Environmental Impact Assessment

United Nations Support Office for AMISOM (UNSOA)

Proposed Expansion of Logistics Base Mombasa, Kenya

FOI

UNEP

ENVIRONMENTAL IMPACT ASSESSMENT

UNSOA

(United Nations Support Office for AMISOM)

PROPOSED EXPANSION OF LOGISTICS BASE MOMBASA, KENYA

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1 Executive Summary

United Nations Support Office for AMISOM (UNSOA) is a logistics operation that supplies the African Unions Mission in Somalia (AMISOM) with necessary supplies and equipment. The Mombasa logistics base (log base) acts as a hub in this operation to which goods from different suppliers are tested for functionality and temporarily stored before being repackaged and shipped by sea to Somalia. There are also plans for hazardous waste to be brought back from Somalia to Kenya, via Mombasa log base, for final treatment and disposal as such facilities are not available in either Mogadishu or Mombasa. In response to increases in troop numbers stationed in Somalia, the logistics base is required to expand. Two alternatives have been presented to facilitate this expansion, the first is an expansion of the existing site, referred in this report as the "AWL site," the other is to develop an entirely new base within the compounds of Moi International Airport, referred to as the "Airport site." On request from the UN Department for Field Support (DFS) a reduced scope environmental impact assessment has been conducted to assess key environmental concerns related to the two alternatives.

The EIA included looking at potential impacts on the human, physical, and ecological environment. This includes (to the extent possible given the resources available) socio-economics, community infrastructure and services, health, safety and security issues, natural resources, pollution of air, soils, or water resources, and impacts on protected reserves and especially sensitive areas or resources, biodiversity, flora, and fauna.

The table below illustrates a summary of the results from the environmental impact assessment. This table is followed by a more detailed description of the aspects or activities identified to have a high or very high risk to result in a potentially significant. More detailed information on these, as well as on all other identified impacts with lower risk ratings, is provided in chapter 6.

AWL Site	Actual Risk	Mitigation required to reduce risk
Existing Fuel Storage Tank	• Release of fuel from the storage tank and into the groundwater • Release of fuel into the soil from the dispenser • Risk of collision	• Lift tank and place above ground on impermeable bunded base. • Place dispenser onto impermeable base • Install collision prevention measures
Borehole Sanitary Seal	• Pollutants in surface water can go into the borehole	• Install a seal
Solid Waste Segregation	• Hazardous waste entering into the waste stream • Health impact to workers coming into contact with the waste • Potential impact to the environment at point of deposition (landfill)	• Develop waste management plan with clear identification of hazardous waste storage areas • Appoint and educate a single point of contact to be the waste manager
Septic Sludge Disposal	• Potential impact to the environment at point of deposition (water course) • Loss of reputation to the UN under responsibilities of duty of care	• Develop waste management plan with clear identification of hazardous waste storage areas • Appoint and educate a single point of contact to be the waste manager • Ensure contractors are managed well and made responsible for their actions – seek evidence of proper disposal
Emissions	• Health impacts to employees from chronic exposure to exhaust fumes.	• Develop truck management plan - Minimize empty running, enforce restrictions, incentivise good behaviour • Evaluate the possibility of using the railway

Airport site	Potential Risk	Mitigation required to prevent risk
Fuel Storage	• Release of fuel from the storage tank and into the groundwater • Release of fuel into the soil from the dispenser • Risk of collision	• Place all tanks above ground on impermeable bunded base. • Place dispenser onto impermeable bases • Install collision prevention measures
Septic Tank Fluids to Soakaway	• Contaminants (sewage) can go into the groundwater	• Avoid use of soakaways • Design soakaways properly
Solid Waste Segregation	• Hazardous waste entering into the waste stream • Health impact to workers coming into contact with the waste • Potential impact to the environment at point of deposition (landfill)	• Develop waste management plan with clear identification of hazardous waste storage areas • Appoint and educate a single point of contact to be the waste manager
Septic Sludge Disposal	• Potential impact to the environment at point of deposition (water course) • Loss of reputation to the UN under responsibilities of duty of care	• Develop waste management plan with clear identification of hazardous waste storage areas • Appoint and educate a single point of contact to be the waste manager • Ensure contractors are managed well and made responsible for their actions – seek evidence of proper disposal

Preferred alternative

Since the activities and planned facilities of the two base alternatives assessed are close to identical, the comparison of advantages/disadvantages is focused to differences in the sensitivity of the environments surrounding the two sites. Since the AWL site is located in surroundings that are already subject, and somewhat adapted, to similar types of impacts and since the contribution from the UNSOA activity is estimated to be minor in relation to ancillary activities, both on-site and along access routes (very close proximity to the Nairobi highway), the total impact is estimated to be lower at the AWL site. Access to railway sidings at the AWL site also presents the possibility of substituting much of the truck traffic with railway transportation. This is an opportunity which would mitigate the environmental effects of vehicle movements drastically compared to other alternatives.

The alternative Airport site is currently undeveloped and if chosen, infrastructure, facilities, and activities including increased transports would be introduced in an area where these activities would be out of scale with regards to current on-site and adjacent activities. The surrounding environment is also more vulnerable, mainly due to the presence of the hospital, which increases environmental risks such as potential water and air pollution and medical waste disposal.

Hence, from an environmental perspective an expansion of the AWL site is to be preferred. However, with proposed mitigation efforts both alternative sites would be acceptable.

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2 Introduction

2.1 Background

The United Nations Support Office for AMISOM (UNSOA) is a field support operation led by the United Nations Department of Field Support (DFS). The operation involves the delivery of a logistics capacity support package to AMISOM (African Union Mission in Somalia). The logistics package consists of equipment and mission support services normally provided for a United Nations peacekeeping operation of the same size. UNSOA is located near the AMISOM Headquarters in Nairobi, Kenya, with logistics operations facilitated through a logistical base (log base) in Mombasa. Due to increases in troop numbers stationed in Somalia, it is proposed that the logistics base is required to expand – this expansion may take the form of increase in area of the existing base AWL site or the development of a new base within the compound of the Mombasa Airport site.

As part of the planning process for the activity described above, DFS is requesting for an environmental assessment to be performed in order to analyze the environmental implications of the proposed changes to the base. Contained in this report are the results of the assessment process, intended to identify and assess key environmental concerns.
A team of professionals from within the United Nations Environment Programme (UNEP) and the Swedish Defence Research Agency (FOI) performed the environmental assessment.

2.2 Objective

The approach of the assessment as well as the format of this report in many ways resemble that of a prescribed Environmental Impact Assessment (EIA), however the objective is not to fulfill any such formal requirements. The aim instead is to perform a more concise, reduced scope, so EIA focused only on the key environmental issues of concern (including the physical, human, and ecological environment). The results of the assessment will be followed by suggestions on suitable mitigation efforts. The reason for the assessment is to ensure that the information is available as early as possible in the planning phase of the operation to allow for environmentally informed decisions regarding available alternatives and early mitigation measures.

2.3 Methodology

The assessment is based on information collected through a desk study of available environmental documentation on the area and consultations with UNSOA staff.

In addition, on-site field observations and studies have been conducted on both the AWL and Airport site. These include a preliminary site investigation and planning visit (May 2010) (assisted by the use of an EIA screening checklist, see Template 1 Appendix 1). The preliminary site investigations were followed by an environmental baseline study (August 2010) where additional environmental information was collected through walking tours of the site, (assisted by the use of an EBS checklist, see Template 2 in Appendix 1) discussions with on-site, and neighbouring occupants. People working at or staying close to the areas were also interviewed.

The EBS included soil, sediment, and liquid contamination sampling and analysis. An on-site ecology study as well as a socioeconomic study were also performed.

Checklists and Templates used during the assessments are based on “Environmental Templates for UN Field Missions.”[1] The main templates applied within the process of conducting the EIA, as well as the EBS have been reproduced in Appendix 1 and are referenced within relevant sections of the report.

2.4 Scope and limitations

The EIA focuses on environmental concerns related to the expansion and development of the Mombasa logistical base, and its possible relocation. This includes activities located in and around the compound (i.e., within Mombasa only). Aspects concerning the wider logistical chain of the UNSOA operation are hence outside the scope of this report.

This study should be regarded as a limited scope EIA, specially developed for conflict and crises situations (see template 3 and 4 in Appendix 1). The report format is based on template 4 in Appendix 1.

The reduced scope of the assessment compared to a conventional EIA results in a few limitations, the main one being the lack of a public participation process which was not possible to include within the scope of the limited EIA. This is otherwise a standard component of a conventional EIA process to be able to collect the opinions concerning the planned activity by the local population and other affected and interested parties.

2.5 Environmental legislation

As mentioned in the previous section the assessment is to be regarded as a limited EIA adapted for conflict and crises situations and hence host nation standard procedures are not applicable. However, for reference the legislative context of Kenya in terms of the requirements for undertaking Environmental Impact Assessments and developing an Environmental Action/Management Plan, Appendix 2 has a detailed list of requirements from the environmental management and co-ordination act (EMCA). In addition, Appendix 3 is a summary of the main binding legal agreements and conventions (e.g., Basel Convention for Transboundary Movements of Hazardous Waste), applicable in the context of the UNSOA log base.

3 General description of the activity

Since UNSOA is a purely logistical operation, the main activities involve transport, storage, and handling of goods (mainly vehicles, food, equipment, and IT) with origins from suppliers located both within and outside of Kenya, via a logistical base (log base) in Mombasa, to then be delivered to Mogadishu, Somalia. The Mombasa log base acts as a hub in the operation to which goods from different suppliers arrive by lorry, get offloaded and tested for functionality and temporarily stored before repackaged, and shipped by sea to Somalia approximately every two weeks (alternatively returned to the supplier if not functional or damaged). The goods arrive at their final destination in Mogadishu harbor where they are offloaded and delivered to the AMISOM forces.

In addition to the above described activities, UNSOA also plan for hazardous waste, such as decommissioned vehicles/equipment, used car batteries, oils, etc. to be brought back to Kenya as a response to the absence of appropriate treatment facilities in Somalia, where it is currently being stored. Figure 1 illustrates the logistical chain of the UNSOA mission.

The planned operational life span of the Mombasa log base is ten years, maximum up to twenty-five years, with activities expected to increase over the coming years, which also requires the Mombasa log base to expand during this period. At the end of the operations all UNSOA infrastructure, not decommissioned, will be passed over to the Government of Kenya.

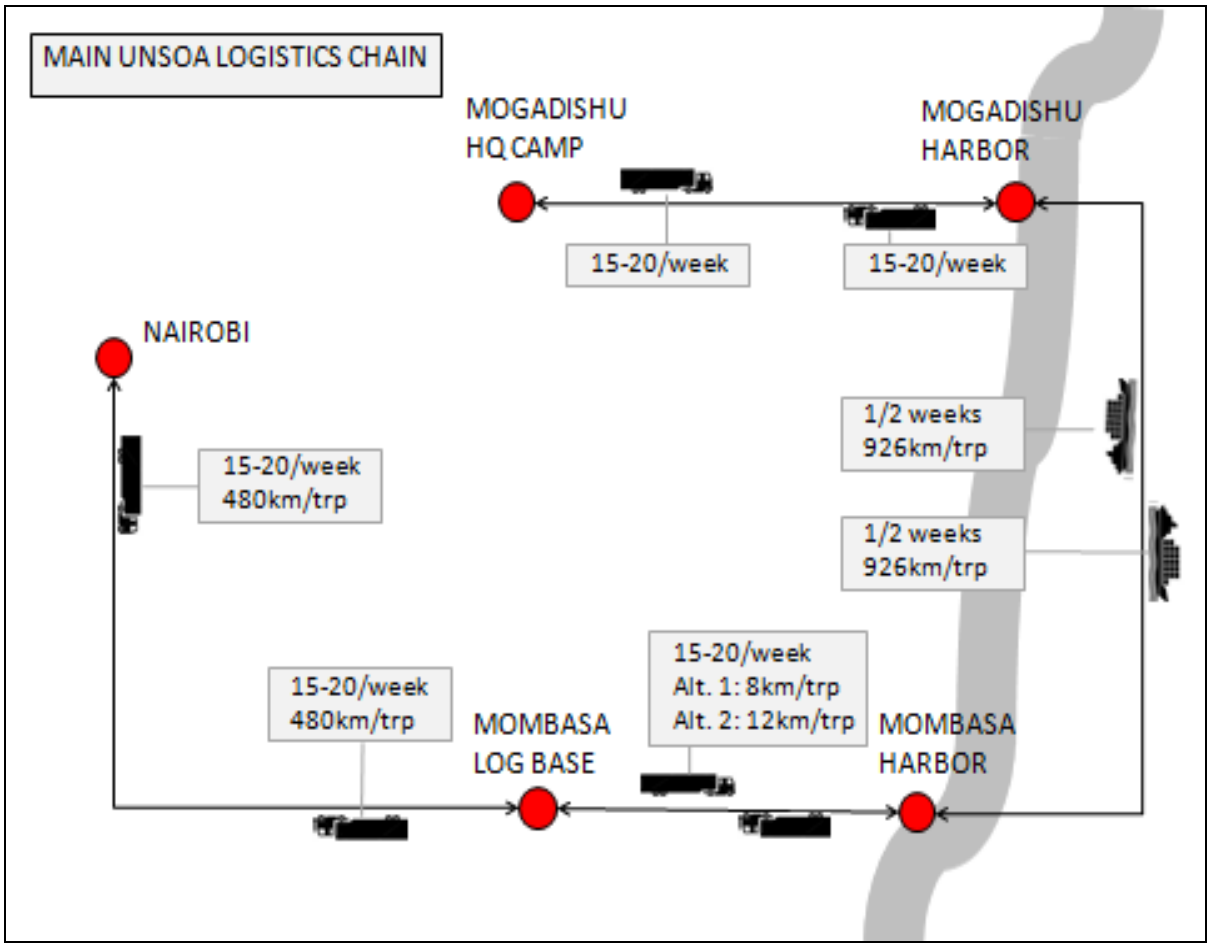


Figure 1: The figure illustrates the principal logistical chain of the UNSOA operation, the Mombasa base works as a logistical hub where goods entering or leaving Mogadishu are temporarily stored and inspected.

In essence the Mombasa log base operates largely as a transfer station for goods required by the AMISOM operations in Somalia. The base will receive approximately 15-20 lorry deliveries per week with a maximum of four truck loads reaching the base in a day (same amount leaving the base).The Mombasa log base has a staff force of 45, expected to increase to approximately 60-120 as the activities increase. Staff will work in modularized office blocks, ten hours a day, five days a week. There is no accommodation of staff at the base.

The base will handle most items required by AMISOM in Mogadishu, with the exception of ammunition and fuel. This includes vehicles, construction equipment, maintenance equipment, office provisions, domestic provisions, consumables, etc. In terms of HAZMAT, there will be solvents and cleaning liquids, lubricants, etc., an example shipment list has been included in Appendix 4 as a reference. There will however not be any bulk fuel shipped through Mombasa, except what is contained in the tanks of the vehicles.

All goods arriving at the base are unpacked for temporary storage prior to inspection. The base operates on a two-week rotation in synchronization with the transport ships; hence there is no bulk storage of goods, which generally are not stored longer than approximately one month.

The inspections consist of checking functionality and making sure that the goods are not damaged in any way. The checks include assembling and preparing equipment for usage as well as test starting engines, etc. Damaged goods are stored before later disposal or return to supplier. The goods that clear the tests, and hence are destined for Mogadishu, are containerized in sea containers (seacons) and loaded on to trucks awaiting transport to Kilindini Harbor.

As mentioned in the previous section the plan is also to bring back HAZMAT, waste, and dysfunctional equipment back from Mogadishu for safe disposal in Nairobi in which case temporary, intermediate, storage most likely will be used at the Mombasa log base. Medical waste from Mogadishu is not planned to pass through the log base in Mombasa, but shall be transported to a destruction facility in Nairobi.

To facilitate future loads at the Mombasa log base there is a need for expanding the AWL site beyond its current size. Details have been shared, by UNSOA, on two alternative solutions to facilitate this expansion which will both be included in the assessment. There are a number of criteria that have been developed by UNSOA on which the final decision for camp location will be made and the environmental impact is one. Issues such as security, expansion potential, cost, and transport have also been evaluated under separate studies but these were not made available to authors of this assessment.

4 Log base location alternatives

As mentioned in section 3.2 there are alternative solutions being discussed to facilitate the planned expansion of the Mombasa log base. There are in practice two main alternatives which include expansion of the AWL property or alternatively moving the base to an entirely different location 4 km southwest of the AWL site within the Moi Airport complex Airport site. Both these alternatives represent different means of meeting the general purpose and need of the proposed activity. The “No-Go” alternative presented below is the option of not undertaking the proposed activity (i.e., not expanding or relocating the base), as such the “No-Go” alternative provides the baseline for the assessment. Each alternative as well as the related environmental impacts are further described in the following sections.

4.1 Alternative 1 “No-Go”, “AWL site”

4.1.1 Site location

The AWL base is located in a purpose built warehousing complex, operated by Allied Wharf Ltd, see figure 2. (hence referred to as the AWL site). The site is in the middle of an industrial area in the northeastern part of the Changamwe district in Mombasa city, GPS coordinates Lat. 4°00’47”S Long. 39°37’44”E. In very close proximity, just to the north of the camp are a set of railway sidings and beyond these the Nairobi highway (A109). Both the railway as well as the highway connects to Kilindini Harbor, approximately 4 km southeast of the compound, where the ships are loaded for further transport to Mogadishu, Somalia. The Moi International Airport is located approximately 4 km southwest of the site.

The tidal creek, Tudor Creek, which forms an estuary before running into the Indian Ocean, is 1 km to the east of the base.

Figure 2: The AWL site is located in an industrial area in the northeastern part of the Changamwe District in Mombasa. Just north of the site runs the A109 as well as the railroad running from Kilindini Harbor to Nairobi. (Satellite image adapted from DigitalGlobe)

4.1.2 Site layout

Appendix 5 contains a general outline of the surrounding area and main facilities within the compound. The UN log base is located at the end of the wharf and is surrounded by warehouses on three sides and open land, put to domestic agricultural use. The complex operates generally light industrial activities, including a soap manufacturer and activities in support of gold mining (including the storage of cyanide solutions, stored in sealed barrels and on appropriately bunded hard foundation), car/engine repair workshops, and general warehousing and container storage yards. The total size of the AWL compound is 15900 m².
The access road to the log base, off the A109, is approximately 900 m long, unpaved and of very poor condition. Numerous large potholes and stones make it difficult for both private cars and large trucks to go faster than 10 km/h, often resulting in traffic jams. Tin sheds harbouring elementary services such as cookshops, were present along parts of this unpaved road.

4.1.3 Buildings/facilities

Offices
The current staff force of forty-five personnel work in four modularized office blocks located within the base (containers, flat packs of approximately 500 m² in total, 5x50 m each). The offices contain office equipment such as computers servers and communication systems and are serviced with electrical lighting and air conditioning. The office blocks are occupied ten hours per day; five days a week. As mentioned there is no accommodation on the base.

Hygiene/sanitary facilities
The office blocks are serviced by ablution units, three in total, as well as W/C units that include four showers, four toilets, and hand washing basins. Black and grey water from the

ablution units and toilets is collected in a septic tank. The tank is designed to contain all the waste (i.e., there is no soakaway of supernatant water).

On/off-loading areas and storage
Goods, as specified in section 3.2, entering or leaving the base are on/off-loaded at yard B. Yard B also serves as an area for temporarily storing arrived goods before inspection, and already inspected equipment which have been repackaged in seacons. Leakages of unknown chemicals were observed from seacons stored at the camp, however it was determined during the site visit that the volumes where small and of low significance.

There are two warehouses, warehouses 1-2 in figure 3, on the compound where equipment is temporarily stored awaiting further transport to or from the base. There is also some storage capacity for items pending order by AMISOM, mainly disposable items such as office consumables. In warehouse 1 (yard C) detergents are stored for further transportation to UN missions. At the time of the site visit approximately 10000 liters of detergents was stored in individual 20 liter plastic cans (jerry cans). A few of these cans containing detergents and solvents were observed to be leaking.

In total there are six warehouses/workshops covering an area of approximately 7500 m^2 in total. The warehouses all have concrete walls and floors and are covered with tin roofs (ridge roof).

There are currently no designated storage facilities or other arrangements for HAZMAT.

Equipment inspection area
The functionality tests of the received goods, including assembly and test running of engines, etc. are currently being performed on yard C, see figure 3. There are no specific facilities designated for these tests which are done in the open. All malfunctioning or damaged equipment is returned to the manufacturer, hence there are no repairs done on the equipment at the base.

Fuel storage/filling stations
Fuel is mainly used for re-fueling office vehicles and equipment to be inspected and tested. Currently the base gets its fuel supplies through AWL, which delivers the fuel (diesel) to an on-site storage tank, see figure 3. The underground tank, approximately 22 m^3, is buried with its base at 4 m depth. The tank is connected to surface fill points supplied with an electrical pump. The tank is claimed to be about four years old and in good condition, by UNSOA site personnel, but it has not been integrity tested. The construction of the hard base at the site is also insufficient to prevent spills from entering the underlying soil layers and there is an absence of spill control equipment at the surface fill points.

Staff parking area
There is a staff parking area located at the opposite side of the railway sidings north of the compound. The staff travel to and from the base in their own vehicles; the number of staff vehicles is estimated to one per employee and an additional five pool vehicles.

Clinic
There is also a small on-site clinic on the base which offers basic health services to the UNSOA staff.

4.1.4 Power supply

Electrical supply will be provided through the Kenyan electrical grid, where the majority of the electricity produced is hydro/thermo-electric. However, for the purpose of making the base self-sufficient there are also on-site diesel generators. It is understood that these are only used if the grid supply is cut. A review of the proposed power consumption of the base in a

separate study commissioned by the UNDFS indicates that the power consumption is approximately 2 million Kwh/year, mostly used for energy consumption of air conditioning.

4.1.5 Water supply

The main water demand on the base is from the three ablution units and the W/C unit. An on-site borehole well, owned and maintained by the landlord of the site (i.e., AWL), supplies non-potable water for the ablution and W/C units. The water is treated with primary chlorination and stored in an overhead distribution tank with a volume of 22 m^3, the well and water tank are marked on the site layout in figure 3. The water is reported to be chlorinated every three months, as per municipal requirements. With current chlorination routines it has been certified safe for domestic/non-potable use by Government of Kenya.

The borehole is reported as being approximately 36 m deep and the level of the water table is 20 m. There are currently no additional specific concerns on the well, however, observations done during the site visit reveal that the top seal of the well seem to be very poor/non-existent.

There is currently no connection to any municipal water line. Potable water is supplied to the staff in the form of commercially packaged plastic bottles.

