="list-style-type: none"> ▪ Install road traffic signs warning of wildlife in the area ▪ Install speed bumps next to settlements ▪ Police speed limit of haul trucks on access road 	CLIENT	ECO & MHUEAT
Existence of a road across water courses will alter water flow.	<ul style="list-style-type: none"> ▪ Maintain culverts, mitre drains and roadside drains clear of vegetation and debris to avoid damming up of water courses 	CLIENT	ECO & MHUEAT
Increased noise level with increased traffic flow	<ul style="list-style-type: none"> ▪ Enforce speed limits. ▪ Improved road surface should reduce noise levels due to more efficient operation of vehicles and less noise from vehicle tyres. 	CLIENT	ECO & MHUEAT

SITE 3: MAINTENANCE AND STAFF HOUSING (equipment, vehicle maintenance, staff housing)			
Environmental Impacts	Mitigation / enhancement measure	Implementing Authority ³	Monitoring Authority ³
PRE-CONSTRUCTION PHASE			
Negative impact on aesthetics of natural landscape	<ul style="list-style-type: none"> ▪ Locate and design staff housing with minimal impact on the landscape. 	CLIENT	EC
Existing site with old and broken machinery, vehicles etc. left lying around	<ul style="list-style-type: none"> ▪ Clean up existing (old) salt processing site of old / broken equipment 	SEL	EC
Inadequate drainage design causing localised pollution	<ul style="list-style-type: none"> ▪ Locate equipment and buildings appropriately and install drainage to avoid localised pollution (e.g. concrete mixers, employees accommodation, stores, laboratories/workshop). 	CLIENT	EC
Waste disposal sites	<ul style="list-style-type: none"> ▪ Locate solid waste disposal site away from buildings and people and plan regular waste removal 	CLIENT	EC
CONSTRUCTION PHASE			
Loss and/or destruction of natural areas outside the existing fenced maintenance building site	<ul style="list-style-type: none"> ▪ Confine construction activities to the demarcated maintenance/staff building area. 	CLIENT & CONTRACTOR	ECO & MHUEAT
Sewage and sanitation	<ul style="list-style-type: none"> ▪ Ensure adequate sewage and sanitation management for construction workers. ▪ The Contractor must provide suitable sanitary arrangements at the construction personnel. A minimum of 1 toilet will be provided per 15 persons at each working area. The Contractor must maintain, keep clean, neat and hygienic all site sanitation facilities 	CLIENT & CONTRACTOR	ECO & MHUEAT
Solid waste disposal	<ul style="list-style-type: none"> ▪ Manage solid waste disposal 	CLIENT & CONTRACTOR	ECO & MHUEAT
Washing of vehicles with local water supplies without catch trays	<ul style="list-style-type: none"> ▪ Use recycled water to clean vehicles and use catch trays underneath to catch runoff 	CLIENT & CONTRACTOR	ECO & MHUEAT
Unemployment of locals	<ul style="list-style-type: none"> ▪ Maximise employment of local labour during construction of buildings. 	CLIENT & CONTRACTOR	ECO & MHUEAT

³Client – Salt Investment S.A. / Hardtech; EC – Environmental Consultant; ECO – Environmental Control Officer; RO – Research Officer; MHUEAT – Environmental Authority; DAM – Directorate of Maritime Affaires; SEL - Societe D'Exploitation du Lac.

	<ul style="list-style-type: none"> ▪ Careful attention to the recruitment of workers to ensure it is fair and also does not generate conflict. ▪ Optimise secondary/informal employment opportunities, especially for women 		
The presence of construction camps attracts market opportunists with informal roadside shops which are poorly managed in terms of health regulations and waste disposal.	<ul style="list-style-type: none"> ▪ Identify suitable sites for the establishment of small shops and other facilities servicing the construction camp. 	CLIENT & CONTRACTOR	ECO & MHUEAT
OPERATIONAL PHASE			
Pollution of groundwater supplies	<ul style="list-style-type: none"> ▪ Specific drainage is required around fuel depots and ablution blocks to prevent runoff affecting groundwater. 	CLIENT	ECO & MHUEAT
Servicing of vehicles outside the vehicle maintenance building in oils and lubricants penetrating soil surface	<ul style="list-style-type: none"> ▪ All vehicles must be serviced in a designated area inside the maintenance building ▪ Catch trays must be installed 	CLIENT	ECO & MHUEAT
Oil or petrol spills at fuel depot	<ul style="list-style-type: none"> ▪ In the event of an oil/petrol spill, the spill must be cleaned up immediately and deposited at a registered landfill site 	CLIENT	ECO & MHUEAT
Spread of STD's and other diseases	<ul style="list-style-type: none"> ▪ Enlist the help of the local Health Centre to undertake workshops on STD's and AIDS Awareness for the workers ▪ Ensure the contract workers are aware of local health facilities ▪ Employ local communities living next to the maintenance site, so family structure is maintained 	CLIENT	ECO & MHUEAT
Indiscriminate disposal of waste around camp site	<ul style="list-style-type: none"> ▪ Designate restricted places for eating in working areas, and provide adequate refuse bins 	CLIENT	ECO & MHUEAT
Pressure on local water resources	<ul style="list-style-type: none"> ▪ Water for drinking purposes must be imported to the site. ▪ Use recycled water for 	CLIENT	ECO & MHUEAT

