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DAR RAPID TRANSIT AGENCY

First Floor, Ubungo Plaza, Morogoro Road, Dar es Salaam
P.O. Box 724, **Dar es Salaam**

NON-TECHNICAL EXECUTIVE SUMMARY

FOR

CONSTRUCTION OF A BUS DEPOT COMPONENT AT JANGWANI AREA

Submitted for Approval to:

NATIONAL ENVIRONMENT
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APRIL 2010

NON-TECHNICAL EXECUTIVE SUMMARY

Project Title:

CONSTRUCTION OF A BUS DEPOT COMPONENT AT JANGWANI AREA

Proponent:

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Outline and Justification of Project

Project Description

The government of United Republic of Tanzania through Prime Ministers' Office intends to develop a Rapid Transit System to cater for the Dar es Salaam City. The aim of the Dar Rapid Transit (DART) is to have a modern public transport system that meets international standards using modern high capacity buses operating on exclusive lanes at less travelling time and is cost effective. An essential component of the Project is a Bus Depot that will be constructed at the Jangwani flood plain in Ilala Municipal Council, Dar es Salaam City. This facility will consist of maintenance areas and parking lot for 150 buses. The project will also provide for off-peak parking, public parking, office space, canteen and changing rooms, ablution facilities for DART Bus Depot workers and general users of other facilities within the area.

The proposed depot is to be constructed on approximately 75,000m2 piece of land, which is about 10 percent of the total Jangwani valley usable area. It should be noted here that the project is not developed on the land hitherto temporarily used for playing grounds, open air public meeting space, or parking of trucks. Nevertheless, in order for the project to be implemented by taking on board likely negative and positive social and environmental impacts and to conform to the requirements of the Environmental Management Act of 2004, the proponent commissioned an EIA consultant, Prof. Jamidu H.Y. Katima, to undertake ESIA study for the project.

Description of the Environment

The proposed depot site is located on the Jangwani flood plain within the larger Msimbazi river basin. The area is environmentally sensitive and has a tendency of getting flooded during the long rains. The area is typical of the rest of the wetland with swamps and marshes. Generally, the topography of the area is characterized by a low laying even terrain sloping gently towards the Msimbazi River located adjacent to it, which directs water to the Indian Ocean. The topsoil of the site is mixed alluvial deposits (sands, silts and clays) which are also found in other main river valley systems that cross the Coastal Plain (e.g. Mzinga). About 75% of the whole area is occupied by grassland community, 8% by scattered planted trees and natural bushes, 7% occupied by swampy marshland and 7% occupied by cultivated land. The remaining 3% is occupied by bare land which, during scoping exercise, was used for car park, despite the fact that since three years ago the Ilala Municipal Council had prohibited use of this area as a car park.

Common grass species are *Cynodon dactylon, Dichanthium annulatum, Eragrostis stapfianus, E. ethiopica, Digitaria milanjianus, Chloris virgata, Panicum corolatum,P. maximum Sporobolus virginicus* and *Eleusine indica.* Common herbs includes *Acalypha ornata,Tridax procumbens, Rhynchosia minima, Phyllanthus numulariifolius, Waltheria indica, Sida acuta, Euphorbia hirta, E.heterophylla* and *Indigofera arrecta.* Common planted tree species are *Azidarachta indica, Pithecellobium dulce, Millingtonia hortensis, Leucaena glauca, Sapindus saponaria, Peltophorum pterocarpum* and *Trichilia sp.* Few indigenous tree species are found in this area such as *Sclerocarya birrea ssp. caffra, Tamarindus indica, Ficus mucuso* and *Acacia nilotica.* The dominant bush species are *Pluchea dioscoridis, Ipomoea carnea* and *Calotropis gigantean,* respectively.

The dominant groups of fauna in the project area were birds and insects. Sparrow and Great White Egrets were in relatively large numbers compared to other species of birds. In the group of insects, grasshoppers were relatively many.

Stakeholders' Participation

Stakeholders' consultations were carried out through interviews and meetings. A multidisciplinary team of experts met with officials from Government departments and district authorities, officials from public and private organisations, non-governmental organisations (NGOs) and ward leaders. The team considered all aspects of the project that can cause environmental or socio-economic changes at all stakeholders meetings. It also evaluated the significance of each aspect of the project in terms of defined criteria, taking into account the scale, extent, duration, the potential to implement mitigation measures and controls and the likelihood and timescale of environmental recovery.

Results of Public Consultation

The stakeholders' consultations came out with diversity of opinions on the project; some coming out strongly in favour of the project, and others against the project. This diversity of opinions was as follows:

Those in favour of the project argue that

- The project will help improve transportation in the city
- The project will help in reducing congestion in the city
- It will create employment and help in boosting economic gains among the people to be employed

- The project will enhance commuter safety since currently there is a weak system of ensuring buses plying Dar es Salaam roads are roadworthy
- The project may help to improve security in the area
- The project will improve the appearance of the city in general and Jangwani flood plain in particular
- The project will enhance aesthetics of the area since currently there are places used as solid waste dumpsite
- The project will reduce mosquito breeding areas through development of proper drainage system
- The development of the area will help in the overall development of the city's infrastructure.

Those against:

- Jangwani Flood Plain is a hazard land, building in the area will make it worse
- The Jangwani flood plain was allocated to the ministry of Sports and Culture for developing the area into recreational facilities such as a stadium
- It serves as a buffer zone for the city
- Pollution of Msimbazi river will increase
- Drying up of the mangroves located downstream due to heavy metals, oils and fuels spills
- More floods in the area is likely to happen due to blockage of the natural flow of water
- Depot will affect the migratory birds that usually come to the area from far
- Pollution of the air will affect the oxygen-carbon balance in the city
- Jangwani Flood Plain is the only green belt in the city
- Scarcity of recreational area
- The project will destroy the 'natural sense of the place'
- Congestion of Morogoro road is likely to worsen
- Proliferation of unplanned settlements around the depot premises
- Crime rate may escalate
- The project will deepen the problem of scarcity of recreational areas in the city
- The natural beauty of the area will be lost
- The same area is used to park lorries
- The area is used for religious and political rallies

Significant Environmental and Social Impacts and Proposed Mitigation Measures

Results of the consultations were analysed and mitigation measures proposed. The significant environmental and social impacts and respective proposed mitigation measures are presented in the table below. The impacts and mitigation measures are categorised in terms of project phases; viz. site selection, design, mobilization, construction, operation, demobilization and decommissioning phases.

Summary of Mitigation Measures

Phase	Potential Direct Impacts	Management/Mitigation Measures
SITE SELECTION	Land Ownership: Certificate of occupancy	(1) A letter signifying presidential approval for the use of the land has been secured. The developer, in collaboration with the local government authorities, will follow up the matter with Ministry of Lands, Housing and Human Settlements Development to secure the relevant documents when a detailed plan for the area is in place.
	Damage to wetland habitat and contained biodiversity	(2) The construction shall be limited to the space needed for the depot. (3) SUDS will be installed to overcome flooding damage to living organisms.
	Conflict of interest among the stakeholders	(4) The project shall not encroach on the existing sports ground and grounds used for religious and other social gatherings
DESIGN PHASE	Damage to constructed structures and disruption of operations as a result of natural processes	(5) The design will provide for wide drains and a Sustainable Drainage System. The project shall also expand the bridge crossing Msimbazi River along its longitudinal axis by constructing additional box culvert and dredging outlets to ensure no blockage
	Degradation / Impairment of local air quality including noise	(6) The design shall include construction of a wall around the site.[2] (7) The design shall specify that all electric motors such as compressors be housed in soundproof enclosures (8) The design shall include planting of trees to absorb carbon dioxide and replenish the oxygen that will be lost through combustive processes and compensate for part of the city's green belt that will be lost
	Compromised Security of the project facilities and the general area	(9) The design shall include construction of a wall around the project and during mobilisation, construction and operation phase controlled access shall be instituted (10) The design shall include construction of a Police post (11) The design shall include installation of security lights at appropriate places
	Public health and safety during mobilisation, construction and operation phases	(12) The project shall design an emergency plan to cater for public health and safety for the entire project cycle
MOBILISATION PHASE	Occupation health and safety during mobilisation, construction and operation phases	(13) Guidelines from OSHA will be adhered to accordingly eg by providing personal protective gears (PPE).
	Public health hazards/safety during mobilisation, construction and operation phases	(14) Awareness campaigns on HIV/AIDS (15) Sensitisation of workers to undergo voluntary testing

[2] It is scientifically proved that walls minimise noise to the neighbourhood

	Degradation at points of sources of construction materials	(16) The contractor shall procure construction material from licensed suppliers to avoid materials extracted from illegal borrow pits. (17) The developer will work with relevant bodies such as Municipal Councils and the City Council to draw up a closure plan of borrows pits. (18) Water recycling system will be used to minimise use of virgin waters.
CONSTRUCTION PHASE	Contamination / Impairment of quality of receiving bodies	(21) Disposal of overburden: The excavated top soil shall be used as filling material within the site and adjacent sites
	Damage /erosion of exposed surfaces due to inadequacies in resurfacing and compaction and improper timing of construction period.	(22) all excavated sites shall be compacted (23) depot surfaces shall be reinforced by concrete (24) construction shall be done during dry season
OPERATION PHASE	Impairment/ deterioration of local air quality due to increased vehicles and painting	(25) Regular servicing of all vehicles shall be done after every 3000km travelled and weekly services to check minor defects that may occur during normal operations shall be conducted (26) Spraying shall be done in specially designed spraying bays (27) Selection of energy efficient engines to minimise air pollution (28) Trees shall be planted to improve the Oxygen/Carbon Dioxide balance

	Contamination and /impaired quality of receiving body – land and water due improper disposal of waste	(29) Areas enclosed by secondary containment shall be maintained (30) Collected oils shall be disposed of in boilers and/or furnaces (31) Water from maintenance bay shall also be discharged through oil traps (32) Disposal of domestic and office solid waste shall be done through Ilala Municipal Council solid waste management system (33) Disposal of metal parts: shall be sold to metal recyclers (34) Disposal of broken glass: shall be sold to Kioo Ltd. for recycling. (35) Disposal of car batteries: shall be collected and returned to batteries recycling companies e.g. UASA batteries (36) Disposal of plastic bottles: shall be collected and transported to plastic recycling plants (37) Disposal of oil filters: All oil filters shall be punctured on the dome end and hot-drained for 24 hours. Furthermore the used oil filters shall be crushed and dismantled to remove the remaining oil. Since DART Agency will use non terne-plated oil filters, the filters the drained and/or crushed oil filters will be disposed in the regular solid waste management system. (39) Fuel and oils wastes: Disposal of waste oil will be done through combustion in boilers or furnaces at such places as Twiga Cement, Kioo Ltd where these facilities exist. (40) Disposal of wastewater containing cleaning chemicals: DART shall use environmentally friendly cleaning chemicals, such as *ClearClean*[3]
	Disrupted bus depot operations and Contamination and /impaired quality of receiving body – land and water. Due to inadequacies in operation and maintenances	1. The project shall develop preventive and periodic maintenance plans 2. The project shall have a dedicated maintenance department. 3. The project shall provide a dedicated budget line for maintenance activities.
	Deterioration of public health and sanitary condition due to inadequacies in operation and maintenance	Same as (41) – (43)
	Deterioration of worker's health and safety due to occupational exposure	4. paints that contain lead and cadmium shall not be used 5. painting and spray shall be done in spraying bay with appropriate gadgets to mitigate impacts 6. provide workers with appropriate protective gear

[3] http://www.safegreencleaners.com/gogreen.html (accessed on 21st January 2009)

DECOMMISSIONING PHASE	Vacated depot building and other facilities due to closing of the business.	7.	A preliminary decommissioning plan has been included in the ESIA to provide for stakeholder consultation and decision making at the close of the project. Possible action include: (a) use the depot as a bus stand (b) convert it for use by small scale traders like garage operators (c) the site be demolished and returned to its original state (d) The demolished debris shall be disposed of as filling materials
	Loss of jobs/loss of livelihood	8.	All employees will paid their terminal benefits following the closure of the business by using contributions made by the employer to the Social Security Fund.

Environmental and Social Management

The Environmental and Social Management Plan (ESMP) outlines the entities responsible for implementing the measures listed above, as well as the costs involved.

Monitoring and Auditing

Apart from the commitment to mitigate the impacts as presented in ESMP, the Environmental and Social Monitoring Plan (ESMoP) has also been prepared and it outlines parameters to be monitored and the responsibilities of respective authorities.

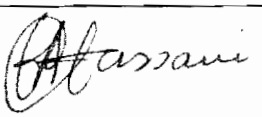
Decommissioning

A preliminary decommissioning plan has been developed. The plan provides for the project removal to begin six months after closure and continue for six months. Within the first six months, DART Agency will take inventory of all components that need to be removed and/or disposed of and consult with relevant stakeholders on disposal and post project use of the site. The inventory will include building structures to be demolished or converted to other uses, machinery to be disposed of and chemicals including chemical waste to be disposed of, debtors and creditors to settle debt with. Also mode of disposal and identification of smelters of scrap metals will be finalized within this period. This information will assist in the preparation of the final decommissioning plan for approval by NEMC

Names of Consultants

SN	Name of Consultant	Position/Area of Expertise	Signature
1.	Prof. Jamidu H.Y. Katima	Lead Consultant and Environmental Engineer	
2.	Ms. Saada K. Juma	Environmental Management and Planning	
3.	Mr. Ojung Longdare	Sociologist	
4.	Mr. Bashiru Abdu	Socio Economist	
5.	Dr. Amelia Sylvery Buriyo	Ecologist	

Majina Ya Washauri:

Na.	Jina la Mshauri	Nafasi/Eneo la Utaalam	Sahihi
1.	Prof. Jamidu H.Y. Katima	Kuongoza Ushauri na Mhandisi Mazingira	
2.	Bi. Saada K. Juma	Usimamizi na Upangaji wa Mazingira	
3.	Bw. Ojung Longdare	Mwanasosholojia	
4.	Bw. Bashiru Abdu	Mwanauchimijamii	
5.	Dk. Amelia Sylvery Buriyo	Mwanaikolojia	

WAKALA WA USAFIRI WA HARAKA

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Dar es Salaam

MUHTASARI RASMI – TATHMINI YA ATHARI KWA MAZINGIRA NA JAMII

KWA

MRADI WA UJENZI WA KITUO CHA MAEGESHO YA MABASI ENEO LA JANGWANI

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APRILI 2010

MUHTASARI RASMI USIO WA KITAALAM

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Mtu wa kuwasiliana naye : **Mtendaji Mkuu**

Mshauri wa Mazingira

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Muhtasari na Uhalali wa Mradi

Maelezo ya Mradi:

Serikali ya Jamhuri ya Muungano wa Tanzania kupitia ofisi ya Waziri Mkuu inakusudia kuanzisha mfumo wa mabasi yaendayo haraka Jijini Dar es Salaam. Dhumuni la DART ni kuboresha mfumo wa usafiri wa umma ambao utakidhi viwango vya kimataifa kwa kutumia mabasi ya kisasa yenye ujazo mkubwa wa kubeba abiria yatakayofanya kazi katika njia maalum kwa muda mfupi na gharama nafuu. Sehemu muhimu ya mradi ni ujenzi wa kituo cha mabasi ambacho kitajengwa eneo la viwanja vya bonde la Jangwani wilaya ya Ilala, Dar es Salaam. Huduma hii itajumuisha maeneo maalum ya matunzo na maegesho ya mabasi 150. Mradi pia utatoa huduma nyinginezo kama vile maegesho ya muda, maegesho ya umma, sehemu za ofisi, mgahawa na vyumba vya kubadilishia mavazi, huduma za vyoo kwa wafanyakazi wa DART na watumiaji wengine wa huduma nyinginezo ndani ya kituo.

Huduma hii itawekwa katika eneo kiasi cha mita za mraba 75,000 (yaani asilimia 10 ya jumla ya eneo la viwanja vya bonde la Jangwani). Ieleweke wazi kwamba mradi hautohamisha watumiaji wengine wa ardhi k.m. viwanja vya michezo, eneo la mikutano ya hadhara n.k. Hata hivyo, ili mradi kuweza kutekelezwa bila athari hasi kwa mazingira mpendekezaji wa mradi kwa kuzingatia Sheria ya mazingira ya mwaka 2004 amefanya tathmini ya athari kwa mazingira. Prof. Jamidu H.Y. Katima, Mkurugenzi Mtendaji wa Kampuni ya JSB EnviDep ya Dar es Salaam aliteuliwa kufanya tathmini hii.

Maelezo ya Mazingira

Eneo tarajiwa la kituo lipo katika viwanja vya Jangwani ndani ya bonde kubwa la Mto Msimbazi. Eneo ni lenye asili ya ardhi oevu na huwa na kawaida ya kufurika haswa kipindi cha mvua za muda mrefu. Eneo. Kwa ujumla, topografi ya eneo linaelezewa kuwa ni bonde lenye mteremko hafifu hadi mto Msimbazi ambao upo pembeni ambao pia hutiririsha maji katika Bahari ya Hindi. Tabaka la juu la udongo katika eneo ni mchanganyiko wa mlimbikizo wa udongo tope (mchanga, lushabo na mfinyanzi) ambao pia hupatikana katika mabonde ya mito mingine ipitayo ukanda wa pwani (mf. Mzinga). Kiasi cha asilimia 75 ya eneo lote limejawa na nyasi, asilimia 8 miti ya kupandwa iliyotawanyika na vichaka vya asili, asilimia 7 ardhi oevu na asilimia 7 ardhi iliyolimwa. Asilimia 3 iliyobaki ni eneo la wazi ambalo kwa sasa linatumika kwa maegesho ya magari, ingawa ukweli ni kwamba tangu miaka mitatu iliyopita Halmashauri ya Manispaa ya Ilala ilikataza matumizi ya eneo hili kama maegesho ya magari.

Aina ya nyasi/majani yaliyopo ni *Cynodon dactylon, Dichanthium annulatum, Eragrostis stapfianus, E. ethiopica, Digitaria milanjianus, Chloris virgata, Panicum corolatum, P. maximum Sporobolus virginicus* na *Eleusine indica.* Mitishamba iliyopo ni kama *Acalypha ornata, Tridax procumbens, Rhynchosia minima, Phyllanthus numulariifolius, Waltheria indica, Sida acuta, Euphorbia hirta, E.heterophylla* na *Indigofera arrecta.* Aina ya miti ya kupandwa ni *Azidarachta indica, Pithecellobium dulce, Millingtonia hortensis, Leucaena glauca, Sapindus saponaria, Peltophorum pterocarpum* na *Trichilia sp.* Miti michache ya asili iliyopo katika eneo hili ni kama vile *Sclerocarya birrea ssp. caffra, Tamarindus indica, Ficus mucuso* na *Acacia nilotica.* Aina ya vichaka vilivyopo kwa wingi ni *Pluchea dioscoridis, Ipomoea carnea* na *Calotropis gigantea* vilivile.

Wanyama waliokuwepo katika eneo la mradi ni ndege na wadudu. Ndege aina ya *Sparrow* na *Great white Egrets* walikuwepo kwa wingi ukilinganisha na aina nyingine ya ndege. Katika kundi la wadudu panzi walikuwepo kwa wingi.

Ushirikishwaji Wadau

Ushirikishwaji wa wadau ulifanyika. Mahojiano na mikutano na maafisa kutoka Idara za Serikali na Mamlaka za Wilaya, maafisa kutoka mashirika ya umma na ya binafsi; mashirika yasiyo ya kiserikali (NGO), na viongozi wa kata yalifanyika. Timu ya wataalamu wa fani mbalimbali walizingatia vipengele vyote vya mradi vinavyoweza kusababisha mabadiliko ya kimazingira, kiuchumi na kijamii wakati wa mikutano ya mashauriano na wadau. Walitathmini umuhimu wa kila kipengele cha mradi kwa mujibu wa vigezo vilivyoelezwa , ambavyo vilizingatia kiwango, ukubwa, muda, uwezekano wa kutekeleza hatua za udhibiti na uzuiaji, na kipindi kinachotarajiwa kurejesha mazingira katika hali yake.

Matokeo ya Mashauriano na Wadau

Mashauriano na wadau yalidhihirisha kwamba kuna mitazamo mbalimbali juu ya mradi baadhi waliuunga mkono mradi na wengine walipinga mradi. Mitazamo ilikuwa kama ifuatavyo:

Wanaounga mkono mradi:

- Mradi utasaidia kuboresha huduma za usafiri jijini
- Mradi utasaidia kupunguza msongamano ndani ya jiji
- Utatoa ajira na kusaidia kuboresha hali ya uchumi kwa waajiriwa
- Mradi utaboresha usalama kwa abiria kwani kwa sasa kuna mfumo duni wa kuhakikisha mabasi yanayotumika jijini ni yale yanayostahili.
- Mradi utasaidia kuboresha hali ya usalama eneo la Jangwani

- Mradi utaboresha Mandhari ya Jiji kwa ujumla hususan viwanja vya Jangwani
- Mradi utaboresha muonekano wa eneo kwani kwa sasa kuna maeneo yatumiwayo kama majalala ya taka ngumu.
- Mradi utapunguza sehemu za mazalia ya mbu kwa kutengeneza mifereji Uendelezaji wa eneo utasaidia maendeleo ya jumla ya miundombinu ya jiji.

Wasiounga mkono mradi:

- Viwanja vya Jangwani ni eneo la hatari, kujenga kwenye eneo hilo kutazidisha hatari
- Viwanja vya Jangwani viligawiwa kwa Wizara ya Michezo na Utamaduni kuendeleza eneo la michezo na burudani
- Huudumia kama ukanda bafa jijini
- Uchafuzi wa mto Msimbazi utaongezeka
- Kukauka kwa *mangroves* yaliyopo bondeni kutokana na kemikali za metali nzito na kuvuja kwa mafuta
- Mfuriko zaidi yanaweza kutokea kutokana na kuzuiwa kwa mtiririko wa asili wa maji
- Kituo kitaathiri ndege wahamao ambao mara kwa mara hutua kutoka mbali
- Uchafuzi wa hewa utaathiri mlinganyo wa hewa ya oksijeni-kaboni jijini
- Viwanja vya Jangwani ni ukanda kijani pekee jijini
- Uhaba wa eneo la burudani
- Mradi utaharibu "maana asilia ya eneo"
- Msongamano katika barabara ya Morogoro utaongezeka
- Mfumuko wa makazi holela utatokea katika maeneo ya kituo
- Kiwango cha uhalifu kitaongezeka
- Upotevu wa ardhi ya mashamba
- Mradi utaongeza tatizo la uhaba wa maeneo ya michezo na burudani jijini
- Uzuri wa asili wa eneo utapotea
- Eneo hilo hilo linatumika kwa maegesho ya malori
- Eneo hutumika kwa mikutano ya kidini na siasa

Athari za Mazingira na Mapendekezo ya Namna ya Kuzitatua:

Matokeo ya mashauriano yalifanyiwa uchambuzi na mapendekezo ya namana kutatua athari za mazingira kupendekezwa. Athari za mazingira na za kijamii na mapendekezo ya utatuzi yanaainishwa kwenye jedwali hapa chini. Mapendekezo hayo yamepangwa kulingana na hatua za utekelezaji mradi ambazo ni; uchaguzi wa eneo, usanifu, uendelezaji, maandalizi ya ujenzi, ujenzi, utoaji huduma, maandalizi ya kufunga shughuli na kufunga mradi.

Muhtasari wa Mapendekezo ya namna ya kutatua atahari za Mazingira

AWAMU	ATHARI	MAPENDEKEZO YA UPUNGUZAJI WA ATHARI
UCHAGUZI WA ENEO	*Kuharibiwa kwa maeneno ya ardhi oevu na baionuai zilizomo*	Mradi utatekelezwa ndani ya eneo maalum lililotengwa tu.
	Mvutano juu ya maoni miongoni mwa wadau	Ili kupunguza athari tabiriwa na mvutano miongoni mwa wadau DART itajikita katika kuongeza uelewa na utoaji wa taarifa juu ya mradi. Mkazo maalum utatolewa kwa masuala yaliyopendekezwa na wadau.

USANIFU	*Kuharibiwa kwa majengo yaliyojengwa na kukatisha uendeshaji kutokana na majanga ya asili*	Usanifu utaandaa mipango ya upanuzi wa mifereji ya maji ya mvua, daraja la mto Msimbazi kufanyiwa upanuzi, ujenzi wa "culvert" za nyongeza na matoleo ya maji yatasafishwa kuwezesha maji kupita.
	Uchafuzi wa hewa na athari za kelele	• Usanifu utajumuisha ujenzi wa ukuta kuzunguka eneo la mradi.[1] • DART itajenga ukuta kuzunguka eneo [imethibitishwa kisayansi kwamba kuta hupunguza kelele] • Mota zote za umeme kama vile kompresa zitawekwa kwenye uzingo wenye jarabati sauti.
	Makubaliano ya Kiulinzi	• Eneo la mradi litajengewa uzio na kuwekwa utaratibu maalum wa kuingia • Kituo cha Polisi kitajengwa • Taa za usalama zitawekwa
	Afya na Usalama wa jamii kipindi cha maandalizi, ujenzi na utoaji huduma	• Mradi utaandaa mipango ya dharura ya kukidhi mahitaji ya afya ya jamii na usalama kwa kipindi chote cha mradi
MOBILISATION PHASE	*Hatari za kiafya na Usalama kwa jamii*	• Kampeni za kuongeza ufahamu juu ya VVU/UKIMWI • Kuwashawishi wafanyakazi kupima VVU/UKIMWI kwa hiari.
	Uharibifu kwenye chanzo cha upatikanaji wa maunzi kwa ajili ya ujenzi	• Mradi utapata maunzi ya ujenzi kutoka kwa wagavi waliothibishwa kuzuia uchimbaji kwenye eneo la Jangwani • Halmashauri za Dar es Salaam zitashirikiana na mwendelezaji kuhakikisha mashimo yote yanajazwa • Mfumo wa kusafisha maji yaliyotumika na kuyatumia tena utatumika kupunguza matumizi ya maji safi
UJENZI	*Uchafuzi wa Mazingira pokezi-ardhi na maji*	• Kifusi kitatumika kufunikia mashimo katika kituo na maeneo yaliyopo pembezoni. • Maeneo ya maegesho yataimarishwa kwa na zege Ujenzi utafanyika kipindi kisicho na mvua
UENDESHAJI	*Kuharibika/kuchafuka k wa hali ya hewa kutokana na kuongezeka kwa magari na upakaji rangi*	• Upuliziaji rangi utafanywa katika eneo maalum • Magari yatafanyiwa matengenezo yatimizapo KM 3000 na kukaguliwa kila wiki • Upandaji miti utapewa kipaumbele • DART itaagiza na kutumia injini zenye ubora wa hali ya juu (Euro III) zenye utokaji kidogo. • DART itahakikisha kwamba magari yote yanafanyiwa ukarabati baadaya ya kutembea kilomita 3000. DART pia itafanya ukarabati kila mwezii ili kubaini matatizo madogo madogo yanayoweza kujitokeza wakati wa uendeshaji wa kawaida.
	Kuchafuka/Kuharibik a kwa hali ya mazingira pokezi	• Bidhaa zote za petroli, mafuta chakavu na kemikali nyinginezo zitawekwa katika chombo maalum. • Chombo maalum kilichotengwa kitatunza • Maji yote yatayokusanywa ndani ya chombo maalum yatamwagwa kupitia vinasa mafuta. • Mafuta yaliyokusanywa yatamwagwa katika bwela na/au majoko • Chombo hicho maalum kitakuwa na uwezo wa kuhifadhi 110 % ya uwezo wa tanki kubwa la hifadhi. • Maji toka eneo la matunzo yatatiririshwa kupitia katika vinasa mafuta

[1] Tafiti za kisayansi zinathibitisha ukuta huzuia kelele

UENDESHAJI		**Utupaji wa taka ngumu** • Uondoshaji wa Taka ngumu zitatupwa kupitia mfumo wa Halmashauri ya Manispaa ya Ilala • Vipande vya vyuma vitauzwa kwa wayeyushaji vyuma. • Vioo na chupa zilizovunjika zitauzwa katika kampuni ya Kioo Ltd kwa ajili ya uyeyushaji • Betri zitakusanywa na kupelekwa katika makampuni ya uyeyushaji k.m. Kampuni ya betri ya UASA • Chupa za plastiki zitakusanywa na kusafirishwa katika viwanda vya kuyeyusha plastiki kama vile *Simba Plastics* au *TIRDO* • Vichujio vyote vya mafuta vitateketezwa. Pia vichujio vya mafuta vilivyotumika vitavunjwa kuondoa mafuta yaliyobakia. DART itatumia vichujio ambavyo ni *non terne-plated*, ambavyo vinaweza kutupwa kama taka za kawaida. **Utupaji wa matairi yaliyotumika** • DART itahakikisha tairi zina upepo wa kutosha, na ziko katika hali ya usalama wakati wote. • Kuzuia ubadilishaji usio wa lazima wa matairi. Kuelimisha wafanyakazi mbinu sahihi za kujuwa wakati muafaka wa kubadilisha matairi. • Kupeleka matairi yaliyotumika kwa wachonga matairi na wayeyushaji wa matairi. DART pia itatafiti namna nyingine za utupaji wa matairi chakavu ambayo inajumuisha kutumia matairi chakavu kuhimarishia kuta, bafa katika guda, au moja ya vifaa katika viwanja vya michezo, yanaweza pia kutengenezwa na kutumika kama mazuria ya milangoni na kwenye vituo vya mazoezi au kutumika kama kinga dhidi ya mafuriko. • DART itajiepusha na yafuatayo: – Mchanganyiko wa matairi kwenye taka nyingine – Utupuaji usio halali wa matairi. – Mlundikano wa matairi kwa kipindi kirefu kugeuka mazalia ya mbu. **Umwagaji wa maji machafu yatokanayo na usafishaji wa mabasi** • Maji machafu yatokanayo na usafishaji wa mabasi na maeneo ya matengenezo yatatiririshwa kwenye chujio la mafuta na kutiririshwa kwenye mfereji wa majimachafu. Masalia yatabakizwa kwenye madimba ya ndani ya maji machafu **Taka za fueli na mafuta** • Utupaji wa mafuta chakavu utafanyika kwa kuyagawia makampuni yenye majoko au bwela kama vile Kiwanda cha Saruji cha Twiga, Kioo Ltd ili kuchoma mafuta chakavu kama njia ya utupaji. • Maji machafu yatokanayo na usafishaji wa mabasi na maeneo ya matengenezo yatatiririshwa kwenye chujio la mafuta na kutiririshwa kwenye mfereji wa majimachafu. Masalia yatabakizwa kwenye madimba ya ndani ya maji machafu • DART itatumia *Green Cleaners* kama vile bidhaa za *ClearClean*. Bidhaa hizi zimetengenezwa kwa lengo la kukinga afya ya mwanadamu na mazingira. Bidhaa za *ClearClean* hupunguza madhara kwenye macho, ngozi na mapafu ambayo hutokea zitumikapo kemikali za kawaida za kusafishia. Bidhaa za *ClearClean* hazina kemikali kali, vichafuzi hatari vya hewa, vichanganyishi viharibuvyo tabaka la ozoni, rangi au manukato. Badala yake, hizo bidhaa za *ClearClean* zina nguvu maradufu, yenye pH ya kati, yeyushi asilimia 100 na ni rafiki kwa mazingira.
	Katizo la uendeshaji wa kituo cha mabasi na kuchafuka kwa na/kuharibiwa kwa hali ya mazingira pokezi – ardhi na maji.	• Kuweka mipango ya kinga na matunzo ya muda • Kuwa na idara ya matunzo iliyojidhatiti. • Kuanzisha bajeti maalum ya shughuli za matunzo. • Rangi zenye kemikali za risasi na kadmiamu hazitatumika • Upakaji na upulizaji rangi utafanyika kwenye eneo maalum la upulizaji lenye kinga ili kupunguza athari • Kutoa vifaa maalum vya kinga dhidi ya ajari

	Afya na Usalama kazini:	• Kutoa mafunzo ya afya na usalama kwa wafanyakazi wote, na haswa kwa waajiriwa wapya. • Kuunda mpango wa dharura • Kutoa huduma ya kwanza • Kutoa vifaa sahihi vya kujikinga dhidi ya majanga • Kuhakikisha mazingira endelevu na bora ya kazi
	Kufungwa kwa eneo la mradi	• Mpango wa ufungaji wa eno umeelezwa kwenye ripoti ya mazingira. Utekelezaji wa mpango utafanyika baada ya kushauriana na wadau. Miongoni mwa mapendekezo yaliyopo ni : – Eneo litumike kama kituo cha mabasi – Ujenzi wote kuvunjwa na kurudishwa kwenye hali yake ya kawaida – Vifusi vitakavyotokana na uvunjaji vitatumika kujaza maeneo ya jirani
KUFUNGA MRADI	*Uharibifu/uchafuzi wa hali ya eneo pokezi kutokana na usimamizi wa taka za kufunga mradi*	• Kutumiwa kwa eneo kama kituo cha mabasi • Kugeuza eneo na kutumiwa na wafanyabiashara wadogo (Wamachinga) • Eneo litabomolewa na kurudishwa katika hali yake ya awali • Mabaki ya majengo yaliyobomolewa yatatumika kama kifusi
	Upotevu wa ajira	▪ Wafanyakazi wote watalazimika kuwa wanachama wa mashirika yanayoshughulikia wastaafu ambayo ni NSSF, LAPF na GEPF. DART na makampuni tanzu hususan Kampuni za mabasi yatawasilisha michango ya wafanyakazi kwenye mashirika hayo.