4.1.6 Waste generation and disposal

Solid waste

Minor volumes of non-hazardous solid waste are generated in the offices (office consumables, empty water bottles, etc.) as well as from on/off loading and inspection of equipment (packaging materials). Solid/municipal waste is disposed of through contract arrangements with AWL who takes responsibility for the waste. All the solid waste from the wharf is collected in bulk (i.e., no segregation is done and there is hence a potential for hazardous materials, such as oils, lubricants, batteries, medical wastes, etc. to be present given the activities undertaken on the site). No attempts on detailed characterization have been made on any of the waste streams.

The collected waste is disposed of through contract with a local youth group who recover waste with an economic value (e.g., plastic water bottles). Once these are removed the resulting waste stream is dumped at a local uncovered landfill located adjacent to the sea. Information has been made available stating that Mombasa municipality is constructing a new landfill site that will replace the existing one that will close (reportedly within a year). There is currently no information on operators; however, the landfill is said to be designed to a comparatively high standard.

Liquid waste

All surface water runoff (i.e., rain and water arising from the operation from general domestic cleaning, washing of vehicles, etc.) is collected in an open concrete channel drainage system. The flow in the drainage system is to the north and drainage from other warehousing units within the AWL area is channeled through the UN base. Off site, third parties have been observed to dispose of liquid waste to the drainage system, an explicit example of this was observed at the time of the site visit where discharges of soap from the adjacent soap factory was channeled along drains through the UN base.

Surface water drainage from the compound is channeled to a point outside of the perimeter of the camp where it is collected in a sump (possible catch basin, though unconfirmed) before discharging into the municipal drainage system which in turn discharges into the local municipal sewerage system in turn discharging either to the Mombasa waste water treatment plant or directly to the sea. No information on the condition of the municipal drainage system has been accessed to allow this to be fully assessed.

The septic tank sludge is emptied and transported off the compound when required, approximately every three months, by a contractor hired by AWL. There is currently no record available on the final disposal site of the sludge. There is no record of any plans to connect to the local sewerage system.

Also the construction of the hard base at the site for vehicle washing was again found to be insufficient to prevent spills from entering the underlying soil layers. There is no collection or pre-treatment of the washing waste water before it is disposed to the drainage system.

Hazardous waste
There are no arrangements in place on the base for safe storage or disposal of hazardous waste. As mentioned previously the solid waste produced on-site is currently not segregated which means that there is a risk that hazardous waste will be mixed with the solid waste stream.

The plans of bringing hazardous waste back from Mogadishu would most likely include temporary, intermediate, storage at the base. The required facilities for this are currently not in place, although it is acknowledged that plans for this are being progressed. Unsuccessful efforts to identify acceptable and safe disposal capabilities in Mombasa might as well leave no other alternative for future end disposal/treatment than to ship the waste to Nairobi, where contractors with adequate facilities are available.

4.1.7 Possible sources of pollution

UNSOA activities on the site that may cause pollution include:

- Potential releases of minor volumes of chemicals from spilled products within deliveries and inspection of equipment. Offices, equipment inspection areas, and operation of other facilities will produce minor volumes of hazardous waste such as batteries, etc.

- If indeed hazardous waste were decided to be brought back from Mogadishu and temporarily stored on the AWL site this would potentially be a major source of pollution if the reception and storage facilities are not constructed and monitored according to necessary requirements.

- The underground diesel tank has not been integrity tested and is hence a major potential source for pollution. Re-fuelling of personnel vehicles and equipment to be tested, as well as refilling the fuel storage, could result in spillage that because of the absence of spill control at surface fill points could result in pollution.

- As can be seen in figure 3 there is a borehole well, less than 20 m from the diesel tank, which if not properly lined and sealed could act as an access route for ground water pollution caused by diesel spills or from other sources both on-site or from adjacent facilities carried into the well by surface run-off.

There are spill prevention kits available at the log base however it was observed during the site visit that these were not always appropriately located and it is not known if staff at the site had received the appropriate education and training on how to use the equipment.

4.1.8 Emissions

There is a high usage of heavy diesel vehicles within the transportation of goods with clear emission problems transporting goods in and away from the base resulting in increased levels of carbon monoxide, nitrous oxide, possible oxides of Sulphur, and dust. Transport of goods is arranged for by the suppliers, and goods leaving the base destined for the harbor

are currently the responsibility of the ship operator, not directly contracted by the UN. As such, it is acknowledged that that there is little the UN can do to control these emissions.

Other sources for impact on air quality is from the test running of equipment, staff traveling to/from the compound as well as UN-business travel which increases the overall carbon emissions for the UN. The use of on-site diesel generators will further contribute to reduced air quality, however, it is understood that these will be used on an 'as needs' basis and electrical supply will primarily be provided by the Kenyan electrical grid.

4.1.9 Noise and vibrations

The current noise profile of the AWL site is one dominated by the presence of delivery vehicles and transportation lorries removing supplies to the ships. This profile will reflect the provisioning timetable's largely controlled by the presence of a ship in harbor. In this respect there will be periods of relative quiet punctuated by periods of intense activity with corresponding peaks in noise emissions. However, the overall sensitivity of the AWL site with respect to the impact of noise emissions is low reflecting the industrial setting of the wharf – of course there are points of exposure that have significantly higher profiles as a result of movements from the wharf as a whole, notably the exit entrance point, however, this is not considered further in this report. Vibrations are also not considered of any relevance and will therefore also not be considered further.

4.1.10 Construction process

The alternative is concerning existing facilities only

4.1.11 Liquidation process

Following liquidation of the logistics base, the infrastructure will be handed back to the AWL. Preceding the hand over will be a camp liquidation process, including an on-site contamination survey where the final condition of the site will be assessed to determine the extent of damage and if there are any environmental or health and safety concerns present. In case of any hazards these will be safely removed.

4.1.12 Health and safety

Fire safety
The UNSOA Log Base has no fire fighting team. In case of a fire, the UNSOA Log base is part of an agreement between different fire fighting capacities in Mombasa including the Harbour and the oil refinery´s fire fighting capacity. Within the AWL Camp fire fighting equipment is placed at strategic points, see Figure 3.

Figure 3: Fire fighting equipment is strategically placed within the base

4.2 Log base alternative 2, Expansion of AWL site

4.2.1 Site location

Alternative 2 represents the planned expansion of the AWL site to facilitate the expected future increase in activities at the Mombasa log base; the location is hence the same.

4.2.2 Site layout

The proposed expansion of the log base is planned to stretch into the AWL complex to the west including an additional section of the wharf, see Appendix 6, adding an additional area of approximately 14000 m², which totals the log base size to just under 30000 m². The expansion includes renting parts of currently occupied industrial properties including general warehousing units, mechanical workshops, a truck assembly company (yard A) as well as a mining industry property.

In this alternative, all existing activities would be terminated/relocated and the spaces cleared to host UNSOA activities.

4.2.3 Buildings/facilities

Offices
Same as described for alternative 1, see section 4.1.3

Hygiene/sanitary facilities
Same as described for alternative 1, see section 4.1.3

On/off-loading areas and storage
Goods entering or leaving the base, as specified in section 3.2, will likely be on/off-loaded at yard A if the base is expanded. Yard A will also serve as an area for temporarily storing arrived goods before inspection, and already inspected equipment which have been repacked in seacons.

The expansion of the base will include another three warehouses, warehouses 3-5, located on the site. Additional warehouses are also planned to be used for temporary storage of equipment awaiting further transport to or from the base.

Equipment inspection area
Same as described for alternative 1, see section 4.1.3

Fuel storage/filling stations
There will be a fuel storage tank at the new site, see site lay-out in Appendix 6. The type and size will be similar to the tank at the AWL site (i.e., 22 m^3 with surface dispensers).

Staff parking area
The existing staff parking area is to be expanded and the access road improved. To allow for easier access to the compound from the parking area a bridge is proposed, 40 m long, crossing the railway. The bridge would be designed for pedestrian, and possibly also vehicular access.

Clinic
Same as described for alternative 1, see section 4.1.3

Parking bay/HAZMAT storage area
There is a designated parking bay or HAZMAT storage area proposed for the expanded site intended for temporary, intermediate, storage of hazardous material, decommissioned/damaged vehicles and equipment, used motor vehicle batteries, oils, etc., shipped in from Mogadishu. The storage area will be constructed to conform to UN specifications and operating procedures.

The waste will be transported by contractors to and from the HAZMAT storage area and final disposal will most likely be arranged for in Nairobi due to lack of appropriate facilities in Mombasa, negotiations are currently ongoing with contractors. There is currently no detailed information on HAZMAT quantities or volumes.

Workshops
A transport (TPT) workshop, see figure 4, is proposed intended to be used for maintenance and repairs of tools and equipment that does not have to be contracted out.

4.2.4 Power supply

Same as for alternative 1, see section 4.1.4

4.2.5 Water supply

Same as for alternative 1, see section 4.1.2

4.2.6 Waste generation and disposal

Solid waste
Characteristics of the solid waste will be the same as for alternative 1, see section 4.1.6, however, a general increase of solid waste production is anticipated due to the expected increase in activities.

Liquid waste
Characteristics of the liquid waste will be the same as for alternative 1, see section 4.1.6, however, a general increase of liquid waste production is anticipated due to the expected increase in activities.

Hazardous waste
Once the HAZMAT storage facilities, primarily intended for temporary storage of hazardous waste brought back from Mogadishu, are developed and compliant with UN specifications and protocol, they could be used for storage of hazardous waste generated at the camp as well. This would however require for arrangements to be put in place for the hazardous waste to be segregated from the solid waste stream, plans for which are yet to be presented. In addition to a general increase of the hazardous waste production in the expanded base due to the expected increase in activities, relatively small volumes of hazardous waste in the form of liquid chemicals such as oil, coolants, etc. and batteries would be produced in the TPT workshop.

4.2.7 Possible sources of pollution

Spills when handling hazardous materials such as liquid chemicals (oil, fuel, coolants, etc.) in the proposed TPT workshop are a potential pollution source, as well as hazardous waste produced. Besides these, other possible sources of spills will be the same as those described for alternative 1, see section 4.1.7.

4.2.8 Emissions

An expansion of the AWL site reflects an increase in activity (shipment of goods) and increased numbers of lorry movements. An increase in emissions (particles, SO2, etc.) related to vehicle movements and diesel combustion is therefore anticipated with elevated risk of negative impact for those located in the immediate zones of impact.

No significant increase in dust generation from an expansion of the AWL site is to be expected due to local conditions (see description of receiving environment below).

4.2.9 Noise and vibrations

The effect on the noise profile, caused by the increase of vehicle movements related to the expansion of the AWL site, will be periods of intense activity and possible elevated noise levels caused by increased possibilities for cumulative effect as more vehicles might be in operation at a given time. It will also result in an increased number of peak noise emissions. The overall sensitivity of the AWL site with respect to the impact of noise is however with the anticipated increase in vehicle movements still estimated to be relatively tolerant, again reflecting the industrial setting of the wharf. At the main compound exit/entrance point and in on/off loading areas the increase in exposure to extended and/or elevated noise levels will be noticeable to those within these immediate zones of impact. The potential risk for negative effects caused by noise emissions will therefore be increased locally with an expansion of base activity.

Any impact caused by vibrations alone is not considered of relevance for the scope of this study and will not be assessed further.

4.2.10 Construction process

Availability of existing facilities and infrastructure allows for construction activities related to the expansion of the AWL site to be kept at a minimum. Some renovation work is however planned mainly for the staff parking area as well as the associated access route, including the construction of the access bridge crossing the railway sidings.

4.2.11 Liquidation process

Same as for alternative 1, see section 4.1.11

4.2.12 Health and safety

Same as for alternative 1, see section 4.1.12

4.3 Log base alternative 3, “Airport site”

4.3.1 Site location

The proposed Airport site for the Mombasa log base is located directly adjacent to Moi International Airport in the southwestern part of the Changamwe district in Mombasa city; GPS coordinates 4°02’17”S, 39°36’00”E (see Figure 4).

The site is government-owned belonging to the Mombasa Airport and run by Kenya Airport Authority. The site is located in a relatively undeveloped area, used for low intensity agriculture. There are two single-story buildings, adjacent to each other located in the centre of the site, which have previously been used as offices. The largest is approximately 200 m² and the smaller 100 m² in size. Right next to the buildings there is a communications tower.

Approximately 4 km southwest of the AWL site, just 0.5 km south of the compound is the tidal creek, Port Reitz Creek, which forms an estuary before running into the Indian Ocean. Kilindini Harbor, where the ships are loaded with goods intended for further transport to Mogadishu, is located approximately 4 km to the east of the proposed base site.

Figure 4: The Airport site is located just adjacent to Moi International Airport, approximately 4 km southwest of the AWL site. Just 0.5 km south of the compound is the tidal creek Port Reitz Creek. Kilindini Harbor is located approximately 4 km to the east of the proposed base site.

4.3.2 Site layout

Appendix 8 contains a general outline of the surrounding area and main facilities within the compound. The total size of the main compound is 55000 m². Just to the north of the main compound there are plans for an UNSOA hangar/workshop. To the north there is an area with facilities occupied by the Kenyan air force and by Kenyan Pipeline Company fuel cisterns. In these tanks Kerosene is stored, the facilities however, seem to be well maintained and operated. In the area located immediately to the northeast (neighboring the Kenyan Air Force and Kenyan fuel tank site) an UNSOA staff parking area is planned to be constructed. The area to the west borders the airport operational boundary. Neighboring to the east is the Port Reitz hospital with wards, clinics and student dormitories (located on opposite sides of the access road to the site with the general hospital being located on the north side of this road).

4.3.3 Buildings/facilities

The main activities at the proposed airport base will be identical to those at the planned expansion of the AWL base described in the previous sections; the same applies for the facilities which type and scale will be very closely comparable. Hygiene and HAZMAT storage facilities, etc. will be designed to conform to UN specifications.

Offices

Details same as described for alternative 1, see section 4.1.3

Hygiene/sanitation facilities

Besides an on-site septic/soak-away system the possibility of connecting to the local sewerage system is being reviewed by UNSOA engineers. There is a sewerage trunk main servicing the port Reitz area which the airport is connected to, however, the pump lifting the waste water to the waste water treatment works is currently broken down and effluents are discharging to the sea. Efforts are underway to rehabilitate all the pump stations, progress is uncertain.

On/off-loading areas and storage

Goods entering or leaving the base in seacons, as specified in section 3.2, will be on/off-loaded on both sides of the paved circle road inside the compound, see Appendix 8. The same area will likely also serve as an area for temporarily storing arrived goods before inspection, and already inspected equipment which have been repacked in seacons.

Six warehouses are also planned to be used for temporary storage of equipment awaiting further transport to or from the base as well as housing workshops.

Equipment inspection area

Functionality tests of received goods, including assembly and test running of engines, etc. will be performed on base.

Fuel storage/filling stations

Fuel is to be stored in an on-site fuel tank next to the generators. The tank will be servicing both the generators as well as being fitted with filling stations to allow for re-fueling of office vehicles and equipment to be tested at the site.

Staff parking area

The planned area for the staff parking is 6 500 m²

Clinic

Same as described for alternative 1, see section 4.1.3

Parking bay/HAZMAT storage area

Same as for alternative 2, see section 4.2.3

Kitchen/dining facilities
The dining facilities will consist of a mess room where staff can cook their own food (i.e., no industrial type cooking facilities).

UNSOA Hangar/workshop
No information on current use as well as intended activity was available during the assessment.

4.3.4 Power supply

Same as for alternative 1, see section 4.2.4

4.3.5 Water supply

Potable water is planned for from the municipal supply; however, an on-site borehole well is also planned to be installed as well as a water treatment plant for production of potable/non-potable water to make the base self-sufficient. Information on the type or design of this treatment plant was not available when conducting the assessment.

4.3.6 Waste generation and disposal

Solid waste
The waste will be temporarily stored at a garbage collection point awaiting final disposal using municipal services. There is mention of plans to introduce segregation and recycling of the waste streams but no specific information could be sourced and evaluated for this draft version of the assessment report.

Liquid waste
A local contractor will be hired by UNSOA to empty the septic system and transport the sludge off the compound as required.

The site is not currently drained and water is directed naturally to the south following the slope of the site. Plans are to install forced drainage where surface water run-off is collected and discharged from the site via a connection to the municipal drainage system. There are also plans to reduce surface water run-off by taking advantage of natural infiltration on the site. The plans include a limitation of the development of impermeable surfaces such as paved areas, etc. as well as limiting the clearance of natural vegetation which helps retain rainwater.

Hazardous waste
Same as for alternative 2, see section 4.2.6

4.3.7 Possible sources of pollution

Spills when handling hazardous materials such as liquid chemicals (oil, fuel, coolants, etc.) in the proposed workshops are possible sources of pollution, as is the hazardous waste produced. Other than this the possible sources of spills will be the same as those described for alternative 1, see section 4.1.7.

4.3.8 Emissions

An expansion of the AWL site reflects an increase in activity (shipment of goods) and increased numbers of lorry movements. An increase in emissions (particles, SO2, etc.) related to vehicle movements and diesel combustion is therefore anticipated with elevated risk of negative impact for those located in the immediate zones of impact.

Intermittent but frequent generation of dust from a high usage of heavy truck movements is also expected to increase along the access routes to the compound. The presence of mainly paved roads however reduces the dust generation.

4.3.9 Noise and vibrations

The effect on the noise profile caused by the increase of vehicle movements related to the establishment of the base will be increased periods of intense activity and possible elevated noise levels caused by increased possibilities for cumulative effect as more vehicles might be in operation at a given time. It will also result in an increased number of peak noise emissions. At the main compound exit/entrance point and in on/off loading areas the increase in exposure to extended and/or elevated noise levels will be noticeable to those within these immediate zones of impact.

Any impact caused by vibrations alone is not considered of relevance and will not be assessed further.

4.3.10 Construction process

The establishments of the UNSOA base at the Airport site will as much as possible make use of existing facilities, which includes renovating the existing building at the site as well as the existing roadway. There will however be a need for site clearance to make way for hard standings, parking areas, and storage structures, as well as infrastructure such as drainage, etc. This will result in vegetation being physically removed from the surface, it has been stated however that any larger trees will be left and included in the design of the base.

4.3.11 Liquidation process

Same as for alternative 1, see section 4.1.11

4.3.12 Health and safety

Fire safety
The same arrangements concerning fire fighting equipment is planned for the Airport site, see section 4.1.12.

In order to illustrate the risk related to a potential fire, two scenarios have been modelled, 1) a fire in nearby POL storage affecting the Airport base as it stands at the moment (i.e., before a potential establishment of a base on the site, see Appendix 9), 2) a fire inside the Airport base affecting the surrounding area again as it stands at the moment, see Appendix 10. The risk areas will be reduced if the site is indeed developed because of the facilities (e.g., containers which will be constructed around the fuel tank which would act as a blast wall.) The model includes rough estimations of:

- Self-Ignition Risk area
- Heat Risk area
- Soil and groundwater leakage

Potential soil and groundwater pollution in case of fire/release from the fuel tank has also been modelled, again using very rough estimations, see Appendix 11.

5 Description of the receiving environment

This section presents a brief description of the environment in the surrounding region of Changamwe in which the two site alternatives are located. The relatively close proximity of the compounds to each other allows for the main contents of this description to apply for both base sites, where differences apply these are noted. The description will include aspects affecting ecological, human, as well as the physical environment. The description is based on desk studies, consultations with UNSOA staff, on-site observations, and studies performed during two field visits in June and August 2010 as well as an on-site ecological study performed in June 2010. Any information/data that could not be sourced at the time of completing this assessment is duly noted.

5.1 Physical environment

5.1.1 Climate

AWL and Airport site

The mean annual rainfall in the Changamwe region ranges from 950 mm in the south decreasing to 1050 mm in the north, see Figure 5. The main rainy season is between late March and early June with the rainfall decreasing from August. Some rain occurs between October and November but from December, rainfall decreases again to a minimum during January and February. Humidity is comparatively high all year round, peaking during the wet months of April to July.

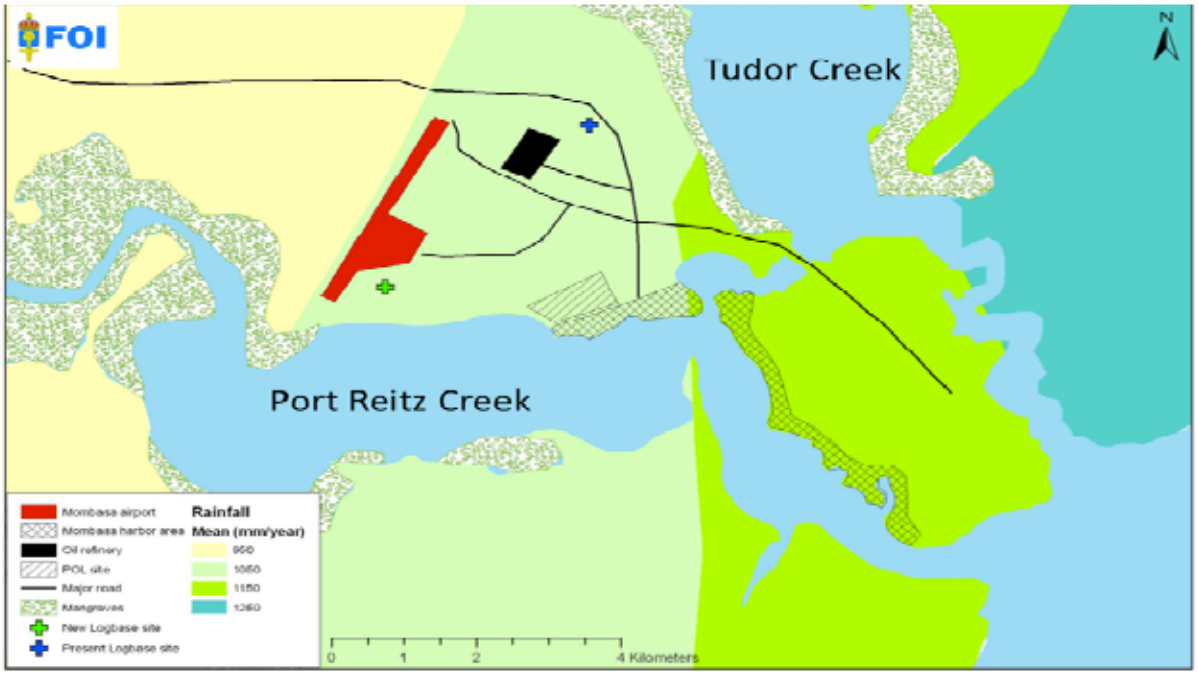


Figure 5: The figure illustrates the annual mean rainfall in Mombasa (Adapted from Munga et al. 2004)[2]

Wind conditions are attributed to southeasterly monsoon winds between April and September, and northeast monsoons during October to March. Mean monthly minimum and maximum temperatures are 18 °C to 32 °C.[3]

5.1.2 Geology, soils, and drainage

AWL and Airport site

Mombasa is located in coastal lowland with extensive flat areas rising gently from sea level up to about 100 m above sea level in the west. The Changamwe district is located in an area made up by a severely dissected and eroded belt that consists of Jurassic shale overlain in places by residual sandy plateau.