SITE 4: SALT STORAGE AND SHIP LOADING BEACH SITE			
Environmental Impacts	Mitigation / enhancement measure	Implementing Authority⁴	Monitoring Authority⁴
PRE-CONSTRUCTION PHASE			
Reduce the aesthetics of the Ghoubbet beach area	<ul style="list-style-type: none"> ▪ Locate and design salt storage area away from tourist beach site. 	CLIENT	EC
Damage to potential archaeological and cultural sites	<ul style="list-style-type: none"> ▪ Ensure public consultation identifies archaeological and cultural sites in the project area. ▪ Locate any buildings/operations to do with the salt project away from sensitive areas. 	CLIENT	EC
Damage and pollution to the marine environment	<ul style="list-style-type: none"> ▪ Plan ship loading facility with minimal impact on the marine environment. ▪ Appoint environmentally conscious shipping company. ▪ Locate desalination plant with minimal impact on the marine environment 	CLIENT	EC
CONSTRUCTION PHASE			
Increased construction vehicle traffic affecting local tourism	<ul style="list-style-type: none"> ▪ Ensure construction vehicles only operate on weekdays ▪ Put in place and police speed limits. 	CLIENT & CONTRACTOR	ECO & MHUEAT
Sedimentation of the marine environment when constructing the dyke and levelling at the beach storage area	<ul style="list-style-type: none"> ▪ Restrict building of the dyke to low tide periods only. ▪ Install temporary berms to prevent spillage of building materials into the sea. ▪ Restrict building activities during very windy conditions 	CLIENT & CONTRACTOR	ECO & MHUEAT
Increased noise levels due to construction vehicles, affecting tourism	<ul style="list-style-type: none"> ▪ Restrict vehicle movement to weekdays 	CLIENT & CONTRACTOR	ECO & MHUEAT
Spillage of cement in the sea whilst building of jetty pylons and sea anchors	<ul style="list-style-type: none"> ▪ Restrict building of jetty to calm sea conditions to minimise risk of cement spillage 	CLIENT & CONTRACTOR	ECO & MHUEAT
Waste disposal on site	<ul style="list-style-type: none"> ▪ Allocate eating areas for construction staff and install bins for local refuse disposal. ▪ Ensure regular removal of waste to a designated waste disposal site 	CLIENT & CONTRACTOR	ECO & MHUEAT

⁴Client – Salt Investment S.A. / Hardtech; EC – Environmental Consultant; ECO – Environmental Control Officer; RO – Research Officer; MHUEAT – Environmental Authority; DAM – Directorate of Maritime Affaires; SEL - Societe D'Exploitation du Lac..

Sewage and sanitation on site	<ul style="list-style-type: none"> ▪ Ensure adequate latrines on site. ▪ Ensure regular removal of latrines 	CLIENT & CONTRACTOR	ECO & MHUEAT
Pressure on local water resources	<ul style="list-style-type: none"> ▪ Import potable water for construction workers. ▪ Use recycled water for construction use. 	CLIENT & CONTRACTOR	ECO & MHUEAT
OPERATIONAL PHASE			
Decrease in air quality due to wind blown dust and salt from salt storage area, affected health of workers	<ul style="list-style-type: none"> ▪ Monitor air quality at salt storage area ▪ Ensure salt is adequately covered and protected from wind. 	CLIENT	ECO & MHUEAT
Salt being delivered via haul roads, increased traffic on main road to the beach	<ul style="list-style-type: none"> ▪ Transport salt during non-peak times. ▪ Police speed limits of haul trucks 	CLIENT	ECO & MHUEAT
Increased noise levels from salt operations on the beach	<ul style="list-style-type: none"> ▪ Limit peak loading activities to weekdays. ▪ Monitor noise levels and determine if tourist are affected 	CLIENT	ECO & MHUEAT
Sedimentation of the marine environment	<ul style="list-style-type: none"> ▪ Maintain dyke structure and beach graded area so that there is no sedimentation into the marine environment. 	CLIENT	ECO & MHUEAT
Spillage of salt from conveyor system	<ul style="list-style-type: none"> ▪ Maintain operation of conveyor system to prevent salt spillage. ▪ Ensure bulk salt is adequately secured. 	CLIENT	ECO & MHUEAT
Pressure on local water resources	<ul style="list-style-type: none"> ▪ All ships to use their own imported potable water resource whilst docked. ▪ Water from desalination plant to be used only for salt operations and to supply locals. 	CLIENT	ECO & MHUEAT
Pollution of marine environment from ships whilst docked (oils, fuel, sewage, ballast water)	<ul style="list-style-type: none"> ▪ Involve Djibouti Port in management of ships. ▪ Have penalties in place for ships leaking fuel and oil into marine environment. ▪ No sewage or waste disposal from the ships is allowed whilst docked in the Ghoubbet. ▪ Ensure ballast water origin is from local marine waters. 	CLIENT	ECO & MHUEAT
Ships sailing in the Ghoubbet having a negative impact on the whale sharks or any marine fauna in the bay	<ul style="list-style-type: none"> ▪ Strict navigational routes which avoid the locations frequented by the whale sharks. 	CLIENT	ECO & MHUEAT
Shipping loading activities impacting on local tourist beach.	<ul style="list-style-type: none"> ▪ Only have one main jetty operating for ship loading i.e. do not allow additional piers / jetties to built at this site. ▪ Ensure minimal pollution by shipping activities. 	CLIENT & SEL	ECO & MHUEAT