Usimamizi wa Mazingira na Kijamii

Hii tathmini inawasilisha muhtasari wa mpango wa usimamizi wa mazingira na kijamii (ESMaP). Sehemu kubwa ya majukumu ya kila siku ya utekelezaji wa sera za kimazingira na kijamii zitasimamiwa na mkandarasi mkuu wa DART, huku zikisimamiwa kwa karibu na Afisa Mazingira.

Usimamizi wa Ukaguzi

Hii tathmini vilevile inawasilisha muhtasari wa mpango wa ufuatiliaji wa kimazingira na kijamii (ESMoP). Hii itasaidia wadau kusimamia (1) Utekelezaji wa udhibiti wa wa athari na (2) ufanisi wa mpango wa udhibiti wa athari.

Uchanganuzi wa Faida na Gharama

Tathmini hii inawasilisha tathmini ya mradi, katika athari hasi, ikilinganishwa na faida za kiuchumi na kijamii ambazo hazitapatikana iwapo mradi hautatekelezwa. Uchanganuzi wa gharama na faida za kimazingira umetathminiwa kwa njia ya athari hasi dhidi ya athari chanya. Faida za mradi, kwa maana ya fedha na faida za kijamii ni kubwa. Hali kadhalika, athari za kimazingira zinaweza kudhibitika vizuri na rasilimali fedha inayotakiwa kudhibiti athari hasi, ikilinganishwa na uwekezaji unaotakiwa ni kidogo mno kwa uwiano. Tathmini iliyofanyika imethibitisha kwamba faida zinazidi gharama.

Kufunga Mradi

Mpango wa awali wa kufunga mradi umetengenezwa. Imedhihirika kuwa uondoaji wa mradi utaanza miezi sita baada ya kufunga na kuendelea kwa miezi sita. Katika miezi sita ya kwanza DART itaorodhesha vifaa vyote vinavyopaswa kuondolewa au kutupwa. Orodha hii itajumuisha majengo yatakayobomolewa, mashine zitakazotupwa, kemikali zikiwamo taka za kemikali zitakazotupwa, wadai, wadaiwa wanaostahili kusuluhisha madeni yao. Pia aina ya utupaji na utambuzi wa wayeyushaji wa vyuma chakavu, kemikali na taka za kemikali watapatikana ndani ya kipindi hiki. Taarifa hii itasaidia katika kutayarisha mpango wa mwisho wa ufungaji wa mradi ili kuthibitishwa na Baraza la Taifa la Hifadhi na Usimamizi wa Mazingira.

THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICEREGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

DAR RAPID TRANSIT AGENCY

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT FOR THE PROPOSED CONSTRUCTION OF A BUS DEPOT AT JANGWANI AREA

Submitted for Approval to:

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This study was executed by the following Registered Environmental Experts

SN	Name of Consultant	Position/Area of Expertise	Signature
1.	Prof. Jamidu H.Y. Katima	Environmental Engineer ESIA Team Leader	
2	Ms. Saada K. Juma	Environmental Management and Planning	
3	Mr. Ojung Longdare	Sociologist	
4	Mr. Bashiru Abdu	Socio Economist	
5	Dr. Amelia Silvery Buriyo	Ecologist	

EXECUTIVE SUMMARY

Project Title:

CONSTRUCTION OF A BUS DEPOT COMPONENT AT JANGWANI AREA

Proponent:

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Outline and Justification of Project

Project Description

The government of United Republic of Tanzania through Prime Ministers' Office intends to develop a Rapid Transit System to cater for the Dar es Salaam City. The aim of the Dar Rapid Transit (DART) is to have a modern public transport system that meets international standards using modern high capacity buses operating on exclusive lanes at less travelling time and is cost effective. An essential component of the Project is a Bus Depot that will be constructed at the Jangwani flood plain in Ilala Municipal Council, Dar es Salaam City. This facility will consist of maintenance areas and parking lot for 150 buses. The project will also provide for off-peak parking, public parking, office space, canteen and changing rooms, ablution facilities for DART Bus Depot workers and general users of other facilities within the area.

The proposed depot is to be constructed on approximately 75,000m2 piece of land, which is about 10 percent of the total Jangwani valley usable area. It should be noted here that the project is not developed on the land hitherto temporarily used for playing grounds, open air public meeting space, or parking of trucks. Nevertheless, in order for the project to be implemented by taking on board likely negative and positive social and environmental impacts and to conform to the requirements of the Environmental Management Act of 2004, the proponent commissioned an EIA consultant, Prof. Jamidu H.Y. Katima, to undertake ESIA study for the project.

Description of the Environment

The proposed depot site is located on the Jangwani flood plain within the larger Msimbazi river basin. The area is environmentally sensitive and has a tendency of getting flooded during the long rains. The area is typical of the rest of the wetland with swamps and marshes. Generally, the topography of the area is characterized by a low laying even terrain sloping gently towards the Msimbazi River located adjacent to it, which directs water to the Indian Ocean. The topsoil of the site is mixed alluvial deposits (sands, silts and clays) which are also found in other main river valley systems that cross the Coastal Plain (e.g. Mzinga). About 75% of the whole area is occupied by grassland community, 8% by scattered planted trees and natural bushes, 7% occupied by swampy marshland and 7% occupied by cultivated land. The remaining 3% is occupied by bare land which, during scoping exercise, was used for car park, despite the fact that since three years ago the Ilala Municipal Council had prohibited use of this area as a car park.

Common grass species are *Cynodon dactylon, Dichanthium annulatum, Eragrostis stapfianus, E. ethiopica, Digitaria milanjianus, Chloris virgata, Panicum corolatum,P. maximum Sporobolus virginicus* and *Eleusine indica.* Common herbs includes *Acalypha ornata,Tridax procumbens, Rhynchosia minima, Phyllanthus numulariifolius, Waltheria indica, Sida acuta, Euphorbia hirta, E.heterophylla* and *Indigofera arrecta.* Common planted tree species are *Azidarachta indica, Pithecellobium dulce, Millingtonia hortensis, Leucaena glauca, Sapindus saponaria, Peltophorum pterocarpum* and *Trichilia sp.* Few indigenous tree species are found in this area such as *Sclerocarya birrea ssp. caffra, Tamarindus indica, Ficus mucuso* and *Acacia nilotica.* The dominant bush species are *Pluchea dioscoridis, Ipomoea carnea* and *Calotropis gigantean,* respectively.

The dominant groups of fauna in the project area were birds and insects. Sparrow and Great White Egrets were in relatively large numbers compared to other species of birds. In the group of insects, grasshoppers were relatively many.

Stakeholders' Participation

Stakeholders' consultations were carried out through interviews and meetings. A multidisciplinary team of experts met with officials from Government departments and district authorities, officials from public and private organisations, non-governmental organisations (NGOs) and ward leaders. The team considered all aspects of the project that can cause environmental or socio-economic changes at all stakeholders meetings. It also evaluated the significance of each aspect of the project in terms of defined criteria, taking into account the scale, extent, duration, the potential to implement mitigation measures and controls and the likelihood and timescale of environmental recovery.

Results of Public Consultation

The stakeholders' consultations came out with diversity of opinions on the project; some coming out strongly in favour of the project, and others against the project. This diversity of opinions was as follows:

Those in favour of the project argue that

- The project will help improve transportation in the city
- The project will help in reducing congestion in the city
- It will create employment and help in boosting economic gains among the people to be employed

- The project will enhance commuter safety since currently there is a weak system of ensuring buses plying Dar es Salaam roads are roadworthy
- The project may help to improve security in the area
- The project will improve the appearance of the city in general and Jangwani flood plain in particular
- The project will enhance aesthetics of the area since currently there are places used as solid waste dumpsite
- The project will reduce mosquito breeding areas through development of proper drainage system
- The development of the area will help in the overall development of the city's infrastructure.

Those against:

- Jangwani Flood Plain is a hazard land, building in the area will make it worse
- The Jangwani flood plain was allocated to the ministry of Sports and Culture for developing the area into recreational facilities such as a stadium
- It serves as a buffer zone for the city
- Pollution of Msimbazi river will increase
- Drying up of the mangroves located downstream due to heavy metals, oils and fuels spills
- More floods in the area is likely to happen due to blockage of the natural flow of water
- Depot will affect the migratory birds that usually come to the area from far
- Pollution of the air will affect the oxygen-carbon balance in the city
- Jangwani Flood Plain is the only green belt in the city
- Scarcity of recreational area
- The project will destroy the 'natural sense of the place'
- Congestion of Morogoro road is likely to worsen
- Proliferation of unplanned settlements around the depot premises
- Crime rate may escalate
- The project will deepen the problem of scarcity of recreational areas in the city
- The natural beauty of the area will be lost
- The same area is used to park lorries
- The area is used for religious and political rallies

Significant Environmental and Social Impacts and Proposed Mitigation Measures

Results of the consultations were analysed and mitigation measures proposed. The significant environmental and social impacts and respective proposed mitigation measures are presented in the table below. The impacts and mitigation measures are categorised in terms of project phases; viz. site selection, design, mobilization, construction, operation, demobilization and decommissioning phases.

Summary of Mitigation Measures

Phase	Potential Direct Impacts	Management/Mitigation Measures
SITE SELECTION	Land Ownership: Certificate of occupancy	(1) A letter signifying presidential approval for the use of the land has been secured. The developer, in collaboration with the local government authorities, will follow up the matter with Ministry of Lands, Housing and Human Settlements Development to secure the relevant documents when a detailed plan for the area is in place.
	Damage to wetland habitat and contained biodiversity	(2) The construction shall be limited to the space needed for the depot. (3) SUDS will be installed to overcome flooding damage to living organisms.
	Conflict of interest among the stakeholders	(4) The project shall not encroach on the existing sports ground and grounds used for religious and other social gatherings
DESIGN PHASE	Damage to constructed structures and disruption of operations as a result of natural processes	(5) The design will provide for wide drains and a Sustainable Drainage System. The project shall also expand the bridge crossing Msimbazi River along its longitudinal axis by constructing additional box culvert and dredging outlets to ensure no blockage
	Degradation / Impairment of local air quality including noise	(6) The design shall include construction of a wall around the site.[1] (7) The design shall specify that all electric motors such as compressors be housed in soundproof enclosures (8) The design shall include planting of trees to absorb carbon dioxide and replenish the oxygen that will be lost through combustive processes and compensate for part of the city's green belt that will be lost
	Compromised Security of the project facilities and the general area	(9) The design shall include construction of a wall around the project and during mobilisation, construction and operation phase controlled access shall be instituted (10) The design shall include construction of a Police post (11) The design shall include installation of security lights at appropriate places
	Public health and safety during mobilisation, construction and operation phases	(12) The project shall design an emergency plan to cater for public health and safety for the entire project cycle
MOBILISATION PHASE	Occupation health and safety during mobilisation, construction and operation phases	(13) Guidelines from OSHA will be adhered to accordingly eg by providing personal protective gears (PPE).
	Public health hazards/safety during mobilisation, construction and operation phases	(14) Awareness campaigns on HIV/AIDS (15) Sensitisation of workers to undergo voluntary testing

[1] It is scientifically proved that walls minimise noise to the neighbourhood

	Degradation at points of sources of construction materials	(16) The contractor shall procure construction material from licensed suppliers to avoid materials extracted from illegal borrow pits. (17) The developer will work with relevant bodies such as Municipal Councils and the City Council to draw up a closure plan of borrows pits. (18) Water recycling system will be used to minimise use of virgin waters.
CONSTRUCTION PHASE	Contamination / Impairment of quality of receiving bodies	(21) Disposal of overburden: The excavated top soil shall be used as filling material within the site and adjacent sites
	Damage /erosion of exposed surfaces due to inadequacies in resurfacing and compaction and improper timing of construction period.	(22) all excavated sites shall be compacted (23) depot surfaces shall be reinforced by concrete (24) construction shall be done during dry season
OPERATION PHASE	Impairment/ deterioration of local air quality due to increased vehicles and painting	(25) Regular servicing of all vehicles shall be done after every 3000km travelled and weekly services to check minor defects that may occur during normal operations shall be conducted (26) Spraying shall be done in specially designed spraying bays (27) Selection of energy efficient engines to minimise air pollution (28) Trees shall be planted to improve the Oxygen/Carbon Dioxide balance

	Contamination and /impaired quality of receiving body – land and water due improper disposal of waste	(29) Areas enclosed by secondary containment shall be maintained (30) Collected oils shall be disposed of in boilers and/or furnaces (31) Water from maintenance bay shall also be discharged through oil traps (32) Disposal of domestic and office solid waste shall be done through Ilala Municipal Council solid waste management system (33) Disposal of metal parts: shall be sold to metal recyclers (34) Disposal of broken glass: shall be sold to Kioo Ltd. for recycling. (35) Disposal of car batteries: shall be collected and returned to batteries recycling companies e.g. UASA batteries (36) Disposal of plastic bottles: shall be collected and transported to plastic recycling plants (37) Disposal of oil filters: All oil filters shall be punctured on the dome end and hot-drained for 24 hours. Furthermore the used oil filters shall be crushed and dismantled to remove the remaining oil. Since DART Agency will use non terne-plated oil filters, the filters the drained and/or crushed oil filters will be disposed in the regular solid waste management system. (39) Fuel and oils wastes: Disposal of waste oil will be done through combustion in boilers or furnaces at such places as Twiga Cement, Kioo Ltd where these facilities exist. (40) Disposal of wastewater containing cleaning chemicals: DART shall use environmentally friendly cleaning chemicals, such as *ClearClean*[2]
	Disrupted bus depot operations and Contamination and /impaired quality of receiving body – land and water. Due to inadequacies in operation and maintenances	(41) The project shall develop preventive and periodic maintenance plans (42) The project shall have a dedicated maintenance department. (43) The project shall provide a dedicated budget line for maintenance activities.
	Deterioration of public health and sanitary condition due to inadequacies in operation and maintenance	Same as (41) – (43)
	Deterioration of worker's health and safety due to occupational exposure	(44) paints that contain lead and cadmium shall not be used (45) painting and spray shall be done in spraying bay with appropriate gadgets to mitigate impacts (46) provide workers with appropriate protective gear

[2] http://www.safegreencleaners.com/gogreen.html (accessed on 21st January 2009)

DECOMMISSIONING PHASE	Vacated depot building and other facilities due to closing of the business.	(47)	A preliminary decommissioning plan has been included in the ESIA to provide for stakeholder consultation and decision making at the close of the project. Possible action include: (a) use the depot as a bus stand (b) convert it for use by small scale traders like garage operators (c) the site be demolished and returned to its original state (d) The demolished debris shall be disposed of as filling materials
	Loss of jobs/loss of livelihood	(48)	All employees will paid their terminal benefits following the closure of the business by using contributions made by the employer to the Social Security Fund.

Environmental and Social Management

The Environmental and Social Management Plan (ESMP) outlines the entities responsible for implementing the measures listed above, as well as the costs involved.

Monitoring and Auditing

Apart from the commitment to mitigate the impacts as presented in ESMP, the Environmental and Social Monitoring Plan (ESMoP) has also been prepared and it outlines parameters to be monitored and the responsibilities of respective authorities.

Decommissioning

A preliminary decommissioning plan has been developed. The plan provides for the project removal to begin six months after closure and continue for six months. Within the first six months, DART Agency will take inventory of all components that need to be removed and/or disposed of and consult with relevant stakeholders on disposal and post project use of the site. The inventory will include building structures to be demolished or converted to other uses, machinery to be disposed of and chemicals including chemical waste to be disposed of, debtors and creditors to settle debt with. Also mode of disposal and identification of smelters of scrap metals will be finalized within this period. This information will assist in the preparation of the final decommissioning plan for approval by NEMC

Conclusion

The ESIA has identified significant negative impacts. Most of the negative impacts associated with the project can be mitigated using normal engineering practices and structural measures such as landscape or site treatment; engineering design such as construction of a sustainable drainage system; construction of new drainage system; dredging part of the Msimbazi River and expanding the culverts; provision of acceleration lane, in addition to traffic control system and installation of oil traps.

Other impacts can be mitigated using non-structural measures such as provision of economic incentives; implementation of relevant legal, institutional and policy instruments; provision of community services training, and capacity building with regard to identification of nature and severity of environmental impacts and respective mitigation measures. An Environmental and Social Management Plan and an Environmental and Social Management Monitoring Plan have been prepared to ensure the identified impacts will be mitigated and any unforeseen ones can be identified in due course and mitigated, as well.

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ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
BRT	Bus Rapid Transit system
CTCP	Central Transport Corridor Projects
CoET	College of Engineering and Technology
DART	Dar es Salaam Bus Rapid Transit System
DART Agency	Dar es Salaam Bus Rapid Transit Agency
DAWASCO	Dar es Salaam Water and Sewerage Company
EIA	Environmental Impact Assessment
ESMP	Environmental and Social Management and Mitigation Plan
ESMoP	Environmental and Social Monitoring Plan
HIV	Acquired Immune Deficiency Syndrome
IDA	International Development Association
JBD	Jangwani Bus Depot
MDA	Ministries, Departments and Agencies
NEMC	National Environment Management Council
PMO-RALG	Prime Ministers' Office – Regional Administration and Local Government
PMU	Project Management Unit
TANESCO	Tanzania Electric Supply Company
TOR	Terms of Reference
URT	United Republic of Tanzania
WEO	Ward Executive Officer

ACKNOWLEDGEMENT

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- The National Environment Management Council for reviewing the scoping report and approving the Terms of Reference.
- The Technical Advisory Committee and the World Bank for reviewing the draft EIS and providing useful comments which enabled the Consultant to clarify several issues.
- Dar Rapid Transit Agency chief executive, management and staff for entrusting him with this assignment and their cooperation and valuable inputs during the site visits, for providing information and reviewing the drafts.
- All stakeholders as listed in Appendix B are also acknowledged for their invaluable comments, information and data.

1.0 INTRODUCTION

The Tanzania Prime Minister's Office – Regional Administration and Local Governments (PMO-RALG) through the Dar Rapid Transit Agency (DART Agency) intends to develop a Bus Depot at Jangwani flood plain area along Morogoro Road, Ilala Municipal, Dar es Salaam as an integral part of the Dar Rapid Transit System (DART).

One of the major challenges facing large cities in developing countries is trying to cope with service provision for rapidly expanding urban populations amidst dwindling resources. Swelling population creates problems of urban sprawl into unplanned areas of cities where there is little or no road infrastructure and public services. With economic development car ownership grows, making it impossible to provide roads and parking space for so many cars.

Municipal governments in these major urban centers are required to mobilize significant resources for infrastructure and services for efficient movement of people and goods. Large populations demand transport services, which can only be provided by well organized and managed public infrastructure and service. Despite these facts public transportation has been relegated in government priorities.

The upshot is that urban transport has become a very sensible social problem in many cities because governments have left the market run out of control, allowing too many operators without adequate regulation. Low fares and lack of organization have created serious antagonism between the interests of the user and the operator.

The rationale behind the proposed Dar Es Salaam Bus Rapid Transit System branded Dar Rapid Transit (DART) is the serious public transport problem facing Dar Es Salaam caused by lack of safe road infrastructures that endanger both motorized and non-motorized transport users including pedestrians and small obsolete passenger vehicles operating without control. As a result there is unreliable service with astonishingly low levels of quality.

Meanwhile, the minimal investment engaged by operators, explain the proliferation of small vehicles (Daladalas). A greater number of small buses are necessary to transport the same amount of passengers. Allied to small fares, the obvious consequences are overcrowded vehicles and congested roadways.

The purpose of the DART Project is to regulate urban transport through a specialized infrastructure known as Bus Rapid Transit (BRT) that has been tested in other cities over the last 25 years. BRT is a bus-based mass transit system that essentially follows the performance and characteristics of a modern rail-based transit system but at a fraction of the cost. It consists of a corridor of exclusive and segregated lanes, high capacity articulated buses and high performance boarding with central platform for level boarding and large closed stations that allow fare payment outside the trunk vehicles. The proposed system can reach average speeds of 25 km/h.

The Jangwani Bus Depot – (about 75.000m^2 land space) will form a critical segment of the DART infrastructure that will provide spaces and facilities for the periodic maintenance, cleaning, fuelling and parking of 150 buses for the efficient running of the Bus Rapid Transit (BRT) system. The Depot is also expected to accommodate facilities for DART employees e.g. drivers, mechanics etc., including all necessary support facilities. An area for off-peak parking and a public parking is also part of the proposed design.

1.1 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REQUIREMENT

The Tanzania Environmental Management Act, Cap 191 requires that ESIA be undertaken for all new projects that may cause adverse environmental and social impacts. Under the Environment Impact Assessment and Audit Regulations, 2005 GN No.349 of 2005, construction works especially within ecological sensitive areas e.g. floodplain/wetland systems, are categorized as EIA obligatory projects, for which a full EIA is required.

DART Agency commissioned Prof. Jamidu Katima to carry out the Environmental and Social Impact Assessment study for the proposed Bus Depot and associated facilities and services. In fulfilment of the Tanzania EIA procedure the project was registered with NEMC and after screening it was found that the project requires EIA study. The ToR is included as Appendix A.

1.2 SCOPING

In June 2008, the team undertook a scoping study to identify significant impacts related to this project. NEMC vide its letter with Ref No: NEMC/179/1/Vol.24/15 dated 11th July 2008 approved the terms of reference). The ToR is included as ***Appendix A.***

Generally, Scoping exercise aimed at:

- To ascertain key issues that are likely to be important during EIA;
- To identify and involve key stakeholders in the EIA process by expressing their views and concerns;

Specifically

a) To identify project alternatives;
b) To identify EIA study boundaries;
c) To identify information requirements;
d) To develop effective methods for carrying out EIA study, particularly information collection; and
e) To defining the terms of reference for the EIA study.

1.3 OBJECTIVES OF THE ENVIRONMENTAL IMPACTS STUDY

Development of a Bus Depot, which involves space for bus maintenance, cleaning, fuelling and parking; offices for some DART staff e.g. drivers, mechanics etc. falls under the mandatory list of projects that are required by the Environmental Management Act Cap 191 to develop EIA. Part IV of the EIA Regulations G.N. No. 349 of 2005 provides the general objectives for carrying EIA. Among others the following are main objectives:

- To ensure that environmental considerations are explicitly addressed and incorporated into the development of the project.
- To anticipate and avoid, minimise or offset the adverse significant biophysical, social and relevant effects of developmental proposal.
- To protect the productivity and carrying capacity of natural systems and ecological processes.
- To promote development that is sustainable and optimizes resources use and management opportunities.
- To establish impacts that are likely to affect the environment before a decision is made to authorize the project.
- To enable information exchange, notification and consultations between stakeholders.

Consequently, Dar es Salaam Bus Rapid Transit Agency undertook Environmental Assessment so as to decipher the principles of sustainable development and environmental protection into strategies and actions that can be practically applied to the proposed Bus Rapid Transit System Project.

1.4 METHODOLOGY OF THE STUDY

This study followed procedures stipulated in the Environmental Impact Assessment and Audit Regulations, 2005. The study was done partly as a desktop study involving review of literature and by field reconnaissance at the project site in Jangwani area located in Ilala District, Dar es Salaam City to gather information and data on various aspects of the project site as well as consultations with key stakeholders. Consultations with key stakeholders intended to collect their concerns so that they are addressed by the EIA and subsequently by the project designs and project implementation. The study adopted the following approach

1.4.1 Consultations with Stakeholders

Identification of key stakeholders

Roles as well as relevance, to the proposed project, were used as a basis for identifying key stakeholders. Given the nature of the project, three main groups of stakeholders were predetermined: (i) Government officers and technocrats at all levels, i.e. Ministries, Departments and Agencies (MDA) and Local Government (ii) professional groups including academia and research institutions, environmental/natural resources conservation (iii) the general public, interested groups, affected groups and individuals (current users of the project area and residents in nearby areas). The following are *stakeholders consulted:*

- Prime Minister's office-Regional Administration and Local Government
- Ministry of Lands, Housing and Human Settlements Development
- Vice President's Office- Director of Environment
- Ministry of Natural Resources and Tourism
- Ministry of Information, Culture and Sports
- National Environmental Management Council
- Ministry of Infrastructure
- Ministry of Water and Irrigation
- Regional Commissioners' office
- Dar es Salaam City Council
- Ilala Municipal Council*
- Kinondoni Municipal Council
- Ward Executive Officers of Jangwani and Mchikichini Wards.
- Msimbazi Bondeni Sub-ward
- Idrissa Sub-ward
- Mtambani B Sub-ward
- Ruvu/ Wami Basin Office
- Ardhi University University of Dar es salaam-College of Engineering and Technology
- Dar es Salaam Water Supply Company (DAWASCO)
- Dar es Salaam Water and Sewarage Authority (DAWASA)*
- Lawyers Environment Action Team(LEAT)
- Tanzania Association of Environmental Engineers(TAEEs)

1.4.4 Field Data / Information Collection

This involved visiting all sites earmarked for different project components and activities. The Consultants were accompanied to the sites by the DART Agency staff. Field surveys were done to capture a broad picture of the prevailing situation on the site. This included:

- Appraisal of physical and environmental conditions of the project site and areas that may be impacted by/influence the Bus Depot project – climate, topography, soils, drainage/hydrology, flora, fauna etc.
- Appraisal of adjacent land use, alternative sites for the depot and assessment of other relevant socio-economic parameters.
- Detailed project description.

1.5 REPORT STRUCTURE

This report is organized in twelve chapters. Chapter 1 gives a general background to the study; Chapter 2 deals with the project background and description; Chapter 3 gives a description of policy, administrative and regulatory framework within which the project will operate; and Chapter 4 presents the baseline or existing conditions of the project site. Chapter 5 presents the findings from Stakeholders' consultations.

Chapter 6 presents the assessment of environmental and social impacts and identification of alternatives for the project and project operations. This chapter presents an assessment of aspects of the project that can cause environmental and socio-economic impacts. The chapters also determine the extent of the impacts and evaluate the significance of each in terms of defined criteria. Sources of both negative and positive impacts are presented. This is followed by impact quantification. Mitigation measures are provided for impacts considered to be of medium or high significance.

Chapter 7 gives details of mitigation measures which are summarised in Chapter 8 as Environment and Social Management Programme (ESMaP). Chapter 9 presents the Environment and Social Monitoring Programme (ESMoP), Chapter 10 discusses cost benefit analysis, while Chapter 11 presents an initial decommissioning plan. Chapter 12 provides conclusions and recommendations of the project.