Dominant soil types in the raised areas in Chamgamwe district consist mainly of unconsolidated deep sandy to loamy soils (Magarini), see Figure 6, with a top soil of fine sand to sandy loam which are well drained. The area is also quite flat which together with the generally high permeability of the soil makes for relatively high recharge rates, 4-12 m/day, see Figure 7, which makes the area quite vulnerable to ground water contamination.

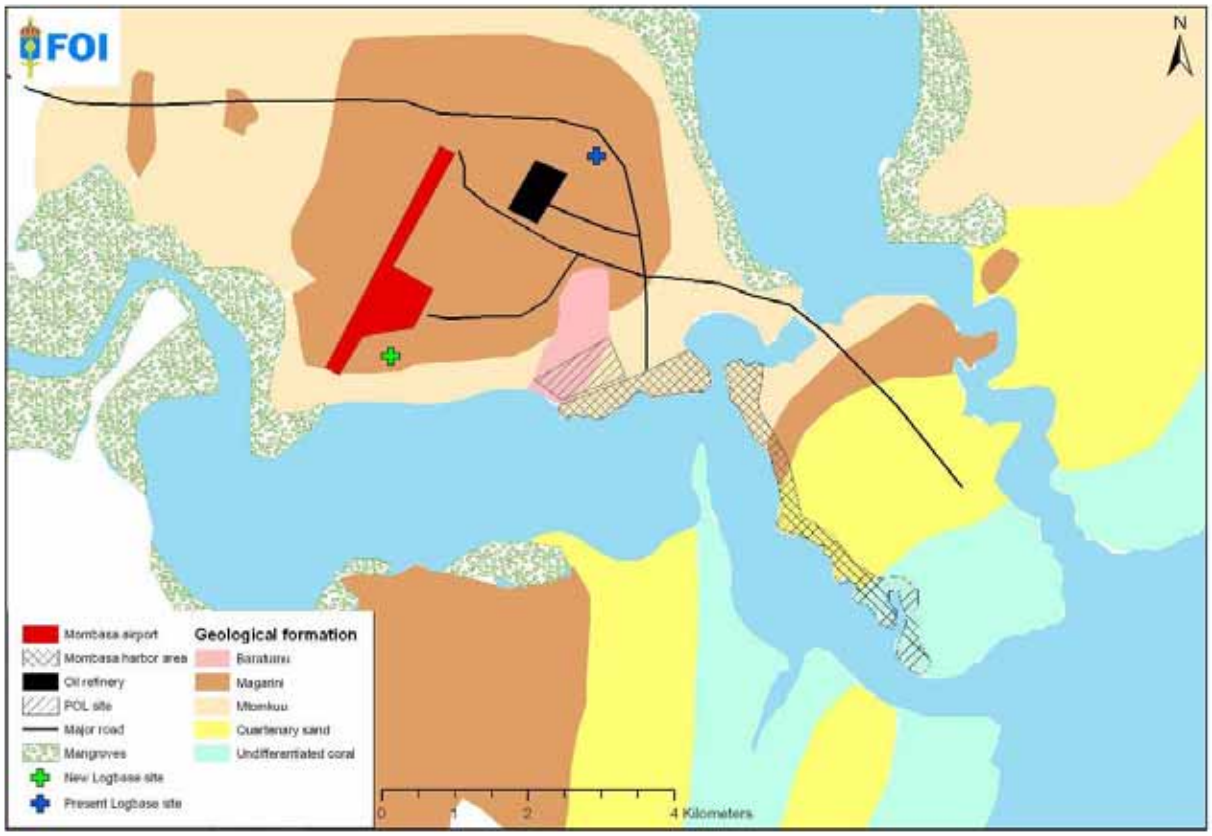


Figure 6: the main soil type of the raised area of Chamgamwe district consist of unconsolidated deep sandy to loamy soils (Magarini) (Adapted from Munga et al. 2004)[4]

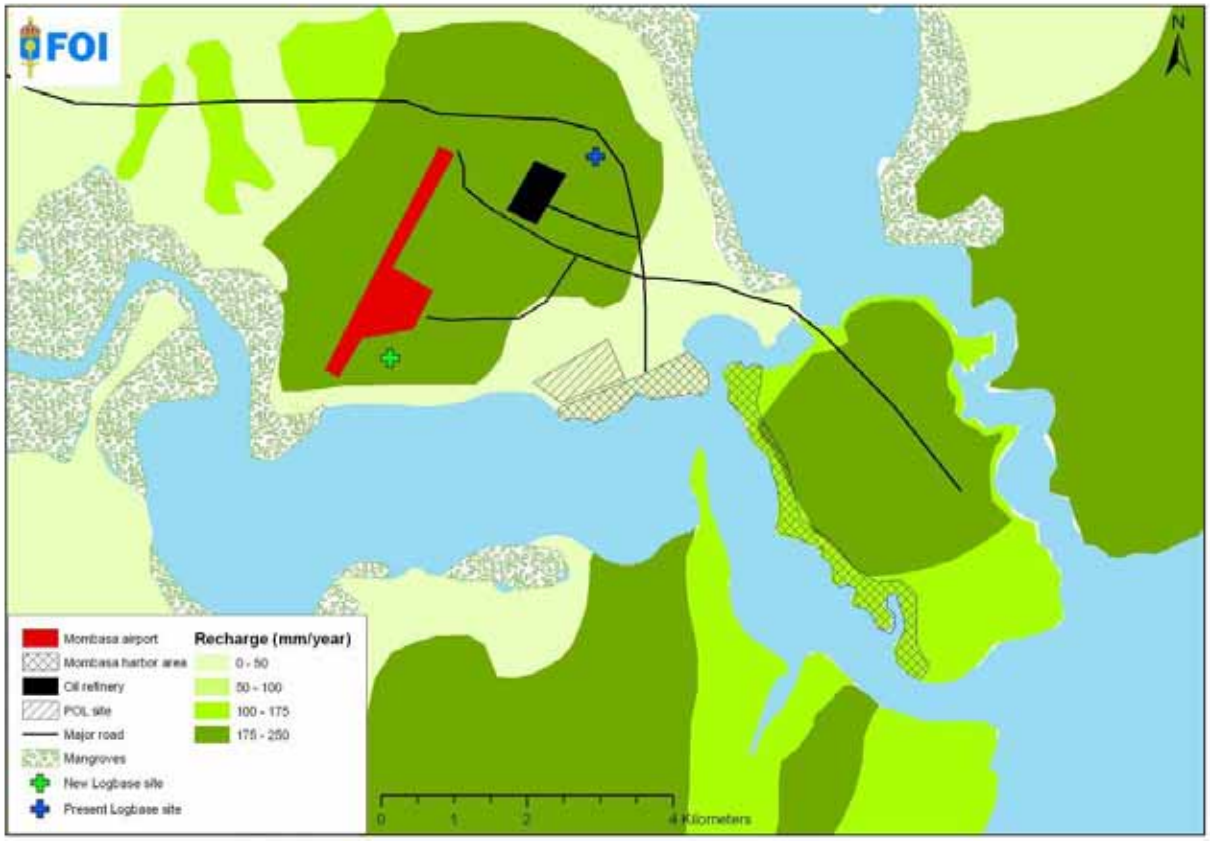


Figure 7: Aquifer recharge in Mombasa district (Adapted from Munga et al. 2004)[5]

AWL site

At the AWL site, the area slopes gently to northwest, creating a natural run off from south to north. According to information from locals, the area was originally a swampy area and a layer of filling material (crushed coral, aka "*maram*") covers the premises. The thickness of this layer varies between 50 to 70 cm. Above this filling material, a thin layer of sand/silt was found, which provides the base for a bricklayer which covers the whole area. This bricklayer is joined together only by interlocking and is not therefore sufficient to prevent liquids from penetrating and enter the underlying soil.

Airport site
The Airport site is generally flat with the exception of a large pit and a small ridge at the north eastern section of the site (for exact location see environmental sampling point 138 in figure 2 of the EBS report for Airport/New). The ground is covered with lush vegetation and the soil contains a thin organic layer (brown/dark brown) and underneath laterite soil.

5.1.3 Existing contamination

AWL site
Bacterial contamination has been identified in the well showing that the aquifer quality has been impacted by the presence of sewerage. Initial analysis performed by local authorities indicated a total coliform count of 93/100ml. The water extracted from the well was also reported to be perceived as “rather saline”. No analysis of the well was made during the EBS. The concentrations of dissolved solids (DS) and the Coliform count are not considered significant as the water is used for non-sensitive/non-potable purposes.
Some soil samples collected during the EBS did have a distinct odour of chemicals, similar to rubber or tar. At the car wash area, the re-fuelling point and the former area for toxic chemical storage in yard A (cyanide storage area) signs of spills were observed. Leakage from a limited number of the detergent/solvent storage cans in warehouse 1 was also observed. According to soil, sediment, and liquid sample analysis performed on this site, the pollution levels - compared to limit values for industrial areas – were low indicating low risk to site occupants. However, compared to limit values for residential areas the levels elevated for Pb, Cr, Cu, Zn, and Ni at some sampling spots, (see full AWL EBS report for detailed information, Appendix 12). It was not possible to sample soils underneath the warehouses during the EBS. The hard floor surfaces in the warehouses does however allow for the relatively small spills from this source to be collected with reduced risks for soil or water contamination.

Odors, indicating air contamination, were also perceived close to the fuel pump, workshops, and close to the soap factory. A smell of sewage was also noticed in water filled trenches.

The EBS also identified that given the broad spectrum of activities performed within the larger area of the industrial estate, it is possible that additional pollution is present in areas which have the potential to become part of the UN site as the site expands.

Airport site
The site historically has been a part of the Airport complex and as may have been used for potentially contaminating activities. These could include aircraft maintenance (hangars are close by) and storage and transportation of fuel (fuel tanks are adjacent to the site). Potential contaminants therefore include heavy metals, solvents, fuels, etc.

According to the results from a soil analysis of a total of three samples collected from the site during the EBS conducted in August 2010, the proposed UN compound is not exhibiting the presence of levels of contaminants that could be considered as a risk to the environment or occupants of the site.

The Airport site EBS report is included in full in Appendix 12.

5.1.4 Water resources

AWL and Airport site
Mombasa relies, to a great extent, on water sourced from outside the district for its potable needs; with the west mainland including Changamwe being supplied with piped water from Mzima springs and Marere area. However, the piped supply is currently not able to meet the demand and there is a shortfall of approximately 70000 m^3 or 35 percent of the total yearly demand. The remaining demand is met by tapping local groundwater sources. The

permeable soils of the area form the main recharge areas to the unconfined aquifer, which is characterized by a high water table of 20 m or less. There are indications however that the ground water quality of the district has been declining, mainly caused by insufficient and/or a complete lack of wastewater treatment infrastructure. There is also virtually no regulation on water abstraction which has exacerbated the quality problem as a result of saline water intrusion. In the upland areas of Changamwe groundwater of acceptable potable standard is however still obtainable.

5.1.5 Noise

AWL site
The noise profile of the AWL site is one dominated by the presence of delivery vehicles and transportation lorries removing supplies to the ships. This profile will reflect the provisioning timetable's largely controlled by the presence of a ship in harbor. In this respect there will be periods of relative quiet punctuated by periods of intense activity with corresponding peaks in noise emissions. However, the overall sensitivity of the AWL site with respect to the impact of noise emissions is low reflecting the industrial setting of the wharf – of course there are points of exposure that have significantly higher profiles as a result of movements from the wharf as a whole, notably the exit/entrance point, however, this is not considered further in this report.

Airport site
Sensitivity of the Airport site to noise impacts is significantly higher than the AWL site with Port Reitz Hospital located immediately adjacent to the operational area and the access route. A hospital by its very nature is sensitive to all negative impacts and excessive noise may present a cause for concern.

Given its international designation, Moi Airport operates both long haul flights, mainly to Europe and the Far East, as well as short haul domestic and within Africa. An assessment of the flight schedules for summer 2010 and the proposed schedule for winter 2010/2011 confirms that the Airport operates on average 60 plane movements per day (there are no distinctions between winter and summer). Traffic commences at approximately 6 am and is concluded by 9 pm and it is composed mainly of commercial flights with only a small proportion of freight and humanitarian aid traffic.

The Moi Airport has two runways, the main runway oriented on a north/east/south/west axis and the secondary runway orients east/west.

Given the relatively light volume of traffic operating from the runway (in comparison the movement off Gatwick Airport in the UK is between 500 and 600 per day) it is assessed that the impacts from noise are of a minor nature to potential occupants of the base.

5.1.6 Air quality

The main source of contamination reducing air quality caused by UNSOA related activities include emissions from lorries (exaggerated by the use of old vehicles and low quality fuel with an estimated high sulphur content).

AWL Site
Adding to previous mentioned sources additional emissions at the AWL include emissions from a nearby refinery, potential illegal burning of waste and fugitive emissions from local traffic. The EBS also showed elevated levels of VOCs at the AWL site compared to a reference site located outside of the industrial area (for further detail refer to the full EBS report in Appendix 5).

As a consequence of cumulative emissions arising from neighboring operations on the Allied Wharf estate, the air quality at the AWL site is likely to be of lower quality than the Airport site.

At the AWL site the creation of dust from vehicle movements is estimated to be low with local characteristics being relatively unsusceptible to changed/increased traffic loads due to a short access route, relatively high percentage of paved areas, low speeds, and already established heavy traffic loads compared to which the UNSOA contribution is to be regarded as limited. The local environment, again being located in an industrial development, is also to be considered relatively tolerant to the limited level of increased dust generation which can be expected.

Airport site
From the Airport the main sources of emissions come from aircrafts and the fuel storage as well as from an incinerator located at the Airport.

The Airport site is more sensitive to elevated dust generation levels, especially due to the presence of Port Reitz Hospital located adjacent to the access road to the site. Other sections of the access route to the Airport site can also be expected to be more sensitive, mainly residential areas immediately adjacent to the road. These sections are also to be regarded as more susceptible to increased dust generation due to sections of unpaved dirt road, higher speeds as well as to the introduction/increase of current traffic, more out of scale with current loads.

5.2 Human environment

This section is based on information collected from the visit in late August 2010 along with reports, articles, and interviews. The information should be seen as a snap-shot of the socio-economic situation in the areas surrounding the proposed two sites.

5.2.1 Demographics

AWL site and Airport site
Mombasa consists of approximately 2 million people. Christianity and Islam are the major religions but Mombasa also has several religious minority groups. The major languages are English and Swahili. The largest export commodities are tourism, cotton, coffee, tea, and cement.[6] Mombasa has the largest sea-port in East Africa and the city is Kenya's main tourist hub.[7] [8] [9] Figure 8 contains a summary of key demographic data for Mombasa.

Figure 9: Summary of key demographic data on Mombasa

Population Mombasa	- Approx 1 million people[10] 45.3 % female 54.7 % male (1999 census)[11] - Ages 0-13 years: 226,932 Ages 15-25 years: 186.386 - Number of households: 183,540 - Female headed: 47,043 - Average household size 4 people[12]
Livelihoods/ economic activity Mombasa	- Number of unemployed (2002): 189,246 - Income from agriculture (2002): 1 % - Absolute poverty (urban and rural): 217,402[13]
Refugee situation Kenya	- 340,000 registered refugees + hundreds of thousand unregistered refugees - Refugees are mainly from Somalia, Ethiopia, and DRC[14] [15] - Internally Displaced Persons: 399,000 - Most refugee camps are situated along the Somalia border[16] - Refugee populations are expected increase, foremost in Dadaab camp in north-eastern Kenya[17]
Health Kenya	- Infant mortality 54.7 deaths/1,000 live births (world ranking: no 45) - Life expectancy 57.86 years - Fertility rate 4.38 born/woman (world ranking: no 37) - Major infectious diseases: diarrhea, hepatitis A, typhoid fever, malaria, Rift Valley fever, rabies - HIV prevalence 6.7 % 2007 (world ranking 10)[18]
Religion Kenya	- Protestant 45 % - Roman Catholic 33 % - Muslim 10 %[19]
Ethnic groups Kenya	- Kikuyu 22% - Luhya 14% - Luo 13% - Kalenjin 12% - Kamba 11% - Kisii 6% - Meru 6% - Other African 15% - Non-African (Asian, European, and Arab) 1%[20]
Language Kenya	- English - Kiswahili - Indigenous languages[21]

5.2.2 Socio-economic activity at base sites

AWL and Airport site

The main livelihood activities in Mombasa consist of small scale farming, tourism/hotel/restaurant services and jobs in the mechanical/industrial business.
In Mombasa young men often get jobs on a “day-to-day” basis – in this respect they can be hired by Allied Wharfage Ltd or the UN as “handy-men”. Many women are involved in cooking and cleaning in the hotel business or run small scale farming.

According to a UNICEF report there is a flourishing sex tourism involving young boys (referred to as “beach boys”) and girls in Mombasa city. According to the report about 30 percent in the ages 12-18 are involved in casual sex work along the coast (Mombasa, Malindi, Kalifi, and Diani). Due to the high levels of tourism this business is taking place all year round.[22] Reported incidences of increases in the sex trade as a result of troop influx will

not be realised as a result of the operations from UNSOA – numbers of foreign employees are of a low order.

The estimated HIV/AIDS average prevalence for people age 15-49 in Kenya is approximately 7 percent, which is quite high (no. 10 in the world).[23]

AWL site

The Allied Wharfage Ltd site is a medium to large scale industrial estate on the outskirts of Mombasa. The UN base comprises a small component of the overall Wharfage. Although no analysis has been made of the occupancy of the AWL estate observations made during the two field missions suggest that occupancy is high with industries ranging from manufacturing to vehicle repair and storage. There appears also to be a strong supportive industry of roadside food production and retail.

The UN operations centerd on the AWL site have a number of economic impacts the main one of which are detailed below;

- Payment of rent to AWL
- Employment of local people on a full-time basis
- Employment of third party contractors – cleaners, security guards, waste disposal
- Hiring of ships and crew
- Hiring of lorries for use in transportation
- Indirect impacts associated with the provisioning of camp operations (e.g., consumables, office equipment, etc.)

Extension of the AWL facility by the UN will increase the level of impact arising from these activities. This is in the case of both direct impact such as that arising from an increase in the number of people employed by the UN as well as indirect impact such as an increase in the economic profile of the base such as the use of third party contractors.

Expansion of the operation will occur in the context of an existing industrial estate and so construction phase impacts will be neutral and of short duration.

An increase in the size of the base will result in the incorporation of units currently used for activities unrelated to the UN – this includes vehicle repair and soap and detergent manufacture as well as general storage. These facilities to be displaced by UN expansion are likely to be housed elsewhere on the AWL site although this has not been confirmed. In the event that housing cannot be found then there is the possibility that companies will cease to operate and workers made redundant.

Expansion of the base will also have the effect of increasing the overall economic footprint of its operations and as such have the effect of increasing employment opportunities both directly (increased number of employees) and indirectly (increased number of truck movements)

Airport site

The Airport site is currently undeveloped and secured although one or two itinerant families are present in the direct area. It is understood from UNSOA that these families will be employed on some menial level by UNSOA and will not be displaced. Similarly for the guard who currently resides on-site. The site is also being used for small scale subsistence farming, see Figure 9.

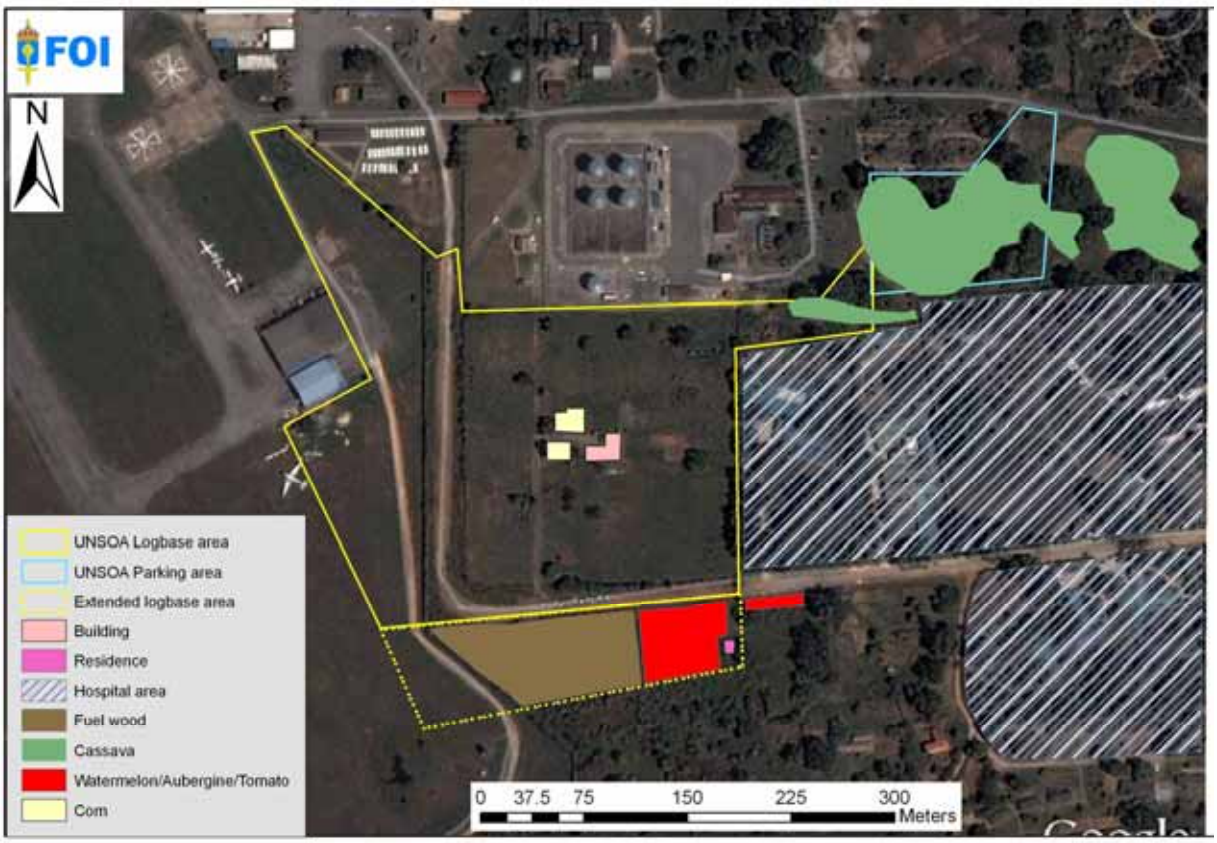


Figure 9: The figure illustrates the location of the farming activities at the site, including type of crop.

The Airport and the Port Reitz Hospital are the main employers in the area – this is supplemented with a high proportion of 'cottage' industries present along the main road from the airport to Mombasa. Given this and in the absence of official statistics, it is likely that locally to the proposed UN camp unemployment will be on a low level.

Movement of the UN operation from the AWL site to the Airport complex will generate a number of economic impacts both positive and negative and short- and long-term. In the short-term positive impacts will arise from the construction of the camp and provisioning of the camp infrastructure. As the camp enters into operation the economic profile will become similar in form to that currently existing for the AWL site.