	<ul style="list-style-type: none"> ▪ Ensure Dankelo beach (Plate 4.10d) is cleaned up before ship loading activities start so that salt operations are not blamed for beach pollution. ▪ Ensure jetty/port does not interfere with existing and proposed tourist facilities in the bay ▪ Restrict ship loading to weekdays when tourist and/or locals are using the Dankelo beach. 		
Negative impact of salt operations on tourism	<ul style="list-style-type: none"> ▪ Help with beach cleanup operation at tourist beach – which is already polluted by visitors to the beach. ▪ Include salt storage and ship loading activities in the “visitors centre” tours for educational purposes. 	CLIENT & Ministry of Tourism	ECO & MHUEAT
Shipping opportunities	<ul style="list-style-type: none"> ▪ Contract out local tugs to facilitate the ships for loading. ▪ Appoint environmentally conscious shipping company 	CLIENT	ECO & MHUEAT
Increased economy	<ul style="list-style-type: none"> ▪ Ensure percentage of profits of the Lake Assal Salt Project remain in Djibouti so the local economy benefits in the long run. ▪ Assist local government in building of a clinic, school, and mosque in the study area. 	CLIENT	ECO & MHUEAT
Job creation for potential distributors	<ul style="list-style-type: none"> ▪ Maximise opportunities for locals in the export of salt products 	CLIENT	ECO & MHUEAT

APPENDIX I: PROJECT COMPLIANCE REPORT FORMAT

Issue/Impact	Extent To Which The Objectives/Targets Have Been Met ⁵					
	2008			2009		
	Oct PCR 1	Nov PCR 2	Dec	Jan	Feb	...etc
Contractor's site camp	●	○				
Noise pollution	●	○				
Health & Safety	○	○				
Pollution of land and water	○	○				
Access roads	●	○				
Erosion prevention and/or	●	●				
Archaeological protection	○	○				
Tourism	○	○				
Local employment	○	○				
Land use and interaction with	○	○				
Local Communities	○	○				

⁶.Rating : ● = non compliance ○ = partial compliance ○ = full compliance

**MITIGATION MEASURES REQUIRED IN THE CONSTRUCTION PHASE
Lake Assal Salt Processing Plant**

Objectives/Targets/Actions (as stated in the EMP)	Observations/Checks/Evidence ⁶ (Response to on-site observations, checks and evidence)	Recommendations (Additional measures to be taken to achieve compliance)																												
Issue/Impact: Lake Assal Salt Processing Plant																														
Objectives:	1. Movement and presence of vehicles (bulldozers, front-end loaders, trucks) on and around the lake 2. Groundwater contamination by oil, grease, and fuel in equipment areas 3. Visual impact of the salt construction activities at the lake to tourist areas 4. Dumping of construction materials / spoil on land adjacent to processing plant activities 5. Open borrow pits resulting in negative visual impact and potentially a safety hazard 6. Risk to health and safety of employees																													
Targets:	1.																													
	PCR:																													
Actions:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 10%; text-align: center;">1</th> <th style="width: 10%; text-align: center;">2</th> <th style="width: 30%; text-align: center;">Comment</th> </tr> </thead> <tbody> <tr> <td>1. Provide "parking" areas for vehicles not being used at any one time</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td></td> </tr> <tr> <td>2. Control collection and recycling of lubricants Have precautions to avoid accidental spills</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td></td> </tr> <tr> <td>3. Minimise construction activities during peak tourist periods Ensure site area is organised and clear of solid wastes.</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td></td> </tr> <tr> <td>4. Management of waste materials must be stipulated in the management plan</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td></td> </tr> <tr> <td>5. Rehabilitate borrow pits to original landscape</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td></td> </tr> <tr> <td>6. Ensure all employees have safety gear – hard hats, gloves, steel-toed boots. Have emergency procedures in place in case of accidents</td> <td style="text-align: center;">●</td> <td style="text-align: center;">●</td> <td></td> </tr> </tbody> </table>		1	2	Comment	1. Provide "parking" areas for vehicles not being used at any one time	●	●		2. Control collection and recycling of lubricants Have precautions to avoid accidental spills	●	●		3. Minimise construction activities during peak tourist periods Ensure site area is organised and clear of solid wastes.	●	●		4. Management of waste materials must be stipulated in the management plan	●	●		5. Rehabilitate borrow pits to original landscape	●	●		6. Ensure all employees have safety gear – hard hats, gloves, steel-toed boots. Have emergency procedures in place in case of accidents	●	●		
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