2.0 PROJECT BACKGROUND AND DESCRIPTION

2.1 BACKGROUND

The Government of the United Republic of Tanzania through Prime Minister's Office intends to apply part of its credit from International Development Association (IDA) towards the cost of Second Central Transport Corridor Projects (CTCP-2) and intends to apply part of the proceeds of the Credit to cover eligible payments under the contract for construction of works of phase 1 of Dar Rapid Transit Project (DART). The project capital total is USD 132 in which USD 122 million will come from the World Bank loan while USD 10 million will be contributed by the Government of the United Republic of Tanzania. The life span of the project is estimated to be 20 years.

2.2 PROJECT RATIONALE AND OBJECTIVES

The rationale behind the proposed Dar Es Salaam Bus Rapid Transit System branded Dar Rapid Transit (DART) is the serious public transport problem facing Dar es Salaam caused by lack of safe road infrastructures that endanger both motorized and non-motorized transport users including pedestrians and small obsolete passenger vehicles operating without control. As a result there is unreliable service with astonishingly low levels of quality.

Meanwhile, the minimal investment engaged by operators, explain the proliferation of small vehicles (daladalas). A greater number of small buses are necessary to transport the same amount of passengers. Allied to small fares, the obvious consequences are overcrowded vehicles and congested roadways.

The purpose of the bus rapid transit is to regulate urban transport through a specialized infrastructure known as Bus Rapid Transit (BRT) that has been tested in other cities over the last 25 years. BRT is a bus-based mass transit system that essentially follows the performance and characteristics of a modern rail-based transit system but at a fraction of the cost. It consists of a corridor of exclusive and segregated lanes, high capacity articulated buses and high performance boarding with central platform for level boarding and large closed stations that allow fare payment outside the trunk vehicles. The proposed system can reach average speeds of 25 km/h.

The overall objective of project is to introduce affordable mobility, improve quality of urban environment and in particular the quality of life of low income urban population majority of whom depends on public transport.

The specific objectives of Dar es Salaam BRT system are:
- To **increase the level of mobility** of the majority of residents enhancing their participation in a wide range of economic and social activities,

- To **facilitate the use of Non Motorized Transport** (NMT) by improving service roads and implementing parallel bicycle routes allowing for integration of bicycles and the bus system and for reduction of congestion in the carriage way,

- To **meet the continuous increase of travel demand** of the city, and
- To **have a comfortable public transport system** at reasonable cost to the users and yet profitable to the operators, using quality high capacity buses which meet international service standards, environmentally friendly, operating on exclusive lanes at less travelling time.

The proposed construction of a bus depot is one of the essential components of the proposed Dar es Salaam Rapid transit project under establishment. This facility will consist of maintenance areas and parking lots for 150 buses. An area for off-peak parking and a public parking is also part of the proposed design that will enable smooth operation of the bus system.

2.3 SITE DESCRIPTION

The site is adjacent to the Kajima Construction Company main base to the west, Morogoro road on the North East, the Jangwani playground and open area for public meetings to the East and an open area of natural vegetation on the South. Msimbazi River pass through the area and a bridge is located about 50m to the north. The residential houses are located relatively far from the site approximately 500 metres and separated from the site by Kajima plot. A total land size required for construction of bus depot facilities is about 7.5Ha. The area will be divided as follows:

- Bus deport only will cover 3.6 Ha
- Peak Parking Area will cover 2 Ha
- Public parking, Ablution facilities and reserved area for future development is 1.9 Ha.

Site Acquisition and Ownership

The site on which the project is to be implemented is an area earmarked for non residential use except for day time events such as worship gatherings, public meetings etc. Because of this, the government through the Ministry responsible for lands administration allotted the area to the Ministry of Sports and Cultural Development so as to plan to develop part of the area into recreational facilities such as a stadium. However, according to the Principal planner in the Ministry of Lands there is no detailed land use plan to guide development in the area.

The developer secured land for the bus depot at Jangwani area after submitting request through consultations and negotiations with the Prime Minister's Office-Regional Administration and Local Government (***Appendix F***). The Agency in collaboration with the local government authorities of Dar es Salaam are working towards securing permanent sites at the corridor ends to ensure sustainability of the system as it expands city-wide. The Government of Tanzania will be requested to facilitate development of the new depot before the closure of business at Jangwani area.

The developer intends to develop a depot at the site ensuring that development of the entire area is achieved through a participatory and collaborative manner with all stakeholders. This project will occupy an area which is approximately 10% of the usable valley area. This means that other significant developments such as the proposed stadium will remain as proposed by other public institutions. The physical, biological characteristics and socio-economic setting of areas that constitute core areas are described in details in Chapter 4.

Core Areas

The core areas for the project include:

- 600m x 120m area for constructing the bus depot facility.
- An access road to the depot: this is an earth track that turns off the Morogoro road just before the Msimbazi river bridge.
- The borrow pit situated at Boko (or Kigamboni) about 30km (or 45km) from which the fill material for the site will be sourced
- Road network between the Boko/Kigamboni borrow pit and the site.

- The quarry at Msolwa about 160km from which the construction aggregates will be sourced
- Access road between Msolwa borrows pit and the site.

The Area of Influence

The Area of Influence includes all areas that are likely to be affected by the project's direct or indirect impacts. The environmental and socio-economic influence of the project is anticipated to extend beyond the project boundary. Specifically during construction phase, dust and noise may affect residential houses along the roads that will be using by trucks carrying construction materials. During operation, fuel and oil spill from maintenance area, water discharge from the depot may affect aquatic environment on the flood plain of Jangwani and downstream to the Indian Ocean. The area of influence includes sections of the Jangwani flood plain upstream and down- stream of the site.

Design of the Depot

According to current design plan/project concept, the Jangwani Bus Depot will constitute several buildings, which will perform different maintenance and support functions. The design will provide spaces, which will be flexible enough to suit any necessary changes in the design or dimensions of spaces. Therefore most of the functions will be located beneath a high roof with columns placed in a modular sequence. These buildings are as follows:

Main maintenance building

The main building will house the main workshop and offices for the maintenance management, with all conveniences and support facilities. This building covers a built up area of 6,829m^2 and houses the following functions; storage room, parts cleaning area, pump repair area, maintenance repair area , battery room, electrical repairs room, parts painting room, panel beating room, tyre repair section, office areas, toilet and changing facilities, external painting cabin, bus cleaning section and oil changing area.

Generator and air pressure station house

This building will consist of a generator and air compressor housed in one building but separated with a 230mm wall. The generator room is designed to accommodate a containerized generator set so as to reduce noise pollution.

Visual inspection shade

This shade is where the bus will receive first inspection on issues regarding; control of odometer, filling format for informing maintenance staff on condition of the bus, external verification of problems, verification of equipments functioning, state of floor and seats, seats of windows and general vehicle.

Fuelling shade

This shade is designed to accommodate 3 fuelling buses at the same time.

Gate house

This is to house the security personnel who will control movement in and out of the Depot

Administration buildings

In the designs the administration building is a 3 - floor building with a circular front façade. It is designed to accommodate the restaurant and staff canteen, administration offices, drivers and restaurant changing facilities and drivers seating areas.

Layout of the Jangwani Bus Depot and other facilities is as shown in the figure below and ***Appendix G***.

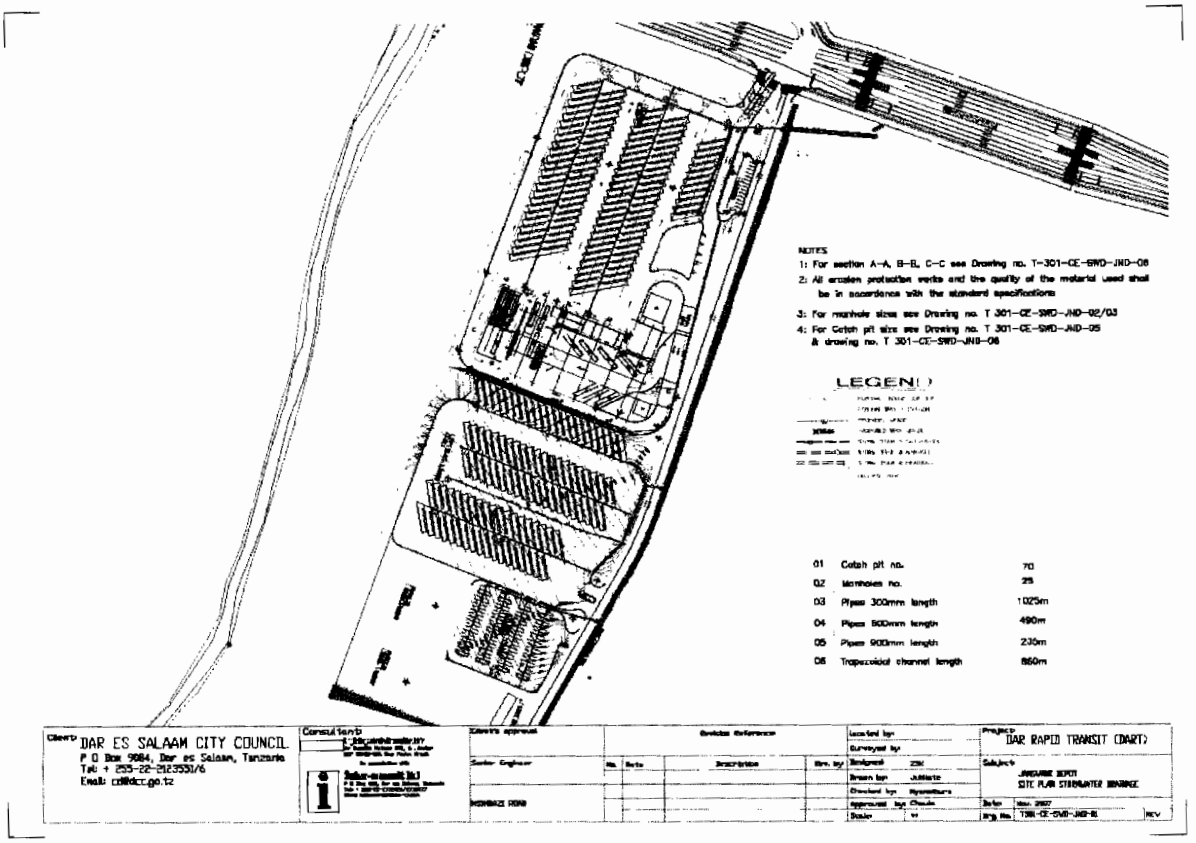


Figure 1: Layout of the Jangwani Bus Depot and other facilities

Design specifications

Capacity - 104 buses to be accommodated in the parking area, 6 buses in the maintenance pit and 4 in the pit-less maintenance area. 2 buses can be accommodated in the oil maintenance area and 4 buses at a time in the cleaning area. 3 buses can fuel at a time.

Headroom - Minimum headroom provided for the bus maintenance area is 6.5m from the road level, while the storage area will also have maximum headroom of 6.5m.

Number of employees - The Depot is designed to accommodate 25 maintenance staff, 200 drivers during the whole day but 30 drivers at a time. The restaurant can accommodate 90 persons at a time and 200 persons in the office space provided.

Hours of usage - It is assumed that the Depot will be in use from 04:00hrs to 02:00hrs depending on the Bus operator. Thus adequate provision has been made to internal and external lighting.

Bus design - The buses to be used for DART shall be articulated buses with 900 mm floor deck height from the level of the road at the entrance. The design height of the bus is 3.05, width of 2.5 and length of 18.0m.

Space Schedule

Table 1 to Table 4 show a schedule of the spaces accommodated in the buildings of the depot.

Table 1: Administration building

Facility	**Area (m^2)**
Restaurant	136
Changing Facilities	99
Admin Offices	527
Total [inclusive circulation]	895

Table 2: Main maintenance building

Facility	**Area (m^2)**
Storage	391
Parts cleaning	37
Maintenance room	184
Pumps repair room	62
Battery room	60
Electrical room	46
Parts painting room	37
Tyre repair	66
Panel beating room	84
Washroom	90
Offices area	777
Total [inclusive circulation]	6829

Table 3: Generator building

Facility	Area in m^2
Generator room	30
Air Pressure room	30
Total	60

Table 4: Visual inspection shade

Facility	**Area in m^2**
Inspection shade	211
Inspectors office	7
Total	218

Material schedule

Construction materials for the depot have been carefully chosen to comply with durability needs, low maintenance, aesthetics and functional requirements etc. Materials such as sand, stone, aggregates, pavement, cement, sanitary ware and steel will be procured locally and no hazardous substances will be used. Table 5 shows the primary materials to be used on the project.

Table 5: Materials of construction

BUILDING COMPONENTS	MATERIALS
Floors	300 x 300 x 12mm Porcelain Tiles for office areas and heavy duty unglazed 200 x 200 x 14mm Porcelain Tiles for wet areas within the workshop and Heavy duty Industrial porcelain tiles for workshop areas.
Walls	Block wall painted with mouram coating/glass mosaic finish
Doors	Toughed glass swing entrance doors in the administration block, while Roller shutter doors for the main Depot building
Windows	Fixed 8.38mm thick PVB laminated Safety glass with Tinted interlayer on Natural Anodized Aluminium frames.
Ceiling	Suspended "Luxalon" ceiling and 12mm gypsum ceiling in office areas.
Roof	"Hullet Aluminum hula — span A7"color coated roof covering to Steel "Z"purlins with reinforced concrete slabs

Structural engineering design

Based on the architectural design layout of the terminal, the main depot building has been designed as a reinforced concrete structure roofed Zink alum sheets on structural trusses.

Concrete grade 30 will be used for all structural work i.e. foundation bases, columns, beams, slabs and reinforced concrete staircase in the building. Concrete grade 15 will be used for block wall strip footings and concrete grade 10 will be used for blinding work only. Ground floor slab shall be constructed in accordance with specifications for external road pavement.

Reinforcement shall be high tensile of grade 460 for all main bars while mild steel grade 250 has been specified for links.

Structural steel of grade 43 conforming to BS 4848 hot rolled will be used. The Structural steel section has been specified for all structural works. Bolts grade 8.8 conforming to BS 4190 have generally been specified.

Design Philosophy

As mentioned above, the main building is a combination of framed reinforced concrete structure and structural steelwork.

- Design of concrete is based on BS 8110 Part 1 Structural use of concrete, code of practice for design and construction.
- Design philosophy adopted is limited state design, which is considered less than two limit states namely ultimate limit state and serviceable limit state.
- Structural design of roof structural steelwork is based on BS 5950-1-2000 Code of practice for design of rolled steel and welded sections. Steel of grade 43 has been specified in accordance with BS 4848.

Structural Analysis and Design

Design loads adopted for structural work in the whole design are;

- Dead and imposed loads in accordance with Reinforced Concrete designers handbook table 2- table 11
- BS 6399 Part1- Loading to Buildings; Code of practice for Dead and imposed load
- BS 6399 Part 3- Loading to buildings: code of practice for Imposed load roof loads
- BS 6399 Part 2 –Loading to buildings: Code of practice for wind loading.

Other off-site works

Access roads:

This refers to any new access or improvement of existing roads. Main access for consideration include the route to be used by buses to access the depot: this is an earth track that turns off the Morogoro road just before the Msimbazi river bridge. Access to borrow pits will be through existing roads such as Morogoro and Bagamoyo.

Sites for sourcing fill materials and Borrow pits

The precise amount of filing materials cannot be determined precisely at this stage. But knowing that this is flood area, and that relatively heavy truck will be plying the area, a very strong base, will be needed. The project has conducted a geological survey of the area. This study will enable precise assessment of the quantity of filling materials requirement during EIA. However, assuming that on average the filling will be done for 1.15 meters the about of excavated material shall be approximately 86,250m^3. Most of the area will get levelled using cut and fill principle after the top soil (about 15-20cm deep) has been hauled to spoil. As such the quantity that will be obtained from borrow pits i.a about 71,250m^3.

Sites for of disposal of removed soils

Most of the soils will be used to level the site using cut and fill principle after the top soil, about 15-20cm deep, which will be hauled to spoil.

2.4 MOBILIZATION PHASE

During mobilization phase the a number of activities will be conducted including: set up land acquisition issues for construction of the depot facilities; Campsite preparation, pavement of access road; identification of sources of standard construction materials; depot designing; preparation of the contractor's campsite; transportation of the machines and materials to the site; identification of the types and amounts of the properties likely to be affected such as crops, structures, vegetation, water sources and so forth; and arrangement for compensation of properties to be affected. Mobilization activities will take place within 8 months before commencement of the actual construction activities.

Mobilization of Construction Equipment

The contractor will bring to the site all the required equipments for depot construction as early before the actual construction started. These equipments will include the following:

S/N	Type	Quantity	Function	Duration (Month)	Source (Hire, Contractor etc)
1	Excavator	1	Mobilization	8	Contractor
2	Wheel loader	1	Mobilization	8	Contractor
3	Trucks	5	Mobilization	8	Contractor

Water supply

Water to be used during mobilization phase will be obtained from DAWASCO water supply.

Energy

The contract will use generator for electricity generation during mobilisation phase. When possible electricity provided by TANESCO will also be utilized.

Local supplies and services (food, medicals, fuel, water etc.)

Food supplies will be from the local suppliers. Medical services will outsourced from nearby dispensaries, health centres and/or hospitals. Fuel will be supplied from local vending stations in town and water will be from DAWASCO.

Other facilities

A temporary and contractor's office will be built on the site, preferably a container made office for easy removal during demobilization. Toilets for construction workers will also be built on site.

Waste disposal

Liquid and various types of solid waste that will be generated will require proper handling.

Others will include fuels from machines and vehicles.

Solid wastes will include paper, plastic bags, packing materials for spare for vehicles and other equipments.

2.5 CONSTRUCTION PHASE

Construction Activities

All construction activities will be the responsibility of the Main Contractor. DART Agency will be represented by the project Consultant. Construction activities will be done within two (2) years. Construction will be according to requirements of main project component using conventional civil works, engineering scheduling, procedures and practices.

During construction phase, the project will involve significant earthworks including excavation for site preparation, extraction of construction materials, soil moving and compacting, channelling of effluents and storm water ways, site clearance, levelling, resurfacing, landscaping, construction of access roads.

Site preparation

Site preparation activities will involve clearance of vegetation, removal of top soil by using motor grader machine. Approximately 1.15m over the entire area of 75,000m^2 of land will be cleared. This will generate about 71,250m^3 of spoil material which will be used as fill materials after removing the top soil.

Foundation

The foundation will be based on a bearing capacity of 150KN/m^2. Mostly pad footings will be adopted for foundations. Works will involve: excavations, shaping and sizing, importation of foundation material and spreading, watering and compaction.

Fabrication erection and construction

The design of the depot is based on normal concrete construction cast in situ using normal formwork and scaffolding, it is expected to be simple and fast if the contractor will have advanced proprietary formwork. Connections for structural work in the roof construction are mainly welding of roof trusses in the workshop with very minor welding in the field while

connections in the field during erection, bracing and tying of the roof trusses will be by bolting. High quality primer shall be applied on the trusses in the workshop followed by final two coats of painting, which has been specified for corrosion protection of the roof structure.

Levelling, resurfacing and pavements

All the area that will be used for parking 150 buses will be paved by interlocking concrete stones. Since the volume of material required is so big, the contractor shall acquire block making equipment and produce bricks on site.

Landscaping

Some areas inside the project site will be graded, drained, gravelled and planted trees other vegetation as appropriate. Unoccupied spaces will be landscaped.,

Transportation

The materials from the borrow pits will be transported by trucks to the construction site. Most construction machinery is available locally.

Storage

Materials will be used immediately after delivery i.e. no piling up is expected. On site workshop will be within the project area, storage of materials to be used for construction, services bay and repair facilities will be within the project area.

Waste generation and management

Depot construction activities will involve generation of both liquid and various solid wastes which will require proper handling in order to avoid contamination in the ecosystem. Liquid waste to be generated will include effluents from toilets, wastewater from construction activities, storm water, used oils and fuel from operating machines and vehicles.

Sites for disposal of removed soils: Most of the soils will be used to level the site using cut and fill principle after the top soil, about 15-20cm deep, which will be hauled to spoil.

Construction of Access Road

An access road of 1 km from bus depot to Morogoro Road and nearby community will be constructed. The Channelization at the Junction of Morogoro Road with access road will done.

Sources of Construction Materials

The project will require various standard construction materials including gravel, aggregates, sand, cement, steel structures, bitumen and water.

Type of Material	Source
Gravel	Mjimwema, Amar Borrow pit; Minaki Borrow pit; Kimani Borrow pit; Bunju Moyofoka; Bunju A; and Kifaulongo
Hardstone	Mjimwema quarry; Lugoba Quarry; and Kunduchi Quarry
Sand	Donge mkuranga Sand pit; Chamanzi; Mpiji River; and Mikwazumbe
Granite aggregate	Ex-Msolwa
Ordinary Portland Cement	Portland cement factories in Dar es Salaam
Structural steel	Metal and steel factories in Dar es Salaam
Bitumen	Dar es Salaam

Equipment and machinery

The project will employ a number of construction equipment as shown in Table 6 below. At the quarry site and borrow pits, the materials will be excavated using excavator and wheel loader machine and loaded into trucks.

Table 6: Construction equipment

S/N	Type	Quantity	Function	Duration (Month)	Source (Hire, Contractor etc)
4	Excavator	1	Construction	8	Contractor
5	Wheel loader	1	Construction	8	Contractor
6	Trucks	5	Construction	8	Contractor
7	Motor grader	1	Construction	8	Contractor
8	Compactor	1	Construction	8	Contractor

Water supply

Water to be used in construction activities will be obtained from DAWASCO water supply.

Energy

During construction phase the contract will use generator for electricity generation. When possible electricity provided by TANESCO will also be utilised.

Manpower

Construction work will be done by the contractor who will employ approximately 40 workers.

2.6 PROJECT OPERATION AND MAINTENANCE

Activities associated with operation phase will include cleaning of vehicles, maintenance and fuelling. The project will operate in 15 years after two year of construction period.

Project Requirements

During operation phase the project will require the following:

Water Supply
The water supply source for DART Bus Depot Project will be from existing DAWASCO mainlines available in the Project area. Jangwani Bus Depot will be supplied from existing DAWASCO mainline via 75 mm diameter G.S pipe to fill the receiving underground tank with capacity of 185m^3. Then the water will be pumped to the overhead tank on administration block with capacity of 28m^3 (will supply water to administration building) and two overhead tanks with total capacity of 37m^3 will be installed on the main building (will supply water to the main building and the bus cleaning area).

Power Supply
Electricity will be obtained from TANESCO and will be backed up by a standby generator

Occupancy capacity
During operation the depot is expected to accommodate 25 maintenance staffs, 200 drivers during the whole day but 30 drivers at a time. The restaurant can accommodate 90 persons at a time and 200 persons in the office space provided.

2.6.1 Management procedures

Liquid Waste Management
The sanitary drainage system for Jangwani Bus Depot will be connected to the existing central sewer system at the nearest possible point as a means of sewerage treatment and disposal.

The drainage system has been designed to allow adequate circulation of air within the system, thereby preventing the danger of siphonage or unsealing of trap seals under normal working conditions. The system will have a venting system to get rid of foul gases. Sewerage or wastewater from the plumbing system will not be discharged in subsoil or in any waterway unless it has first been rendered harmless by an acceptable form of treatment.

Effluents and waste pipe systems:
A single stack system will be used which will eliminate the anti-siphon age pipe in the one pipe system. To be effective it will be used in buildings having normal domestic flow. Where used the toilets fixtures will be grouped together around a shaft to provide short and easy connections and as far as possible the fixture layout will be repetitive vertically.

Oil separator and grease trap will be provided in the bus cleaning area. The grease entering the trap will be congealed by the water and periodically removed by lifting the perforated tray. The separated oils will be burnt in furnaces or boilers. An access points will be provided at the each charge of direction or gradient, at the junction, at change of pipe size, at the highest point of the drain. The distance between manholes will not exceed 90 m.

Solid Waste Management

Solid waste collection chamber will be constructed for collecting all sort of solid waste generated from offices, restaurant, and depot. Such solid wastes will include used papers,

containers, garbage, wrappers, packaging materials, tyres, metals, and wood materials. Solid wastes from collection point will be transported to the authorised dumping sites to be disposed of according to the existing Ilala Municipal Council requirements

Health & Safety measures

There will be first aid units at the DART Depot, which will serve minor health treatments for workers, and emergency cases. The major cases will be referred to nearby government hospitals, health centres and dispensaries.

Security

The DART Depot will have maximum-security measures such as a solid brick fence and containment fence 2.5 m in height around the area. Also there will be full time security at main entry and exit points. Usual security measures used by Ilala Municipality will add security to the bus depot.

Emergency services

The project will install fire-fighting facilities such high-pressure water horse, fire extinguishers and fire blankets. Furthermore the project will use fire services existing in Dar es Salaam, e.g. Fire Brigade (which less than one kilometre away), the Dar es Salaam International Airport fire brigade services, The Tanzania Harbour Authority fire services and private companies such as Knight Support.

2.6.2 Project Overall Management

After testing and commissioning of the project components, the project will be operated by the DART Agency. During the guarantee period as shall be specified in the contracts, it will be the responsibility of the contractor to rectify all problems as per the agreement.

Environmental Management

The developer will assign one environmental management staff to do day-to-day environmental monitoring and report to the management. Overall, periodic audits will be done by NEMC according to the approval conditions of certificate as specified by the EIA and Audit Regulations, 2005.

2.7 DEMOBILIZATION PHASE

Demobilization phase for the bus depot construction activities will include movement of equipments and machines from the site, demolition of construction facilities, restoration of all excavation on site, termination of the construction contract and removal and disposal of all waste accumulated on site.

2.8 DECOMMISSIONING PHASE

After 20 years of project operations at Jangwani area the bus depot will be closed and the infrastructures such as public toilets, parking lots and administrative block will be handed over to Ilala Municipal Council for other use. Other activities associated with closure of the project operations will include relocation of bus deport to another site, refubrication of bus maintenance area into parking yard to discourage possibility of turning the area into a garage. All project employees will be transferred to the depot with operator. Wastes generated during decommissioning will be disposed off to the authorized dumping sites. Fuel tanks and filling machines for the depot will also be removed to avoid turning the area into a fuel filling station. Generally decommissioning will be done according to procedures prescribed in Chapter 13.

3.0 RELEVANT POLICY, LEGAL AND INSTITUTIONAL ASPECTS

3.1 INTRODUCTION

Design, construction/mobilization, operation and final decommissioning of the Bus Depot will have both positive and negative impacts on the ecology and social environment. These impacts need to be addressed so that the envisaged operations do not unnecessarily cause detrimental social and environmental impacts, and also to ensure that they are in line with policies and/or legal regime operating in Tanzania. Furthermore, there are international agreements and/or conventions, to which Tanzania is a Party, which also need to be considered during project construction and operation. The following sections discuss Tanzania national and sectoral policies, legislation and institutional framework, which are relevant to this project.

3.2 NEED FOR ENVIRONMENTAL IMPACT ASSESSMENT

Environment Impact Assessment is an important planning tool which is used to facilitate and promote sustainable development by integrating environmental conservation and management in the decision making process. As such, most sector policies and legislation have incorporated the requirement of undertaking EIA in designing and implementing development project. The purpose of EIA is to evaluate the environmental and related social implications (negative and positive) of carrying out a development project. Such an evaluation can then be set alongside socio-economic objectives of the proposal in order to make balanced decisions.

3.3 RELEVANT POLICIES

Clarifying relevant policies is important in setting boundaries for the EIA in line with national interests and future prospects. The following are relevant sectoral and cross – sectoral policies which stipulate the need for EIA and provide directives on how projects should be operated in Tanzania. The project proponent will need to observe these policies in the course of designing and implementing the proposed project activities.

3.3.1 National Environmental Policy (1997)

The National Environment Policy provides a framework for environmental protection in Tanzania. The policy requires that project development be done in a way that it does not compromise the environmental integrity. It stipulates that the chosen technologies should be environmentally sound, socially acceptable and economically viable. Relevant provisions of this policy to DART Bus Depot operations are:

a) Sections 28 and 29, which states that in all projects, environmentally sound technologies (i.e. those that generate no or low waste or protect environment) should be used.
b) Section 48 (c), which advocates for technologies that use water efficiently, provides wastewater treatment.
c) Section 56 (f), which states that workers' health shall be adequately protected from environmental health hazards.

DART Agency shall comply with all of the above and other relevant provisions.

3.3.2 The National Land Policy (URT, 1995)

The National Land Policy advocates for the protection of land resources from degradation for sustainable development. Among other things the policy requires that project development should take due consideration the land capability, ensures proper management of the land to prevent erosion, contamination and other forms of degradation. Important sections of the policy relevant to the Developer are 2.4 (on use of land to promote social economic development), section 2.8 (on protection of land resources) and section 4 (on land tenure). DART Agency shall observe these provisions.

3.3.3 The National Human Settlements Development Policy (2000)

One of the objectives of National Human Settlement Development Policy (2000) is to protect human settlements, the environment and embedded ecosystem thereof from environmental pollution, environmental degradation and destruction of loss of biodiversity in order to attain sustainable development. The planning of the proposed Bus Depot shall observe this requirement.

3.3.4 National Water Policy (2002)

The National Water Policy (NAWAPO) calls for the adoption of holistic basin approach integrating multi-sectoral planning and management to minimize negative impacts on water resources development to ensure sustainability and protection of the environment. NAWAPO recognises the following, among others:

- There is a growing scarcity, misuse and wastage of water resources in many places of Tanzania, which may become a serious threat to sustainable availability of the resource.
- That uncontrolled abstraction of water resources from different water basins is taking place.

NAWAPO requires the developer to observe judicious use of water by putting in place water conservation measures.

DART Bus Depot project intends to use, relatively, small amount of water - about 150m^3 of water per day during construction and 36 – 45 m^3 per day during operation, mainly for bus cleaning and washing. Nevertheless, the company intends to put in place water conservation measures, for example using high pressure washing nozzles, which use relatively less water.