5.2.3 Land use

The west mainland, including Changamwe, is a major industrial location in Mombasa. Major industrial establishments include an oil refinery, a steel works, and food processing plants. There are also a lot of general warehousing and mechanical workshops, etc., as well as some small-scale agricultural activities.

5.2.4 Community infrastructure and services

Waste water management practices

AWL and Airport site
Lack of funds has delayed the extension of water-borne sewerage in Mombasa and the majority of sanitary installations therefore are made up by pit latrines (70 percent) or septic/soak-away systems (17 percent). Often the soak-aways and latrine pits are dug all the way to the water table resulting in direct contamination of the ground water.

Septic sludge is emptied either by the Mombasa city council or by private contractors; often suction trucks are used in the process. Information on where private contractors dispose of the sludge is not available. Illegal wastewater discharges are not uncommon.

The waste water treatment plant servicing the area under study is located in Kipevu, 5-10 km away, within the southeast corner of West mainland abutting the northern boundary of Kilindini Harbor. The waste water treatment plant has been reported to be in good working condition with excess treatment capacity. The sewerage system services four main areas including Changamwe and Port Reitz. The waste effluents include both residential and industrial effluents.

Airport site
The Port Reitz area uses the trunk sewer system connected with one pump and only the Moi International Airport is connected to this system. The sewerage which was installed, generally suffer from disrepair resulting in waste water in some areas of the Changamwe district including Port Reitz, being discharged untreated into the sea, the system is however undergoing rehabilitation work.

AWL site
During site visits the water being conveyed in the drainage was noticed to have a smell of sewage, which could indicate that either septic sludge or supernatant is being discharges to the drainage system. This could however not be confirmed.

Solid waste management practices

AWL and Airport site
No properly engineered municipal solid waste disposal sites have been identified in Mombasa. Although authorized sites are available, these are most often sub-standard as well as being located in close proximity to marine water bodies. It is also not uncommon for waste at these sites to be burned potentially causing excessive release of hazardous fumes and fly ash. The exact location of landfill(s) serving or intended to serve either of the two sites is yet to be confirmed. Privately contracted services should be assumed to improperly dispose of provided waste fractions unless certified and approved by local authorities, or evaluated and frequently controlled using UNSOA own resources.

A new municipal landfill site is planned. According to unverified information, this site will conform to “western standards.” The date of completion has not been verified but assumed to coincide with the liquidation of current site(s).

Water supply

AWL and Airport site
The west mainland, including Changamwe, is supplied by piped water from Mzima springs and Marere area with chlorination done at break pressure tanks. Although majority of the households are said to receive piped water the current demand cannot be met hence very few receive a continuous supply. The deficit is met by tapping local ground water.

AWL site
At the AWL site the surrounding abstraction of groundwater is unknown.

Airport site
At the Airport site the main existing water abstraction of ground water is by the neighboring hospital area which has a well supplying the facilities with their water needs including potable water demands. The rate of abstraction is not known. According to hospital staff there has not been any recent complaints or concerns of the water source being contaminated.

5.2.5 Sites of archaeological and cultural interest

AWL site
The area for the AWL base is located in a built environment and no sites of cultural or historical interest in the immediate vicinity of the compound have been identified.

Airport site
The proposed Airport site is located in a relatively undisturbed area where no known investigations on cultural or historical interests have been performed. However, results from the EBS indicate no signs of sites of cultural or religious interest.

5.3 Ecological Environment

The immediate area surrounding the compound of the AWL base is located in a built environment and there is no reported sensitive ecology. The proposed Airport site however is located in a relatively undisturbed area, although previously cleared for cultivation, where no known previous ecological assessment has been performed. In order to be able to assess the vulnerability of the area, an on-site ecological study was therefore performed on the Airport site to identify any site-specific sensitive flora or fauna, the full report can be found in Appendix 14.

The ecological study of the Airport site was performed in June 2010 and consisted of surveys which were conducted on foot using the “walk over” method. The method consists of making botanical and zoological descriptions of plants and animals along evenly spaced transects of the site. The findings were recorded using the internationally recognized DAFOR (dominant, abundant, frequent, occasional, rare) scale of abundance. Field signs such as tracks, droppings, feeding remains, habitat preference, and informal interviews with the caretaker and watchmen were additionally used to identify species. As part of the description, the dominant species and plant associations were noted, and a species list was then drawn highlighting the presence of rare and/or protected species in the international context, see table 1 in the main ecology study report in Appendix 14 for a full list of identified species.

5.3.1 Flora

AWL site
The immediate area surrounding the compound of the AWL base has no sensitive flora

Airport site
Most of the vegetation at the site is secondary in nature, considering the area has once been cleared for cultivation of subsistence crops. The site has now re-vegetated under natural conditions. Grasses covered about 80% of the site, see habitat map in figure 10 in the main ecological study report in Appendix 14. The grasses are not endangered, however, they are an important feeding habitat for birds, insects and reptiles, and also important in erosion control.

Despite having few indigenous trees in the compound such as Mango, Fig, Doum Palms, etc., no endangered species were found. The trees however, provide a shelter and nesting habitat for the birds. Shrubs were also abundant amongst the grasses but no endangered species were found. However, both shrubs and grasses were observed as habitat for an abundance of insect life.

5.3.2 Fauna

AWL site
The immediate area surrounding the compound of the AWL base is located in a built environment and there are no reported sensitive fauna

Airport site
Very few bird species were observed during the site ecological survey due to loss of the initial habitat following removal of primary vegetation years ago, however, there were weaver birds nesting in the bigger trees. No reptiles were sighted during the survey, however, informal interviews with the caretaker of the compound and watchmen from adjacent compound indicated that rock python, red headed Agama lizard, cobra, and monitor lizard were common within the site. Mammals were particularly rare, traces of field and cane rats were detected via large holes and droppings seen on ground and from informal interviews. No other mammal species were observed at the site during the ecological survey; however, random sightings of Vervet monkeys, very common in Kenya, were made during site visits by the assessment team.

5.3.3 Sensitive environments

AWL and Airport site
Both base sites are situated within approximately one kilometer to the shoreline of two tidal creeks, the AWL site to Tudor Creek, and the proposed Airport site to Port Reitz Creek, see figure 4. Both tidal creeks form estuaries before running into the Indian Ocean. The estuaries hold significant mangrove stands. Mangrove swamps are highly productive environments that are very sensitive to pollution. Mangroves are also of economic importance since they provide spawning and nursery grounds for fish and shrimps providing produce for subsistence and for the local market. Mangroves also protect the shores against erosion, and they provide firewood and building material as well as a long list of other natural products.

A recent coastal sensitivity study, looking at coastal types, ecological resources, and human use conducted by the UNDP and the Kenya Marine and Fisheries Research Institute classed the shorelines closest to the two base sites as low sensitivity (i.e., of low biological diversity), ranking one out of five for the coastal zone of Port Reitz (close to the Airport site), and three out of five for the coastal zone located close to the AWL base; however, the estuary areas as a whole contain areas of high sensitivity, particularly at the exiting points into the Ocean, see Appendix 15.[24] The Indian Ocean coastline around Mombasa also contains highly productive coral reefs, which as well are very susceptible to pollution.

5.3.4 Endangered species

AWL and Airport site
No species listed as endangered in the IUCN Red List of endangered species were found.

6 Assessment of impacts and proposed mitigation measures

6.1 Assessment methodology

The initial identification of activities with a potential to significantly impact on the local physical, human and ecological environment was performed using a screening matrix. The result from this initial screening can be found in Appendix 16 for the AWL site and Appendix 17 for the Airport site. In this process several criteria were used to allow the significance of each impact to be assessed, criteria include but are not limited to: extent, frequency, duration, reversibility, reparability, and scale, etc. (see below).

The impacts identified during the initial screening were then subject to an extended, more thorough, evaluation. This evaluation included an individual rating of each activity identified to be significant on both the level of significance of the estimated impact as well as of the probability of the impact occurring, using a scale ranging from 1-10. In order to make systematic assessments of the significance and probability templates with defined scales were used, see template 4 in Appendix 1.

This individual rating of each criterion was then followed by a matrix-based assessment where they were weighed against each other to retrieve a final estimation based on local circumstance, see template 5 in Appendix 1.

The result of this assessment is an individual scoring of each impact allowing for comparability between activities (useful when prioritizing mitigation efforts). The assessment of the impacts from each activity is then followed by initial recommendations on mitigation efforts, adapted to local conditions, which are considered necessary if to reduce the estimated impact from each activity to an acceptable level.

An additional important aspect, which has been registered during the assessment process, is the quality and/or reliability of the data used during the assessment. The scale ranges from “no data” (cannot be assessed) to verified on site (high confidence level), see template 6 in Appendix 1. The confidence in the assessment results is directly dependant on the quality/reliability level of the data, which could be retrieved, and this should be taken into consideration when the results from the assessment, presented below, are reviewed.

The results from the assessment process are presented in a summarizing table, presented below.

6.2 Assessment results

ALT. 2, "Expansion of AWL site"							
Activity		**Description of impact**	**S**	**P**	**impact rating without mitigtion**	**Quality/ reliability of data**	**Recommendations/Mitigation**
HAZMAT MANAGEMENT	**Fuel tank**	The underground fuel storage tank at the site was installed four years. It has not been inspected or integrity tested and is hence of uncertain condition, hence there is a risk for diesel to continuously spill and contaminate soils and ground water. Furthermore, the tank, fill pipes, and surface dispenser are located on a permeable base and fuel spilled can migrate directly into the soil, groundwater or into the drainage. There is also no collision protection which increases the risk of a spill if a vehicle where to collide with the facility.	8	?	?	-	It is recommended that the underground tank is inspected and its integrity tested, if in poor condition it should be replaced. The tank should be placed above ground on an impermeable and bunded base with separate drainage arrangements (see below). This base should also hold the fuel dispensers. Spill prevention kits must be made readily accessible, and training in how to use them provided to all personnel. There should also be protection installed against vehicle collisions.
	Handling of goods	Containers used during shipping of goods will contain HAZMAT. The containers have been observed to be in poor condition, often corroded and with signs of physical damage. There have also been observations of fluids leaking from the containers, suggesting a risk for spillage of hazardous substances during transport, on/off loading and storage. It has also been observed that spill prevention kits are not always appropriately located and accessible preventing spill events to be effectively managed.	4	5	ELEVATED	++	All goods containing HAZMAT should be stored at a designated HAZMAT storage area conforming to UN specifications. It must also be ensured that proper storage containers designated for Hazmat including petrol, oil, and lubricants POL are used within the main freight containers during transport and storage. Spill prevention kits must be made readily accessible at all locations where HAZMAT is being stored (main storage area, workshops, etc.), and training in how to use them provided to all personnel. Efforts should also include the development of an emergency response plan.
Cumulative impact	None.						

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
WATER SUPPLY	Borehole well	The borehole is not fitted with a proper top seal and there is hence a risk that the well could act as an access route allowing for surface contaminants to reach the ground water. The borehole well is in close proximity (approx 20 m) to and downstream of the Hazmat/POL storage area as well as the fuel tank which increases the risk for HAZMAT contamination	6	6	HIGH	+	The well should be fitted with a top seal stretching no less than three meters below ground and 15 cm above ground. An example of an appropriate design for the well/borehole can be found in Appendix 18.
	Waste	The use of bottled water contributes to the total waste production rate increasing waste transport requirements (affecting all aspects related to vehicle movements/transport).	3	3	LOW	+	The possibility to connect to the municipal water supply to work as a primary supply option for potable water should be evaluated.
	Water demand	There is a local deficit within the municipal water supply that has led to localized over abstraction of ground water resources. The water usage of the base could contribute to such negative trends. The demand of the base is however relatively low compared to ancillary activities so the impact is estimated to be limited.	4	5	ELEVATED	+	Water conservation and sensitization measures could be implemented when/where applicable to avoid wasteful use.
Cumulative impact	None						

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
LIQUID WASTE MANAGEMENT	Sludge removal	The final recipient for the septic sludge has not been confirmed. Improper disposal by contractors providing sludge removal services is a documented problem in Mombasa, and there is hence a risk that the sludge can cause contamination of surface watercourses.	7	7	VERY HIGH	+	The sludge should be disposed of at the Mombasa waste water treatment works, which provides adequate facilities for treatment. Contractor disposal sites for sludge that is pumped out of septic tanks should be reviewed, and contractual arrangements should include provisions clearly making the contractors accountable for environmentally responsible behavior.
	Drainage/ surface water run-off	Storm water, vehicle washing, waste water, etc. which has passed over the site, potentially carrying contaminants, are currently allowed to enter the municipal drainage system without pre-treatment. This could result in contaminated run-off water possibly reaching sensitive marine ecosystems in Tudor Creek where it can result or contribute to both environmental and socio-economic impact.	5	4	ELEVATED	+	All the effluents generated should be identified and quantified and designated areas should be appointed for vehicle washing, etc. Processes such as slow sand-filtration, percolation, etc. for collected storm water should be instituted where applicable. The capacity and condition of the local sewerage and drainage system should be inspected including catch basins, overflows, etc. and final discharge recipients determined. At a minimum interceptor tanks should be installed for collecting run-off from particularly sensitive activities such as storage areas for chemical products and waste, vehicle washing, lubrication, and/or fueling areas. The tank should be designed to include oil/water separation as well as a settlement basin, to allow silt, pollutants, and rubbish to settle/float out before run-off from the site is allowed to enter the municipal drainage system. The drainage channel should also have a liquidation device to contain leaks inside each storage area, in order to allow them to be neutralized or absorbed.
Cumulative impact	None						

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
SOLID WASTE MANAGEMENT	Segregation	The presence of workshops and a medical clinic will result in the generation of hazardous waste, which due to the current lack of waste segregation routines, poses both a health risk to the personnel handling the waste, primarily the youth help group, as well as creating a source of pollution of the sensitive environment in the Tudor estuary when land filled.	6	6	HIGH	++	Hazardous wastes should be segregated out by providing separate collection containers and educating the personnel on how to identify hazardous materials. The separated hazardous waste should be temporarily stored in the HAZMAT storage area and co-shipped with other HAZMAT for final treatment/disposal at accredited facilities in Nairobi. It is recommended that a UN employee is appointed as waste coordinator to understand the waste streams arising from the log base operations, the coordinator would also be responsible for ensuring that hazardous and non-hazardous wastes are sorted and stored in separate areas.
Cumulative impact	None						
HAZARDOUS WASTE MANAGEMENT	Handling of goods	The relatively large volume of hazardous waste planned to be brought in from Mogadishu as well as the waste produced on-site is a possible source of contamination of soils, groundwater and surface water courses during transport, on/off loading and storage, The planned reception and storage areas for the waste significantly reduces the risk, however this requires for all facilities to include all necessary features described in the mitigation section to the right.	7	4	ELEVATED	+++	All hazardous waste should be stored at a designated HAZMAT storage area, located far from any main drains, conforming to UN specifications (impermeable bases, bunding, fencing and ideally also have a covering to protect from sunlight and rain). Hazardous waste stored at the HAZMAT storage area should be segregated into common themes (e.g., oily wastes, batteries, paints etc) and not mixed. It should be ensured that reputable contractors are used for handling, treating and disposing of hazardous wastes. It must also be ensured that proper storage containers designated for Hazmat and POL products are used within main freight containers during transport and storage. Spill prevention kits must be made readily accessible at all locations where HAZMAT is being stored as well as during transport, and training in how to use them provided to all personnel including drivers. Prepare a spill response plan, to establish the procedures to be followed in the event of a spill. Identify the emergency response members and establish their roles, resources, and concerns. The plan should be distributed to key personnel identified in advance with chemical accident management responsibilities.
Cumulative impact	None.						

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
VEHICLE MOVEMENTS	Noise and vibrations off-base	Road transports will only be conducted along already established roads with existing heavy and high intensity vehicle traffic. As such the impact of noise and vibrations related to UNSOA activities will be limited in relation to the already existing contributions from other traffic.	3	3	LOW	++	None.
	Noise and vibrations on-base	In the direct zone of impact (i.e., on/off loading areas and the entry/exit point) to the wharf risks of negative impact caused by noise is elevated. This can potentially result in increased health risks for base personnel working if exposed for extended periods of time.	5	4	ELEVATED	+++	See emissions section below.
	Dust	Dust generation levels can be expected to be increased as a result of increased traffic loads. Current site conditions and a relatively unsusceptible environment will however limit the impact significantly.	4	4	LOW	+	If problems with dust arise, dust suppression measures should be evaluated and when possible implemented.
	Emissions	Emissions operational phase: There is a high usage of trucks with clear emission problems resulting in increased particulate, carbon monoxide, nitrous oxide, and oxides of Sulphur (elevated due to suspected high Sulphur levels in local fuel). This can have a local impact on those working within the compound for prolonged durations of time (mainly respiratory problems).	5	6	ELEVATED	++	Minimize empty running (e.g., by arranging the on/off loading area in a way that reduces the need for queuing) and/or enforcing restrictions for empty running within the compound. Evaluate the possibility of reducing or eliminating the current dependence on truck transport by substituting it with railway transportation, which is a possibility at the site because of the access to railway sidings.
	Road damage	Increased wear and damage to current roads could impact other means of transportation. Roads outside of the allied wharf are however paved and the contribution in traffic load from UNSOA is estimated to be relatively low.	3	3	LOW	+	None.
Cumulative impact	None.						

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
LAND USE	Socio economic	The overall socio-economic impact is assessed to be none to positive. This reflects the continued use of the Allied Wharf Industrial Estate for commercial activities. Appendix 19 contains a table of the full appreciation of socio-economic impact for the AWL site	-	-	NONE/ POSITIVE (See positive impacts below	++	UNSOA, however, need to ensure, as much as is operationally possible, the continued employment of 'local' employees and to ensure that local employees are considered in the creation of new posts. Appendix 20 contains a checklist which to be used to minimize negative socio-economic impact
	Ecology	Site clearing during construction will result in loss of vegetation	4	5	ELEVATED	++	It should be ensured that any larger trees are not removed
POWER SUPPLY		Energy use has been calculated at two million Kwh/year resulting in a CO_2 output of 200 tonnes					A separate study for UNSOA has confirmed that up to 30% of the energy consumption of the operation of the base can be reduced through the installation of simple measures. These should be considered for implementation.

POSITIVE EFFECTS	HAZMAT/Waste management	
	Socio-economic	The continued use of the Allied Wharf Industrial Estate for commercial activities will bring with it positive effects by offering job opportunities

ALT. 3, "Airport site"							
Resource	**Activity**	**Description of impact**	**S**	**P**	**impact rating without mitigtion**	**Quality/ reliability of data**	**Recommendations/Mitigation**
HAZMAT MANAGEMENT	**Fuel tank**	If placed under ground potential spills will be more difficult to detect and manage.	7	?	?	-	The tank should be placed above ground on an impermeable and bunded base with separate drainage arrangements (see below). This base should also hold the fuel dispensers. Spill prevention kits must be made readily accessible, and training in how to use them provided to all personnel. There should also be protection installed against vehicles collisions.
	Handling of goods	Containers used during shipping of goods will contain HAZMAT. The containers (especially during sea transports) have been observed to be in poor condition, often corroded and with signs of physical damage. There have also been observations of fluids leaking from the containers, suggesting a risk for spillage of hazardous substances during transport, on/off loading, and storage.	5	6	ELEVATED	++	All goods containing HAZMAT should be stored at a designated HAZMAT storage area conforming to UN specifications. Fuel storage tanks should also be placed above ground. It must also be ensured that proper storage containers designated for HAZMAT and POL products are used within the main freight containers during transport and storage. Spill prevention kits must be made readily accessible at all locations where HAZMAT is being stored (main storage area, workshops, etc.), and training in how to use them provided to all personnel. Efforts should also include the development of an emergency response plan.
Cumulative impact	None.						

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
LIQUID WASTE MANAGEMENT	Septic supernatant	There is a risk that the septic supernatant water, contaminated by fecal matter, which is infiltrated in the soak away, will locally pollute the ground water. As the neighboring hospital uses locally abstracted ground water as the main water source, including potable demand, the environmental risk is considered very high. The risk however for fecal contamination is directly dependent on the travel time of pathogens (i.e., allowing for natural die off before reaching the abstraction point). The current planned location of the soak away is less than 50 m from the hospital border.	4	6	HIGH	++	Considering the general topographical and hydro-geological properties of the site it is considered possible to achieve sufficient natural die off of pathogens in the infiltrated supernatant if the vertical distance from the bottom of the soak away to the ground water table is at least 1.5 m, and the horizontal distance of the soak away to the hospital well at least 50 m. Since the exact location of the hospital well was not possible to confirm during the site visits this data must be sourced. The possibility of connecting to the local sewerage system, to work as a primary sewage disposal option, should be evaluated.
	Sludge removal	The final recipient for the septic sludge has not been confirmed. Improper disposal by contractors providing sludge removal services is a documented problem in Mombasa, and there is hence a risk that the sludge can cause contamination of surface watercourses.	7	7	VERY HIGH	+	The sludge should be disposed of at the Mombasa waste water treatment works, which provides adequate facilities for treatment. Contractor disposal sites for sludge that is pumped out of septic tanks should be reviewed, and contractual arrangements should include provisions clearly making the contractors accountable for environmentally responsible behavior. Whenever possible only certified or approved services should be contracted.
	Drainage/storm water management Construction phase	Construction activities mainly involving shifting of landmasses and exposure of bare earth could result in altered drainage conditions and elevated levels of silt in storm water runoff. This could potentially increase the load on current drainage arrangements and surface water recipients including sensitive marine ecosystems in Port Reitz Creek where it can result in both environmental and socio-economic impact. The impact is reduced due to it being temporary.	5	5	ELEVATED	+	Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, etc and modifying or suspending activities during extreme rainfall and high winds to the extent practical.

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
	Drainage/storm water management. Operational phase	Storm water, which has passed over the site, potentially carrying contaminants, could result in contaminated storm water reaching sensitive marine ecosystems in Port Reitz creek where it can result in both environmental and socio-economic impact. Surface run-off can also be estimated to increase/intensify due to altered surface characteristics including roofing, soil compaction, and tarmacing, which reduces infiltration.	6	5	ELEVATED	+	All the effluents generated should be identified and quantified and designated areas should be appointed for vehicle washing, etc. Processes such as slow sand-filtration, percolation, etc. for collected storm water should be instituted where applicable. The capacity and condition of the local sewerage and drainage system should be inspected including catch basins, overflows, etc. and final discharge recipients determined. At a minimum interceptor tanks should be installed for collecting run-off from particularly sensitive activities such as storage areas for chemical products and waste, vehicle washing, lubrication, and/or fueling areas. The tank should be designed to include oil/water separation as well as a settlement basin, to allow silt, pollutants, and rubbish to settle/float out before run-off from the site is allowed to enter the municipal drainage system. The drainage channel should also have a liquidation device to contain leaks inside each storage area, in order to allow them to be neutralized, absorbed, and safely disposed off.
Cumulative impact	None.						