3.3.5 The National Construction Industry Policy (2003)

This policy promotes among other things, application of cost effective and innovative technologies and practices to support socio-economic development including utilities and ensure application of practices, technologies and products which are not harmful to both the environment and human health. This EIA is undertaken to ensure that the project proponent uses technologies, materials and products not harmful to both the environmental and human health by providing appropriate mitigation measures.

3.3.6 The National Transportation Policy (2003)

The policy aims at guiding the development of an efficient, well integrated and coordinated transport infrastructure and operations, which are economically financially, socially and environmentally sustainable.
Relevant sections of the policy are:

ii) 2.6.1 - which recognises that road accidents are on the increase due to non-adherence and enforcement of rules and regulations. And that environmental problems (noise, air, water pollution) are on the increase due to traffic congestion
iii) 4.1.1 (vi) on the intention of the policy to facilitate sustainable development by ensuring all aspects of environmental protection and management are given sufficient emphasis at the design antidevelopment stages of transport infrastructure and when providing services
iv) 5.3.2.5 - which shows that the policy advocates for developing and operating mode of transport in urban centres on the basis of economic savings on fuel use, operation efficiency, including reducing traffic congestion, environmental protection and safety.

DART Agency is guided by these provisions in developing DART system.

3.4 RELEVANT LEGISLATION AND REGULATIONS

This section addresses the legal and regulatory conditions which are relevant to the proposed DART Bus Depot project. This EIA has been conducted in general compliance with these legislations in mind.

3.4.1 Environmental Management Act No. 20 of 2004

The Environmental Management Act No. 20 of 2004 seeks to provide for legal and institutional framework for sustainable management of the environment.

The Environmental Management Act No. 20 of 2004 mandates NEMC to undertake enforcement, compliance, review and monitoring of environmental impact assessment and facilitate public participation in environmental decision making. Among other things, The Act also requires the Council to determine whether the proposed project should be subjected to an EIA, approve consultants to undertake the EIA study, and invite public comments. The Council has the statutory authority to review EIS and recommend to the Minister for approval and issuance of EIA certificate. This new Act imposes an obligation on developers to conduct an EIA prior to the commencement of the project to determine whether the project may/or is likely to have, or will have a significant impact on the environment.

DART Agency has complied with relevant provisions of the Act in carrying out this EIA.

3.4.2 The Environment Impact Assessment and Audit Regulations, G.N. No. 348 and 349 of 2005

According to this regulation, the developer first registers the project, by submitting Form EA1 to NEMC, with outline details of the project and its likely impacts. The regulations advocate for periodic and independent reassessment and that the outcome of such assessment will serve to provide instructive feedback into the environmental management process. Environmental Impact Statement (EIS) is then submitted to the Technical Advisory Committee (TAC) coordinated by NEMC for review. The proponent shall meet the costs of the review. In carrying out this EIA, the requirements of these regulations have been observed.

3.4.3 The National Land Use Planning Commission Act No. 3 of 1984

The National Land Use Commission (NLUPC) was established under this Act as the principal advisory organ of the Government on all matters related to land use. Among other functions, it recommends measures to ensure that Government policies, including those for development and conservation of land are in harmony. It also takes adequate account of their effects on land use and seeks the advancement of scientific knowledge of changes in land use. It encourages development of technology to prevent, or minimize adverse effects

that endanger man's health and his/her welfare; it also specifies standards, norms and criteria for beneficial uses and maintenance of the quality of land.

In accordance with the functions mentioned above, the Commission can indirectly help to prevent or minimize pollution by restricting location of potential and actual pollution sources. The Bus Depot project is planned in accordance with the requirement of this Act.

3.4.4. The Urban Planning Act No. 8 of 2007

The objectives of this Act is to provide guidance on orderly and sustainable development of land in urban areas, to preserve and improve amenities; to provide for grant and consent to develop land and powers of control over the use of land. Relevant sections of the Act to this project include article 4 which elaborates on the objectives of urban planning Part IV which elaborates on the planning process. This part gives powers to the Minister to publish in the Gazette, declare any planned area. This means that the change of land use at the project site will have to be accommodating in the land plan of the Dar es Salaam City. Article 29 (3) requires EIA for developments that need planning consent. By conducting EIA DART has fulfilled this requirement. Part V of the Act is on purchase of land, acquisition and compensation. As far as this project is concerned necessary steps have been taken to respect the provision of this Act. However, compensation issues did not arise since there was no displacement.

3.4.5. The Local Government (Urban Authorities) Act No. 8 of 1982

This Act establishes urban authorities for the purposes of local government, to provide for the functions of those authorities and for other matters connected with or incidental to those authorities.

Section 55 of the Act enumerates basic functions of the urban authorities. The functions that are relevant to the DART Bus Depot Project are:

- to provide for the prevention and abatement of public nuisances or of nuisances, which may be injurious to the public health or to the good order of the area of the authority;
- to regulate any trade or business, which may be noxious, injurious to the public health or a source of public danger, or which otherwise it is in the public interest expedient to regulate, and to provide for the issue of licenses or permits to facilitate the regulation of any such trade or business, and for the imposition of fees in respect of such licenses or

Section 59 lists the powers of the Urban Authorities. The following powers are considered relevant to DART Bus Depot Project activities:

- to undertake the abatement of fire and the prevention of the spread thereof and for such purposes to enter any premises;
- to provide for the imposition and fixing of charges to be paid in respect of services rendered by the authority.

Section 80 of the Act empowers the urban authorities to set by-laws. DART Agency shall observe these and other relevant provisions in this Act.

3.4.6. The Occupational Health and safety Act No 5 of 2003

This deals with the protection of human health from occupational hazards. It specifically requires the employer to ensure the safety of workers by providing safety gear at the work place. Relevant sections of the ordinance to the project activities include Part IV which deals with general health provision, such as provision of regular medical examination of employees; safe means of access and safe working place; prevention of fire etc.; and Part V on health and welfare provisions, which includes provision of supply of clean and safe to workers, sanitary convenience, washing facilities and first aid facility. Section 50 deals with

fire prevention issues. Part III requires that the Project Proponent submits the drawing of the facility to the Chief Inspector

Section 15 gives powers to the Registrar of Factories and workplace to enter any factory or workplace to perform his duties as provided by the Act. Section 16 requires that factories and workplace should register with Registrar of factories and workplaces before commencing operations. DART Agency will observe the provision of this act during construction and running of the plant.

Part VI is dealing with special safety provisions for working places involving handling hazardous chemicals, hazardous processes or hazardous equipment.

3.4.7. The Land Act No. 4 of 1999

The Acts seek to control land use and clarify issues pertaining to ownership of land and land-based resources, transactions on land and land administration. Since the site was obtained legally by DART Agency and that the project does not displace other public uses the issue of conflicts do not arise and thus this is not discussed further.

3.4.8. Executive Agency Act No. 30 of 1997

Dar Rapid Transit (DART) Agency was established by GN No. 120 of 25th May, 2007 under the Executive Agency Act No. 30 of 1997 and its subsequent amendments. The key role of the DART Agency is to establish and operate the Bus Rapid Transit (BRT) system for Dar es Salaam. DART Agency aims at achieving the following objectives;

a) Establish and operate Bus Rapid Transit (BRT) system for Dar es Salaam;

b) Ensure orderly flow of traffic on urban streets and roads; and

c) Ensure effective Management of the Agency.

3.4.9. Local by-laws and restrictions

All cities, Municipals and Town Councils in Tanzania are allowed to form by-laws as provided for in section 55(2) and 80, of local Government (Urban Authorities) Act no.8 of 1982. This has been done by Dar es Salaam City Council whose by-laws address proper use of land and water to ensure public health is safeguarded.

3.4.10. The Roads Act No. 13 of 2007

This Act intends to provide guidance for road financing, development, maintenance and management. There are several Articles which need to be observed by the project throughout project life cycle. The following are some of such provisions:

(i) Part V is on road safety – it emphasise observance of speed limits. This will be necessary during construction and operation of the project.

(ii) Part VI provides guidance on constructing access roads from the main roads. This is relevant because DART will be constructing an access road. It will be necessary to work with TANROADS to make sure that this is in compliance with the Act.

(iii) Part VII is about restrictions on use of roads – this may be necessary during construction.

3.5 INTERNATIONAL AGREEMENTS AND CONVENTIONS

Tanzania is a Party to a number of Conventions. International agreements convention and treaties which are relevant to this project are:

3.5.1 Convention on Biological Diversity (1992)

Tanzania signed the CBD in 1992 and ratified it in March 1996, thereby committing to the conservation and sustainable use of biological diversity. The objective of the Convention on Biological Diversity (CBD; 1992) is to conserve biological diversity, promote the sustainable use of its components, and encourage equitable sharing of the benefits arising from the utilization of genetic resources (see *www.biodiv.org*). Article 8 of the CBD addresses in situ conservation, stating that each Contracting Party shall:

i) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;

ii) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings; and

iii) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application.

Article 6 provides general measures for conservation and sustainable use of biodiversity. Article 9 deals with ex-situ conservation strategies. Article 14 requires parties to carry out EIA on all projects and development in protected areas. As was reported in Sections 4.3.1 75% of the fauna in the area is grassland. This EIA study has established that there is no rare or endangered species on the site. However, whenever possible DART Agency shall conserve natural biodiversity by avoiding unnecessary land clearance and wetland drainage.

3.5.2 Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention) (1971)

The Convention on Wetlands is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975, and it is the only global environmental treaty that deals with a particular ecosystem. The Convention's member countries cover all geographic regions of the planet.

The Convention's mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.

Each Party to the Convention has a right to list its wetland to be included in the Ramsar List as stated in the Convention "*.....Each Contracting Party shall designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance, hereinafter referred to as "the List" which is maintained by the bureau [secretariat of the Convention] established under Article 8....*"

Wetlands included in the List acquire a new status at the national level and are recognized by the international community as being of significant value not only for the country, or the countries, in which they are located, but for humanity as a whole.

However, the Jangwani flood plains are not listed in the Ramsar List as such they do not have that status.

3.5.3 African Convention on the Conservation of Nature and Natural Resources, September (1968)

This covers measures for the countries, including Tanzania, Party to the agreement to conserve nature and natural resources and specifies rare and endangered species in specific areas of the continent. This EIA was carried out to identify if there is any rare or endangered species within the project site. The study identified none, refer to sections 4.3.

3.5.4 Other International Conventions Ratified by Tanzania

- ILO Convention: C138 Minimum Age Convention, 1973 (Ratified by Tanzania (United Republic of) on 16:12:1998) which prohibits Child labour. DART Bus Depot Management shall ensure no child is employed in its activities.
- ILO Convention: C148 Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (Ratified by Tanzania (United Republic of) on 30:05:1983) which protects Workers against Occupational Hazards in the Working Environment Due to Air Pollution, Noise and Vibration. DART Bus Depot Management shall ensure workers are protected against occupational hazards.
- ILO Convention: C182 Worst Forms of Child Labour Convention, 1999 (Ratified by Tanzania (United Republic of) on 12:09:2001). DART Bus Depot Management shall ensure no child is employed in its activities.

3.6 GUIDELINES AND STANDARDS

Following guidelines are considered to be relevant to the project and are discussed below:

3.6.1 World Bank Safeguards Policies (OP 4.00 2005)

The World Bank has developed a series of safeguard policies to help promote socially and environmentally sustainable approaches to development, as well as to ensure that Bank operations do not harm people and the environment. These safeguard policies include, among others, the Bank's policy on Environmental Assessment (EA).

The World Bank conducts Environmental Assessments (EA) of each proposed investment loan to determine the appropriate extent and type of environmental impact analysis to be undertaken, and whether or not the project may trigger other safeguard policies. The Bank classifies the proposed project into one of four categories (A, B, C, and FI) depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

The government is responsible for the assessments required by the Safeguard Policies while the World Bank is responsible for overall compliance with these policies.

While the objectives of these safeguard policies are many the following relevant objectives to DART Bus Depot Project.

2. To help ensure the environmental and social soundness and sustainability of investment projects.
3. To support integration of environmental and social aspects of projects into the decision making process.
4. To promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions.
5. To avoid or minimize involuntary resettlement and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

The safeguard policies also recommend operational principles. The following is a list of those principles the Consultant consider very key to this project.

a) Assess potential impacts of the proposed project on physical, biological, socio-economic and physical cultural resources, including transboundary and global concerns, and potential impacts on human health and safety.
b) Assess the adequacy of the applicable legal and institutional framework, including applicable international environmental agreements, and confirm that they provide that the cooperating government does not finance project activities that would contravene such international obligations.
c) Provide for assessment of feasible investment, technical, and siting of alternatives, including the "no action" alternative, potential impacts, feasibility of mitigating these impacts, their capital and recurrent costs, their suitability under local conditions, and their institutional, training and monitoring requirements associated with them.
d) Prevent and, where not possible to prevent, at least minimize, or compensate for adverse project impacts and enhance positive impacts through environmental management and planning that includes the proposed mitigation measures, monitoring, institutional capacity development and training measures, an implementation schedule, and cost estimates.
e) Involve stakeholders, including project-affected groups and local nongovernmental organizations, as early as possible, in the preparation process and ensure that their views and concerns are made known to decision makers and taken into account. Continue consultations throughout project implementation as necessary to address EA-related issues that affect them.
f) Use independent expertise in the preparation of EA where appropriate. Use independent advisory panels during preparation and implementation of projects that are highly risky or contentious or that involve serious and multi-dimensional environmental and/or social concerns.
g) Disclose draft EA in a timely manner, before appraisal formally begins, in an accessible place and in a form and language understandable to key stakeholders.
h) Where projects adversely affect non-critical natural habitats, proceed only if viable alternatives are not available, and if appropriate conservation and mitigation measures, including those required to maintain ecological services they provide, are in place. Include also mitigation measures that minimize habitat loss and establish and maintain an ecologically similar protected area.
i) Consult key stakeholders, including local nongovernmental organizations and local communities, and involve such people in design, implementation, monitoring, and evaluation of projects, including mitigation planning.
j) Provide for the use of appropriate expertise for the design and implementation of mitigation and monitoring plans.

3.6.2 The Tanzania Bureau of Standards Act No. 3 of 1975

The Tanzania Bureau of Standards is the designated national authority (TBS Act 1975) for developing all kinds of national standards, including environmental standards. The TBS Act establishes the National Environment Standards Committee (NESC) which is responsible for developing environmental standards. The National Environment Management Act 2004, recognises the existence of the NESC. Part X enumerates the types of environmental standards to be established, they include water quality, discharge of effluent into water, air quality, control of noise and vibration pollution, sub-sonic vibrations, soil quality, control of noxious smells, light pollution, and electromagnetic waves and microwaves.

Development of national environmental standards is still at its infancy stage. Only 9 compulsory environmental standards (those that require compulsory compliance) have been developed so far. Although, it is not stated in the Acts, in the absence of national standards,

project proponents are encouraged to use international standards such as those of WHO, World Bank, BS, EU, American Public Health Association (APHA), US EPA etc.

Relevant national environmental standards (to a limited extent though) include:

TZS 860: 2005 Municipal and Industrial Wastewaters – General Tolerance Limits for Municipal and *Industrial Wastewaters*. This standard provides permissible limits of important environmental parameters such as BOD, COD, pH, Colour, Temperature range, Total suspended solids and turbidity. It also gives permissible limits of a range of inorganic and organic components.

TZS 845:2005 Air Quality – Specification: This standard gives permissible emission limits of sulphur oxides, carbon monoxide, hydrocarbons (as total organic carbon), Dust, Nitrogen oxides and lead.

EMDC 2(1758): Air Quality - Vehicular Exhaust Emissions Limits and This standard is mainly derived from EU Directives 96/69/EC, 91/542/EEC and 97/24/EC. This Tanzania Standard gives permissible limits of some common substances found in exhaust emissions of motor vehicles, namely carbon monoxides, suspended particulate matter (PM), oxides of nitrogen, and hydrocarbons. The standard covers all types of vehicles namely, passenger cars, light commercial vehicles, heavy-duty vehicles, and two and four strokes motorcycles and scooters. AESL need to ensure that the hired vehicles or its own meets this standard.

EMDC 6 (1733) P 2: ACOUSTICS - General Tolerance Limits for Environmental Noise: This standard focuses on urban environmental noise, and does not cover occupation environment. In the absence of other standards it may be used to give indication of permissible noise levels in factory/workshop environment.

DART Agency shall observe these standards during construction and operation of the project.

3.7 INSTITUTIONAL FRAMEWORK

Table 7 shows a list of relevant institutions and groups of stakeholders and their responsibilities as stipulated in various policy and legal documents and articulated by stakeholders during consultation.

Table 7: Relevant Institutions to this project

Level	Stakeholders group	Responsibilities
National level	Vice President's Office-Division of Environment	• Co-ordinate environmental management policy, act and guidelines • Environmental monitoring and auditing. • Advise Government on all environmental matters
	Prime Minister's office	• Modernisation of public transport system • Provide standards for operations • Funds for resettlement /Compensation (if any) • Project monitoring and internal auditing
	Ministry of Lands and Human Settlement	▪ Advice government on land use issues ▪ Allocation of plots and sites for projects
	Ministry of Natural Resources and Tourism	• Custodian of Wetlands in Tanzania • Enforce law and regulations for wetlands conservation in project area of influence
	Ministry of Information, Culture and Sports	• Policy guidance on Development of sports and sports facilities • Custodians of all state owned sports facilities
	NEMC	▪ Reviewing of EIA reports ▪ Enforcement and compliance of EMA Act, 2004

Level	Stakeholders group	Responsibilities
Regional level	Dar es Salaam Regional Commissioners office	• Oversee and advice on implementation of national policies at Regional level • Oversee enforcement of laws & regulations ▪ Advice on implementation of development projects and activities at Regional level
	Dar es Salaam City Council	• Urban planning • Flood plain management and assistance
Municipal Level	Ilala Municipal Council	• Plan and coordinate activities on the Municipality. • Enforcement of laws and regulations ▪ Baseline data on health, social and economic conditions ▪ Provides guidelines for management of land within project area and area of influence, ▪ Land use planning ▪ Environment management ▪ Land valuation and compensation procedures
Ward level	▪ Jangwani Ward Executive officer ▪ Mchikichini ward Executive officer	▪ Oversee general development plans for the Ward. ▪ Provide information on local situation Extension services ▪ Technical support & advice ▪ Project Monitoring
Sub-ward (Mtaa) level	▪ Msimbazi Bondeni Sub-Ward office ▪ Idrissa Sub-Ward office ▪ Mtambani B Sub-Ward office	▪ Information on local social, economic, environmental situation ▪ View on socio-economic and cultural value of the sites and on proposed bus depot operations. ▪ Rendering assistance and advice on the implementation of the project ▪ Project Monitoring (watchdog for the environment, ensure well being of residents and participate in project activities
Research institutions	▪ Ardhi University ▪ University of Dar es Salaam-CoET	▪ Technical advice on impacts of the project and mitigation measures
Utilities service providers	DAWASCO	▪ Providing water and sewerage services
Public and interested/affected groups	▪ NGOs ▪ Kajima company ▪ Residents around the project site ▪ Small holder farmers, ▪ Sand and stones Crushers ▪ Truck drivers ▪ Religious institutions	• Information on local social, economic, environmental situation ▪ View on socio-economic and cultural value of the sites and on proposed bus depot operations. • Resettlement issues ▪ Effect on their business

4.0 ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE

4.1 INTRODUCTION

This chapter provides a description of relevant environmental, economic and social characteristics of the project core area (site specific), and areas in the immediate vicinity of the project, which is Jangwani Ward as well as broad description of the area of influence i.e. Ilala Municipality, Kinondoni Municipality and Dar es Salaam Region. The level of details in the various sections depends on the interactions between the project activities and the particular environmental or socio-economic aspect. Information provided in this chapter will be superimposed on to the project concept and components for impact identification, evaluation and development of mitigation measures.

4.2 PHYSICAL CHARACTERISTICS

4.2.1 Administrative Location

Administratively the project is situated within Mtambani B Sub-Ward (Mtaa), Jangwani Ward, Ilala Municipality in the city of Dar es salaam. The Dar es Salaam Region encloses a land of 1,350km^2.

The project area is located about 4 kilometres from the city centre thus making it accessible by roads and foot paths throughout the year. The Project lies in the between latitudes 6°48' and 6.49' south, and between longitude 39°21' and 39°28' east of the Greenwich Meridian line. The main access to the area is via Morogoro Road. Figure 2 below shows the location of the proposed deports in the city of Dar es Salaam.

4.2.2 Biophysical Features

Climate

The climatic conditions of Dar es Salaam is typical of the coastal area of Tanzania, which is characterised by high temperatures, low wind speed, high humidity, and the absence of cold season. The main rainy season lasts from March to May and the long dry and cooler season from June through to October. During the rain season the Jangwani flood plain always become flooded. Also there is a short rainy season in October to December followed by a short drier hot spell in January/February.

Rainfall

The annual rainfall for Dar es Salaam averages just over 1000mm in two seasons the short rains with storms of limited duration during November and December providing an average rainfall of 75-100 mm per month and the long rains between March and May where a monthly average rainfall of 150-300 mm can be expected.

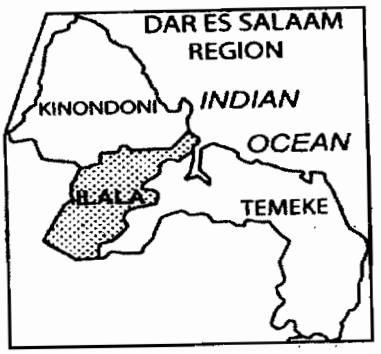
Temperature

Temperature in the Dar es Salaam region does not vary much from one area to another. The mean annual temperature is 26°C with a mean daily range of ± 4°C. Seasonal variations are slight with a mean seasonal range being ± 4°C (TMA, 2007).

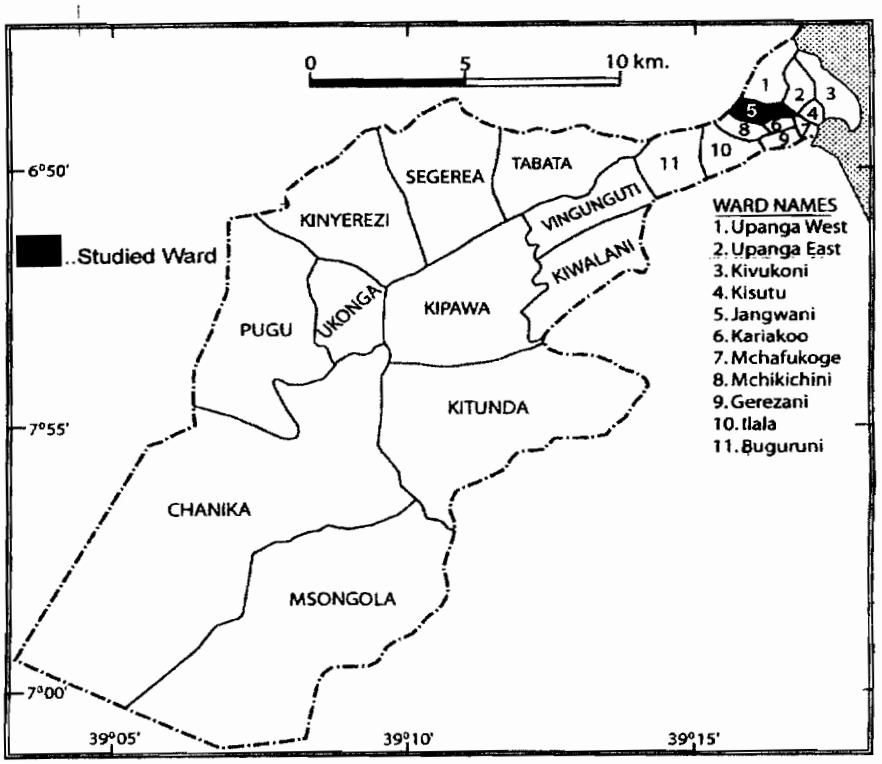
Humidity

The humidity of air is related to the rainfall pattern and is highest during the long rains. Daily maximum humidity occurs at dawn, averaging 96% while minimum humidity is experienced in the afternoons, averaging 67% (TMA, 2007).

TANZANIA



DAR ES SALAAM REGION



KINONDONI DISTRICT

Figure 2 : Location of the proposed Bus Deport in Dar es Salaam

Table 8: Average monthly rainfall data in Dar es Salaam

Month	Average rainfall (mm)	No of days with 0.25mm or more
January	63	8
February	97	8
March	120	12
April	267	21
May	162	13
June	31	7
July	32	6
August	26	5
September	25	6

Month	Average rainfall (mm)	No of days with 0.25mm or more
October	61	7
November	129	10
December	103	11
Total	1117	114

Source: Julius Nyerere Airport Weather Station 2007

Winds

The wind system in Dar es Salaam is typical of the wind regime of the Western Indian Ocean, which is characterized by a complete clockwise wind system over the northern Indian Ocean. It sets out during the northern summer months of April to September. During this period the winds are predominantly south-easterly (SE monsoons) and the southern summer is marked by NE winds (monsoons). Winds in the region are quite weak, generally of F3-F4 (Beaufort scale). The peak speeds occur in the months of February (NE monsoon period), April and July (SE monsoon). This wind system is coupled with an almost complete clockwise current system that changes character with the changing wind. The mean wind speed available recoded at the Julius Nyerere International Airport at 0600 GMT is 6kts and at 1200 GMT is 10kts27 (TMA, 2007).

Topography

The Jangwani valley is within the larger Msimbazi river basin. The area is categorised as hazardous and not suitable for residential development and floods during the rainy seasons. Generally, the topography of the area is characterized by a low laying even terrain sloping gently to the Msimbazi River located adjacent to it which directs water to Indian Ocean. Currently, a road has been developed traversing from Mchikichini area to Magomeni on the western side as one moves along Morogoro road from City Centre to Magomeni.

Geology and soils

The nature of geology of Dar es Salaam is characterized by various episodes of sea transgression and regression that led to both erosion and deposition of various layers of sands and clays. The evaluations of the rock, supported by existing data indicate that sandstone and limestone are two dominant types of rocks typical of the bedrock of Dar es Salaam region. The overburden is classified by their geological age, into two major periods:

Quaternary Deposits

This consists of three subgroups as follows:

- Alluvial deposits;
- Coastal plain deposits; and
- Limestone.

The coastal plain deposits and alluvial deposits are mostly of Pliocene to recent age and are found mainly moving from the coast towards the mainland. These consist of sands, clay and sometimes clay bound sands, gravels and pebbles. Fine to coarse grained sand occur widely within valleys creeks, deltas and mangrove sites. The main deltas are situated at the mouth of river Mzinga, Kizinga and Msimbazi. Limestones are mainly coralliferous and are found along the coastal strip. They are generally weathered and normally covered on the surface by white buff sands or reddish brown soils. They are found in Kurasini and Kigamboni areas.[3]

[3] Lightness J Kasonta and Anthony S Kasonta (1999). Geophysics locates water in Dar es Salaam. 25th WEDC Conference.

Hydrology

The project site is situated on the broad catchment of the Msimbazi River. The river is one of the large natural rivers that discharge its water into the Indian Ocean. The Msimbazi river systems emanate from Pugu/Kisarawe hills which have catchment forest reserves. The river system has a catchment area of 300km^2 with tributaries namely Kinyerezi, Zimbiri, Kinyenyere, Ubungo, Sinza and Luhanga rivers.**Error! Reference source not found.**Signs of environmental degradation as well as decline in natural resources and biodiversity along Msimbazi River catchments have been observed. In areas around Msimbazi river mouths, there have been excessive sediments caused by contaminated wastewater discharges.

In terms of groundwater characteristics, the water table at the project site and generally in Dar es Salaam is relatively high. In most cases ground water level rises to ground surface particularly on wetland area such as Jangwania during heavy rain. Construction planned at the Jangwani flood plain which requires long deep trenching may easily hit water pockets.

The study carried out by Mjemah (2007) shows that unconfined aquifer contributes to the flow of Msimbazi River. Msimbazi River is located within the coastal plain, where the sandy sediments favour infiltration, such that groundwater can continue to discharge to the river, sustaining river flow during the dry season. The study established that the lithology of the drainage basin proved to play a major role in river flow.

Other tests included pumping tests which were conducted in the area for 39 boreholes included single-well tests as well as tests with measurements on the pumping well and at least one observation well. The tests were conducted for 6 hours and 30 minutes. 6 hours for pumping and the remaining 30 minutes were used for recovery measurements. The methods used to analyze the pumping test data included: specific well capacity (which was calculated for both aquifers), Neuman type curve fitting (for the unconfined aquifer) and Walton type curve fitting (for the semi-confined aquifer) under constant discharge. Transmissivity was additionally, estimated based on specific well capacity and by Thiem's method for steady state.

The results from the curve fitting methods show the following parameters: an average transmissivity and hydraulic conductivity of 34m^2/d and 1.58 m/d, respectively for the unconfined aquifer; the semi-confined aquifer has an average value of 63 m^2/d and 2.14 m/d for transmissivity and hydraulic conductivity respectively. For the storability, the unconfined aquifer has an average early-time elastic storability of 0.01 while the lower aquifer has 0.002. Transmissivities estimated from specific well capacity and Thiem's method were similar to values obtained by Walton's method for the semi-confined aquifer, but were 2 to 3 times higher than values deduced by Neuman's method for unconfined aquifer. This observation, confirm the above observation that unconfined aquifer plays a major role of River Msimbazi flow. Construction of the bus depot will minimise this contribution during dry season. However, during rainy season surface water runoff will increase because of the surfaced area.