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
SOLID WASTE MANAGEMENT	Segregation	The nature of the activity at the base as well as the lack of waste segregation routines creates an evident risk that hazardous waste is present in the solid waste stream. This poses both a health risk to the personnel handling the waste as well as creating a source of pollution of the sensitive environment in the Tudor Estuary when land filled.	6	6	HIGH	++	Hazardous wastes should be segregated out by providing separate collection containers and educating the personnel on how to identify hazardous materials. The separated hazardous waste should be temporarily stored in the HAZMAT storage area and co-shipped with other hazmat for final treatment/disposal at accredited facilities in Nairobi. It is recommended that a UN employee is appointed as waste coordinator to understand the waste streams arising from the log base operations, the coordinator would also be responsible for ensuring that hazardous and non-hazardous wastes are sorted and stored in separate areas.
	Construction waste	During construction, waste generation rates will increase and include land masses, scrap building materials, etc. These materials are estimated to be non-hazardous and since generation is temporary the impact is considered low.	3	3	LOW	+	Institute an effective management system for construction waste that includes all activities such as packaging, transportation, and disposal. Also ensure proper disposal of non-hazardous construction waste, and whenever possible, recycling of this non-hazardous construction waste.
Cumulative impact							
WATER SUPPLY	Water demand	There is a documented local deficit within the municipal water supply in the Chamgamwe district, which has led to localized over abstraction of ground water resources. Main surrounding activities at the location of the Airport site extracting local ground water is the hospital which uses the source for both hygienic as well as drinking water supply demands. The close proximity of the airport base to the hospital area poses a potential risk for the water extraction to negatively affect the hospital water supply by lowering the water table.	5	5	ELEVATED	-	Water levels in the hospital well should be monitored on a regular basis and a dialogue established with hospital staff in order to identify and mitigate potential long-term effects
	Waste	The use of bottled water significantly contributes to the total waste production rate increasing waste transport requirements (affecting all aspects related to vehicle movements/transport).	3	3	LOW	+	The possibility to connect to the municipal water supply to work as a primary supply option for potable water should be evaluated.
Cumulative impact	None.						

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
VEHICLE MOVEMENTS	Traffic security	The access route to the new location passes through densely populated residential areas to which the UNSOA activity will significantly contribute in heavy traffic loads. UNSOA will therefore also affect the current traffic safety situation in these areas. The transport of hazardous material increases such risks.	6	5	ELEVATED	+	Further assessment of the receiving environment along, and the condition of, the access route is recommended (to be included in the EBS). It is also recommended that efforts are made so that properly maintained vehicles and trained operators are contracted.
	Dust, construction phase	Dust and noise generation during construction will result in a temporary but significant local impact mainly affecting the neighboring hospital.	5	5	ELEVATED	+	Dust suppression measures should be evaluated and implemented when possible.
	Dust, operational phase	Intermittent but frequent generation of dust from a high usage of heavy truck movements might result in elevated levels of localized impact on the social welfare (disturbance) of residents, such as fouling of the built environment and reduced visibility. Health issues might arise, as the exposure will be long-term, of particular concern is the hospital. The presence of mainly paved roads reduces the impact significantly.	5	5	ELEVATED	+	The actual dust generation potential from vehicle movements and operations on site and along access routes should be further assessed (to be included in the EBS study, to be performed in August 2010). If the impact from dust is found to be significant, dust suppression measures should be evaluated and when possible implemented. The impacts can also to a large extent be further controlled by ensuring constructive and ongoing dialogue with the hospital co-coordinators to provide them with information regarding lorry movements. Additionally thought should be given to constructing a separate entrance/exit should it be required.
	Noise an vibrations construction phase	Noise/vibrations, construction phase: Dust and noise generation during construction will result in a temporary but significant local impact mainly affecting the neighboring hospital.	5	5	ELEVATED	++	The impacts can be further controlled by ensuring constructive and ongoing dialogue with the hospital co-coordinators

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
	Noise and vibrations operational phase	Noise and vibrations, operational phase: The intermittent but frequent use of heavy trucks will result in a local increase of noise levels which can significantly impact those working within the zone of impact for prolonged durations of time. Increased noise levels will also negatively impact on the social welfare (disturbance) of the population. The hospital neighboring the site is especially sensitive. The close proximity to the airport might reduce the contribution of, and thus impact from, UNSOA related vehicle operation.	5	7	HIGH	++	Further assessment of the receiving environment along, and the condition of, the access route is recommended. Generator houses should also be located in a manner minimizing the impact of such noise on the health of staff and local personnel working near such facilities. The impacts can also to a large extent be further controlled by ensuring constructive and ongoing dialogue with the hospital co-coordinators to provide them with information regarding lorry movements. Additionally thought should be given to constructing a separate entrance/exit should it be required. The construction of noise barriers, at particularly sensitive sites is also a potential solution.
	Emissions	Emissions operational phase: There is a high usage of trucks with clear emission problems resulting in increased particle, carbon monoxide, nitrous oxide, and possible oxides of Sulphur. This can have a significant impact on the health of those working within the zone of impact for prolonged periods of time. The hospital area is particularly sensitive and emissions from the base may be of significant detrimental effect to patients.	6	6	HIGH	++	Minimize empty running (e.g., by arranging the on/off loading area in a way that reduces the need for queuing) and/or enforcing restrictions for empty running within the compound.
	Road damage	On dirt road sections where current heavy traffic loads are limited, the UNSOA contribution to vehicle movement might significantly contribute to road ware and damage, especially during and immediately after the rainy season. This might negatively influence other local activities dependent on the road.	4	5	ELEVATED	+	Road conditions including load capacity, especially during the rainy season, should be subject to further assessment.
Cumulative impact							

Activity		Description of impact	S	P	impact rating without mitigtion	Quality/ reliability of data	Recommendations/Mitigation
LAND-USE	Socio-economic	Local itinerant population and the employees and patients of the hospital may be negatively impacted through the influx of construction workers. Appendix 21 contains a table of the full appreciation of socio-economic impact for the airport site	?	?	ELEVATED	++	UN are to ensure that any contractor appointed to undertake the construction works is aware of the sensitivities associated with the hospital and to ensure that interaction is not encouraged. Furthermore the UN is to make allowances for the presence of the itinerant families and to ensure that negative interaction between the contractor and the families is prevented. Appendix 20 contains a checklist which is to be used to minimize negative socio-economic impact

POSITIVE EFFECTS	HAZMAT/Waste management	If suggested mitigations are implemented as recommended the ability to better manage solid, liquid, and hazardous wastes with subsequent reduced threats to the local environment will follow the suggested extension or relocation of the log base compared to the “No-Go” alternative.
	Socio-economic	On the longer term, following occupation of the airport site, the impact is assessed as being positive. New jobs could be created, alongside training and career development opportunities. Furthermore the UN can act as a ‘responsible neighbour’ and encourage best practice in areas such as waste management.

SITE LIQUIDATION (Relates to all site alternatives)							
SITE LIQUIDATION		Any personnel involved with the site remediation process could be posing possible health risk if not properly trained and equipped.	6	5	ELEVATED	-	Any personnel involved with the site remediation must be given proper instructions and equipment ensuring work safety, including safe handling of contaminated material and safe digging in the area.
		If a situation occurs where there is no expressed interest in taking over parts of the mission infrastructure, this could pose a potential environmental and/or health risk if not safely decommissioned and the site restored to its original condition. Some considerations of particular importance are included in the recommendations to the right.	6	5	ELEVATED	-	Developed water sources should, if not handed over to local authorities, be restored to avoid them becoming potential access routes for contamination Drainage installed on sites not handed over to local authorities will have to be decomissioned including restoring original drainage patterns of the site by replacing soil cover and replanting of vegetation, etc. to avoid problems with flooding, stagnant water and erosion. Developed waste water treatment systems should, if not handed over to local authorities, be decommissioned and waste removed and receive proper treatment
		Infrastructure handed over to local authorities could become a health or environmental risk if not properly operated or maintained.	6	5	ELEVATED	-	Ensure that any hand-over of infrastructure to local authorities is preceded with proper documentation and training, as well as adapted to local capabilities, concerning their operation and maintenance so as to avoid them from becoming a health or environmental risk
		Remediation and removal of identified health and environmental hazards could pose a risk if the process is not properly planned and organized.	6	5	ELEVATED	-	Based on the findings of the Environmental Liquidation Survey and before any actions are carried out a Close Out Plan should be developed with a description of the methodologies to adopt for safe removal of any remaining environmental hazards.
		Liquidation of the base could result in a negative socio-economic impact due to loss of job opportunities for local population.	6	5	ELEVATED	-	During the liquidation make sure to include socio-economic aspects such as continued job opportunities in the local society. Special effort should be put on including women.

7 Conclusions and recommendations

It was found in the assessment that both proposed sites are located in, and near, areas which are environmentally sensitive. Both proposed alternative bases are located on top of a vulnerable aquifer, used as an important local source of potable water. There are also sensitive marine ecosystems in the form of estuaries with mangrove stands local to both proposed alternatives. These are of significant, environmental as well as socioeconomic value.

7.1 Main findings

The main issues of environmental concern relating to the log bases include:

HAZMAT management
Since the Mombasa log base will be used for handling and storing significant quantities of hazardous materials the main environmental concern is preventing these from entering the surrounding environment through leaks and spills. The main identified routes for HAZMAT to reach the environment include:

- Spills migrating through the soil or directly through improperly sealed borehole well at AWL site, to the ground water.

- Contaminated surface water run-off reaching the municipal drainage system, discharging into sensitive marine ecosystems.

- Hazardous waste not segregated from the solid waste stream reaching the sensitive estuaries or groundwater through landfill leachate.

- Possible leaks from the underground diesel tank at “AWL” site.

To minimize pollution risk, proper HAZMAT management is crucial and should include segregation of hazardous waste from the solid waste stream, implementation of spill containment facilities at HAZMAT (including fuel) storage areas in accordance to UN specifications and recommendation in chapter six of this report, as well as making sure that an emergency response plan is developed and all personnel have access to and proper training in using spill prevention kits.

Vehicle use
Emissions, dust, and noise caused by movements of heavy diesel vehicles will result in potential health risks to personnel, who are regularly exposed. It also has the potential to impact negatively on the heath, as well as social welfare, of local residents living in close proximity to the base or its access routes.

To reduce negative impacts caused by vehicle use empty running should be limited (e.g., by arranging the on/off loading area in a way that reduces the need for queuing) and/or enforcing restrictions for empty running within the compound. Possibilities of reducing the current dependence on truck transport should also be evaluated, for example by looking into the possibility of substituting it with railway transportation, in particular from and to Nairobi, which is a real possibility at the AWL site because of the access to railway sidings.

Waste water management
The significance relating to the presence of fecal pollution of ground water sources will depend on the hydro-geological properties at the site as well as the proximity of abstraction wells to the bases. Although the initial site survey suggests that the risk of polluting potable water supplies are low since ground water abstraction close to the bases are limited, an

evaluation of these properties is necessary to confirm this. The main concern is the Port Reitz Hospital located adjacent to the Airport site which water supply could become contaminated.

To reduce an overall cumulative impact on local water supplies due to extensive use of septic supernatant infiltration it is recommended that the possible connection to municipal sewerage systems is evaluated as a primary waste water disposal option.

7.2 Comparing the proposed alternatives

Since the activities and planned facilities of the two base alternatives assessed are close to identical, any comparison of advantages/disadvantages mainly relates to the difference in location (i.e., the alternative environments surrounding the camp).

The proposed Airport site is in an area which is currently undeveloped although previous indications of the presence of airport related infrastructure do remain – a communications tower and associated buildings. As such, a greater degree of impact will be realized as a result of the need to build entire sections of infrastructure that currently exist at the AWL site. However, these impacts are temporary in nature and will be mitigated to a large extent through the good operation of the camp and its subsequent low impact to the environment. The installation of new infrastructure does offer the opportunity to ensure that all required processes and protocols for the correct management of wastes and mitigation of environmental risks can be satisfied. Conversely much of the current AWL site will require retro-fitting within existing physical constraints to bring it to a 'standard' acceptable level.

The intended activities at the Mombasa log base also more closely resemble those generally existing in the area of the AWL site which is an established industrial area with heavy transport and vehicle use. This reduces the possibility of the activity impacting negatively (emissions, noise, traffic, etc.) because of it not being out of scale with its surroundings. The main access routes connecting the sites to the harbor is also a benefit for the AWL site alternative where the A109 highway, which is adapted to heavy traffic loads, runs just adjacent to the compound. The access route from the Airport site to airport road and onwards to the A109 is longer with sections of it running through residential areas as well as the hospital area, which are more sensitive to increased traffic loads. Access to railway sidings at the AWL site also offer the possibility of transferring the main part of the transports to railway, which would significantly reduce the current use of heavy diesel trucks.

7.3 Preferred alternative

As the AWL site is located in surroundings already subject, and to an extent adapted, to similar types of impacts and since the contribution from the UNSOA activity is estimated to be minor in relation to ancillary activities, both on-site and along access, the total impact is estimated to be lower at the AWL site. Access to railway sidings at the AWL site also presents the possibility of substituting much of the truck traffic with railway transportation. This is an opportunity which would mitigate the environmental effects of vehicle movements drastically compared to other alternatives.

The Airport site is currently undeveloped with infrastructure, facilities, and activities including increased transports having to be introduced in an area where these activities would be out of scale with those from current on-site and adjacent activities. The surrounding environment is also more vulnerable, mainly due to the presence of the hospital, which increases the environmental risks.

From an environmental perspective an expansion of the AWL site is hence to be preferred. However, with proposed mitigation efforts both alternative sites would be acceptable.

7.4 Comments

An assessment of the possible off-site impacts related to the UNSOA operation, mainly due to transports, was not included in the Terms of Reference for this assessment. The opinion of the assessors is however that off-base effect from transports, mainly along access routes, should be subject to a proper assessment since they pose potential significant risks directly related to UNSOA activities, mainly at the Airport site reflecting the sensitivity of the hospital and potential impact from contaminating activities. The main off-base risks related to transport are HAZMAT movements, traffic security, emissions, dust, and noise. An assessment of off-base impact should also include a basic assessment of the contribution of GHG emissions (mainly CO2).

8 Appendices

Appendix 1: EIA and EBS Templates

Template 1: EIA screening checklist

SCREENING CHECKLIST			
DATE:		ASSESSOR NAME:	
		CONTACT INFO:	
SITE NAME/ACTIVITY:		GRID:	
HUMAN ENVIRONMENT			
Question: Will the activity involve actions which will cause changes to the human environment or socio-economic conditions in or around the project site? **(POSITIVE AND NEGATIVE EFFECTS/IMPACTS SHOULD BE CONSIDERED WHERE APPROPRIATE)** IMPORTANT - Consider all distinguishable groups in the society during an assessment on the influence from the indicated factors listed below e.g. can they be affected in different ways? Groups of special interest include women, children, elderly as well as social and ethnic groups of local importance/significance.			
GENERIC	YES/ NO/?	Comment	Is the effect likely to be significant?
DEMOGRAPHICS			
Will the activity cause any changes in the demography on or around the project site? (i.e. influxes of people, induced development and/or re-location of people)			
Economy, living standards and labor			
Will the activity affect the local lifestyle of the people living on or around the project site?			
Will the activity affect housing conditions on or around the project site?			
Will the activity/project affect the local economy and labor conditions/employment levels and quality of employment?			
Material assets			
Will the activity affect the access to or availability of material assets on or around the project area? (e.g. reduced fuel			

availability due to increased demand or increased access due to improved infrastructure and transport routes)			
Will the activity result in any loss of material assets on or around the project area?			
Health/safety/security			
Will the project have the potential to negatively impact the conflict? (e.g. by reducing the accessibility to natural resources etc.)			
Will the activity involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?			
Will the quality or toxicity of air, water, foodstuffs and other products consumed by humans be affected by the activity?			
Will there be any risk of accidents during construction or operation of the project, which could affect human health or the environment?			
Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present health/safety or security concerns?			
Will the activity affect the occurrence or distribution of disease causing vectors including insects on or around the project area?			
Will the activity affect the vulnerability of individuals, communities or populations (e.g. to disease or the general security situation?			
Will the activity affect the individuals' sense of personal security on or around the project site?			
Land use, community infrastructure and services (incl. transport)			
Are there existing land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the activity?			
Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the activity?			

Are there any plans for future land uses on or around the location which could be affected by the project?			
Will the activity result in the development, closure or diversion of transport routes leading to changes in traffic movements? (roads, river crossings etc)			
Will the activity affect the infrastructural capacity in or around the project site? (water, sewerage, power generation and transmission, telecommunications, waste disposal)			
Will the activity result in increased transports of materials and people?			
Will the activity affect the access to social institutions?			
Land ownership			
Will the activity affect land ownership issues on or around the project site?			
Sites of archeological and cultural interest			
Are there any areas on or around the location which are protected under international or national or local legislation for their archeological, historic or cultural value/importance, which could be affected by the activity?			
Social issues			
Will the activity affect the cohesion and identity of any communities on or around the project site?			
Will the activity in any way affect minority right on or around the project site?			

PHYSICAL ENVIRONMENT			
Question: Will the activity involve actions which will cause physical changes in or around the project site? **(POSITIVE AND NEGATIVE EFFECTS/IMPACTS SHOULD BE CONSIDERED WHERE APPROPRIATE)**			
GENERIC	YES/NO/?	Comment	Is the effect likely to be significant?
NATURAL RESOURCES			

Will the activity require natural resources such as land, water, materials or energy? (especially non-renewable or scarce resources)			
Are there any areas on or around the location which contain important, high quality or scarce resources such as land, groundwater, surface water, forest/timber, energy, agricultural productivity, fisheries, tourism, minerals and aggregates, which would be affected by the project? (Either through direct use or through indirect impacts such as pollution)			
CLIMATE			
Will the activity have the potential to effect the atmospheric environment including microclimate and local and larger scale climatic conditions?			
Will the activity generate large amounts of GHG? (e.g. excessive transports)			
DRAINAGE			
Will the activity alter the topography in the area affecting the drainage conditions?			
Will the activity alter the land surface conditions e.g. compaction of the soil, introduction of new surface materials such as paved roads or roofs with drainage arrangements subsequently affecting the current drainage conditions?			
Will the activity affect current water bodies in a way that could alter drainage conditions?			

Will the activity have the potential to alter the drainage conditions in a way that could cause or increase pollution levels in water sources (increased run-off carrying pollutants, erosion etc.)?			
Could the activity cause altered drainage conditions, which would alter the local hydrological conditions (quantity, levels and flows)?			
LANDSCAPE			
Will the activity require significant clearance of existing land, vegetation and buildings?			
Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the activity?			
Is the project/activity in a location where it is likely to be highly visible to many people?			
Is the project located in a previously undeveloped area where there will be loss of green field land?			
SURFACE WATER			
Are there any surface water sources on or around the location of the activity which could be affected?			
Is there a risk of the activity releasing any pollutants, hazardous or toxic substances to surface water sources? (including the nutrient status and eutrophication as well as acidification)			

Will the activity have the potential to alter the hydrology (quantity, levels and flows) of any water courses on or around the project location? (Abstraction, civil works such as river/stream crossings etc.)			
GROUND WATER			
Are there any ground water sources on or around the project location which could be affected by the activity?			
Is there a risk of the activity releasing any pollutants, hazardous or toxic substances to ground water sources?			
Will the activity have the potential to alter the hydrology (quantity, levels and flows) of any aquifers on or around the project location? (Abstraction, civil works affecting drainage and groundwater flows etc.)			
SOILS			
Is there a risk of the activity releasing any pollutants, hazardous or toxic substances to soils/land? (including acidification)			
Will the activity alter the quantity, depths, humidity, stability or erodibility of soils on or around the activity?			
Will the activity in any other way affect the geology or ground conditions on or around the project area?			
AIR QUALITY			
Is there a risk of the activity releasing any pollutants, hazardous or toxic/noxious substances which would affect the local air quality?			
WASTE			

Will the activity generate any waste? (solid, liquid, hazardous)			
NOISE AND VIBRATION			
Will the activity cause noise and vibration?			

BIOLOGICAL ENVIRONMENT			
Question: Will the activity involve actions which will cause changes to the biological environment in or around the project site? **(POSITIVE AND NEGATIVE EFFECTS/IMPACTS SHOULD BE CONSIDERED WHERE APPROPRIATE)**			
GENERIC	YES/NO/?	Comment	Is the effect likely to be significant?
PROTECTED RESERVES AND SENSITIVE AREAS			
Are there any areas on or around the location which are protected under international or national or local legislation for their ecological value, which could be affected by the activity?			
Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other waterbodies, mountains, forests or woodlands, which could be affected by the activity?			
BIODIVERSITY AND ENDAGERED SPECIES			
Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the activity?			
Will the activity result in a loss of native species or genetic diversity on or around the project site?			
FLORA			
Will the activity affect the productivity of any natural systems concerning flora on or around the project site?			
Will the activity result in the introduction of any alien species?			

FAUNA			
Will the activity affect the productivity of any natural systems concerning fauna on or around the project site?			
Will the activity result in the introduction of any alien species?			

Template 2: EBS checklist

EBS CHECKLIST		
SECTION A - EVALUATION PARTICULARS		
Mission/Operation		
Evaluation Level	Preliminary [ ] Detailed [ ]	
Camp Name		
Date		
Climatic details	Temperature (°C)	
	Wind Speed:	
	Prevailing Wind Direction:	
	Humidity:	
	Precipitation (annual incl. seasonal variation):	
	Climatic peculiarities (e.g., katabatic winds):	
Evaluator	Name: Position:	
Local Point of Contact	Name: Tel: Mob: Email:	
Personnel Interviewed	1. 2. 3.	

SECTION B - SITE IDENTIFICATION	
Location (town) Name, Nickname, Alternate names	
Map Reference/ Grid (MGRS or GPS)	
Other	

SECTION C - SITE DATA	
Aspects	**Description (always include position/s when possible)**
Infrastructure	
1. Access roads, railways, etc., including traffic loads, on and adjacent to the site (bear in mind type of traffic and seasonal variations when assessing road conditions).	
2. Power transmission- and telephone lines.	
3. Type, dimension, depths and condition of water and sewage lines (including open sewers)	
4. Type and condition of manholes	
Land use and facilities	
5. Historical and current land use on and close to the site (north, west, east, or south)	
6. Any operational or abandoned utilities, or facilities of relevance on or adjacent to the site (residential, animal housing, warehouses, industry, retail, energy, medical, etc.)	
7. Planned future construction or development projects, on or adjacent to the site	
Cultural and historical	
8. Are there protected areas or areas of special, national, local, historical, religious, or cultural interest?	
Agriculture	
9. Presence of animals and agricultural implications including animal husbandry (pesticide use, farmland, etc.)	
Industrial facilities	
10. Active, inactive or abandoned Industrial facilities, on or	

adjacent to the site (type, condition)	
11. Smoke stacks (output, type, height)	
12. Above and underground bulk storage tanks (type, condition, proximity, size, number, content, and quantity of stored constituent)	
Water treatment facilities	
13. Active, inactive, or abandoned water treatment facilities (type, capacity, condition)	
Waste management facilities	
14. Operational or abandoned sewage treatment facilities. (type, condition, etc.)	
15. Current use, or indications of previous use, of septic systems or drain fields (type, size, condition/current state, etc.)	
16. Pits, ponds, or lagoons that are or may have been associated with waste treatment or waste disposal (type, size, condition/current state, etc.)	
Waste and HAZMAT storage, discharge, or dump sites	
17. Active, inactive, or abandoned sources or dumpsites for solid waste (e.g., filled, graded, or mounded areas) (type, quantity, frequency of disposal, etc.)	
18. Active, inactive, or abandoned sources or outlets of sanitary liquid waste or waste water, on to, from, or adjacent to the site (e.g., to the sewer system, infiltration sites, ditches or streams) (type, quantity, frequency, etc.)	
19. Active, inactive or abandoned sources, storage sites, or transport routes for hazardous material (solid, liquid, gas), on or adjacent to the site (type, quantity, frequency, etc.)	
20. Active, inactive, or abandoned sources, dumpsites or transport routes for hazardous waste (solid, liquid, gas) on to, from, or adjacent to the site. (type, quantity, frequency, etc.)	
21. Any other liquid discharge on to, from or adjacent to the site (e.g., to ditches or streams) (type, quantity, frequency, etc.)	
22. Material or devices containing Asbestos (e.g., pipes, pipe insulation, and building material), PCB (e.g., electrical/hydraulic equipment), Led (e.g., batteries), Radon (e.g., building material), UFFI (Urea Formaldehyde Foam Insulation) (type, quantity, etc.)	
23. Disposal of spent nuclear and radioactive material	
24. UXO and mines	
Additional aspects	

25. Hot water temperatures (Risk for the growth of *Legionella* bacteria.)	
Topography and terrain	
26. Topography (e.g., is the terrain flat or rough, natural wind barriers, etc.)	
27. Hills, slopes, or other steep terrain	
28. Sinkholes	
29. Other types of topography or terrain	
30. Are there any site characteristics NOT consistent with maps, aerial photographs, or other information (such as disturbed areas, changes in vegetation, etc.)?	
Hydrology and Surface Water quality	
31. What rivers, lakes, streams, and ditches are there in the area? Are any of them close to, or on the site?	
32. Cover soil types and characteristics (e.g., cracked soil, compacted soil, etc.)	
33. Vegetation cover (trees, grass, shrubs, etc.) or land cover (sand, asphalt, gravel, etc.)?	
34. Run-off potentials (infiltration rates, etc.)	
35. Engineered drainage arrangements	
36. Flood plains/potential (including risk for tsunamis)	
37. Stagnant water	
38. Are there any hazardous installations upstream (Industries/enterprises, dams)? (Estimate the flow rates)	
39. Active, inactive or abandoned water abstraction points – For what purpose is the water being used (or why is it not being used)? If used, is it treated or used directly? (including condition, frequency of use, abstraction rate, sustainable yield)	
40. What is the quality of the water? Monitoring results?	

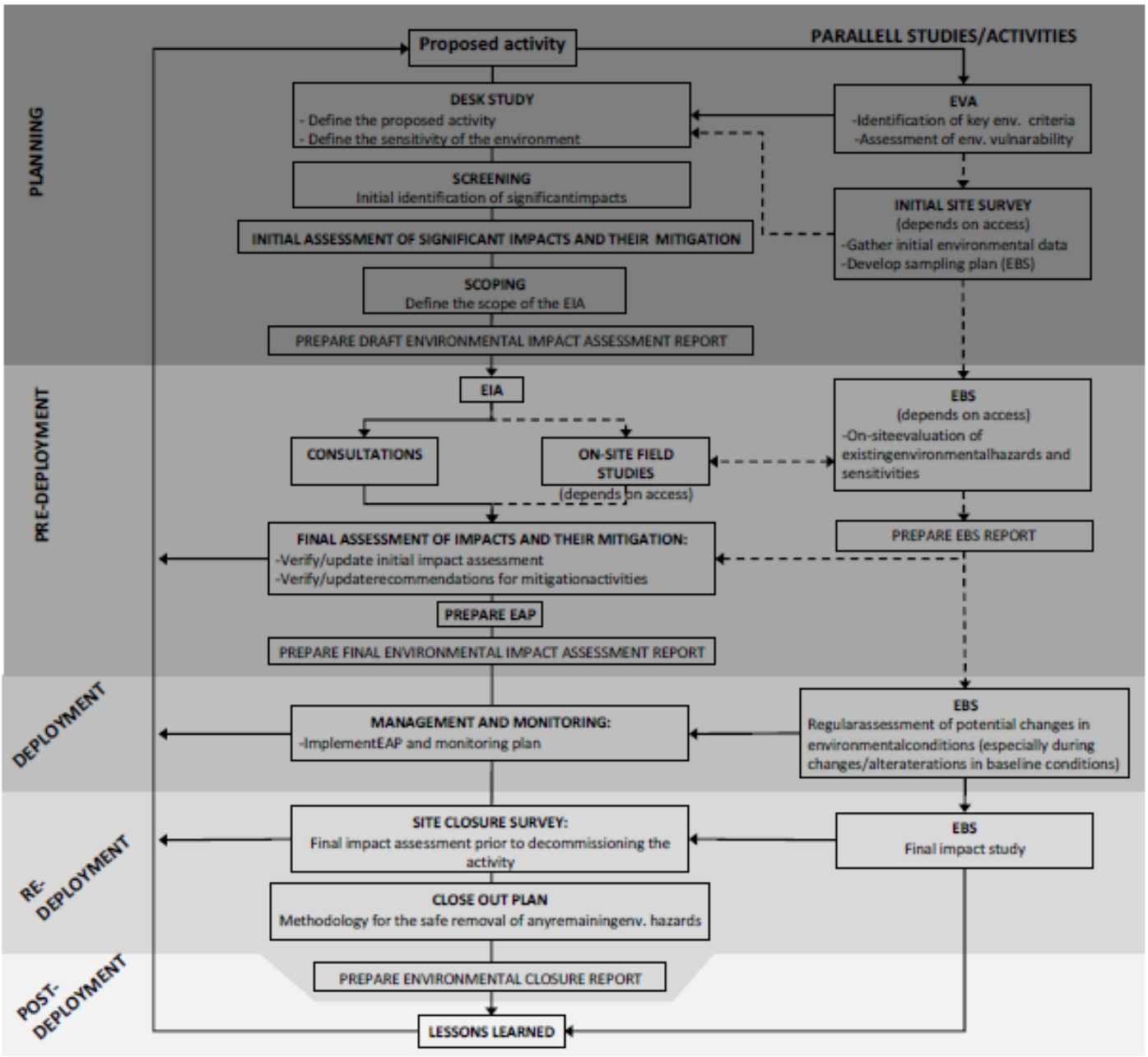
41. What discharges to the water courses (storm water? untreated sewage? Industrial discharges?)	
42. Is water used for amenity purposes – bathing / swimming / fishing?	
43. Oil sheen on water?	
44. Bad smells (solvents/bleach/decaying/fuel/sewage)?	
Hydrogeology and Ground Water Quality	
45. Active, inactive, or abandoned water abstraction points – For what purpose is the water being used (or why is it not being used)? Is it treated or used directly? (including condition, abstraction rate, number of people served, sustainable yield including risks for salt water intrusion)	
46. At what depth is the groundwater?	
47. What aquifers exist (is the groundwater in bedrock or soil)? Soil layer patterns? Soil composition?	
48. What is the direction of the ground water flow?	
49. What is the quality of the groundwater? Monitoring results?	
50. Bad smells (solvent/bleach/decaying/fuel/rotten eggs/sewage)?	
51. Monitoring wells	
Soil Quality	
52. Has any soil pollution monitoring been carried out, if so, when and by whom?	
53. Staining of soil and pavement as well as stressed vegetation (oil/paint or other chemical spills, size and shape of spill, spread)	
54. Other soil pollution related issue of importance?	
Air Quality	
55. What is the quality of the air? How is the air quality perceived? (including monitoring results)	
56. What factors contribute to the air quality? (Odours/Fumes/Smoke/Dust, etc.)	
57. Does it vary over the year?	
58. Can it be a threat to human health?	

59. Have there been any complaints (sore eyes or affected airways, etc)?	
60. Are there any indications of exposure to hazardous substances? Any unusual environmental conditions (e.g., smog, clouds, mist, vapour, inversion), contamination (e.g., staining of ground, stressed vegetation or bad smell (solvent / bleach / rotting / fuel, etc.)?	
61. Indoor Ventilation	
62. Other air pollution related issue of importance?	
Noise and Vibrations	
63. What are the current noise conditions? High/low? Constant or intermittent (frequency Hz, Volume Db, time intervals)?	
64. What activities generate significant levels of noise?	
Ecology	
65. Vegetation	
66. Fauna/insects	
67. Sensitive/endangered species	
68. Sensitive ecosystems and protected areas	
69. Other	

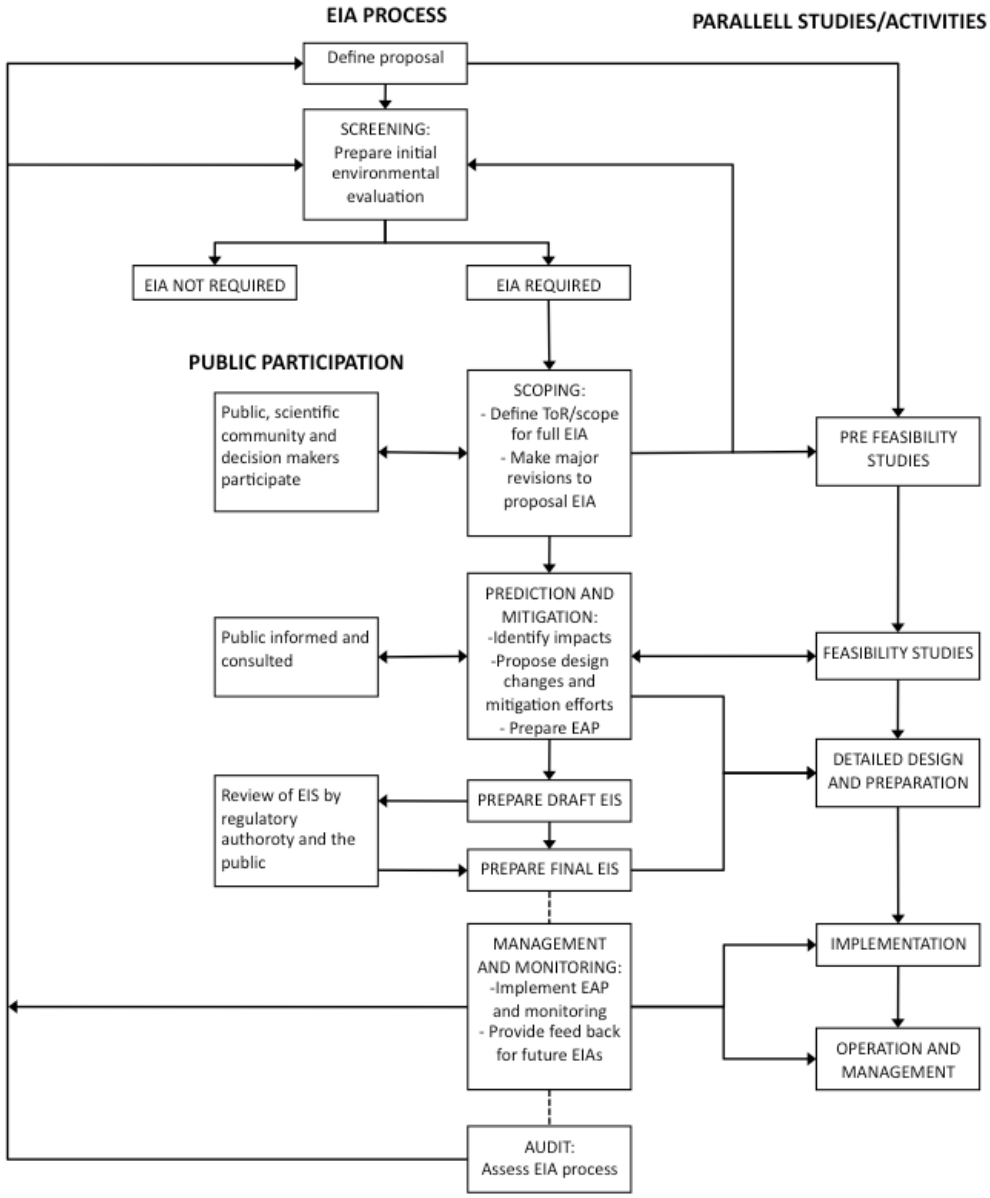
Local Practices/Capabilities	
70. Solid waste collection, treatment, and disposal (including re-use and recycling)	
71. Sewage and sludge collection, treatment, and disposal	
72. Hazardous waste collection, treatment, and disposal	
73. Containment mechanisms for contaminants	
74. Storage of Fuel/POL	
75. Storage of Used Oil/ Coolant/ Anti-freeze/Batteries/Chemical?	
76. Use of Cleaning Products.	
77. Use of drip trays in vehicle compounds	

78. Use of Halocarbons (Freon, Halon)	
79. Local power generation methods	
80. Other	
Observed contamination	
81. Observed Environmental Accidents	
82. Evidences of Petroleum Contamination (state of contamination – solid, pooling, free flowing product, staining, etc., and type of contaminant)	
83. Other	
Previous records	
84. Records of previous flooding	
85. Records of previous environmental incidents or spill reports	
Other comments	

Template 3 Adapted EIA process for conflict and crisis situations



Template 4 – Flowchart illustrating conventional/traditional EIA process



Template 5: EIA report format

EIA REPORT FORMAT	
CONTENT	**DESCRIPTION**
1. Executive summary	Non-technical, for lay public. Include identified high and very high significance impacts from the impact table including recommendations and mitigations.

2. Introduction 2.1 Background 2.2 Objective 2.3 Methodology 2.4 Scope	This section should include a brief description of limitations associated to conducting an EIA in conflict or post-conflict settings.
3. General description of the activity	This section should include a brief and concise description of the activity intended to be undertaken.
4. Description of activity 4.1 Alternative 1… 4.1.1 Site location 4.1.2 Site layout 4.1.3 Buildings/facilities 4.1.4 Power supply 4.1.5 Water supply 4.1.6 Waste generation/disposal 4.1.7 Sources of pollution 4.1.8 Emissions 4.1.9 Noise and vibrations 4.2 Alternative 2… (if several alternatives are given)…	The “No-Go” alternative refers to the option of not introducing the planned activity. This will include the description of the baseline conditions to which development activities will be compared in the successive description of one or preferably several options.

5. Description of the receiving environment 5.1 Alternative 1 5.1.1 Physical environment 5.1.1.1 Climate 5.1.1.2 Geology, soils, and drainage 5.1.1.3 Existing contamination 5.1.1.4 Water resources 5.1.1.5 Noise 5.1.1.6 Air quality 5.2.1 Human environment 5.2.1.1 Demographics 5.2.2.1 Land-use, community infrastructure and services 5.2.2.2 Sites of archeological and cultural interest 5.3.1 Ecological environment 5.3.1.1 Flora 5.3.1.2 Fauna 5.3.1.3 Sensitive environment(s) 5.3.1.4 Endangered species 5.4 Alternative 2…	If there is no significant or identifiable difference in the environments between the sites they can be described in one section only.
6. Assessment of impacts and proposed mitigation efforts	A table documenting the results of the initial assessment would preferably be included in this section, see Figure 10 for an example
7. Conclusions and recommendations	
8. References	
9. Appendices	

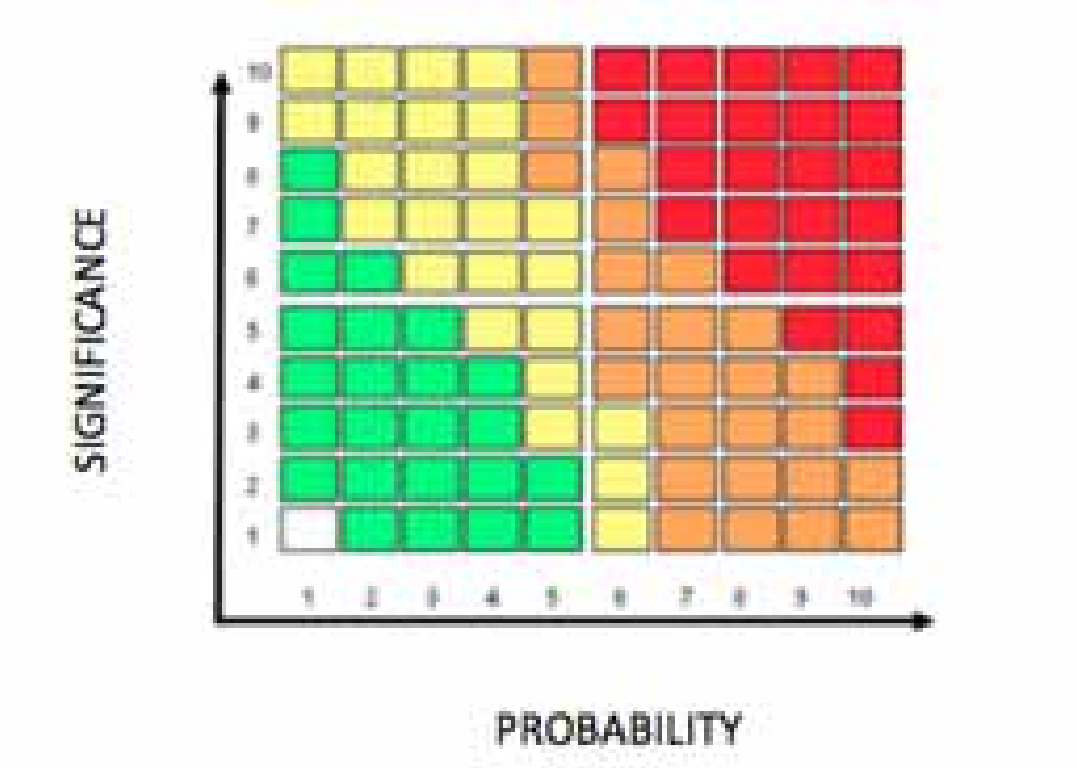
Template 6: Criteria for determining significance and probability

IMPACT PROBABILITY ASSESSMENT SCALE		
Probability level	**Definition**	**Rate level**
Very high	Will occur on a regular basis during the operational lifetime of the activity	**(9-10)**

High	Will likely occur several times in the operational lifetime of the activity	**(7-8)**
Elevated	Will likely occur under special and relatively rare circumstances during the operational lifetime of the activity	**(5-6)**
Low	Will probably not or very rarely occur during the operational lifetime of the activity	**(3-4)**
None	Will most likely not occur during the operational lifetime of the activity	**(1-2)**

IMPACT SIGNIFICANCE ASSESSMENT SCALE		
Significance level	**Definition**	**Rate level**
Elevated	- The scale/extent of the activity's contribution to the total impact is noticeable if compared to the total impact from adjacent and comparable activities - The impact/effect can at times be frequent - The impact cannot without additional resource input be reversed (e.g., managed by the ecosystem itself within a reasonable time span) - The impact can only under exceptional circumstance affect a geographical area larger than local - Will not impact or cause conflict	**(5-6)**
Very high	- The impact caused by the contribution from the activity is out of scale with the accumulated total impact from other already established adjacent and comparable activities (including if no other contributors are present). - The impact is continuous - The impact is permanent - The impact is irreversible - The impact will have a large geographic distribution - The activity can impact or cause significant conflict	**(9-10)**
Low	- The scale/extent of the activity's contribution to the total impact is not or seldom noticeable when compared to the total effect from other/similar adjacent activities - The impact is temporary and reversible without resource input (i.e. self-repairable within a reasonable time span after having occurred) - Especially sensitive/valuable receptors can be affected - The impact is local only - The scale/extent of the activity's contribution to the total impact from adjacent and comparable activities is significant	**(3-4)**
High **None**	- Only occasional impact on individual, non-significant, receptors - The effect is very frequent or continuous - The impact cannot without a significant input of resources be reversed	**(7-8)** **(1-2)**
	- The impact can during certain circumstance spread to a larger geographic area - The activity could, during certain circumstance, impact or cause conflict	

Template 7: Significance/Probability matrix



Template 8: Scales for determining reliability of data

QUALITY/RELIABILITY OF DATA	
LEVEL	**SYMBOL**
NO DATA	-
LIMITED	+
GOOD	++
VERIFIED ON-SITE	+++

Appendix 2: Legislative context of Kenya in terms of the requirements for undertaking environmental impact assessments and developing an Environmental Action/Management Plan

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM

No. R. 385 21 April 2006

REGULATIONS IN TERMS OF CHAPTER 5 OF THE NATIONAL

ENVIRONMENTAL MANAGEMENT ACT, 1998

The Minister of Environmental Affairs and Tourism has in terms of section 24(5) read with section 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), made the regulations set out in the Schedule

(a) Details of:

(i) The EAP who compiled the report; and

(ii) The expertise of the EAP to carry out an environmental impact assessment;

(b) A detailed description of the proposed activity;

(c) A description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is –

(i) A linear activity, a description of the route of the activity; or

(ii) An ocean-based activity, the coordinates where the activity is to be undertaken;

(d) A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic, and cultural aspects of the environment may be affected by the proposed activity;

(e) Details of the public participation process conducted in terms of sub-regulation (1), including:

(i) Steps undertaken in accordance with the plan of study;

(ii) A list of persons, organisations, and organs of state that were registered as interested and affected parties;

(iii) A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and

(iv) Copies of any representations, objections, and comments received from registered interested and affected parties;

(f) A description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;

(g) An indication of the methodology used in determining the significance of potential environmental impacts;

(h) A description and comparative assessment of all alternatives identified during the environmental impact assessment process;

(i) A summary of the findings and recommendations of any specialist report or report on a specialised process;

(j) A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;

(k) An assessment of each identified potentially significant impact, including:

(i) Cumulative impacts;

(ii) The nature of the impact;

(iii) The extent and duration of the impact;

(iv) The probability of the impact occurring;

(v) The degree to which the impact can be reversed;

(vi) The degree to which the impact may cause irreplaceable loss of resources; and

(vii) The degree to which the impact can be mitigated;

(l) A description of any assumptions, uncertainties, and gaps in knowledge;

(m) An opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

(n) An environmental impact statement which contains:

(i) A summary of the key findings of the environmental impact assessment; and

(ii) A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;

(o) A draft environmental management plan that complies with regulation

(p) Copies of any specialist reports and reports on specialized processes complying with regulation.