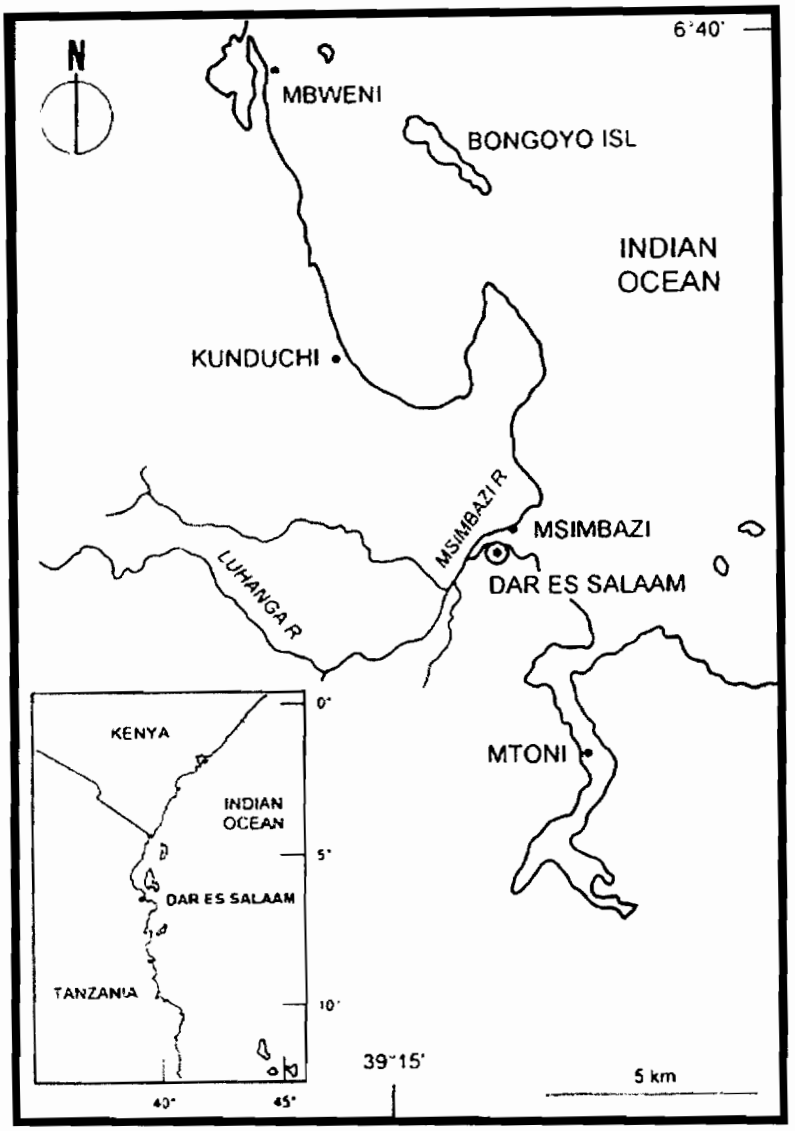


Figure 3: Msimbazi River catchments area

Air quality and noise levels

Anthropogenic noise sources are associated with constant human activities in the area, particularly from motor vehicles. The noise levels measured by Songas in Dar es Salaam (2004) are assumed to be valid. Therefore, averagely the day time noise impact is 50.4dB and night 41.2dB.

4.3 BIOLOGICAL CHARACTERISTICS

4.3.1 Flora (dry and wet season)

Percentage canopy cover of dominant vegetation types

About 75% of the whole area is occupied by grassland community, 8% by scattered planted trees and natural bushes, 7% occupied by swampy marshland, 7% occupied by cultivated land. The rest 3% is occupied by bare land, see Figure 4.

Vegetation types

Five major vegetation types were classified from the study area namely Grassland, Scattered trees and bushes, Swampy/ marshland, cultivated land and Bare land.

Grassland

This vegetation type is characterized by a land covered by the grass species with few herbs and forbs. In the project site it occupies the largest part constituting about 75% of the canopy cover and is commonly found on the south and western part of the project area including football grounds as shown on Plate 1.

Common grass species are *Cynodon dactylon, Dichanthium annulatum, Eragrostis stapfianus, E. ethiopica, Digitaria milanjianus, Chloris virgata, Panicum corolatum,P. maximum Sporobolus virginicus* and *Eleusine indica*

Common herbs includes *Acalypha ornata,Tridax procumbens, Rhynchosia minima, Phyllanthus numulariifolius, Waltheria indica, Sida acuta, Euphorbia hirta, E.heterophylla* and *Indigofera arrecta.*

Scattered trees and bushland

This vegetation type is characterized by a clump of trees scattered with bushes (Plate 2). Most of the trees species at the site are planted as an exotic with indigenous bushes and few tree species. Common planted tree species are *Azidarachta indica,Pithecellobium dulce,Millingtonia hortensis, Leucaena glauca, Sapindus saponaria, Peltophorum pterocarpum* and *Trichilia sp.* as shown on Table 9.

Few indigenous tree species found in this area are such as *Sclerocarya birrea ssp. caffra, Tamarindus indica, Ficus mucuso* and *Acacia nilotica.* The dominant bush species are *Pluchea dioscoridis, Ipomoea carnea* and *Calotropis gigantean.*

Swampy/ marshland

This vegetation type is occurring in depressions where water lodges and permanently floods the surface to a shallow depth (indicated as wetlands in Plate 3). In the project area it occurs in patches especially northern part of the project site near Morogoro road behind police post .Common species are sedges, few grasses, herbs and creepers. Sedge species are *Cyperus alticulatus, C .exaltatus,* and *C. rotundus* (Plate 3 and Plate 4).

Bare land

This land is characterized by uncovered soil after the removal of all types of vegetation. In the project area this area is found at the central part where it used for car parking (though illegally).

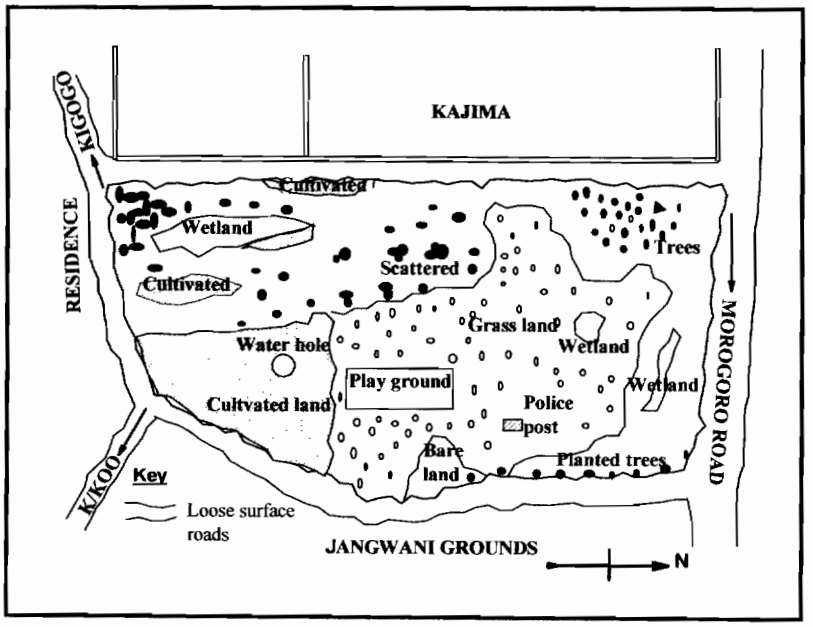


Figure 4: A sketch Map of project area showing major vegetation types

Plate 1: Grassland vegetation type with a football pitch. (*Picture taken on 15th May 2008*)

The dominant grass species is *Cynodon dactylon*

Plate 2: Scattered planted trees and bushes vegetation type growing on the western side of the project area near Kajima plot. (*Picture taken on 15th May 2008*)

The tall tree on the right side is *Peltophorum pterocarpum* and the middle one is *Sapindus saponaria*

Plate 3: Swampy vegetation type dominated by *Cyperus alticulatus* behind the tree. (*Picture taken on 15th May 2008*)

The creeper on the fore ground is *Ipomoea aquatica*

Plate 4: *Ipomoea aquatica* growing behind the police post at the Swampy area (*Picture taken on 15th May 2008*)

4.3.2 Fauna

Findings on fauna survey are presented in Table 10. The dominant groups of fauna in the project area were birds and insects. Sparrow and Great white Egrets (see Plate 5) were in relatively large numbers compared to other species of birds. In the group of insects grasshoppers were relatively many. However, the time allocated for this activity was too short to assess certain species of fauna, for instance mice and rats and other small mammals which involve trap setting. The findings show that none of the ICN threatened species was identified from the proposed project area.

Plate 5: The white bird at the centre is a Great White Egret (*Picture taken on 15th May 2008*)

Table 9: List of plant species recorded in the project area with Socio economic values

Species name	Family	Uses
Moringa oreifera	Moringaceae	Medicinal/Vegetable
Sclerocarya birrea ssp. caffra	Anacardiaceae	Edible fruits
Pithecelobium dulce	Papilionaceae	Hedge/fence
Corchorus eastuans	Tiliaceae	Vegetable
Solanum nigrum	Solanaceae	Vegetable
Dichanthium annulatum	Gramineae	Roofing
Launaea cornuta	Compositae	Vegetable/Medicinal
Tamarindus indica	Caesalpiniaceae	Edible fruits
Ricinus communis	Euphorbiaceae	Castor oil
Cucumis maxima	Cucurbitaceae	Vegetable
Peltophorum pterocarpum	Caesalpiniaceae	Shade
Luffa cylindrica	Cucurbitaceae	Washing brush/Dodoki

Table 10: List of fauna species identified in the proposed project area

	Scientific Name	Common Name	Family Name	Status
Birds	*Corvus splendens*	Indian house crow	Corvidae	Not endangered
	Ardea Melanocephala	Black-headed Heron	Ardeidae	Not endangered
	Passer griseus	Grey headed sparrow	Passeridae	Not endangered
	Halcyon leucocephala	Grey-headed Kingfisher	Alceidinidae	Not endangered
	Andropadus importunus	Zanzibar Sombre Greenbul	Pycnonotidae	Not endangered
	Casmerodius albus	Great White Egret	Ardeidae	Not endangered
Reptiles				
	Lygodactylus luteopicturatus	Yellow-Headed Dwarf Gecko	Geckonidae	Not endangered
	Varanus albigularis	White-throated Savana Monitor	Varanidae	Not endangered
Amphibians				
	Buffo gutturalis	African Common Toad	Buffonidae	Not endangered
Mollusks				
	Achatina fulica	Giant African Land Snail	Achatinidae	Not endangered

	Scientific Name	Common Name	Family Name	Status
Arthropods				
(Insect)	*Crocothemis erythraea*	Common skimmers	Libellulidae	Not endangered
	Omocestus viridulus	Grasshopper	Tetrigidae	Not endangered
	Oecanthus karschi	Cricket	Oecanthinae	Not endangered
	Chiloglottis trapeziformis	Wasp	Tiphiidae	Not endangered
	Phyllobrostis spp	Moth	Lyonetiidae	Not endangered
	Ectomocoris biguttatus	Bug	Peiratinae	Not endangered
	Sphodromantis spp	Playing mantis	Mantinae	Not endangered
(Butterfly)				
	Acraea encedon		Acraeidae	Not endangered
	Precis oenone		Nyphalidae	Not endangered
	Catopsilia florella		Pieridae	Not endangered
	Acraea eponina		Acraeidae	Not endangered
	Belenois spp		Pieridae	Not endangered

4.3.3 Threatened species

From the field observation neither of the flora nor the fauna species falling under any of the IUCN threatened category was identified in the proposed project area. This may be attributed to long term disturbance the site has experienced. The primary vegetation has been replaced with exotic plant species and grasses.

4.4 SOCIO-ECONOMIC ACTIVITIES ON THE PROJECT SITE AND IMMEDIATE VICINITY

4.4.1 Land use

Being the largest open space in the city, Jangwani flood plains has been famous for various uses for religious events, political rallies, sports and other social gathering. Distribution of land uses in the area is as follow:

East:

To the east, the site is occupied by vegetations and trees. At the time of field visit, some people were found within that area cutting grasses for animal feed. Also there is a temporary police post. The immediate land uses are children play ground, and open public meeting ground.

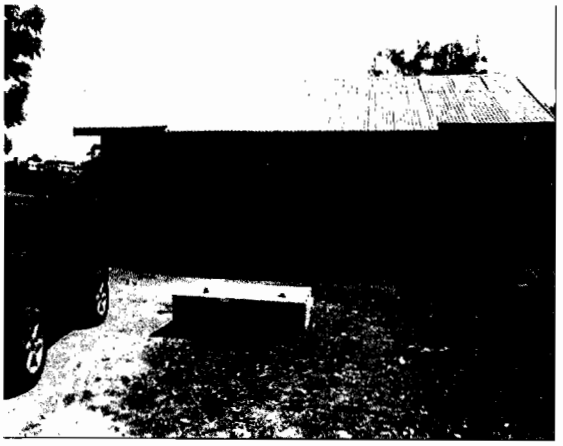


Plate 6: Temporally Police Post (*Picture taken on 15th May 2008*)

Plate 7: Cow peas - cultivated land at the southwest of the project site (*Picture taken on 15th May 2008*)

West:

To the west, the site is neighboured by the Kajima Construction Company base camp and during scoping exercise there was a number of small scale vegetable farms on the south west of the site. The cultivated crops, which were found were sweet potatoes (*Ipomoea batatus*), Chinese cabbage (*Brassica chinensis*), Cow pea (*Vigna unguiculata*) and Amaranth (*Amaranthus hybridus*). It should be noted that by the time of completing this EIS all small scale farmers had harvested their crops and vacated the site.

South

To the south, the site is used by Truck drivers to park their vehicles howver, they have been prohibited.[4] Also other economic activities found on this side were small vegetables farms, food vendors "mama lishe" shed, and tyre puncher repair kiosks. But all these activities are no longer there.

Plate 8 : Trucks parked to south of the proposed project site (*Photo taken on 15th May 2008)*

Plate 9: Pile of waste on the project site(photo *taken on 15th May 2008*

North

To the north, the site is bounded by the Morogoro road and far north there is a wetland and few residential houses.

4.4.2 Existing Environmental Threats and Challenges

The project site is mainly a flood prone area and pollution is one of the environmental challenges facing the Jangwani flood plain. Environmental pollution on the area is mainly caused by haphazard dumping of solid wastes (**Error! Reference source not found.**), Also car washing activities are often taking place near the Msimbazi River along Jangwani, this activity produce wastewater containing oils and grease.

Through a study conducted by Blacksmith Institute, it has been established that main sources pollution of the Msimbazi river basin are wastewater from Vingunguti and Ubungo industrial area, domestic wastewater from unplanned settlements along the River, Vingunguti dumping site, solid wastes from residential areas, solid and liquid waste from the Vingunguti abattoir, ineffective oxidation ponds in Vingunguti and Mabibo wards and dilapidated sewerage systems situated close to Urafiki and Ubungo National Housing blocks of flats.

[4] It was reported during scoping exercise that the Ilala Municipal Council Director prohibited the place to be used as a parking area of upcountry Lories. Therefore, parking of Lorries is illegal.

4.5 SOCIO-ECONOMIC CHARACTERISTICS

4.5.1 Demographics

Dar es Salaam City is the centre for industrial, commercial and administrative activities of Tanzania and has a population of about 3.2 Million (about 1.6 mill. males and 1.6 mill. females) with an average growth rate of 4.3. The population density stands at 1,793 persons per square kilometre). Ilala Municipality has a total population of 637,573 people, comprised of 315,670 females and 321,903 males (2002 national census). The following table below present demographic data of the Jangwani Wards were the project will be located.

Table 11: Demographic data for the Jangwani Ward

Population Number			Household	Children	Youth	Adults	Able to Work
Men	Women	Total					
8,314	7,408	15,722	3227	1310	5974	8438	9,432

Source: Ward Executive Officer Jangwani

The attractions of urban and city life have facilitated a strong and continuous migration, especially of working age males and females. The city is also characterized by a large concentration of people, in heavily built up areas, a large number of unemployed and the usual problems associated with large urban centres such as inadequate social services, higher crime levels, insufficient infrastructure etc. One of such areas is Magomeni, which is about 500m from the project site.

People from most of the tribes and ethnic groups now live in Dar es Salaam therefore there are no single ethnic group, which is dominant. However, according to Jangwani WEO, the main dominant religion in the area is Islam with few members from different Christian denominations. The site is characterized by dominance of Zaramo people with few people from other ethnic groupings, which are Makonde, Hehe, Nyakyusa, Kurya, Pemba, Baniani, Luguru, Nyamwezi, Somali, Indians, Rundis, etc.

According to Jangwani WEO the average annual per capita income of the Jangwani residents is USD 360.

4.5.2 Land Rights and Tenure

Land in urban centres is governed under the Land Act No. 4 of 1999. Most of the land in Jangwani Ward has been surveyed and the individuals are given letters of offer which state the size of plot, use/development conditions, payable land rent, duration of ownership and other covenants. The plot owners are required by law to prepare building plans according to uses/development conditions in the letter of offer and obtain a building permit from the local authority. The building permit is a monitoring parameter that land use is according to the approved land use plan especially in urban areas.

4.5.3 Major Land Uses

Most of land in central business centres of Dar es Salaam City is occupied by industries, markets, institutions and government offices, international conference centres, residential houses, hotels, shopping centres, petrol stations, banks, schools, public services, restaurants, and recreational facilities. Also Dar es Salaam is a city of urban agriculture and a few vegetable plots are found along the seasonal stream and wetland. The current land use on the project site is as shown in section 2.1.3.

4.5.4 Economic Base

Industry, Agriculture and Livestock keeping

Dar es Salaam is the industrial and commercial centre of Tanzania with approximately 80% of the nations industries. The Msimbazi River which passes close to the Jangwani flood plains has been found to be heavily polluted due to effluents from residential areas and industries. Urban agriculture is one of informal sector activity, with livestock keeping being relative low amongst the communities in Dar es Salaam. Dairy cattle, goats, pigs, sheep and fowl are kept in the built up area and in the peri-urban areas for food and as source of income.

Table 12: List of Cultivated plant species occurring in the project area

Species name	Family	Common Name
Vigna unguiculata	Papilionaceae	Cowpea/Kunde
Brassica chinensis	Cruciferae	Chinese cabbage/Spinachi
Manihot glaziovii	Euphorbiaceae	Rubber/Kisamvu
Hibiscus esculentus	Malvaceae	Okra/Bamia
Mangifera indica	Anacardiaceae	Mango/Maembe
Ipomoea batatus	Convolvulaceae	Sweet potato/Viazi Vitamu
Oryza sativa	Gramineae	Rice/Mpunga
Cucurbita maxima	Cucurbitaceae	Pumpkin/Boga
Manihot esculenta	Euphorbiaceae	Cassava/Mhogo
Musa cultivers	Musaceae	Banana/Mgomba
Amaranthus hybridus	Amaranthaceae	Amaranth/Mchicha
Cajanus cajan	Papilionaceae	Pigeon pea/Mbaazi

Quarrying

Sand, stone, limestone and clay are extracted in key locations for building and construction purposes. Approved sand quarrying areas include Mbagala, Chamazi, Pande, Tuangoma, Majohe Makonge, Kitunda, Mpiji, Pugu and Bunju, with other more urban areas where mining is carried out unofficially such as Kawe, Mbezi beach, Tegeta Mtongani, Boko and Tabata. Stone is mainly extracted from Kunduchi, Mjimwema, Boko, Bunju and Kigamboni quarries, supplemented by small scale family operations in disused quarries scattered throughout the urban area, especially in Msasani, Oysterbay and Masaki. Limestone is quarried from Wazo / Kunduchi outcrops and clay is extracted from upper Msimbazi river valley for the manufacturing of bricks. Salt is mined on the shores of Indian Ocean for domestic consumption.

Tourism

The coastal climate is favourable to beach tourism. In Dar es Salaam there are more than 15 tourist hotels, and new ones are under construction. According to the Ministry of Natural Resources & Tourism and the Tanzania Tourist Board, the annual average number of tourist visiting Dar es Salaam is about 201,000 with average annual expenditure of US$ 190 million.

Employment

According to the Jangwani Ward Executive officer, 60 – 65 percent of the active labour force in Mtambani B is unemployed. Generally, unemployment in Dar es Salaam is a serious problem. Persons in fulltime employment range between 51% male and 31% female. Only 36% of the labour force works in the formal sector. 60% of the formal employment is in the public sector. Informal sector, provide an alternative employment opportunities to a large number of people in particular women. Urbanization rate at about 5% exceeds by far annual growth rate of employment opportunities.

4.5.5 Economic Infrastructure

Road networks

Dar es Salaam road network has been developed on a radial pattern with major arteries focusing on the central area. Public transports in Dar es Salaam are by using Daladalas coming from all direction to the City Centre every minute. Morogoro Road which connects the Jangwani Bus Depot site is a very busy highway with heavy traffic to and from the City Centre. The DART system is expected to ease heavy traffic on Dar es Salaam roads. The up-country bus terminal is located about 11 kilometres from the project site while the up-country railway station is located about 4 km from the project site in the City Centre.

Communications network

Tanzania Telecommunication Company Ltd. (TTCL) operates landlines telephone system. There are also a number of Cellular phones providers namely Tigo, Vodacom, Zain, and Zantel.

Air services

Dar es Salaam International Airport is located about 11 km southwest of the city centre along Nyerere Road. The airport has both international and domestic terminals. The airport currently handles 19 international airlines and 6 local carriers operating domestic routes, and has a capacity of 1.5 million passengers per annum.

Harbour

Dar es Salaam harbour has been developed along the Mzinga Creek, which separates the mainland and the Kigamboni peninsula. A passenger terminal is located along the Sokoine Drive in the City centre where a passenger service to Zanzibar is provided. The project site is approximately 4 km from the Dar es Salaam harbour.

4.5.6 Social Services

Education and training

Within the Jangwani Ward there is five pre-school, one primary schools and one secondary school. Dar es Salaam generally is served with a wide range of education facilities ranging from pre-school services to vocational colleges. In Dar es Salaam there are 4 Public Universities, 2 private universities and 2 University Colleges. There are also a number of Tertiary educations institutions.

Health

The Jangwani Ward has two health centres and seven government owned dispensaries with a total of 14 workers (i.e. 2 AMO, 2 MOs and 7 health assistants). Interview with individual and key informants in Mtambani B found out that malaria, diarrhoea and frequent cholera outbreaks are leading killer diseases in the community. Also it was reported that most likely there is high infection of HIV in the area because of high number of commercial sex workers (CSWs) in the Jangwani Ward.

Dar es Salaam Region generally is best served in terms of health facilities, which are located in different parts of the area comprising both informal and formal health establishments. However, the public health situation is far from satisfactory because there are periodic outbreaks of epidemics such as cholera. Environmental and personal hygiene conditions are the principal causes of repeated outbreaks of cholera in Dar es Salaam. Also malaria, upper respiratory tract infections, eye disease, diarrhoea diseases, skin diseases, HIV/AIDS, intestinal worms and other similar diseases are common in Dar es Salaam Region.

Sanitations
The housing condition in the Mtambani B community is very poor; there is overcrowding and poor sanitation. Most people (64%) in the area use traditional pit latrine as main type of toilet facility. Poor environmental sanitation due to inadequate water supply, improper garbage disposal and poor drainage system has been a major cause of floods in the area, making the Jangwani flood plain dwellers vulnerable to losing their assets and properties, either through natural course or forceful government eviction, which involves demolition of buildings.

Water supply
Main water source in Dar es Salaam is by the DAWASCO piped water from Upper Ruvu water plant at Chalinze. The construction and operation of the project will require water which will be available from DAWASCO pipelines.

For the Mtambani B, Jangwani many houses are not connected to piped water; they instead rely on public/community piped water, which is sold at Tshs. 20-50/- per 20 litre bucket. Due to unreliable water supply from DAWASCO, many residents have constructed their own boreholes.

Wastewater management
The sewerage system in Dar es Salaam covers a total length of 130km of sewer and consists of 11 networks supported by 17 pumping stations, including the Jangwani/Kariakoo area where the Jangwani Bus Depot will be located. However, because of the elevation existing between the proposed site and the connection point at Kariakoo, pumping will be necessary (design guidelines for such systems exist). As such the design will be such that there will be a collection tank and from this tank the wastewater will be pumped intermittently. Sewage from the areas supposed to be served is discharged, untreated, directly into the ocean. Jangwani Bus Depot will be connected to this system.

Solid waste management
Solid waste disposal is the sole responsibility of the generators. DART Agency/Contractor for example will collect construction waste that will be generated during construction phase, and transports them to temporary collection points or transfer stations. The Ilala Municipal Council or hired private collectors will then transport the waste to dumpsites, in this case Pugu dumpsite. Solid waste at the Jangwani Bus Depot will be handled through the Municipal system.

Electricity
TANESCO is the main source of energy in Dar es Salaam. The Jangwani Bus Depot also will be supplied electricity from TANESCO and a backup power supplies using a standby diesel generator will be provided.

Police, security, and fire services,
According to the Jangwani WEO, crime is rampant in the area and the youth engage in deviant behaviour such as drug abuse and prostitution. Most cases are attributed to unreliable and/or lack of employment among the people in the community.

Security measure in place includes the Police Post located within the project area and the central Police Post located approximately 4 km from the project site, and Kinondoni Police which is about 1.5km. In Dar es Salaam also there are a number of private security service providers.

Fire services are within reach e.g. the government owned Fire Station at Kariakoo, which is about 1km from the site, the Tanzania Harbour Authority (about 4 km), or from private companies such as Knight Support (about 6 km from the project site).

5.0 STAKEHOLDERS CONSULTATIONS AND PARTICIPATION

5.1 THE STAKEHOLDERS

Stakeholders for the Bus Depot development at Jangwani area are found at both national and local levels and range from government authorities, conservation authorities, to local community members that might be affected or might affect (positively or negatively) the Bus Depot Project in one way or the other. Relevance of stakeholders' group was used to select individuals to consult for identification of issues and concerns. Stakeholders groups of relevance to this project are listed below. Details about the stakeholders (name of institution, person contacted etc. is found in Appendix B). The main stakeholders were identified to be:

- Central Government: Ministries, Departments, and Agencies. These include Vice President's Office (Division of Environment, NEMC), Prime Ministers' Office – Regional Administration and Local Governments (PMO-RALG); Ministry of Lands, Housing and Human Settlements Development, Ministry of Natural Resource & Tourism (Wildlife Division), Ministry of Information, Culture and Sports

- Proponent – DART Agency Executive Officer

- Dar es Salaam Regional Commissioner's Office: urban planner, and Natural Resources Officer.

- Local Government Authorities: Dar es Salaam City Council; Municipal Councils of Ilala, Kinondoni and Temeke together with their technical advisers on urban planning, resettlements, etc.

- Local stakeholders included Jangwani and Mchikichini Ward Executive Officers; Ward Development and Environmental Committees consisting of Ward Councillors, Ward Executive Officers, Ward Extensions, Mtambani B Sub-Ward office, Msimbazi Bondeni Sub-Ward office, and Idrisa Sub-Ward office. Other Sub-Ward leaders (Religious, Teachers, Elders etc); Communities groups (Sand and stones Crushers, Smallholder farmers, women, youth, Truck drivers, etc) and Kajima Construction Company.

- Research and Academia: Ardhi University-real estates studies, urban planning and environmental engineering departments while at the University of Dar es Salaam –Institute of Resource Assessment, department of geography. Others include National Institute of Transport, and NEMC etc.

- Utilities providers: DAWASA, DAWASCO and TANESCO,EWURA

- Conservation Organizations with interest /activities associated with the Jangwani Flood Plains, including LEAT, EMT, ENVIPRO, AGENDA, WWF.

5.2 STAKEHOLDERS' CONCERNS

5.2.1 Uses and Value of Project Area

The stakeholders named specific areas of concern, and values attached to the project area as summarised on Table 13. The project falls within Dar es Salaam Jangwani Flood plain area and currently the land at the project site is empty with some structures as mentioned in section 4. At the time of scoping, the activities carried out on the adjacent plot were as listed. Almost all of these activities will not be affected by the project.

Table 13: Summary of uses and values of the project area

Environmental	Social	Economic
Jangwani flood plain is an environmental buffer zone	Recreational facilities i.e. play fields	Fertile land for urban agriculture
Jangwani flood plain acts as a breather to the Msimbazi river during high tides season	Largest and popular open air public rallies in the Dar city	Grass land for livestock or source of dry season cattle fodder
A wetland area and contained biodiversity	Largest open space in Dar es Salaam	Fish catch from swamps and ditches
Jangwani flood plain provides the greenery scenery necessary to the coastal city		Informal vending point for sand and crushed stones, domestic goods, food etc.
Reduce floods emanating from storm water and run off		
Ground water recharging and purification		
Mangrove growth		

5.2.2 Project Acceptance

During stakeholders' consultation the general acceptance level of the project was assessed. The majority of stakeholders interviewed accepted the project. stakeholders had reservations. However, it is important to note that stakeholders who did not accept the project based their disapproval on their perceived negative impacts of the project particularly because the area is a flood plain.

5.2.3 Perceived Negative and Positive Impacts

The study has provided a wide variety of views and opinions on what are considered to be the main concerns and issues of different stakeholders. Based on the raised concerns, an analysis was carried out and issues ranked accordingly (Table 14). The ranking was based on the frequency an issue was raised and can be categorized as shown below. Stakeholders expect that the project proponent will take their views into consideration in the planning and implementation of the project.

Table 14: **Ranking of the Environmental and socio-economic issues as rose by different stakeholders.**

Issues	Frequency of response in %	Rank
Pollution of the Msimbazi river and the Ocean	82	1
Obstruction of natural flow of storm water thus creating more hazards	79	2
Modernization of urban infrastructure	76	3
Exacerbate scarcity of recreational/public rallies grounds	73	4
Creation of employment opportunities	70	5
Loss of environmental buffer	67	6
Congestion of Morogoro Road	64	7
Air pollution due to emissions	58	8
Noise pollution to the nearby residential settlements	52	9
Mushrooming of unplanned settlements	38	11
Destruction of natural vegetation	35	12
Destruction of mangrove swamps	29	13
Enhancement of security in the area	17	14
Crime rate escalation	15	15
Deprivation of land for small holder farming or gardening	10	16
Setting a precedence to land reclamation in Tanzania	5	17

Perceived Positive Impacts

- ***Employment opportunities***

It is expected that the project will employ both skilled and unskilled workers. However, where skilled labour is concerned, the project proponent might probably bring in outside expertise. This minor impact could be turned into a positive impact if the proponent will commit to hire local labour particularly when only semi-skilled or unskilled labour is required.