Content of draft environmental management plans

A draft environmental management plan must include:

(a) Details of:

(i) The person who prepared the environmental management plan; and

(ii) The expertise of that person to prepare an environmental management plan;

(b) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of:

(i) Planning and design;

(ii) Pre-construction and construction activities;

(iii) Operation or undertaking of the activity;

(iv) Rehabilitation of the environment; and

(v) Closure, where relevant.

(c) A detailed description of the aspects of the activity that are covered by the draft environmental management plan;

(d) An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);

(e) Where appropriate, time periods within which the measures contemplated in the draft environmental management plan must be implemented; and

(f) Proposed mechanisms for monitoring compliance with the Environmental Management Plan and reporting thereon.

Appendix 3: Summary of main binding legal agreements and conventions applicable in the context of the UNSOA log base.
See separate document

Appendix 4: Example of a weekly report of goods delivered at Mombasa log base

MOMBASA UNSOA - MOVCON Weekly Report

Arturo ROLLO, Lilian ALUSIOLA, Moses WANDERA

Commercial SEA/AIR
The following cargo was deliverd from 21st to 27th June at Mombasa LogBase:

Ref No:	Comodity	Date Delivered
9SOA-900168	2 Pallets S.T.C - Ink Catridges	21/6/2010
9SOA-900293	10x20' S.T.C - Soft Skin Tents	21/6/2010
9SOA-900255	2 Pallets S.T.C - Walk behind pallet compressor	22/6/2010
9SOA-900077	1x40' S.T.C Wire Mesh	23/6/2010
9SOA-900217	49x20 S.T.C - Prefabs	23/6/2010
9SOA-900149	2 Pallets S.T.C - Video/TV Conferencing Equip	24/6/2010
9SOA-900230B	6x20 Cntrs S.T.C - 500KVA Generators	24/6/2010

We anticipate the following deliveries from 28th June - 4th July

9SOA-900227	4x40' Cntrs S.T.C - Blankets, sheets, pillowcases Towels	28/6/2010
9SO-A900217	80x20 S.T.C - 6 & 3 Module Prefab	
9SOA-900198	26x20' S.T.C - Generator & Spares	

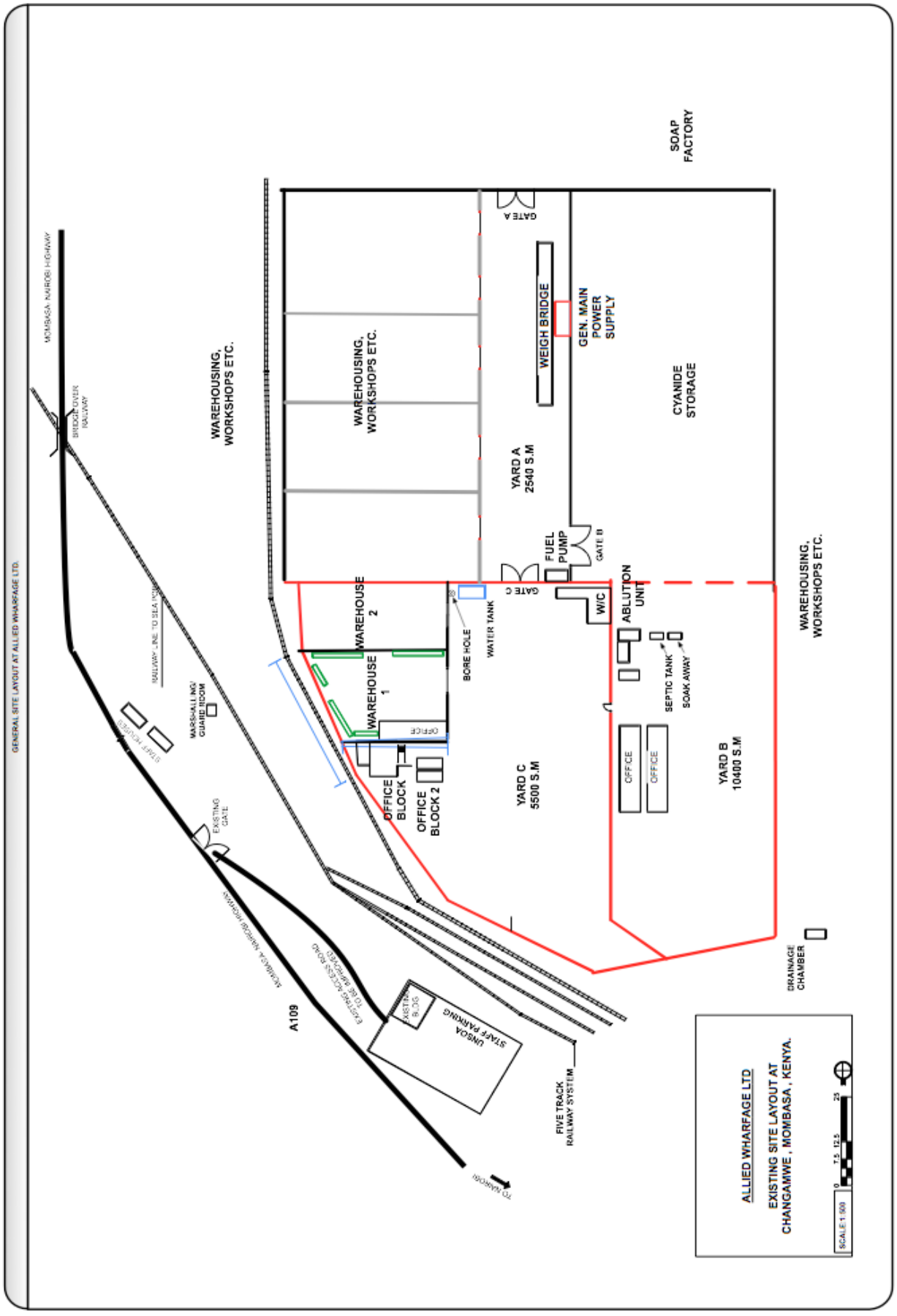
Local Deliveries

9SOA-900240	20 Cartons - Kitchen & Dinning Cutlery	21/6/2010
9SOA-900242	17 Cartons- Binder & Puncher hole	21/6/2010
9SOA-900170	Visitos Chairs	22/6/2010
9SOA-900445	Furniture	23/6/2010
9SOA-900446	Furniture	25/6/2010
9SOA-900315	2 Cartons S.T.C - Customised Labels	21/6/2010

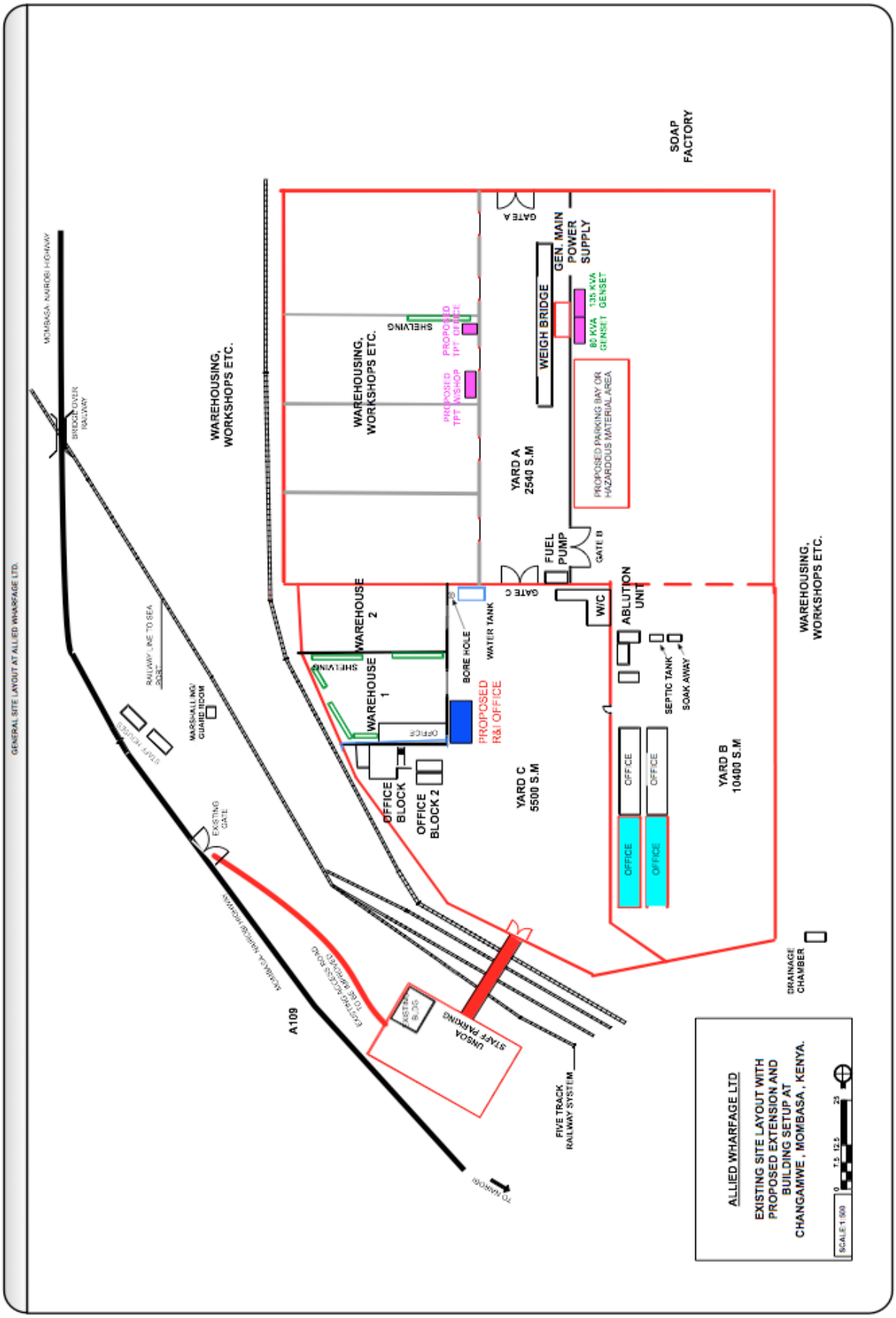
Petra1 24th Vessel to Mogadishu to depart on 28th June 2010

21x20 Reefer	Agility
10x20 dry	Agility
14x20	Supply
9x20	Eng
9x20' Ablution	Eng
1x20	UNMAS
2x20' Dyncorp	Transport

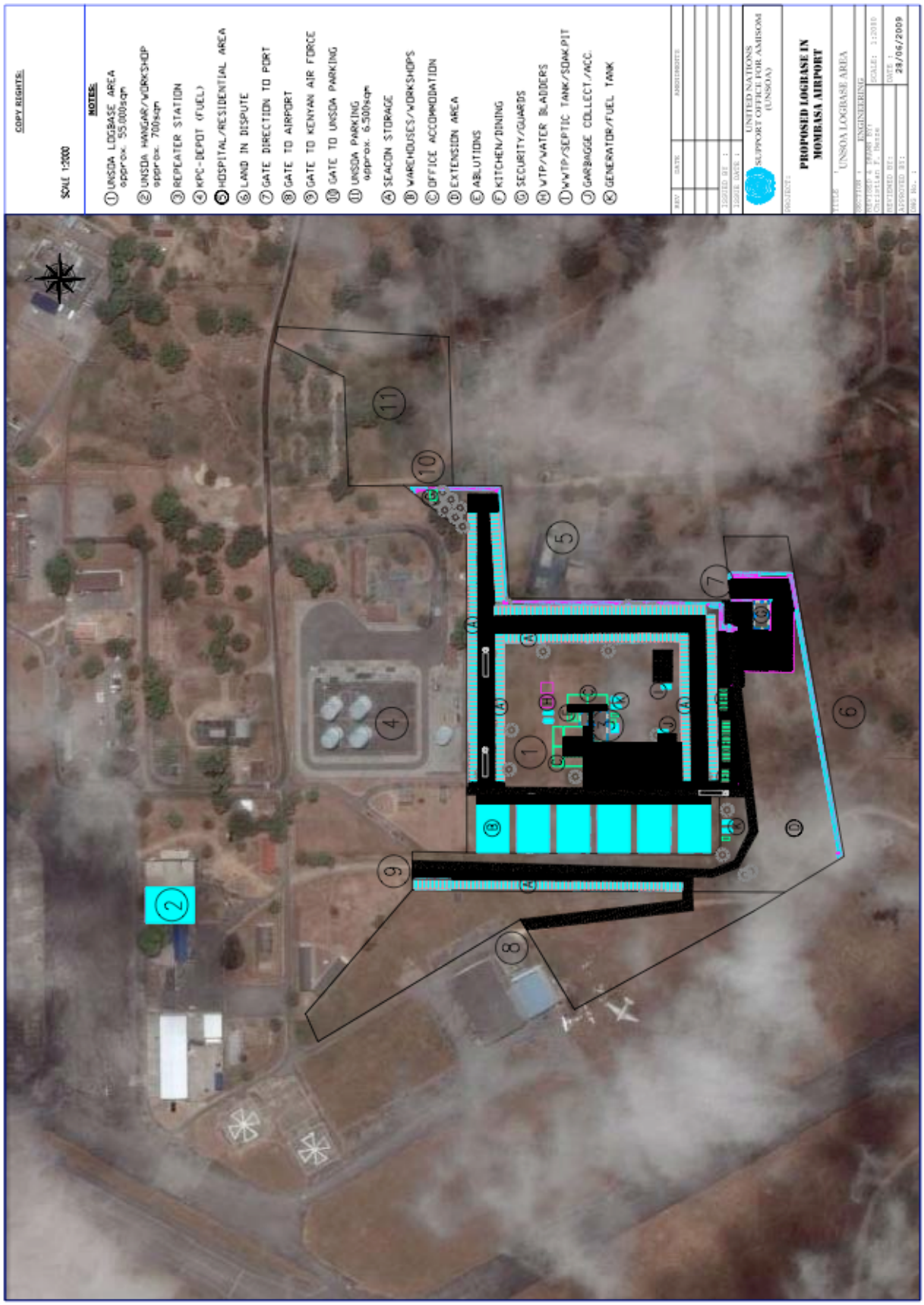
Appendix 5: Site layout (UNSOA area marked in red) containing a general outline of the surrounding area and main facilities within the compound (UNSOA 2009).



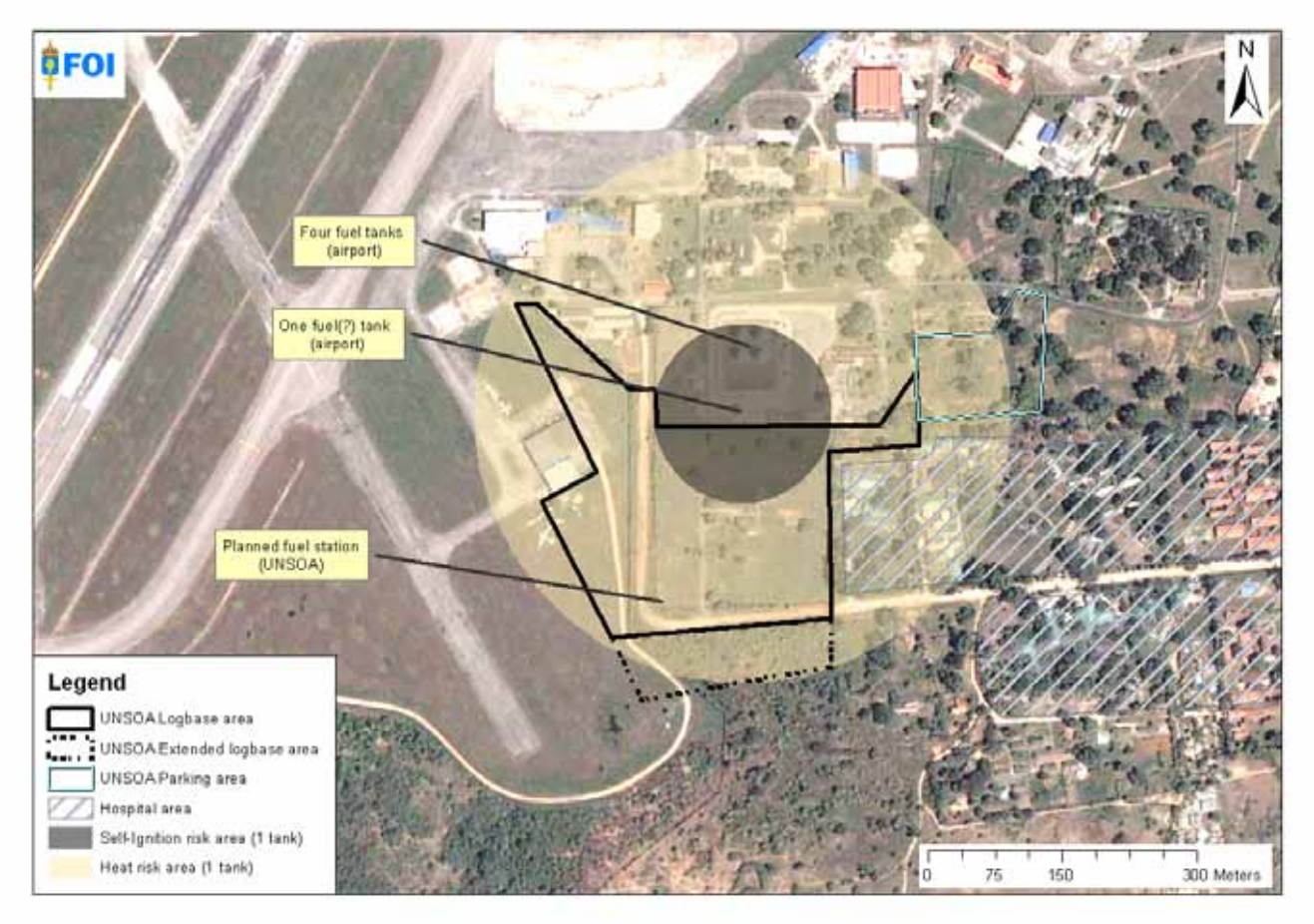
Appendix 6: Site layout (UNSOA area marked in red) containing a general outline including main facilities of the planned expansion of the Mombasa log base (UNSOA 2009).



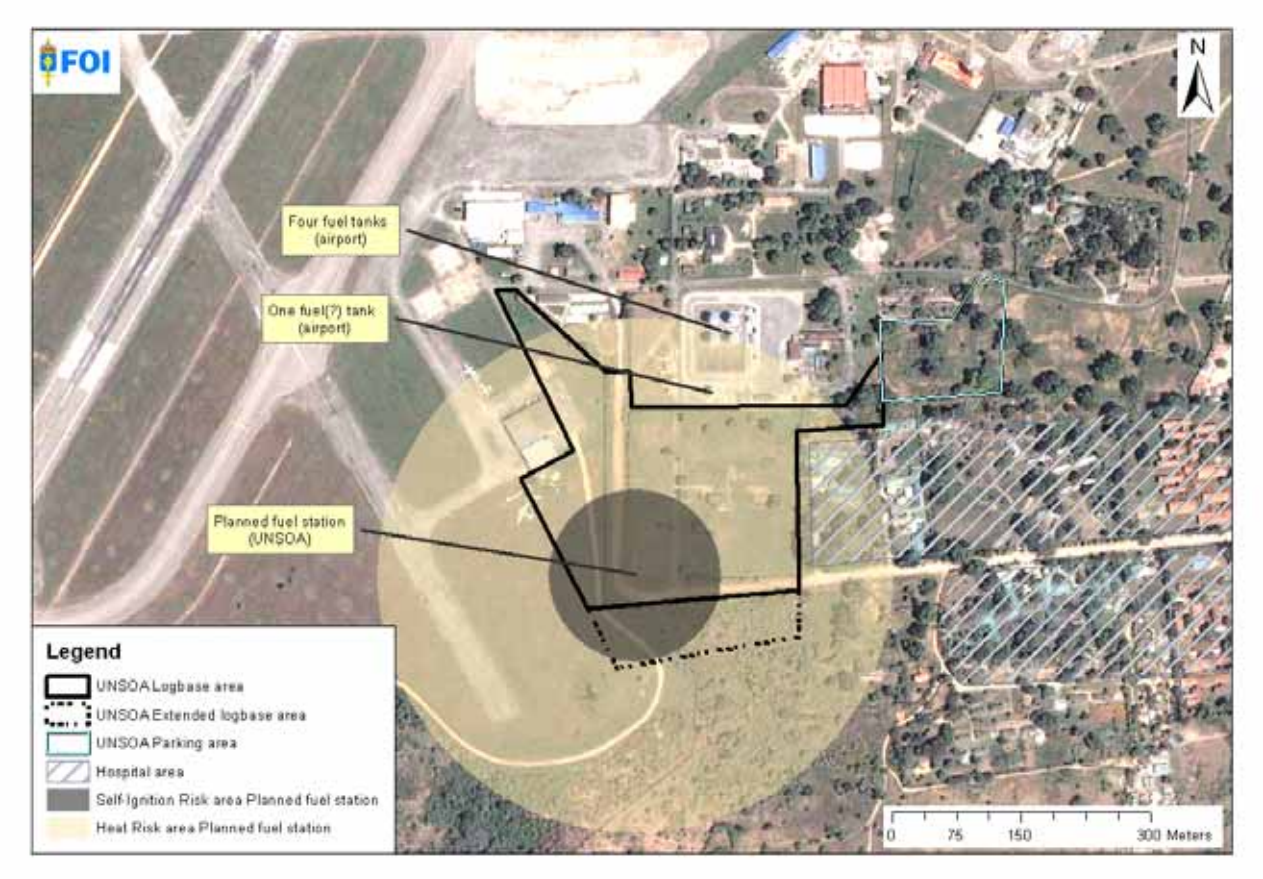
Appendix 7: General outline of the surrounding area and main facilities within the compound (UNSOA 2009)