- ***Modernization of the area***

Currently, the site is not properly planned hence a proper spatial planning and demarcation of the site will improve aesthetic appeal of the area. Figure 2 also shows the size of the project relative to the entire flood plain and the fact that all sports grounds and grounds for religious and social gatherings are not touched by the project. Furthermore, it needs to be noted that the area is used informally as a solid waste dump site. This will be mitigated once the site is converted to proper land use. The proposed depot development will also have toilets for the general public use. It is also anticipated that the existing security services will be enhanced in collaboration with the Ministry responsible for security services in the country.

Contribution to economic development

The Bus Depot is a Government Project. Revenue coming from the project will go directly to the government. Increased activities in the area will result in sprouting of commercial activities such as shops, food vending, soft drink vending, pharmacy etc.

Perceived Negative Impacts

Being the largest open space in the city which is used for various uses, Jangwani flood plains has proved to be famous among all interviewed stakeholders. Interestingly, all stakeholders admitted to have passed through the area or visited it at least once (either for a religious event, a political rally, or a social gathering), thus giving views basing on their knowledge of the area and its current uses.

Environmental impacts

Pollution of the Msimbazi River

During interviews, some stakeholders were quick to associate the project with the negative impacts likely to affect the Msimbazi River which actually passes close to the project area. One of the commonest negative impacts mentioned is the pollution of the river due to fuels, lubricants and oil spills that will result from the depot operation. Some stakeholders went further to point out that the mangroves site located downstream the Msimbazi River close to the Indian Ocean may be affected by pollutants in the river.

Commenting on the mitigation measures, stakeholders recommended proper treatment systems with mechanisms to remove oils, grease and heavy metals before reaching the river should be put in place. However, others were of the opinion that it may not be cost effective to treat chemical wastes resulting from depot operation due to close proximity of the site to the Msimbazi river, hence recommended that the proponent should find an alternative site away from the river.

Increased flooding phenomena

Another negative impact mentioned is the interference of the natural flow of run off water that will occur due to the presence of the bus depot. Stakeholders were of the view that depot buildings will block water especially during rainy seasons or even create more run off water which may result into flooding of the depot itself and nearby residential houses. They based their argument on the previous floods that affected the unplanned settlements in the Msimbazi valley.

Regarding mitigation measures, stakeholders were of the view that proper designs which take due consideration of the topography, rainfall, run off, sea level and terrain of the area may be an option.

Loss of environmental buffer

Loss of environmental buffer zone is another negative impact mentioned. Stakeholders were concerned of the disappearance of the green belt areas which helps to provide carbon-oxygen balance in the air especially at this time when the city is getting bigger and natural vegetation disappearing rapidly. They consider Jangwani flood plains as the only natural green belt site which needs to be conserved for future generations rather than being turned into a built environment.

Stakeholders were not able to propose mitigation measures for this impact but rather insisted the project proponent to find another site which has no similar impacts. However, it should be noted that the perception of those interviewed was that the entire area is going to be taken by the bus depot.

Destruction of Wetland Ecosystem

Another concern raised is the impact of the project to the Msimbazi wetland. Stakeholders were of the opinion that Jangwani flood plain as is one of the large naturally occurring wetlands in the city which deserves to be preserved. They argue that allowing any construction on the Jangwani wetland is tantamount to sanctioning destruction of similar wetlands in the country.

Regarding the mitigation measures, Stakeholders were not able to propose any mitigation measures for this impact but rather insisted the project proponent to find another site which has no similar environmental impacts

Noise and air pollution

Noise and air pollution were also mentioned as impacts that will result from the project. Stakeholders were of the opinion that since there will be maintenance and repair works during the operation phase of the project, noise and air pollution is likely to occur.

However, there were no mitigation measures given for these impacts as they could not quantify the impact.

Social Impacts

Scarcity of recreation and public rallies grounds

Jangwani flood plains are famous for public rallies and recreational activities especially during dry seasons. As pointed out above, almost all interviewed stakeholders said they had visited Jangwani grounds at least once to attend either a public rally or for some other reasons. Given this background, their main concern was the scarcity of land for public gatherings and sports that may occur due to the change of land use.

Regarding the mitigation measures, Stakeholders were not able to propose any mitigation measures for this impact but rather insisted the project proponent to find another site which has no similar social impacts. It is also worth mentioning that the same perception of using the entire plane could be behind this state of affair.

Congestion of the Morogoro road

Increased congestion of Morogoro road due to the positioning of the project is another negative impact cited by interviewed stakeholders. They had opinion that the existence of the bus depot along the busy Morogoro road will lead to more traffic congestion especially when the big busses are turning to enter or leave the depot.

To mitigate the congestion of the road, stakeholders were of the view that proper design of the lanes at the junction which may even incorporate tunnels or flyovers need to be considered so as to avoid inconveniencing other road users.

Crime escalation

Stakeholders raised another concern due to the positioning of the bus depot in the area. They contended that escalation of crimes along Morogoro road at Jangwani and surrounding areas is inevitable because of the increased activities in the area.

Regarding mitigation of crime escalation in the area, stakeholders were of the opinion that reinforcement of security during construction and operation of the project need to be done.

Economic impacts

Disruption of small holder farming

Jangwani flood plain is part of the larger Msimbazi basin which is famous for illegal small holder farming or gardening. Interviews with stakeholders who were using Jangwani flood plains for agriculture revealed while they knew that area is not theirs and were aware that they will have to vacate the area that did not stop them to feel some loss of their livelihoods.

By the time of concluding EIA there were no small holder farmers in the area. The project will provide a notice board to stop cultivating and vacate the area.

Policy/legal or management issues

Mushrooming of unplanned settlements

Mushrooming of unplanned settlement close to the project area is also another negative impact associated to the project. Stakeholders were of the opinion that as there will be more people and activities in the area during construction and operation phases of the project, more people will be attracted to build temporary structures in the surrounding environment hence deepening the crisis of unplanned settlement in the city of Dar es Salaam.

To mitigate the mentioned impact, it was suggested that a special programme aiming at continuously barring people from constructing temporary shelters in the whole of Msimbazi valley need to be implemented.

Hazard land

Jangwani flood plain is within the Msimbazi valley which has for many years been described as a hazard land. Stakeholders referred to the Dar es Salaam Master plan of 1979 which stipulates that Msimbazi basin is a hazard land where residential related activities are not recommended. They also pointed out the fact that Jangwani flood plain is set for recreational activities and put under the supervision of the ministry responsible for culture and sports.

Stakeholders were at loss as to how do city authorities and the government allow the proponent to construct the depot in the hazard land contrary to the master plan.

5.3 HANDLING OF STAKEHOLDERS' CONCERNS

As much as possible measures to ameliorate these main concerns and issues of different stakeholders are proposed in this report. These issues have been addressed under the various sections as shown in Table 15.

Table 15: EIA Recommendations for Issues Raised by Stakeholders

Negative Environmental		
Pollution of the Msimbazi River and the Indian Ocean from fuel, oils, lubricants spillages/leakages and haphazard disposal of waste	• All channels coming from the site will be fitted with oil traps • Solid waste will be handled through Ilala Municipal solid waste management system • from kitchen will be pumped to the nearest central sewer system (see section 4.5.7)	6.1.1 6.1.2 6.1.3 6.2.2 7.2.3 7.3.3 7.4.3
Ineffective storm water drainage and overflows due to obstruction of natural flow of storm water	• Proper engineering design will ensure that water flow is not obstructed	6.1.1 7.2.1
Destruction of wetland ecosystem	• Only 10% of the area will be affected	6.1.1
Air pollution (emissions, dust) from trucks and equipments and buses during operation	• Proper maintenance system will be put in place	6.1.1 6.1.2 6.1.3 7.2.2 7.2.4 7.4.1
Destruction of vegetation cover /loss local biodiversity	• Only 10% of the area will be affected • Planting of trees on open spaces to compensate for the lost vegetations	6.1.2 7.3.2
Negative Socio-Economic		
Noise pollution to the nearby residential settlements from trucks, machinery, crew	• Solid wall to be constructed around the depot	6.2.2
Impacts from social interactions between construction workers and the surrounding communities	• Awareness on the impact of irresponsible intimate relations	6.2.2
Displacement of existing land-uses (small holder farming or gardening)	• Time will be given to ensure they harvest their current crop • Inform them immediate to stop cultivating and vacate the area	6.2.1
Exacerbate scarcity of recreational/public rallies grounds	• Spaces for thhe public rallies, religious events, gatherings and playing grounds will not be touched by the project	6.2.1 7.1.1
Transportation hazards to public – accidents, Morogoro Road congested traffic, material spillage etc.	• There will be a channelization at the junction of Morogoro Road and Access road. • There will a proper traffic design to avoid accidents.	
Compromised security (theft and vandalism)	• Security system will be enhanced	6.2.2 7.2.6
Induced developments and services such as mushrooming of Unplanned settlements	• The project will work with Ilala Municipal Council to prevent mushrooming of unplanned settlement	
Positive Socio-Economic		
Creation of employment opportunities	• almost of the employees of the project will be locals	
Enhancement of security in the area	Development of a Police Station in the area	
Improved transportation services and urban infrastructure	The overall objective of DART.	

5.4 SUMMARY

This chapter has presented a summary of isues, values, concerning and perceptions of the relevant stakeholders consulted on the implementation of the depot at Jangwani in Dar es Salaam. The chapter that follows presents the assessment of social and environmental impacts.

6.0 ASSESSMENT OF IMPACTS

The assessment of impacts includes both environmental and social.

6.1 ASSESSMENT OF ENVIRONMENTAL IMPACTS

This section determines likely sources and quantification of both negative and positive environmental impacts.

6.1.1 Site Selection Phase

Site selection phase presents the overarching impacts of the presence of the project on the general natural settings at the project area. The impacts are further analysed in subsequent sections. The sources of main impacts are related to land take, effects of natural factors and processes.

Land take

- Potential impact: ***Destruction of wetlands, flood plain, and natural feature due to change in land use***

According to current designs the depot requires a total land area of about 75.000m^2 (see section 4.2.1 on site coordinates). The access road will take about 3,000m^2 (assuming that the access road will be about 6m width and 500m long. The project shall need other site (about 1000m^2), though temporarily at both the bus depot site and at borrow pits for storage of equipments and materials and for office and construction crew.

Although, the project core area is within the Msimbazi valley – the study could not identify any flora or fauna.

However, some of stakeholders contend that:

- Jangwani valley is a hazard land and thus construction of the depot will make it even more vulnerable
- A bus depot will affect the migratory birds that usually come to the area from far (this information was provided by the Principal Game Officer of the Ministry of Natural Resources and Tourism)
- Pollution of the area will affect the oxygen-carbon balance in the city
- Pollution of Msimbazi River by fuels, oils, grease is inevitable.

Impacts negative, residual, long-term and of high significance

Effects of natural factors and processes

- Impact: ***Damage to constructed structures and disruption of operations***

This is related to the possibilities of natural factors e.g. extremes of climatic elements and earth movements etc. to have effects on the project components and vice versa. Dar es Salaam is known to experience extreme climatic conditions in the months of April - May with heavy rains, and sometimes storms that damage buildings, tall trees and other built structures. Flooding is an annual phenomenon in the low lying areas of Dar es Salaam with the Jangwani area being the most notorious.

There are very few structures that are likely to be affected by this development.

Impact negative, long-term and high significant

6.1.2 Design phase

Main impact sources for the design phase relate to:

- Placement of project components
- Choice of Technologies, Environmental Practices, techniques (to meet both Tanzania and international Health, Safety and Environmental (HSE) standards;
- Choice of materials
- Setting management procedures for handling and disposal of wastes; and health & safety procedures;
- Planning for availability of adequate resources

Storm water drainage and overflows

Potential Impacts*:*

- ***Damage to constructed structures***
- ***Ineffective utilization of the bus depot***
- ***Disruption of natural water/flood flows***

Due to the low-lying, flat terrain, storm water tends to remain stagnant at the Jangwani grounds especially during the heavy rains (section 6.1.1.2). This may cause damage to built structures. This may in turn affect effective utilization of the bus depot. The inverse is a situation where the establishment of the depot may affect natural flows of water and cause more flood tendencies at Jangwani.

Condition of existing structure, such as that of Kajima construction base campus, is in sound conditions. Other users do not have permanent structures. The Police post is constructed in a movable container. On the north of the site there is a natural drainage, the Msimbazi River. However, there is no constructed drainage channel.

CONCLUSION: there exists a good slope towards the Msimbazi River and its tributaries, which can be utilized to design and build efficient drainage system. This should be done with due consideration and mitigation of potential pollution loads discussed under section 8.2.3 below.

Impact will be negative, high significance.

Exploitation of borrow pits/quarries and other natural resources

- ***Degradation at points of source of construction materials***

The project requirements of construction/operations materials are indicated in Table 16.

Table 16: Materials requirement for construction works

Type of materials	Quantity/rate of extraction	Potential Source
Gravel	32,000 tones	Kunduchi, Mjimwema, Boko, Bunju and Kigamboni
Aggregates	12,000 tones	Msolwa
Fill-in materials *(kifusi)*	71,250 tones	Boko or Kigamboni
Sand	32,000 tones	Either of the following: Mbagala, Chamazi, Pande, Twuangoma, Majohe Makonge, Kitunda, Mpiji, Pugu and Bunju,
Water	150m^3 per day	DAWASCO
Power	10KVA	TANESCO

Extractions of construction materials from both authorized borrow pits and quarries on government land, communal land and on private-owned land are associated with depletion and degradation at points of source with no efforts of restoration/re-vegetation. Most exploited borrow pits are found on land of natural forests and woodlands or planted trees which have been cleared/disturbed and left unfilled. Some borrow pits are on or close to sensitive ecosystems such as rivers, hilly terrain etc. Pollution risks include sediment overload to water bodies during rain season and contamination by oils from trucks, excavators and loaders.

It should be noted that the aggregate-rich borrow pit at Kunduchi area and other areas had to be closed due to rampant and haphazard exploitation methods that posed pollution risks to the nearby Indian Ocean. And in some instances sand was extracted from riverbeds. Most of these areas are declared by the government as a danger zones and exploitation is prohibited. The developer shall not encourage suppliers of these materials to use closed down borrow pit or sand extracted from river bed. Instead it shall use licensed suppliers.

The project will require water for construction and cleaning during depot operation. Over-exploitation of local water resources may contribute to water scarcity, particularly so during dry season. Ruvu river - the main source of water for Dar es Salaam city reach critical low levels during dry season. However, amount of water required for construction activities is approximated at $50m^3$ per day. Considering that DAWASCO's daily capacity is about $273,000m^3$ per day, the requirement by the project will not significantly contribute to water scarcity.

Although Dar es Salaam region receives about 80% of power generated in the country and Dar es Salaam is the main centre for generation of thermal electricity (gas, fossil fuel), the city is at times experiencing frequent power failures.

Resources extraction is open to all contractors / users, thus, the project will be adding on to existing problems (cumulative impacts). Thus, impacts associated with resource extraction from off-site locations are considered as:

Secondary or indirect negative impacts, cumulative, short to medium-term but of medium significance.

Haphazard disposal of wastes

- Impact: ***Contamination and /impaired quality of receiving body – land and water.***

Main sources of construction waste will be from site preparation, earth moving works and domestic waste from construction crew(see Table 17). During operation of the bus depot, solid and liquid wastes mainly from human activities and bus cleaning and maintenance including potentially hazardous waste such as fuels oils and cleaning chemicals, will be generated.

Table 17: Main types sources of construction and operation waste

Type of waste	Main source	Quantity/Generation rate
Vegetation and top soil (overburden)	Site preparation / Clearance	$40,000m^3$[5]
Excess soils	Excavation	$150,000m^3$[6]

[5] Assuming 5cm removal of top soil
[6] Assuming 2m excavation

Type of waste	Main source	Quantity/Generation rate
Solid wastes (food, paper, metal parts, glass, batteries etc.)	- From construction crew - Food and refreshment centres, - offices	50kg/day[7] 125kg/day 5kg/day
Waste water	- Bus cleaning - Service areas / workshops, - Offices, food and refreshment areas	36,400 -45,600 litres per day[8] 6250 litres per day[9]
Fuel and oils wastes	- Construction equipments - Maintenance workshops - Bus fuelling points	About 1000 litres per day
Cleaners chemicals (solvents, detergents that emulsify oil, the emulsified oil itself)	- Bus cleaning	About 50 kg per day[10]

Approximately 120 workers will be needed during construction and 250 during operation. Assuming that the per capita waste generation is about 0.5 kg per day, about 60kg per day of solid waste will be generated during construction. Assuming that each person will use 25 litres of water and 80% of this amount is discharged as waste the amount of domestic wastewater that will be generated is about 3,000 litres per day.

Thus designs should take due consideration for prevention of haphazard waste disposal. The wastes may contaminate land or be washed into local surface and ground water resources and impair the quality of these receiving bodies. Other impacts include increased bird population (attracted by food waste).

The bus depot is very close to a main river system – the Msimbazi River that eventually discharge into the Indian Ocean. There is possibility for waste from various construction and operation activities to be dumped/washed into local water resources and pollution of aquatic system. Msimbazi River is about 500m from the project site.

Impacts are Negative, cumulative, short-term-long term, high significance.

Air pollution from emissions generating equipments

- Potential impact: ***Deteriorated / Impairment of local air quality***

During construction and operation phases of the bus depot, air pollution by gaseous emissions from various sources is an issue for consideration during design stage. Sources of air pollution will be fuel powered machinery, equipment and vehicles. Main impact is impairment of local air quality, the extent of which will depend on quantities emitted, duration and prevailing atmospheric conditions. Table 18 shows the emission factors of the various construction equipment and vehicles. Table 19 shows the approximated emissions.

Table 18: Emission factors of construction equipments and vehicles

S/N	Type	Quantity	Emission factors	Duration

[7] Based on per capita waste generation of 0.5 kg per day
[8] Based on 40-50 gallons per bus (www.dep.state.fl.us/water/wastewater/docs)

[9] Assuming 25litres per day per person
[10] Assuming 0.25kg per bus (www.dep.state.fl.us/water/wastewater/docs)

1			CO g/hp-hr	NOx g/hp-hr	PM_{10} g/hp-hr	$PM_{2.5}$ g/hp-hr	
2	Excavator	1	0.75	4.31	0.101	0.093	8 months
3	Wheel loader	1	0.94	4.67	0.087	0.88	8 months
4	Trucks	5	11.24	15.27	0.3338	0.3071	8 months
5	Motor grader	1	0.75	4.31	0.101	0.093	8 months
6	Compactor	1	0.94	4.67	0.087	0.88	8 months

Table 19: Total emissions from construction equipments and vehicles

S/N	Type	Total Emission			
1		CO tons	NOx tons	PM_{10} tons	$PM_{2.5}$ tons
2	Excavator	0.268	1.539	0.036	0.033
3	Wheel loader	0.597	2.965	0.055	0.051
4	Trucks	0.007	0.0095	0.002	0.0002
5	Motor grader	0.597	2.965	0.055	0.051
6	Compactor	0.597	2.965	0.055	0.051

The above indicate that the emissions may affect local air quality but will have no significant impact on global air quality issues. However, it should be noted already there are hundreds of vehicles plying Morogoro road which emit same air pollutants.

Impacts are Negative, cumulative, short-term but of low significance.

Use of heavy equipment

- Potential impact: ***Compaction of soil to hardpan /Damage of valuable habitats and species***

Heavy earth moving equipments exert pressure to soil thereby creating a hard pan that is almost impermeable leading to poor drainage and poor root penetration. Vegetation growth is restricted, rendering the area virtually marginal for vegetation growth including crop production. However, the construction of the bus depot requires the area to be compacted. As such this impact is inevitable.

Impacts are Negative, residual, long-term but of medium significance.

6.1.3 Mobilisation and Construction Phases

Main impact sources under this phase include:

- Clearance of project site, excavation, access routes and sites for support facilities (storage, construction camp)
- Draining the Msimbazi wetland
- Transportation of construction equipments, materials and labour.
- Setting up and operation of base camp
- Use of heavy machinery
- Construction works

Vegetation Clearance

- **Impact:** ***Damage local vegetation cover and potentially loss of local biodiversity***

Clearance of vegetation – especially bulldozing of top soil - has tendency to damage local vegetation cover and potentially damage/ loss of habitats and local biodiversity. Vegetation clearance may cause disturbance to land and increase risks to erosion, flooding and change of natural water flows. Permanent clearance will be confined only to areas for used for

permanent structures of the depot. Vegetations on the site are mainly grassland and majority are secondary vegetation. Common grass and herb found on the site are listed in Section 4.3.1.

Impacts are negative, long-term, high significance.

Draining of the Msimbazi Wetland

- Potential impact: ***Destruction of wetland, wetland habitat and contained biodiversity due to construction and operation of the bus depot***

Natural wetlands are important and fragile ecosystem that helps to regulate water levels within watersheds; they filter pollution thereby improving water quality; provide natural flood protection by absorbing and holding high waters; protect against shoreline erosion; provide habitat and critical refuge for countless species. The Msimbazi wetland is therefore acting as buffer zone in the city, it protects mangrove ecosystem at the mouth of the Msimbazi River, it is also known to be used by migratory birds (see Appendix C). Inevitably, construction and operation of the proposed bus depot will mean, draining part of the wetland.

Impacts are negative, long-term, of high significance.

Air pollution

Potential impact: ***Impairment of local air quality***

Equipments capable of generating air emissions are elaborated above (section 6.1.2.4.) However, even with the best available technologies, most of the equipment and vehicles will invariably emit gases such as CO_2, NOx, SOx, particulate matters and hydrocarbons albeit in small quantities - regarded as residual air pollution. Congruent to these are pollutions from fugitive dusts emitted during clearing / excavation works and from vehicles running on loose-surface roadways.

Most of construction materials will be procured locally from within the Dar es Salaam city. Aggregates and fill-material will be transported using trucks from as far as Msolwa in Morogoro about 160 km. Table 20 shows approximate truck journeys required to mobilize construction materials from off-site locations to the bus depot construction site. Tables numbered 20-22 are self explanatory as they discuss issues related to emissions. Table 21 Shows emission factors of vehicles and Table 22 shows estimated emission of air pollutants.

Table 20: Number of truck journeys to mobilize construction materials

Type of material	Quantity	Distance from Source	Truck - Km
Gravel	32,000 tones	30km	108,500
Aggregates	12,000 tones	160km	204,600
Sand	32,000 tones	30km	108,500

Table 21: Emission factors from vehicles

Emission	Vehicles *te/te fuel*
CO_2	3.2
CO	0.027
NO_x	0.038
N_2O	0.00022
SO_2	2 * S conc.
CH_4	0.00023
VOC	0.0054

Table 22: Emissions from vehicles

	CO_2 (tonnes)	CO (tonnes)	NO_x (tonnes)	N2O	SO_2 (tonnes)	VOC (tonnes)	CH_4 (tonnes)
Vehicles	578,194	4,838	6,644	40	522	41.5	975.6

Furthermore construction equipment have tendency of causing noise pollution.

Impacts are negative, short-term, medium significance.

Fuels, oils, lubricants spillage / leakages

- Potential impact: ***Contamination / Impairment of quality of receiving bodies***

Spillage of fuels and oils may occur during refuelling and equipment repairs or leak from equipment that is not well maintained. These may contaminate land or be washed into local surface and ground water resources and impair the quality of these receiving bodies as elaborated under section 6.1.2.3.

Impacts are negative, short-term, low significance.

Excavation

- Potential impact: ***Damage/disturbance to sub-surface organisms.***

Trenching (for buildings, drainage channels, fence etc.) and construction of foundation may cause damage/disturbance to any sub-surface organisms found in the project area. Jangwani bus depot site is rife with termites, ants and borrowing rodents that may be affected as well as the usual subsoil micro-organisms, arthropods and earthworms etc. However, these are not unique or rare organisms as they are found in the general project area see Section 4.3.2.

Dumping of debris, excavated soils on bare lands, water bodies and drains may render the land useless; change ecology of the impacted water body; and block flow of water drains and hence cause localized flooding. Also dumping of debris and excavated soils may cause visual impacts of a given area.

Impacts localized, short term and high significance

Inadequacies in compaction and resurfacing

- ***Damage /erosion of exposed surfaces***

Inadequate compaction and resurfacing compounded by rain, truck movement may cause damage to constructed structures, and soil erosion and consequent sediment load in runoffs

(section 6.1.2.3 above). This is mostly likely to happen if construction is undertaken during the months of Nov - Jan when Dar es Salaam experiences heavy rains.

Impacts localized, short term and of moderate significance

6.1.4 Operation Phase

Impact sources for this phase are:

- Operation of the bus depot
- Washing of buses
- Maintenance and servicing of vehicles
- Fuel dispensing and storage
- Disposal of used tyres, used oil filters
- Panel beating, painting and spraying

Air emissions from increased vehicles and vehicle painting / spraying

- Potential impact: ***Impairment/deterioration of local air quality***

A consequence of establishment of the bus depot will be increased air emissions from increased numbers of vehicles in the area, see section 6.1.3.

Air pollution may also result from evaporated paints and solvents.

Impact is considered negative long- term and of medium significance.

Water pollution from washing of buses

Potential impacts: ***Contamination of water bodies***

It is estimated that about 50 litres of water will be used to wash a single bus (see Table 17). The same amount of wastewater per bus will be generated. And this water will contain oils, grease, mud etc. If allowed to flow freely in the environment it will contaminate the receiving water bodies. Considering that the site is a wetland and is close to Msimbazi River:

Impact is considered negative, long- term and of high significance.

Generation of hazardous materials and solid waste from maintenance and servicing the vehicles

Potential impacts: ***soil contamination and contamination of water bodies***

Visual impacts

Pests, rodents and flies

Maintenance and servicing activities have potential to produce hazardous wastes such used oil, batteries, oil filters and break fluids. These wastes have potential to contaminate soils and water bodies. Furthermore, maintenance activities produce solid waste such as tyres, used brake pads etc. which not only may cause visual impacts but may also provide sites for pests, rodents and flies t o breed. Used oil filters, when removed from equipment, can contain as much as 349.2-453.6 grams of oil.

Stockpiles of old tires present serious health and solid waste disposal problems:

- As potential health risks, used tire stockpiles can be havens in which pests reside and mosquitoes breed, they are a potential fire hazard, and they can contaminate surface water run-off.
- Used tires disposed in landfills will not decompose for many years and will tend to disrupt landfill covers by rising to the surface, and therefore are not recommended.

Impact is considered negative long- term and of high significance.

Inadequacies in Operation and Maintenance

Potential impacts:

- ***Disrupted bus depot operations***
- ***Contamination and /impaired quality of receiving body – land and water.***

Lack of periodic maintenance of the bus depot and inadequate resources to maintain its facilities will inevitably impact the operations of the depot and may also result in contamination of receiving bodies. Floods could also be the main cause of frequent closure of bus depot and inconvenient to operators.

Impacts: negative, long term and of high significance.

Risk of fuel spillage

Potential impacts: ***soil contamination and contamination of water bodies.***
Fuel spillage will cause contamination of soil and water body. Oil contamination may consequently kill micro-organisms and may block re-aeration of water bodies and hence impact aquatic life of receiving water body.

Impacts: negative, both primary and secondary, long term and high significance.

6.1.5 Decommissioning

Disposal of waste from demolished structures

- Potential impact: ***Contamination/impaired quality of receiving body***
  In the event that DART is no longer the mode of transport preferred, the bus depot and associated facilities may need to be demolished necessitating disposal of demolished waste. Haphazard disposal may cause contamination/impaired quality of receiving body – especially land, and water resources.

Impacts: negative, short term and of high significance.

6.2 ASSESSMENT OF SOCIAL IMPACTS

6.2.1 Site Selection phase

Site selection phase determines the overarching impacts of the presence of the project on the general socio-economic settings at the project area. Main impacts sources relate to land take and effects of neighbouring activities and developments.

Land acquisition for bus depot and support facilities

The bus depot requires land space of about 75,000m^2 and access road about 6m x 500m. Any land uses located within this land will need to be taken in order to meet the required dimensions. Potential impacts:

- ***Conflict of interest among the stakeholders***

There are several groups of stakeholders who have interest in the Jangwani flood plain that could potentially conflict with the proposal to develop a bus depot at the earmarked site. (see sections 5 stakeholders consultations and the public): Other concerns together with response by the Project Proponent are as listed in Table 23.

Table 23: Summary of stakeholders' concerns and response by the Project Proponent

Stakeholders' concerns	Response by the Project Developer
Conservationists claim that Jangwani and the Msimbazi basin at large constitute a wetland habitat of ecological value. Most stakeholders in this category support the "No Development" option	The project does not intend to take whole of the Msimbazi Basin. Only 10% of the Jangwani area (see Figure 2), which is less than 1% of the total Msimbazi Basin will be used by the project
Urban planners - by interfering with the natural water flows, construction of the bus depot might exacerbate flooding at the Jangwani area. The area is an open space that provide aesthetic to the city	Engineering design will ensure that water flow is not blocked. These designs include construction a sustainable drainage system, dredging of part of the Misimbazi River, expanding the culvert etc. Refer to section 7.1.1 The project will only use 10% of the available open space, refer to Figure 2
Sports and culture: public meetings (religious, political parties), football play ground. The project was allocated to Ministry of Culture and Sports to construct a stadium	The project will not encroach play grounds, space for religious or political rallies, see Figure 2. The project will construct an ablution facility to be used by people using other facilities within the area. This is an additional benefit, since currently there is no such facility for those using the grounds.
General public: traffic congestion, accident at entry/exit points from Morogoro road	The project will design a proper traffic control system at the junction that will allow orderly transition of traffic without much conflict. This will include construction an acceleration lane in addition to traffic lights.