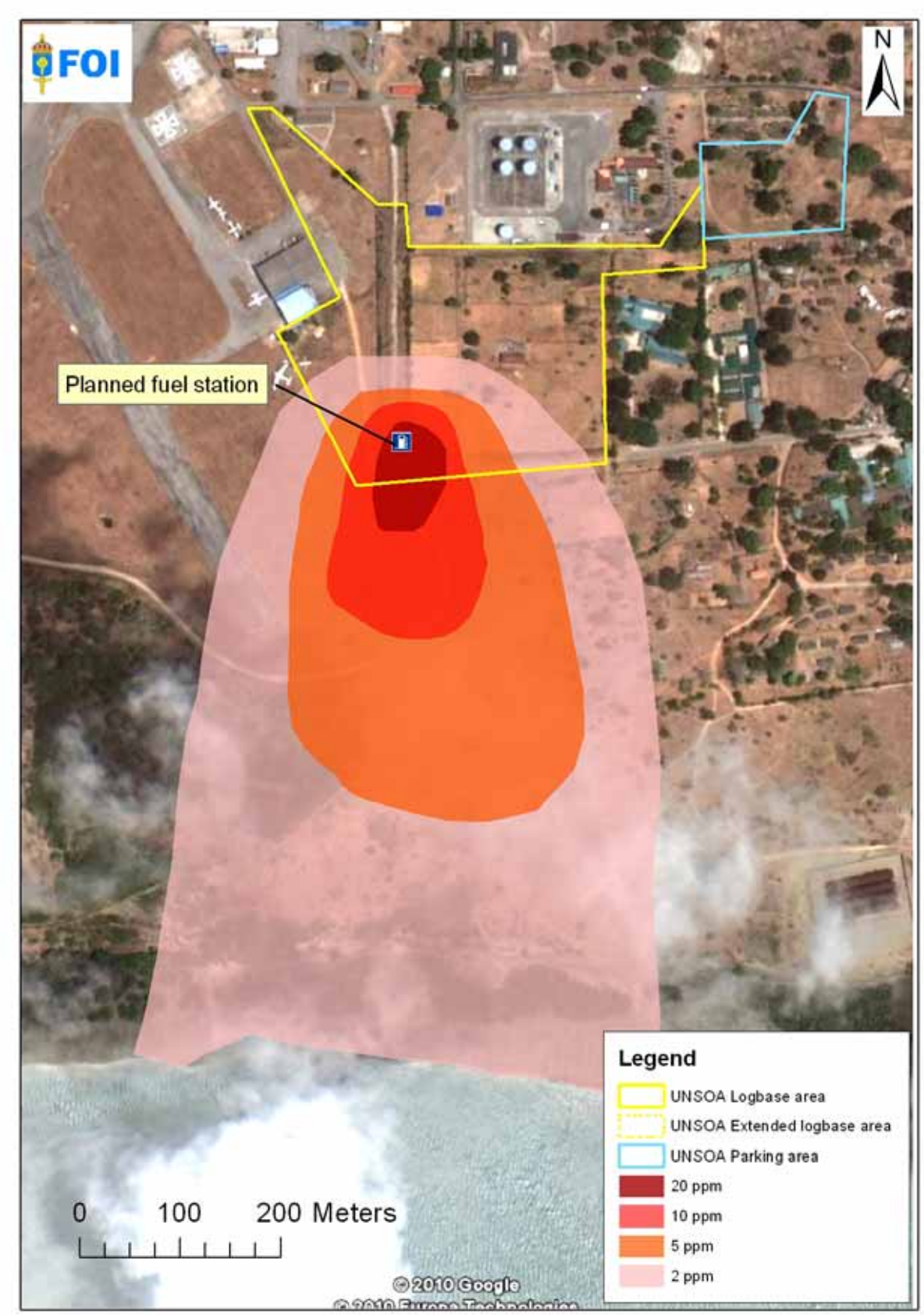
Appendix 8: Model of risk areas for self-ignition respective heat in case of fire in one of the tanks in nearby located POL storage



Appendix 9: Model of risk areas for self-ignition respective heat in case of fire in airport base fuel storage tank



Appendix 10: Model of potential soil and groundwater pollution in case of fire/release from airport fuel storage tank

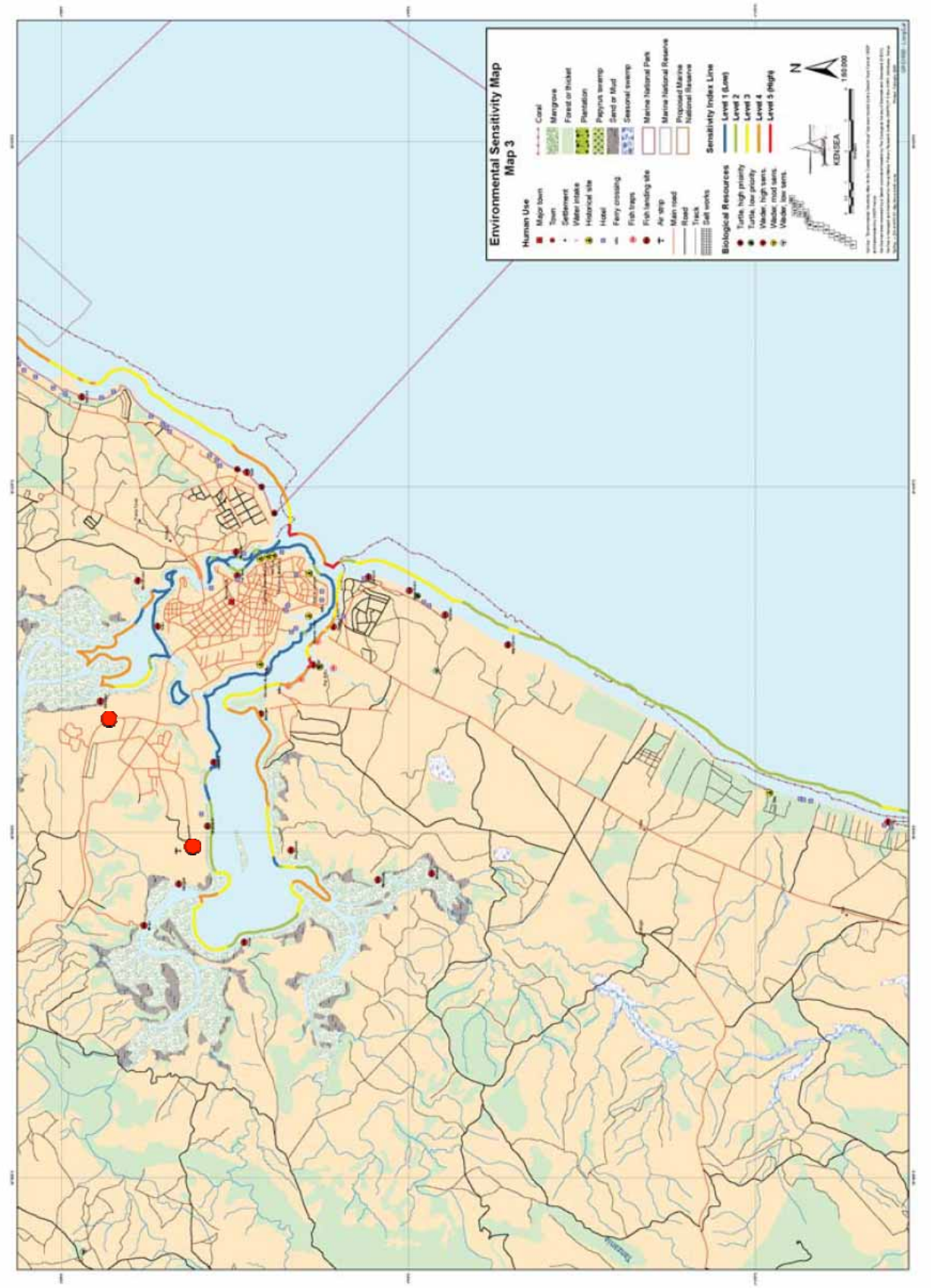


Appendix 11: EBS report, AWL site
Separate document.

Appendix 12: EBS report, Airport site
Separate document

Appendix 13: Ecological study
Separate document.

Appendix 14: The figure contains a ranking of coastal sensitivity, looking at coastal types, biological resources, and human use[25]



Appendix 15: Initial screening checklist of significant/in-significant environmental impacts AWL site

Impacts on human environment and socio-economics								
Resource → **Activities ↓**	Demographics	Economy, living standards and labor	Material assets	Health/safety/ security	Land use, community infrastructure and services (incl. transport)	Land ownership	Sites of archeological and cultural interest	Social issues
Construction phase	MINOR CONSTRUCTION ACTIVITY/NOT APPLICABLE							
Operational phase								
Energy supply	N	N	N	N	?	N	N	N
Water supply	N	N	N	N	N	N	N	N
Solid waste management	N	N	N	I	N	N	N	N
Liquid waste management	N	?	N	I	N	N	N	N
HAZMAT Management	N	N	N	I	N	N	N	N
Access arrangements/roads	N	N	N	N	N	N	N	N
Vehicle movements/operation	N	N	N	I	N	N	N	N
Surface water run-off management	N	N	N	I	N	N	N	N
Other facilities	N	N	N	N	N	N	N	N
General presence of activity	N	N	N	I	?	N	N	N
Cumulative*								
Cumulative construction + operation								

Impacts on physical environment								
Resource → **Activities ↓**	Natural Resources (other than water)	Climate	Drainage	Landscape	Surface water	Ground water	Soils	Air
Construction phase	MINOR CONSTRUCTION ACTIVITY/NOT APPLICABLE							
Operational phase								
Energy supply	N	I	N	N	N	N	N	I
Water supply	?	N	N	N	N	?	N	N
Solid waste management	N	N	N	N	?	?	?	?
Liquid waste management	N	N	N	N	?	?	I	?
HAZMAT Management	N	N	I	N	N	I	I	N
Access arrangements/roads	N	N	N	N	N	N	N	N
Vehicle movements/equip. operation	N	I	N	N	N	N	N	I
Surface water run-off management	N	N	N	N	I	I	I	N
Other facilities	N	N	N	N	N	N	N	N
Cumulative*								
Cumulative construction + operation								

Impacts on biological environment				
Resource → / Activities ↓	Protected reserves and sensitive areas	Biodiversity and endangered Species	Flora	Fauna
Construction phase	MINOR CONSTRUCTION ACTIVITY/NOT APPLICABLE			

Operational phase				
Energy supply	N	N	N	N
Water supply	N	N	N	N
Solid waste management	?	?	?	?
Liquid waste management	?	?	?	?
HAZMAT Management	-	-	-	-
Access arrangements/roads	N	N	N	N
Vehicle movements/equip. operation	N	N	N	N
Surface water run-off management	-	-	-	-
Other facilities	N	N	N	N
Cumulative*				
Cumulative construction + operation				

Fill in the table using "-" if the impact is significant and negative, "+" if the impact is significant and positive (or both, +/-), "N" if the impact is not significant or "?" if the significance of the impact is uncertain.

** Cumulative impacts: This box should be ticked if two or more activities are predicted to cause a significant negative impact on one resource, and thus have been marked with "-", or "?" (if the impact is unknown it should be assumed to have a significant negative impact until data saying otherwise can be collected)*

Appendix 16: Initial screening checklist of significant/in-significant environmental impacts Airport site

Impacts on human environment and socio-economics								
Resource▶ Activities▼	Demographics	Economy, living standards and labor	Material assets	Health/safety/ security	Land use, community infrastructure and services (incl. transport)	Land ownership	Sites of archeological and cultural interest	Social issues
Construction phase								
Site clearance	?	?	N	N	?	N	?	?
Earth moving	?	?	N	N	?	N	?	?
Laying foundations	?	?	N	N	?	N	?	?
Vehicle movements/equip. operation	?	?	N	-	?	N	?	?
Import materials	?	?	N	N	?	N	?	?
Temporary facilities	?	?	N	N	?	N	?	?
Energy supply	?	?	N	N	?	N	?	?
Water supply	?	?	N	N	?	N	?	?
Solid waste management	?	?	N	N	?	N	?	?
Liquid waste management	?	?	N	N	?	N	?	?
HAZMAT management	?	?	N	N	?	N	?	?
Access arrangements/roads	?	?	N	N	?	N	?	?
Surface water run-off management	?	?	N	N	?	N	?	?
Demolition	?	?	N	N	?	N	?	?
General presence of activity	?	?	?	?	?	N	?	?
Cumulative*								
Operational phase								
Energy supply	?	?	N	N	?	N	?	?
Water supply	?	?	N	N	?	N	?	?
Solid waste management	?	?	N	?	?	N	?	?
Liquid waste management	?	?	N	?	?	N	?	?
HAZMAT Management	?	?	N	?	?	N	?	?
Access arrangements/roads	?	?	N	-	?	N	?	?
Vehicle movements/operation	?	?	N	-	?	N	?	?
Surface water run-off management	?	?	N	?	?	N	?	?
Other facilities	?	?	N	N	?	N	?	?
General presence of activity	?	?	N	-	?	N	?	?
Cumulative*								
Cumulative construction + operation								

Impacts on physical environment								
Resource ↓ **Activities**	Natural Resources (other than water)	Climate	Drainage	Landscape	Surface water	Ground water	Soils	Air
Construction phase								
Site clearance	N	N	?	-	-	?	-	-
Earth moving	N	N	?	-	-	?	-	-
Lay foundations	N	N	?	N	N	N	-	N
Vehicle movements/equip. operation	N	(-)	?	N	-	N	?	-
Import materials	?	N	?	?	?	?	?	N
Temporary facilities	N	N	N	N	N	N	N	N
Energy supply	N	(-)	N	N	N	N	N	-
Water supply	?	N	N	N	?	?	N	N
Solid waste management	N	N	?	N	?	?	?	N
Liquid waste management	?	N	?	N	?	?	?	N
HAZMAT Management	N	N	N	N	?	?	?	?
Access arrangements/roads	N	N	?	N	N	N	N	N
Surface water run-off management	?	N	?	N	-	N	?	N
Demolition	N	N	N	N	N	N	N	N
Cumulative*								
Operational phase								
Energy supply	N	(-)	N	N	N	N	N	-
Water supply	?	N	N	N	N	-	N	N
Solid waste management	N	N	N	N	?	?	?	N
Liquid waste management	N	N	N	N	?	?	N	N
HAZMAT Management	N	N	-	N	N	-	-	N
Access arrangements/roads	N	N	N	N	N	N	N	N
Vehicle movements/equip. operation	N	(-)	N	N	N	N	N	-
Surface water run-off management	N	N	N	N	-	-	N	N
Other facilities	N	N	N	N	N	N	N	N
Cumulative*								
Cumulative construction + operation								

Impacts on biological environment				
Resource / **Activities**	Protected reserves and sensitive areas	Biodiversity and endangered Species	Flora	Fauna
Construction phase				
Site clearance	-	?	?	?
Earth moving	-	?	?	?
Lay foundations	N	?	?	?
Vehicle movements/equip. operation	N	?	?	?
Import materials	N	?	?	?
Temporary facilities	N	?	?	?
Energy supply	N	?	?	?
Water supply	N	?	?	?
Solid waste management	?	?	?	?
Liquid waste management	?	?	?	?
HAZMAT management	N	?	?	?
Access arrangements/roads	N	?	?	?
Surface water run-off management	-	?	?	?
Demolition	N	?	?	?
Cumulative*				

Operational phase				
Energy supply	N	?	?	?
Water supply	N	?	?	?
Solid waste management	N	?	?	?
Liquid waste management	?	?	?	?
HAZMAT management	?	?	?	?
Access arrangements/roads	N	?	?	?
Vehicle movements/equip. operation	N	?	?	?
Surface water run-off management	-	?	?	?
Other facilities	N	?	?	?
Cumulative*				
Cumulative construction + operation				

Fill in the table using "-" if the impact is significant and negative, "+" if the impact is significant and positive (or both, +/-), "N" if the impact is not significant or "?" if the significance of the impact is uncertain.

** Cumulative impacts: This box should be ticked if two or more activities are predicted to cause a significant negative impact on one resource, and thus have been marked with "-", or "?" (if the impact is unknown it should be assumed to have a significant negative impact until data saying otherwise can be collected)*

Appendix 17: Description of suggested sanitary seal for the AWL site borehole

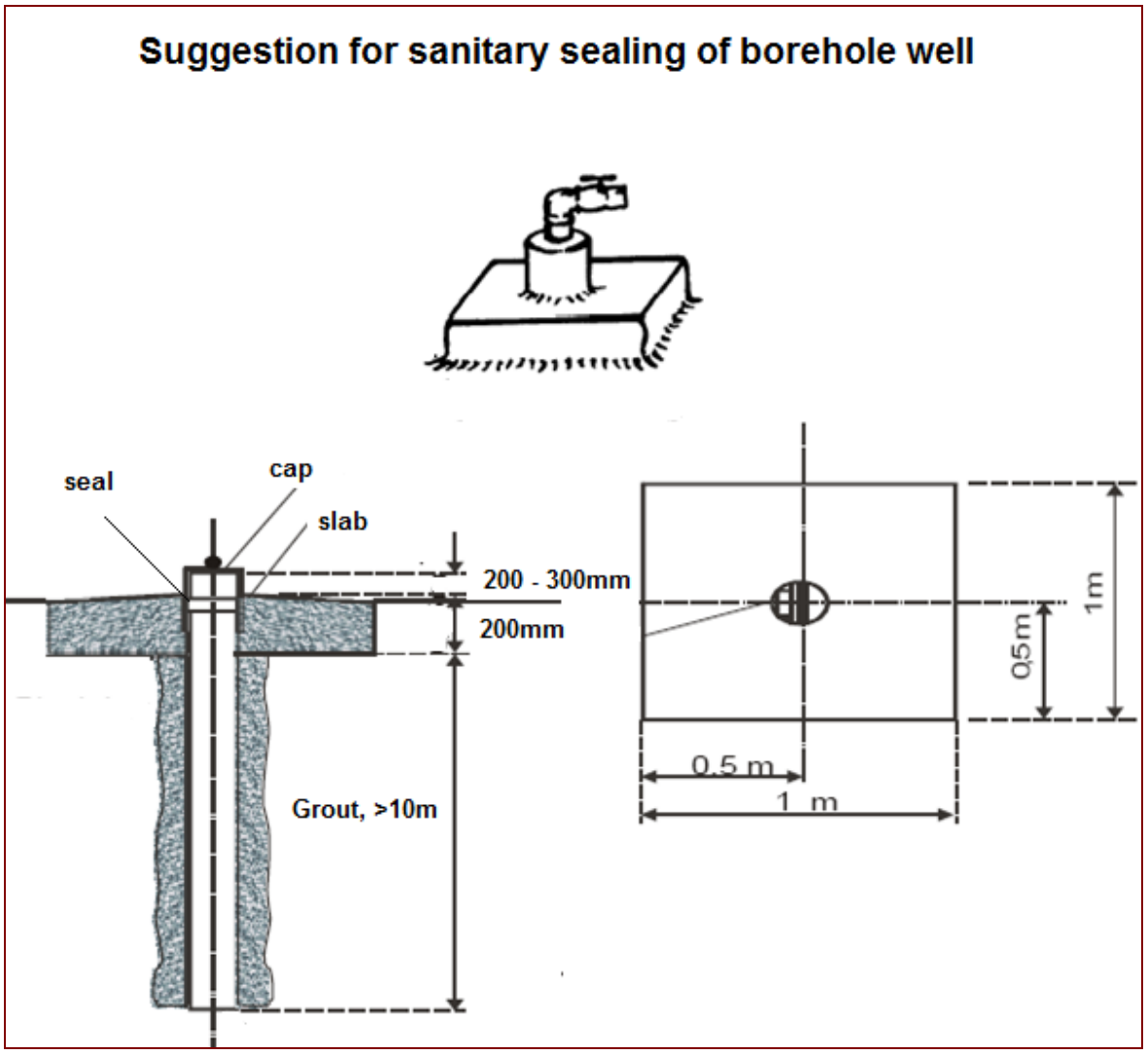
To prevent contamination from surface runoff it must be made sure that a proper sanitary seal is fitted. A sanitary seal should include:

1. A cap at the top preventing any material entering the well casing; Cement grout should be placed in the annulus between the well casing and the borehole wall extending approximately 10 m deep

2. A seal (a type of bushing or packing gland) also needs to be fitted between the casing and the pump pipe to prevent foreign materials from entering the inside of the well

3. A concrete platform (about 1 m by 1 m) around the casing at the surface, the slab should extend a minimum of 200-300 mm above the ground surface (or at least 100 mm above expected flooding level) and sloping slightly away from the well for better drainage

See figure below for an example design.



Appendix 18: Appreciation of socio-economic impact for the AWL site

	SIGNIFICANT IMPACT (Y/N)	**NEED FOR FURTHER ACTION** (Y/N)	**COMMENTS/REMARKS**
Demographics	N	N	
Economy	N	N	
Labour/working	Y	Y	The local people who are hired on the site today will have to get new jobs.
Sexual exploitation and abuse	N	Y	Is there an action plan to avoid a “boom” in the local sex industry?
Land use/ infrastructure	N	N	People living on the area for the new camp are promised jobs.
Land ownership	N	N	
Archaeology	N	N	
Stakeholder engagement	-	Y	Need for analysis of UNSOA institutional capacity to manage stakeholder engagement, report on setbacks and progress. Action plan might be necessary.

Appendix 19: Checklist for minimizing negative socio-economic impact

IMPACT CRITERIA	MEASURE[26]	Y/N
Economy and labour	• For the planning phase to pay attention to salary levels, gender, and rotation when hiring local and international staff.	
	• To rely on the host economy as far as possible and utilize the local market.	
	• Coordinate with civilian agencies to establish if and how peace operations can contribute to the economic development in the host country.	
	• To appoint an "economic officer" in each peace operation to establish the long-term consequences of the operation.	
Sexual Exploitation and Abuse (SEA)	• Recruit more female staff	
	• Establish information campaigns in the host country to increase awareness, transparency, and willingness to report bad behaviour	
	• Increase awareness and knowledge on SEA aspects by carrying out training in partnership with civilian agencies	
	• Establish an "ombudsman" function at each peace operation to be more sensitive to protection issues and coordinate efforts with civilian actors to receive complaints through their channels.	
HIV/AIDS	• Regular leave to national staff to enable them to maintain relations with their families.	
	• The peace operation could provide in-field "refresher" training on regular basis for operation staff which also should include training for local staff.	

Appendix 20: Appreciation of socio-economic impact for the Airport site

	SIGNIFICANT IMPACT (Y/N)	NEED FOR FURTHER ACTION (Y/N)	COMMENTS/REMARKS
Demographics	N	N	
Economy	Y	Y	More staffs might lead to a local "economic boom" if locally produced goods and services are employed. Well planned procurement practices needed. Need for further economic analysis.
Labour/working	Y	Y	Attention could be paid to salary levels, gender and rotation when hiring local and international staff.
Sexual exploitation and abuse	N	Y	Is there an action plan to avoid a "boom" in the local sex industry?
Land use/ infrastructure	Y	Y	People living on the area for the new camp are promised jobs.
Land ownership	N	N	
Archaeology	N	N	
Stakeholder engagement	-	Y	Need for analysis of UNSOA institutional capacity to manage stakeholder engagement, report on setbacks, and progress. Action plan might be necessary.

Appendix 21: Endnotes:

[1] United Nations Department of Peacekeeping Operations, United Nations Department of Field Support, and the Swedish Defence Research Agency. (2009). United Nations Draft: *Environmental templates for UN field missions.* United Nations. New York.

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[3] Climatezone. (n.d.). Mombasa climate information. www.climate-zone.com/climate/kenya/celsius/mombasa.htm.

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[13] Mombasa District Strategic Plan http://www.ncapd-ke.org/UserFiles/File/District%20Strategic%20Plans/Mombasa%20FINAL%20Modified.pdf 2010-10-25.

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[17] Ibid.

[18] CIA World Factbook https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html 2010-10-25.

[19] CIA World Factbook https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html 2010-10-25.

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More technical information available at:
http://www.unep.org/disastersandconflicts/
or: postconflict@unep.org


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