The permit to develop the bus depot has been issued by the President's office after five other sites could not satisfy the needs of the depot, (see section 6.2) and after considering the importance of the project in socio-economic development of Dar es Salaam and the nation at large.

However, considering the perceived negative impacts as discussed above, and based on the fact that the responses provided by the Project Proponent are not known by the public,

The impacts are considered negative, short/medium term and of high significance

- ***Cost of compensation and relocation disturbances***

There is no household on the project area and the small holder farmers who were found on site during scoping exercise had already gone after harvesting their crops. Therefore, there is no resettlement issue. The only facility to be relocated is the temporary Police Post. The project will construct another Police Post.

No major impact.

6.2.2 Design Phase

Main impact sources for the design phase relate to:

- Placement of project components
- Choice of Technologies, Environmental Practices, techniques (to meet both Tanzania and international Health, Safety and Environmental (HSE) standards;
- Choice of materials;
- Setting management procedures for handling and disposal of wastes; and health & safety procedures; and
- Planning for availability of adequate resources.

Exploitation of borrow pits/quarries and other natural resources

- Potential Impact: ***Depletion of resources/conflicts with land owners and resource users***

The impacts are as discussed in section 6.1.2.

Haphazard disposal of construction and operations wastes

- Potential impact: ***Visual impacts / Public health hazards***

Main sources of construction and operations wastes are shown in Table 17 above. Overburden and domestic waste produced by construction activities and during bus depot operations if damped haphazardly becomes an eyesore, cause bad smells and reduce the aesthetic value of an area. Food waste attracts insects (houseflies, ants) and scavengers (rodents, birds, dogs, cats) some of which are potential vectors of diseases including cholera, diarrhoea etc and may create nuisance to bus depot users. Some waste are non-biodegradable and/or poisonous (plastic, batteries, oils etc.) and may seep into under ground/surface water resources. Water table throughout the core study area typically ranges from 5m to 10m. Msimbazi stream is the main source of potable water for small scale farmers and people living in Jangwani valley.

Current measures to manage waste (collection and disposal of solid, liquid and excreta waste) and maintain the sanitation and hygiene within the city are barely sufficient for current population. The area around the project site lack management of waste as solid waste is haphazardly dumped both to the east and west of the site.

Impacts will be negative, short-long term of moderate significance

Hazards to workers

- Potential impact: ***Occupation health and safety***

Safe working environment is normally assured when code of practices in the working place are instituted. Failure during the design to provide for and integrate health and safety (e.g. providing health and safety training to workers, putting in place emergency plan, providing first aid, providing proper personal protective gear and ensuring suitable working conditions) and ensuring there is a clear distribution of responsibilities and accountability for health and safety management activities to all employees at all levels may lead to accidents, injuries to workers, loss of lives and/or of property. Mobilization and construction activities are rife with activities that may cause risk of serious injuries and/or fatalities to workers including use of motored / sharp edged equipments. Construction works use various noise-emitting heavy power equipments and tools and engines including compressors, generators and mixing machinery. Noise is expected to be generated from vehicles and trucks transporting construction equipment and materials. Noise levels from vehicles are about 65 dB.[11] Also fire risk may exist at the base camp, offices, and storage and maintenance areas handling flammable materials. Occupational health hazards may also be promoted by lack of procedures that mitigate negligence at work, fatigue due to understaffing and long working hours, employing wrong people on particular jobs and low morale, etc.

Impacts is negative, short term, of high significance

Public health and safety

- Potential impact: ***Health hazards / disturbances and nuisance to offsite receptors –***

[11] http://www.cdc.gov/elcosh/docs/d0500/d000573/d000573.html

Transportation and construction hazards to public could emanate from vehicles causing accidents, congested traffic, material spillage etc; air pollution from emissions of exhausts of trucks, equipments and dust from loose earth roads; and noise generated from vehicles and trucks transporting construction equipment and crew. Construction works use various noise-emitting heavy power equipments and tools and engines. Main features located closely to the site is the Kajima Construction Company main base while residential houses are located relatively far from the site approximately 500 metres.

Impacts negative, short term, low- high significance

Social interactions

- Potential impact: ***Public health hazards/safety***

Construction works and increased business opportunities at most construction sites are associated with availability of employment opportunities and hasty generation of income. Therefore people with different social background immigrate to the project area to take advantage of these opportunities. This influx of people in the project area and resultant social interactions among workers and locals is inevitable especially on the construction areas, transportation routes etc. The obvious relative wealth of the project workers may lead to exploitative behaviour on the hosts' side. Consequence of these interactions could be increased incidences of health impacts such as spread of STDs, HIV/AIDS and breach of security. In Dar es Salaam, estimates suggest that 12.2 percent of women aged 15 to 49 are HIV-positive, while an estimated 9.4 percent of men in the same age group are living with the virus (UNAIDS 2005). However, bus depot is one among several construction works and other investments taking place in the city. The site is not isolated, thus no influx, workers will be those already residing in the city.

Impacts negative, cumulative, long- term and of high significance

- Potential impact: ***Compromised Security***

Construction activities are associated with incidences of vandalism and theft of equipments and materials such as cement, fuel and other portable items that have ready-made market or for home use. Construction activities will be conducted on bus depot grounds that lack an outer fence this provides opportunity for people residing in nearby settlements to have easy access to construction equipment and other materials.

Impacts will be negative, cumulative, short-term, and of moderate significance.

6.2.3 Mobilization and Construction Phases

Main impact sources:

- Clearance of extension portions and if necessary access routes and sites for support facilities (storage, crew).
- Transportation of construction equipments, materials and labour.
- Setting up and operation of base camp
- Construction works

Vegetation clearance

- Potential impact: ***Loss of crops and impairment of landscape aesthetics***

Clearance of vegetation will entail removal of food crops - vegetables, fruits and various legumes – found on the project site. The farms are small gardens of approximately 40 x 20 meters each mainly used to grow vegetable for selling. Clearance usually affects the natural aesthetic attraction of an area; however the portion that will be cleared will be confined to the project site in an already cleared area.

Impacts will be negative but not be significant
Exploitation of local resources and manpower

- Potential impact: **Income to local suppliers and service providers**

The project intends to procure materials from licensed suppliers. The below are current prices for the various construction materials and the amounts of cash expected to be gained by the suppliers of the materials.

Table 24: Costs of the quantity of materials needed.

Type of material(Estimated Qty-Ton)	Quantity required by project Tons	Unit price [TZS]	Total
Gravel (32,000)	18 tones	180,000	320,000,000
Aggregates (12,000)	18 tones	180,000	120,000,000
Sand (32,000)	18 tones	50,000	89,000,000
Cement (1,000)	50 kg	15,000	300,000,000

The Contractor and crew will also depend on other local supplies and services (food, accommodation, medicals) and employment of casual and semi-skilled labour. Increased revenue to local councils

Impacts will be positive, cumulative, short-term, and of moderate significance

6.2.4 Operation Phase

The impacts sources are:
- Movement of vehicles
- Panel beating and painting
- Use of pumps and compressor
- Fuel dispensing and storage

Increased/improved public transportation services in Dar es Salaam city

- Potential impact: ***Increased commercial and social activities (induced development)***

Dar es Salaam, a city of over 3.2 million residents, has a fleet of private motor vehicles and minibuses that is growing faster than the 4% annual GDP growth rate. The vast majority of trips in Dar es Salaam are concentrated on the central business district (CBD). Only 4 arterials and one 2-lane road serve the over 450,000 daily transit passengers entering the CBD, and these roads are heavily congested with private vehicles and about 7,000 minibuses (16-seater Toyota Hiaces) and medium sized buses (30 seater Isuzus). If nothing is done to check their growth, CO_2 emissions from the transport sector in Dar es Salaam are projected to increase by 50% by 2010, an increase of 1,474,000 MT just within the affected area.

More than 100km BRT trunk system with 200km of feeder lines is envisioned for the Dar BRT system. Under Phase I, 10km will be completed on Morogoro Road. An estimated 24,000 daily passengers currently using private modes of transport will switch to less polluting (per trip) large buses, (because the trip will be much faster). Roughly 270,000 daily bus trips which are currently undertaken using minibuses and microbuses will instead use a

smaller number of cleaner BRT buses. Combined, this should lead to a reduction of 430,000 metric tons of CO_2 emissions in the first year over baseline emissions projections, and a reduction of 1,119,000 metric tons of CO_2 by the fifth year of operation.

The DART Agency (developer) is expected to modernize the public transport system in Dar es Salaam to meet international standards using modern high capacity buses operating on exclusive lanes at less travelling time and cost effective. The developer is geared to provide quality, accessible and affordable mass transport system for the residents of Dar es Salaam. The bus depot is expected to stimulate various social, commercial and economic activities in the city that depend on an improved transportation system including tourism, and urban development. The depots themselves will be a model for other transportation companies who don't have such facilities.The government of Tanzania with support from the government of Japan is undertaking a study on development of Dar es Salaam Urban Transport Policy and Master Plan, the aim of which is to come up with a comprehensive solution to multimode transport system plan in the City. The project is expected to have tremendous positive impacts.

Impacts will be positive, long-term, sustainable and of high significance.

Air emissions and noise pollution

- Potential impact: ***Disturbance and nuisance to receptors***

Consequences of increased bus traffic are increased noise and disturbance to residents and institutions close to the bus depot. Even with the best available technologies, most of the other equipments (generators) and vehicles will emit gases such as smoke, CO_2, NOx, SOx, particulate matters and hydrocarbons - regarded as residual air pollution, see section 6.1.3. Also noise levels are expected to increase to about 55 dBA during the day.

Impact will be negative, cumulative, and of medium significance.

Inadequacies in O & M

- Potential impact: ***Deterioration of public health and sanitary conditions***

Inadequate resources to maintain the bus depot facilities and services e.g. storm water channels and haphazard disposal of wastes as well as inadequate support structures and services not part of the bus depot project e.g. lack of sustained water supply, power supply - may in future result in health hazards to workers and bus depot users and loss of aesthetics and disrupt bus depot operations. Water will be required for cleaning and maintaining the sanitary conditions at the bus depot. Estimates are $10m^3$ daily for cleaning and 25 litres / person/day (about $7m^3$ per day). Inadequate supply has consequence to human health due to poor sanitation.

Impact will be negative, secondary (indirect), cumulative, and of high significance.

Health and safety impacts

Potential impact: ***Deterioration of worker's health and safety***

Some of the paints may contain heavy metals such as lead and cadmium which have significant health impacts. Also moving vehicles, panel beating are bound to cause noise pollution which will inevitable disturb the neighbouring communities.

Fuel dispensing and storage may cause a fire risk which could in turn cause human injury, fatality or loss of property.

Impact will be negative, cumulative, and of high significance.

6.2.5 Decommissioning Phase

Disposal of demolished waste

Potential impact: ***Contamination and impaired water***
In the event that the bus depot is decommissioned associated facilities may need to be demolished necessitating disposal of demolition waste. Haphazardly disposed waste may becomes an eyesore and reduces the aesthetic value of an area.

Impacts: negative, short term and high significance.

Loss of employment

Decommissioning of the bus depot will inevitably result into loss of employment.

Impacts: negative, long- term and of medium significance.

6.3 ANALYSIS OF ALTERNATIVES

6.3.1 Site Alternatives

The following are sites which were considered as alternatives, however, due to number of reasons as explained below they were found unfeasible for this development. Brainstorming took place on discussing the possible site for depot development out of the following five sites.
The criteria for site selection were mainly qualitative, these were:

- access by the buses in operation under Phase 1
- community impacts like potential traffic, noise and air quality impacts to existing neighbourhoods, Land values, cultural and historical sites
- Environmental impacts like flood plains, wetlands, natural features.
- Planning and land use considerations
- Site characteristics such as space available, expansion possibility and cost of acquisition.

Alternative One

This site has an area amounting to 23 acres and is located along Sum Nujoma Road.
It is owned by a public institution known as M/S: Simu 2000 Ltd and by the time evaluation it had already been allocated to AgaKhan Foundation through a Presidential Order issued in 2003. Based on the evaluation criteria shown above this is site was found as not feasible because it is small in size and does not provide possibility for expansion.

Alternative Two

This site is Plot No. 2005/2/2 along Sam Nujoma with an area amounting to 12 acres.
This plot was already been earmarked by Kinondoni Municipal Council for development of a Heart Hospital as a joint venture between Appolo Heart Hospital of India and the National Social Security Fund (NSSF). Again, the site could not be opted for.
Based on the evaluation criteria shown above this is site was found as not feasible because of its small size and does not provide possibility for expansion.

Alternative Three

This site was formerly used as Konoike Base Camp and is located along Sam Nujoma Road
It is an area of 2.5 acres and belongs to the University of Dar es Salaam. Based on the evaluation criteria shown above this is site was found as unfeasible because it is small in size, it is owned by a public institution and does not provide possibility for expansion. Furthermore, it is out of the route under Phase 1 operation.

Alternative Four

This site belongs to Ubungo Farm Implement Ltd.
It has an area of 13.7 acres. At the time of looking for this site, the information from the owner showed that she had already entered into lease agreement with a foreign investor.
Based on the evaluation criteria shown above this is site was found as unfeasible because it is small in size and does not provide possibility for expansion.

Alternative Five

This site has area covering more than 75 hectors (ha) in total. The size of land needed for project implementation is 7.5 ha. The all land is under the jurisdiction of the Dar es Salaam City and Ilala Municipal Councils-institutions that own the project. Planning land use rules have allowed change of use to the depot development and as such there are no costs for land acquisition neither for lengthy negotiations. Likely environmental impacts that are apparent can be mitigated up on by the developer. Based on the evaluation criteria shown above this is site was found as feasible.

Conclusion: based on the criteria as explained above, it is apparent that the suitable site for depot development is ALTERNATIVE FIVE which in this report is referred to as **Jangwani Valley.**

6.3.2 Alternative Depot Design

Open shade depot

Open shade depot is one where the parking bays do not have a roofed structure (similar to the Upcountry Bus Stand at Ubungo).
Advantages:

- Uses less construction materials
- Less operation costs (less lighting requirement, cleaning, de-dusting etc
- Less maintenance costs (less physical structures to maintain)

Disadvantage:

- During rain the drivers will have to walk through rains
- Storm water is scattered and also collects oils and grease from the entire depot site
- Does not offer possibility for rain water harvesting

Closed shade depot

Closed shade depot is one where the parking bay has a roofed structure
Advantages:

- During rain the drivers walk through shaded area
- Storm water is collected from the roof and directed to either drainage
- Provide possibility for rain water harvesting

Disadvantage:

- Uses more construction materials
- Needs more maintenance
- Needs more operation costs (lighting requirement, cleaning, de-dusting etc)
- Needs more maintenance (more physical structures to maintain)

Open shade depot will be constructed.

6.3.3 Alternative Support Structures

Depot with support structures

A depot with support structures is the one where all functions of cleaning, washing, maintenance, inspection, servicing, painting and spraying are done. This is the design that has been adopted for this project. The advantage of this arrangement is that i) it optimises the operations, ii) it allows for better scheduling of activities. Having everything in one roof minimises overhead costs. The disadvantages of this type of depot are such that i) it is more

expensive to build, ii) it limits the outsourcing of some of operations, failure in one function may impact other consecutive functions.

Depot with no support structures

A depot with no support structures is the one where packing of bus is provided and other support services are done elsewhere. The disadvantage of this arrangement is that more plots are needed, and all of the advantages mentioned in 6.2.3 are not possible. It is prone to high overhead costs. Security becomes a major head ache since there is more openings which could be used to steel spares, fuels, consumables etc. The advantage is that it is possible to outsource some of the activities.

6.3.4 Alternative Wastewater Treatment Facility

Use of septic tank and soak away pits

Septic tanks and soak away pits will be prone to flooding because the water table in the area is very high. Operation and maintenance of this system will very costly as the frequency of emptying will be very high.

Use of wastewater stabilisation ponds

Stabilisation ponds are not suitable for a closed system since they generate foul smell and provide breeding ground for mosquito. Besides, the area is not large enough to accommodate such a system.

Use of constructed wetlands

Constructed wetlands are suitable for tertiary treatment, as such they are more suitable when a combination of system is used e.g. stabilisation pond and constructed wetland.

Use of mechanically operated treatment system

While these systems are very efficient and use very small area, the running costs, due to high cost of electricity, have proved to be a prohibitive factor. Almost all such systems in Tanzania are not working.

Use of central sewer system

Because of the natural setting of the area none of the above system is suitable for the project use of central sewer is considered to be more plausible alternative. Besides, there are plans to establish a plant to improve liquid waste disposal in the area as explained below.

Development of a Conventional Water Treatment Plant

This is one of the latest developments according to DAWASA. It is to be developed in the lower stream of the Msimbazi River and as such it is anticipated that all problems associated with liquid waste management will be solved once this plant is in place. Designs and bidding documents are in place (see ***Appendix G*** for a detail of this plant)

6.3.5 Disposal of Used Oil

Refining the used oil

Refining process removes the additives, water, wear metals and other contaminants from used oil. It returns the base oil fraction that can once again be blended with additives into useful lubricating group I base oils. Through this process used oil, formerly considered a problematic waste substance, can be transformed into a valuable resource. Used oil is the only hydrocarbon that can be restored to its original high quality specifications for re-use. This technology, known as the "Interline Process," is environmentally friendly and a closed loop system. This process is the only waste oil recycling process ever demonstrated to be economic in medium-sized (25-50,000 gallon per day) refining applications. The development of this process makes all other used oil refining processes obsolete. This process becomes more important today with the increasing scarcity of petroleum products. The finished base oil from the refining process can be blended into high quality lubricants in any market application.[12] Unfortunately this technology is expensive.

Use of used oil to suppress dust

Sometime back used oil was used to suppress dust on roads, but this proved to be environmentally degrading.

6.3.6 No Project Alternative

Project alternative could either be no depot development which could literally mean no Bus Rapid Transit in Dar es Salaam (DART) because of inherent relationship between a depot and the bus rapid transit project. The National Transport Policy is very clear on the transport problems facing urban centres and associated problems such as increased road accidents, environmental pollution etc. As such abandoning depot development would mean refusing DART project and as such paralyzing the statements of National Transport Policy (NTP). NTP advocates the development of cost effective, socially acceptable and environmentally friendly transport system. As mentioned a bus depot is an integral part of the rapid transit system.

[12] http://www.interlineresources.com/Used%20Oil%20Re-Refining (accessed on 20th January 2009)

7 ENVIRONMENTAL AND SOCIAL IMPACTS MITIGATION MEASURES

This chapter provides mitigation measures for the impacts that have been identified to be of moderate to high significance.

7.1 ENVIRONMENTAL IMPACTS MITIGATION MEASURES

7.1.1 Site Selection Phase

Site Ownership

Considering the fact that issuance of Certificate of Occupancy takes a while to be obtained the Project Proponent should aggressively follow this issue with relevant authorities

Damage to wetland habitat and contained biodiversity

From the field observation neither of the plant nor fauna species falls under any of the IUCN threatened category was identified in the proposed project area. This may be attributed to long term disturbance of the site. The primary vegetation has been replaced with exotic plant species and grasses.

Damage to constructed structures and disruption of operations due to natural factors such as floods

Although, the project will occupy 10% only of the existing flood plain, the design has taken into consideration the possibility of extreme flood conditions. The drainage design at Jangwani is provided with wide storm water drains (see Figure 5 and Figure 6) which will capture any flow from within and outside the depot. It is also worth noting that river Msimbazi had been trained by the city fathers following El-Niño flood case[13]. DART is going to expand the bridge nearby which will include adding additional box culverts and dredging outlets to ensure no blockage and therefore mitigate any chance of a flood within DART and the rest of the basis. If the river is contained in that manner, there is little or very low risk of flood case after effective corrective measures have been undertaken as designed.

Other measures that include construction of a Sustainable Drainage System (SUDS)[14] aim to reduce flood risk by controlling the rate and volume of surface water runoff from developments, in addition to managing the quantity of surface water more effectively one of the primary benefits of SUDS is the potential enhancement of water quality. Appendix F provides detailed information on SUDS. Guidelines for construction of SUDS exist.[15]

7.1.2 Design Phase

Damage to constructed structures; ineffective utilisation of the bus depot; and disruption of water/flood flows

To mitigate possible flooding tendencies which may in turn impact the structures, functionality of the bus depot and ensuring water natural flow is not restricted the storm water drainage as proposed above shall be constructed.

[13] This is considered to be extreme food condition
[14] http://www.charcon.com/products/suds_range.aspx
[15] www.althon.co.uk/products/althon-suds/sel-source-control-system

Degradation at point source of construction materials

Construction of bus depot is one of many construction activities being carried out in Dar es Salaam. All these constructions extract the resources from the same source. And as long as Tanzania is aspiring to develop, extraction of natural resources cannot be avoided. The important requirement therefore is to ensure the extraction of natural resources should be done in an environmentally friendly manner which may include reclamation of the borrow pits. Since the borrow pits do not belong to the project, the project cannot unilaterally mitigate the impacts at the borrow pits.

However, DART Agency shall procure construction material from licensed suppliers to discourage those who may be extracting materials from closed down borrow pits.

Although the project will only be using about $50m^3$ per day (i.e. 0.018% of DAWASCO's daily water supply capacity) during construction and about $10m^3$ during operation, which is relatively low consumption, DART Agency will put in place a water recycling system within depots to minimise use of virgin waters. In order to mitigate impacts from power shedding DART Agency will install a standby generator.

Contamination and/or impaired quality of receiving bodies (i.e. water and land)

In order to mitigate the potential impacts from solid waste the following mitigation measure shall be put in place, see Table 25. It is worth mentioning that although some the sources of impacts will occur at different phases of the project cycle, their mitigation measures have to be included in the design of the project. However, in the summary table efforts have been made to place the impacts and mitigation measure to their appropriate phase of their expected occurrence.

Table 25: Mitigation measure of solid wastes

Type of waste	Proposed disposal method
Vegetation and top soil (overburden)	Used for gardens and filling material within the site and adjacent sites
Excess soils	Used as filling material on adjacent site
Solid wastes (food, paper, metal parts, glass, batteries, used oil filters etc.)	Disposal through Ilala Municipal Council disposal system Metal parts will be sold to recyclers Glass and broken bottles will be sold to Kioo Ltd. For recycling. Batteries will be collected and sent to recycling companies to extract lead and plastic recycling Plastic bottles will be collected and transported to plastic recycling plant
Used oil filters	All oil filters must be punctured on the dome end and hot-drained for 24 hours. "Hot-drained" means that the filters are drained immediately after being taken off a hot engine. Crushing and dismantling the filters will remove even more of the oil. Filters that are drained and/or crushed, and are "non terne-plated" may be disposed in the regular garbage. Cans may be used as recycling material for small metal industries.
Used tyres	a) The developer will ensure air pressure in tires, periodically rotate and balance tires, and periodically check front end alignment. b) Prevent unnecessary tire change outs. Educate employees on proper techniques for determining the correct time tires should be replaced. c) Disposal used tyres to re-users or re-traders d) Recycle scrap tires. Whole scrap ties can be used for retaining walls, dock buffers, or playground equipment. Tires can also be processed for door and gymnasium mats or for erosion control.
Waste water	Bus cleaning / service areas water will passed though oil separators and discharged through storm water drainage Other grey water will be connected to the existing central sewer system for Jangwani depot (wherever possible) at the nearest possible point

Deterioration / impairment of local air quality

Air pollutants may be minimised by proper maintenance and regular servicing of engines. The developer will put in place two types of systems. Regular services of all vehicles after every 3000km travelled, weekly services to check minor defects that may occur during normal operations. Although the noise levels of about 55 dB are within the acceptable levels for human exposure, DART Agency will construct a wall around the site. It is scientifically proved that walls minimise noise to the neighbourhood.

All electric motors such as compressors shall be housed in soundproof enclosures to keep noise level within permissible limits as per the TBS standards.

Trees and other suitable vegetation will be planted around and within the site as much as practically possible to absorb carbon dioxide and generate oxygen to 'green' the area and compensate for lost vegetation.

7.1.3 Mobilisation and Construction Phases

Damage of local vegetation cover and potential loss of local biodiversity

From the field observation neither of the plant nor fauna species falls under any of the IUCN threatened category was identified in the proposed project area. This may be attributed to long term disturbance of the site. The primary vegetation has been replaced with exotic plant species and grasses.

Destruction of wetland, wetland habitat and contained biodiversity due to construction and operation of the bus depot

Natural wetlands are important and fragile ecosystem that help to regulate water levels within watersheds; improve water quality; reduce flood and storm damages; provide important fish and wildlife habitat. The Msimbazi wetland is therefore acting as buffer zone in the city, it protects mangrove ecosystem at the mouth of the Msimbazi River, it is also known to be used by migratory birds (see Appendix C). Inevitably, construction and operation of the proposed bus depot will mean draining part of the wetland.

Impacts are negative, long-term, of high significance.

Contamination / Impairment of quality of receiving bodies due to Fuel, oils, lubricants spillage / leakages

In order to protect land and water bodies from oil, fuel and lubricants, all petroleum products, used oil and other chemical shall have secondary containment. Areas enclosed by secondary containment shall be maintained, and all accumulated water within secondary containment areas shall disposed of through oil traps. It should be noted that oil traps are able to remove oil, grease to extent of allowing water to be disposed in the natural water streams or rivers without significant environmental impact (i.e. of 10 mg of oil per litres or below).[16] The collected oils shall be disposed of in boilers and/or furnaces of industries such as cement kiln, glass furnaces etc. The secondary containment shall have a storage capacity of 110 % of the capacity of the storage tank.

Furthermore, water from maintenance bay shall also be discharged through oil traps to remove oils, grease and fuels.

[16] http://www.directindustry.com/industrial-manufacturer/oil-water-separator-72923.html (accessed on 20th January 2009)

Damage/disturbance to sub-surface organisms due to Excavation

From the field observation neither of the plant nor fauna species falls under any of the IUCN threatened category was identified in the proposed project area. This may be attributed to long term disturbance of the site. The primary vegetation has been replaced with exotic plant species and grasses.

Solid debris such as grass and shrubs shall be collected and disposed of at the land fill site at Pugu Kinyamwezi land fill.

Damage / erosion of exposed surface due to inadequacies in compaction and resurfacing

In order to mitigate soil erosion tendencies all excavated sites shall be compacted and depot surfaces shall be reinforced by concrete. Furthermore, construction shall be done during dry season.

7.1.4 Operation Phase

Pollution from paints and spraying this shall be done in specially designed spraying bay.

Contamination of water bodies due to water pollution from washing of buses

Mitigation measures are summarised in Table 25.

Soil and water contamination; visual impacts; increase in pests, rodents and flies due to improper disposal of waste

In order to mitigate that may result from solid waste management the following shall be done:

a) batteries shall be sent to batteries manufactures and recyclers who will remove hazardous components on the batteries and recycle the plastic material
b) Oil filters (see Table 25)
c) Used oil shall be sold to companies with boilers or furnaces where the used oil will be combusted
d) Used tyres shall be shredded and used as fuel in boilers and furnaces
e) Used brake pads shall be disposed of, see Table 25.

Disrupted bus depot operations; contamination and impaired quality of receiving body – land and water due to inadequacies in operation and maintenance

In order to mitigate impacts that may result from inadequacies in operation and maintenances DART Agency shall:

a) Put in place preventive and periodic maintenance plans
b) Have a dedicated maintenance department.
c) Establish a dedicate budget line for maintenance activities.

7.1.5 Decommissioning

Contamination / impaired quality of receiving bodies due to improper disposal of waste from demolished structures

In order to mitigate impacts that may results on decommission of the depot the following measures shall be done:

a) Use the depot a bus stand for vehicles coming from other parts of the country similar to what was done for the UDA Depot at Ubungo.
b) If the above is not possible, convert for use by small scale traders especially garage operators.
c) If all of the above are not possible then the site shall be demolished and returned to its original state. The demolished debris shall be disposed of as filling materials

7.2 MITIGATION MEASURES FOR SOCIAL IMPACTS

7.2.1 Site Selection Phase

Conflicts of interest among stakeholders

The scoping exercise identified that there are conflict of interest from different walks of life. The majority of interviewed indicated their reservation because of the following:

(i) Msimbazi valley is a hazard land

(ii) Jangwani plains is the only large open space which provide a buffer to the city

(iii) Construction will block natural flow and hence increase floods in other adjacent areas

(iv) The construction will impact mangrove ecosystem down stream

(v) Oil spills will pollute Msimbazi river

(vi) The bus depot will increase noise in the area

(vii) Bus depot will increased crime in the area

(viii) Jangwani plains are used from recreation and public and religious rallies

(ix) Increased congestion along Morogoro Road

(x) The area was earlier allocated to the Ministry of Sports and Culture to construct a stadium

While the majority of the above impacts mentioned can be mitigated by proper engineering design, the perception of those interviewed is negative. In order to address these concerns developer will conduct a massive awareness campaigns, focussing particularly to the concerns raised by stakeholders.

Cost of compensation and relocation disturbances

There are no permanent structures in the project site save for the Police Station which is to be relocated. Basically, most of the current land users are there on temporary basis with no permanent structure. The developer, through the use of the local government organs will give ample time to those who have garden to harvest their crops. Others like food petty vendors may serve contractors during the construction of the depot.

7.2.2 Design Phase

Depletion of resources/conflicts with land owners and resources users

Comparing with the construction activities (roads, buildings) going on in Dar es Salaam, the contribution of this project to depletion of resources is not that significant. However, the project will authenticate the claims made by some people that they own land along the access road. If their claims are found genuine, compensation according to Land Act shall be made.

Visual impacts / Public health hazards due to Haphazard disposal of construction and operation wastes

For mitigating potential impacts from solid waste the solid waste management system will be used in which all waste will be collected and taken to the designated land fill. Other hazardous waste (plastic, batteries, oils etc.) shall be handled as discussed in section 7.1.3.

Occupation health and safety

In order to mitigate potential health and safety impacts DART Agency shall do the following:

a) provide health and safety training to workers,
b) put in place emergency plan
c) provide first aid services

d) provide proper personal protective gear
e) ensure suitable working conditions

Health hazards / disturbances and nuisance to offsite receptors

Mitigation of these impacts are as explained in section 7.1.3.

Public health and safety hazards

All buses will carry regular awareness campaign posters to remind people of HIV/AIDS scourge. Specific awareness campaigns to DART workers will be conducted regularly.

Compromised security

In order to mitigate potential security problems the following measures shall be put in place

2. the project site shall be fenced and controlled access shall be instituted
3. Police post shall be constructed
4. Security lights shall be put n place

7.2.3 Operation Phase

Disturbance and nuisance to receptors due to air emissions and noise pollution

Mitigation measures for air emissions are as discussed in section 7.1.4.

Deterioration of public health and sanitary conditions due to inadequate in O&M

In order to mitigate potential impacts that may result from inadequate operation and maintenance the measures discussed in section 7.1.4.

Deterioration of worker's health and safety

In order to mitigate health and safety impacts that may result from paints DART Agency shall do the following:

a) paints that contain lead and cadmium shall not be used
b) painting and spray shall be done in spraying bay with gargets to mitigate impacts
c) provide appropriate gear

7.2.4 Decommissioning Phase

Contamination and impaired water due to improper disposal of demolition waste

In order to mitigate impacts that may result from decommissioning activities the mitigation measures as discussed earlier in section 7.1.5 of this report.

Loss of jobs

All employees will be registered with social security funds such as LAPF, NSSF, and PPF. The developer as employer coordinates the collection and submission of workers' contributions to the appropriate security fund.

Table 24 shows a summary of mitigation measures. It should be noted that the majority of mitigation measures happen during design and construction phases. This means that a certain environmental impact may occur during operation if the design does not provide a mitigation measure for such impacts. That is why some impacts that are considered to belong to operation phase are discussed under the design phase, where the design solution has to be provided.

Table 26: Summary of Mitigation Measures

Phase	Potential Direct Impacts	Management/Mitigation Measures
SITE SELECTION	Land Ownership: Certificate of occupancy	(1) A letter signifying presidential approval for the use of the land has been secured. The developer, in collaboration with the local government authorities, will follow up the matter with Ministry of Lands, Housing and Human Settlements Development to secure the relevant documents when a detailed plan for the area is in place.

	Damage to wetland habitat and contained biodiversity	(2) The construction shall be limited to the space needed for the depot. (3) SUDS will be installed to overcome flooding damage to living organisms.
	Conflict of interest among the stakeholders	(4) The project shall not encroach on the existing sports ground and grounds used for religious and other social gatherings
DESIGN PHASE	Damage to constructed structures and disruption of operations as a result of natural processes	(5) The design will provide for wide drains and a Sustainable Drainage System. The project shall also expand the bridge crossing Msimbazi River along its longitudinal axis by constructing additional box culvert and dredging outlets to ensure no blockage
	Degradation / Impairment of local air quality including noise	(6) The design shall include construction of a wall around the site.[17] (7) The design shall specify that all electric motors such as compressors be housed in soundproof enclosures (8) The design shall include planting of trees to absorb carbon dioxide and replenish the oxygen that will be lost through combustive processes and compensate for part of the city's green belt that will be lost
	Compromised Security of the project facilities and the general area	(9) The design shall include construction of a wall around the project and during mobilisation, construction and operation phase controlled access shall be instituted (10) The design shall include construction of a Police post (11) The design shall include installation of security lights at appropriate places
	Public health and safety during mobilisation, construction and operation phases	(12) The project shall design an emergency plan to cater for public health and safety for the entire project cycle
MOBILISATION PHASE	Occupation health and safety during mobilisation, construction and operation phases	(13) Guidelines from OSHA will be adhered to accordingly eg by providing personal protective gears (PPE).
	Public health hazards/safety during mobilisation, construction and operation phases	(14) Awareness campaigns on HIV/AIDS (15) Sensitisation of workers to undergo voluntary testing
	Degradation at points of sources of construction materials	(16) The contractor shall procure construction material from licensed suppliers to avoid materials extracted from illegal borrow pits. (17) The developer will work with relevant bodies such as Municipal Councils and the City Council to draw up a closure plan of borrows pits. (18) Water recycling system will be used to minimise use of virgin waters.
CONSTRUCTION PHASE	Contamination / Impairment of quality of receiving bodies	(21) Disposal of overburden: The excavated top soil shall be used as filling material within the site and adjacent sites

[17] It is scientifically proved that walls minimise noise to the neighbourhood

	Damage /erosion of exposed surfaces due to inadequacies in resurfacing and compaction and improper timing of construction period.	(22) all excavated sites shall be compacted (23) depot surfaces shall be reinforced by concrete (24) construction shall be done during dry season
OPERATION PHASE	Impairment/ deterioration of local air quality due to increased vehicles and painting	(25) Regular servicing of all vehicles shall be done after every 3000km travelled and weekly services to check minor defects that may occur during normal operations shall be conducted (26) Spraying shall be done in specially designed spraying bays (27) Selection of energy efficient engines to minimise air pollution (28) Trees shall be planted to improve the Oxygen/Carbon Dioxide balance
	Contamination and /impaired quality of receiving body – land and water due improper disposal of waste	(29) Areas enclosed by secondary containment shall be maintained (30) Collected oils shall be disposed of in boilers and/or furnaces (31) Water from maintenance bay shall also be discharged through oil traps (32) Disposal of domestic and office solid waste shall be done through Ilala Municipal Council solid waste management system (33) Disposal of metal parts: shall be sold to metal recyclers (34) Disposal of broken glass: shall be sold to Kioo Ltd. for recycling. (35) Disposal of car batteries: shall be collected and returned to batteries recycling companies e.g. UASA batteries (36) Disposal of plastic bottles: shall be collected and transported to plastic recycling plants (37) Disposal of oil filters: All oil filters shall be punctured on the dome end and hot-drained for 24 hours. Furthermore the used oil filters shall be crushed and dismantled to remove the remaining oil. Since DART Agency will use non terne-plated oil filters, the filters the drained and/or crushed oil filters will be disposed in the regular solid waste management system. (39) Fuel and oils wastes: Disposal of waste oil will be done through combustion in boilers or furnaces at such places as Twiga Cement, Kioo Ltd where these facilities exist. (40) Disposal of wastewater containing cleaning chemicals: DART shall use environmentally friendly cleaning chemicals, such as *ClearClean*[18]

[18] http://www.safegreencleaners.com/gogreen.html (accessed on 21st January 2009)

	Disrupted bus depot operations and Contamination and /impaired quality of receiving body – land and water. Due to inadequacies in operation and maintenances	(41) The project shall develop preventive and periodic maintenance plans (42) The project shall have a dedicated maintenance department. (43) The project shall provide a dedicated budget line for maintenance activities.
	Deterioration of public health and sanitary condition due to inadequacies in operation and maintenance	Same as (41) – (43)
	Deterioration of worker's health and safety due to occupational exposure	(44) paints that contain lead and cadmium shall not be used (45) painting and spray shall be done in spraying bay with appropriate gadgets to mitigate impacts (46) provide workers with appropriate protective gear
DECOMMISSIONING PHASE	Vacated depot building and other facilities due to closing of the business.	(47) A preliminary decommissioning plan has been included in the ESIA to provide for stakeholder consultation and decision making at the close of the project. Possible action include: (e) use the depot as a bus stand (f) convert it for use by small scale traders like garage operators (g) the site be demolished and returned to its original state (h) The demolished debris shall be disposed of as filling materials
	Loss of jobs/loss of livelihood	(48) All employees will paid their terminal benefits following the closure of the business by using contributions made by the employer to the Social Security Fund.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The summary of the key issues of the bus depot are shown in Table 27. The Environmental and Social Management Plan is a commitment by the developer on how the identified significant impacts will be mitigated by committing funds. The estimated costs for implementing the mitigation measures are shown as indicator because in the future there could be variations.

Table 27: Environmental and Social Management Plan

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
Site Selection	Land Ownership: Certificate of occupancy	The Project Proponent to follow up this issue aggressively with relevant authorities	A Certificate of occupancy	DART Agency, Ministry of Lands, Ilala Municipal Council.	5,000,000.00
	Damage to wetland habitat and contained biodiversity	• The construction shall be limited to the needed space for the depot (form table 26: summary of mitigation measures) • The developer will adopt a SUD.	Construction kept within permitted/agreed boundaries Adoption of a SUD	DART Agency, TANROADS, Contractor Developer, Ministry of Natural Resources and Tourism; NEMC	Project BOQ (14,338,000,000)
	Damage to constructed structures and disruption of operations as a result of natural processes.	The design will provide wide drains and Sustainable Drainage System. The project shall also expand the bridge crossing Msimbazi River and shall construct additional box culvert and dredge outlets to ensure no blockage.	No or Minimum damage to structures	DART Agency, Contractor Respective Consultant	

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
	Conflict of interest among current land users at the proposed site	The developer in collaboration with the Ministry of Lands, Ilala Municipal Council will prepare a detailed urban land use plan to delineate areas for all users within the neighbourhood. The developer will publicize the project through mass media, brochure so as to make clear to the communities.	No or minimum conflicts No misunderstanding on what the project will and will not do	Developer, Dar City Council	5,000,000
	Land acquisition and displacement except the police post	New police post to be constructed as part of the project and within the project site.	Land for development	Developer, Ministry of Home Affairs,	30,000,000
Design Phase	Flooding tendencies due to blocking natural flow	Same as (2) above			
	Degradation at points of source of building materials.	• The Project will work with relevant bodies such as Municipal Councils; City Council to draw up a closure plan for sources of building materials eg borrows pits. • The contractor procure construction material from licensed suppliers to avoid materials extracted from illegal borrow pits.	Acceptable level of site reclamation	DART Agency NEMC Ilala Municipal Council Kinondoni Municipal Council	20,000,000.00
	Degradation / Impairment of local air quality including noise	• The design shall include construction of a wall around the site.[19] • The design shall specify that all electric motors such as compressors be housed in soundproof enclosures • The design shall include planting of trees to absorb carbon dioxide and replace the oxygen that will be lost through combustive processes and compensate for part of the city's green belt that will be lost	TBS and WHO standards – Noise levels not to exceed 85dB at the wall	Developer, Contractor Respective Consultant	Part of BoQ

[19] It is scientifically proved that walls minimise noise to the neighbourhood

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
	Compromised Security of the project facilities and the general area	• The design shall include construction of a wall around the project and during mobilisation, construction and operation phase controlled access shall be instituted • The design shall include construction of a Police post • The design shall include installation of security lights at appropriate places	Promote the Police post to fully fledged Police Station to the area BS standard BS4737	Developer, Ministry of Home Affairs,	Part of BoQ
	Public health and safety during mobilisation, construction and operation phases	• The project shall design an emergency plan to cater for public health and safety for the entire project cycle	A Plan approved by OSHA	Developer, OSHA, Contractors Registration Board	5,000,000
	Contamination / Impairment of quality of receiving bodies	• The design shall include secondary containment structures for all petroleum products, used oil and other chemical shall have secondary containment. • All secondary containment structures shall be fitted with oil traps • All secondary containment shall have a storage capacity of 110 % of the capacity of the storage tank.	American Petroleum Institute Standard API 650	DART Contractor Consultant (specify here and anywhere else the term appears)	Part of BoQ
MOBILISATION PHASE	Occupation health and safety during mobilisation, construction and operation phases	• Guidelines from OSHA will be adhered to accordingly eg by providing personal protective gears (PPE).	OSHA Guidelines	DART Contractor NEMC	10,000,000.00
	Public health hazards/safety during mobilisation, construction and operation phases	• Awareness campaigns on HIV/AIDS • Sensitisation of workers to undergo voluntary testing	• Number of minimum infection • Number of workers undergoing voluntary testing, National Data will be the reference.	DART Agency TACAIDS Ilala Municipal Council	5,000,000 per year

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
	Degradation at points of sources of construction materials	• The contractor shall procure construction material from licensed suppliers to avoid materials extracted from illegal borrow pits. • The developer will work with relevant bodies such as Municipal Councils and the City Council to draw up a closure plan of borrows pits. • Water recycling system will be used to minimise use of virgin waters.	•		
Construction Phase	Contamination / Impairment of quality of receiving bodies	• Disposal of overburden: The excavated top soil shall be used as filling material within the site and adjacent sites	No piles of overburden after construction	DART Agency Contractor NEMC	Part of BoQ
	Damage /erosion of exposed surfaces due to inadequacies in resurfacing and compaction and improper timing of construction period.	• all excavated sites shall be compacted • depot surfaces shall be reinforced by concrete • construction shall be done during dry season			
Operation Phase	Impairment/ deterioration of local air quality due to increased vehicles and painting	• Regular servicing of all vehicles shall be done after every 3000km travelled and weekly services to check minor defects that may occur during normal operations shall be conducted • Spraying shall be done in specially designed spraying bays • Selection of energy efficient engines to minimise air pollution • Trees shall be planted to improve the Oxygen/Carbon Dioxide balance	TBS standards	Developer,	10,000,000.00

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
Operation Phase	Contamination and /impaired quality of receiving body – land and water due improper disposal of waste	• Areas enclosed by secondary containment shall be maintained • Collected oils shall be disposed of in boilers and/or furnaces • Water from maintenance bay shall also be discharged through oil traps • Disposal of domestic and office solid waste shall be done through Ilala Municipal Council solid waste management system • Disposal of metal parts: shall be sold to metal recyclers • Disposal of broken glass: shall be sold to Kioo Ltd. for recycling. • Disposal of car batteries: shall be collected and returned to batteries recycling companies e.g. UASA batteries • Disposal of plastic bottles:_shall be collected and transported to plastic recycling plants • Disposal of oil filters: All oil filters shall be punctured on the dome end and hot-drained for 24 hours. Furthermore, the used oil filters shall be crushed and dismantled to remove the remaining oil. Since DART Agency will use non terne-plated oil filters, the filters the drained and/or crushed oil filters will be disposed in the regular solid waste management system. • Fuel and oils wastes:_Disposal of waste oil will be done through combustion in boilers or furnaces at such places as Twiga Cement, Kioo Ltd where these facilities exist. • (40) Disposal of wastewater containing cleaning chemicals: DART shall use environmentally friendly cleaning chemicals, such as *ClearClean*[20]	TBS Standards where applicable	DART Agency, NEMC, Ilala Municipal Council,	50,000,000.00

[20] http://www.safegreencleaners.com/gogreen.html (accessed on 21st January 2009)

Phase	Potential Direct Impacts	Management/Mitigation Measures	Target Level/ Standard	Responsibility	Estimated Costs [Tsh]
		• Disposal of wastewater from bus cleaning / service areas shall be passed though oil separators and discharged through storm water drainage. Other grey water will be pumped to the nearest central sewer system,) see section 4.5.7 • Disposal of fuel and oils wastes will be done through combustion in boilers or furnaces at such places as Twiga Cement, Kioo Ltd where these facilities exist.	TBS Standards where applicable	DART Agency	1,000,000 per month 100,000 per month 5,000,000 per year (chemicals)
	Deterioration of worker's health and safety due to occupational exposure	• paints that contain lead and cadmium shall not be used • painting and spray shall be done in spraying bay with appropriate gadgets to mitigate impacts • provide workers with appropriate protective gear	OSHA STANDARDS	DART Agency,	Same as for (13)-(17) above
Decommissioning Phase	Vacated depot building and other facilities due to closing of the business.	• A preliminary decommissioning plan has been included in the ESIA to provide for stakeholder consultation and decision making at the close of the project. Possible action include: (i) use the depot as a bus stand (j) convert it for use by small scale traders like garage operators (k) the site be demolished and returned to its original state (l) The demolished debris shall be disposed of as filling materials	None	DART Agency	30,000.000
	Loss of jobs/loss of livelihood	• All employees will be paid their terminal benefits following the closure of the business by using contributions made by the employer to the Social Security Fund.	Workers to paid properly.	DART Agency and Appointed social security fund	Part of operational overheads

9 ENVIRONMENTAL AND SOCIAL MONITORING PLAN (ESMoP)

Table 28 summaries key environmental and social monitoring issues of the proposed bus depot (ESMoP). The Environmental Monitoring Plan provides parameters to be monitored and responsible entity.

Table 28: Environmental and Social Monitoring Plan

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (Tsh)
	(1) Land Ownership: Certificate of occupancy	A Certificate	Once before commencement of the Construction	DART Offices	Certificate	A certificate should be obtained	DART	5,000,000.00
SITE SELECTION	(2) Damage to wetland habitat and contained biodiversity	Key ecological components	Continuously during the entire project cycle	Depot site	None	Endangered components / endemic components are protected	DART Agency IMC Natural Resource Officer	1,000,000 per year
	(3) Damage to constructed structures and disruption of operations as a result of natural processes.	Soundness of physical structures	Once every year	Plant site	None	No or minimum damage	DART Agency	500,000 per year
	(4) Conflict of interest among current land users at the proposed site	Complaints Grievances	Once every year	Nearby communities	Number of complaints lodged	No complaints or minimum severe complaints	DART Agency NEMC IMC	500,000 per year

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (Tsh)
	(5) Land acquisition and displacement except the police post	Reported complaints or grievances	One month and six months after commencement of the project	Nearby communities	Number of complaints lodged	No complaints or minimum severe complaints Compensations made to those who may happen to have lost their land or property	DART Agency NEMC IMC	
Design Phase	(6) Flooding tendencies due to blocking natural flow	Flooding tendencies	During rainy season	Depot site	None	No floods	DART Agency NEMC IMC	500,000 per season
	(7) Degradation at points of source of building materials.	Extent of degradation	Once at the start of the project and once at the end of construction	At the source of construction materials	None	Minimum impacts	DART Agency NEMC IMC Kinondoni Municipal Council	500,000
	(8) Degradation at points of source of building materials.	Noise levels NOx SOx Particulate Matter	Once every year	Within the site and at the border of the site	dB g/l	<55 dB TBS	DART Agency NEMC IMC KMC	1,000,000 per year
	(9) Visual impacts / Public health hazards due to haphazard disposal of waste	Heaps of waste and haphazard disposal	Continuously during the entire life cycle of the project	Depot site	None	No heaps of solid waste No haphazard disposal	DART Agency NEMC IMC Kinondoni Municipal Council	500,000 per year

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (Tsh)
	(10) Compromised Security of the project facilities and the general area	Number theft incidences and vandals	Once every six months	Depot site	Number	No or minimum number of incidences	DART Agency NEMC IMC KMC Police	500,000 per year
Mobilisation Phase	(11) Occupation health and safety during mobilisation, construction and operation phases	▪ Health and safety measures program in place ▪ Workers' health ▪ Availability of protective wear to all persons accessing these areas ▪ Cases of non use of protective wear ▪ Warning signs	Once every year	Depot site	Human health Safety records Procurement records	Minimum number occupational related health and/or safety impacts	DART Agency NEMC IMC KMC	5,000,000 per year
	(12) Public health hazards/safety during mobilisation, construction and operation phases	Health status of communities including HIV/AIDS prevalence	Once every year	Health centre	Types of disease	Not above City average	DART Agency NEMC IMC KMC Medical Health Officer	1,000,000 per year

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (Tsh)
Construction Phase	(13) Contamination / Impairment of quality of receiving bodies	Overburden	Once every month during mobilisation and construction phase	Depot site	Heaps of improperly managed overburden	None	DART Agency, NEMC Contractor	10,000,000
	(14) Damage /erosion of exposed surfaces due to inadequacies in resurfacing and compaction and improper timing of construction period.	Soil erosion tendencies	Once after rain season	Depot site	Erosion tendencies	None	DART Agency	500,000 Per season
Operation Phase	(15) Impairment/ deterioration of local air quality due to increased vehicles and painting	CO NO_X SO_X Hydrocarbons Type of paints procured and their composition (Heavy metals content)	Continuously during the entire life cycle of the project	Depot site	ppm or g/l	TBS/WHO/	DART Agency NEMC IMC Kinondoni Municipal Council OSHA	1,500,000 per year
Operation Phase	(16) Contamination and /impaired quality of receiving body – land and water due improper disposal of waste	Oil content in soils and water bodies	Once every year	Within the site and at the border of the site	g/l	TBS	DART Agency NEMC IMC KMC	500,000 per year

Phase	Potential Direct Impact	Parameter to be Monitored	Monitoring frequency	Monitoring Area	Measurement unit	Target Level/Standard	Responsibility	Estimated costs (Tsh)
Decommissioning Phase	(17) Vacated depot building and other facilities due to closing of the business.	Abandoned structures	One month after decommissioning	Depot site	Structures	No abandoned structure	DART Agency NEMC	10,000,000
	(18) Loss of jobs/loss of livelihood	NSSF remittance	Once every year	DART Agency Personnel files	Number of employees registered with NSSF	All workers	DART Agency NSSF	5,000,000

10 FINANCIAL COSTS AND ECONOMIC BENEFIT

In this project the costs may include:

- capital expenditures;
- operating and maintenance costs;
- staff costs;
- operation materials; and
- Environment, health and other social costs.

There are quantifiable and non-quantifiable and they are summarised as follows:

a) The project will employ about 250 people composed of about 200 drivers, 25 maintenance staff and about 25 support staff. Almost all staff will be recruited locally.

b) Development of bus depot will also attract other social economic activities such as food vending, shops, etc.

c) The development of this facility will support the efficient functioning of the DART as the buses will be maintained at the depot as the proposed maintenance schedule hence the easy transport for students, better city centre traffic planning etc.

d) The project will provide ablution facilities for public use (although the adjacent area is used for sports, religious and political rallies there are no such facilities).

10.1 POSSIBLE COSTS TO COMMUNITIES

It is a fact that the project will be constructed in an area which is open to public, where small holder farmers were using it to grow crops for their use and for selling (but by the time ESIA was completed there was no one using the area for this purpose). The nearby area is also used for sports, open rallies, religious gathering, and heavy truck packing (the trucks were being packed illegally i.e. it is prohibited by the Ilala Municipal Council to pack heavy trucks in this area). It should be noted that, open grounds for sports; religious gatherings, political rallies and other social gathering will not be encroached by the project. Other impacts are as elaborated in Chapter 7. However, DART Agency is committed to mitigate the negative social and environmental impacts.

There are a number of stakeholders who have expressed concern on the construction of the depot. The expressed concerns include the encroachment of grounds used for sports, religious and political rallies; pollution from depot operation; destruction of a wetland; and disruption of vehicle movement along Morogoro Road. Although, there are good engineering designs that will be used to mitigate pollution impacts, disruption of traffic movement, and the fact that the project will not take any of the current grounds used for sports, religious and political rallies and also that the project will only occupy about 10% of the area, this information is not known to the key stakeholders. In order to address this Project Proponent shall effectively implement the communication strategy using appropriate awareness raising materials that will address all concerns raised by the stakeholders.

10.2 POSSIBLE COSTS TO DEVELOPER

According to the data from ESIA for the Dar es Salaam Rapid Transit the cost for investment for the development of this depot which is under Phase One amounts to TShs.4, 702,604,685. Generally, sources of funds are World Bank Credit facility (IDA) and the

Government of the United Republic of Tanzania. DART Agency is managing the development of the project on behalf of the Government.

10.3 ENVIRONMENTAL COSTS

Environmental cost benefit analysis is assessed in terms of the negative and positive impacts. Furthermore, the analysis is considering whether the impacts can be mitigated and the costs of mitigating the impacts are reasonable. It should be noted that the cost benefit are discussed based on the assumption that the mitigation measures proposed will be implemented by the Project Proponent.

One of the major significant negative environmental impacts is that within the area there are some wet areas (wetland) which flood during the rainy season. Natural wetlands are important and fragile ecosystem that helps to regulate water levels within watersheds; they filter pollution thereby improving water quality; provide natural flood protection by absorbing and holding high waters; protect against shoreline erosion; provide habitat and critical refuge for countless species.

It should be noted that the depot will occupy only 10 % of the entire Jangwani valley. The Depot of this size requires enough space to accommodate all facilities as discussed in section 2.2.2. This Depot requires about 72,000m^2. Some of the alternative sites could not provide this area (see section 6.3.1) and those which had needed area are already earmarked for other equally important development projects.

The suitable site for depot is one that is near the start or end nodes of the proposed route, this is necessary for drivers and other operators, reduction of fuel consumptions to cut down fuel use to travel long distances without commuters (as this produces greenhouse gases).

10.4 SOCIAL AND ECONOMIC COSTS AND BENEFITS ANALYSIS

Although there are negative environmental impacts as explained in 10.5, the choice of this site was motivated by the following facts:

Improved public transportation system has been a cry of the city residents, particularly students for quite some time. DART system will provide the needed relief to this problem. As mentioned the bus depot is an integral part of the whole DART system development.

11 DECOMMISSIONING PLAN

This is a preliminary decommissioning plan. This plan establishes feasible decommissioning schemes that can be accomplished without undue risk to the health and safety of the public and decommissioning personnel, without adverse effects on the environment, and within established guides and limits of the appropriate regulatory agencies. While not a detailed document, this preliminary plan will serve the purpose of ensuring that the decommissioning and ultimate disposition of a facility is considered during the initial design and construction of the facility. The preliminary plan will remain a "living document," and revisions will be made throughout the operating life of the plant. It must be reviewed periodically and revised to reflect any changes in facility construction or operation that might affect decommissioning. Prior to the initiation of actual decommissioning activities for the facility, a detailed final disposition plan will be prepared.

The final plan should be based on the preliminary plan and revisions, and will define specific work activities and include safety evaluations of planned decommissioning methods, and the facility status that will result from the decommissioning program. In addition, this plan must contain sufficient information to obtain any approvals needed from the appropriate regulatory agencies to proceed with decommissioning activities.

11.1 PURPOSE AND CONTENT

11.1.1 Plan Purpose

The preliminary plan serves to establish decommissioning as an important consideration from the inception of the project, during design and throughout the operation of the facility. The plan has the following purposes:

a) The primary purpose of the preliminary plan is to ensure that facility designers are cognizant of decommissioning during the initial design of a facility. Thus, where design choices that would enhance decommissioning are available for types of materials and system components, and location of components, these choices should be made.

b) Another purpose of the preliminary plan is to identity the ultimate decommissioning options and final facility status. These options would be evaluated and narrowed to the decommissioning method of choice as the end of facility life is approached.

c) The final purpose of the preliminary plan is to demonstrate to regulatory agencies that important aspects of decommissioning are considered as early as possible during the initial design of a facility. The plan serves as the starting point to demonstrate that areas such as decommissioning methods, costs, schedules, and operating impact on decommissioning will be reviewed and refined throughout the operating life of a facility.

11.1.2 Plan Content

The preliminary plan will provide a general description of decommissioning methods considered feasible for the facility. The description should demonstrate that the methods considered are practical and that they protect the health and safety of the public and decommissioning personnel.

Design personnel should study the proposed decommissioning methods and take steps to ensure that the design incorporates features that will facilitate decommissioning.

Considerations include:

a) Provisions for adequate material-handling equipment.

b) An estimate of manpower, materials, and costs anticipated to support decommissioning.

c) A description of the anticipated final disposition and status of the facility and site.

d) A discussion demonstrating that adequate financing will be programmed for decommissioning.

e) Identification of records that should be maintained during facility construction and operation which might facilitate decommissioning, including a set of "as built" drawings.

11.2 PRELIMINARY PLAN

11.2.1 Project Removal Methodology and Schedule

DART Agency shall fund and implement all aspects of Project decommissioning, including but not limited to, all engineering, environmental assessment, permitting, construction, and mitigation activities associated with the removal of the Depot, in accordance with this Plan and the Settlement Agreement, and mitigation of Project removal impacts on site. DART Agency shall monitor environmental impacts during and after Project removal to respond to defined events during the monitoring phase.

The developer shall remove the factory and ancillary structures safely and in a manner that:

- minimizes environmental impacts;
- satisfies the requirements of the provisions of EMA CAP 191;
- restores the site to a condition suitable for multiple use; and
- Pays all dues (workers, government, suppliers etc.).

Project removal will begin six months after closure and continue for six months. Within the six months from closure DART Agency will inventories all components that need to be removed and or disposed. This inventory will include building structures to be demolished, machinery to be disposed of, chemicals (cleansing and paints) including chemical waste to be disposed of, debtors and creditors to be settled. Also mode of disposal will have to be finalized. Smelters of scrap metals, experts/organizations that will handle chemicals and chemical waste will be contacted within this period. This information will assist in the preparation of the final decommissioning plan, for approval by NEMC.

After the approval of the decommissioning plan the metal parts will be removed first within the first month (this is important to ensure that they are not vandalized). Unused chemicals and chemical waste could also be disposed of in the first month. The second month of the decommissioning will be used to remove concrete structures. Debris will be used as road fills for rural roads.

Any hazardous material (for example used batteries, tyres, acids etc) discovered during decommissioning will be cleaned up and disposed of in accordance with then current regulations. All disturbed areas will be landscaped and replanted using indigenous trees.

Project decommissioning has five phases: (1) pre-removal monitoring; (2) permitting; (3) interim protective measures; (4) project removal and associated protective actions; and (5) post-removal activities, including monitoring of environment and socio economic activities.

The first three phases will occur prior to removal of the Project (i.e. within the first six months). The fourth phase — project removal and associated protective actions — will take place six months after closing business. The fifth phase will begin after total removal and

due to nature of the project (medium scale, with relatively moderate impacts) removal and continue for at least one year.

The description that follows outlines the activities that will occur in each phase and provides references to detailed descriptions of each activity elsewhere in this Plan.

(1) Pre-removal monitoring: Pre-removal monitoring includes environmental and socio economic status of the Depot, and the surrounding. This monitoring is essential to identify if there is any environmental or social liability which need to be settled before the permit for closure is given. This period will also be used to inventories all assets and facilities that need to be disposed of and to prepare a final decommissioning plan for approval by NEMC.

(2) Permitting: the developer shall obtain all permits required to undertake removal of the Project. This basically will include NEMC, Dar es Salaam City Council, NSSF, Local Government Authorities (Ilala and Kinondoni Municipalities) etc.

(3) Interim Protective Actions: This will take care of any interim protective measure that needs to be implemented to protect human health and environment. For example draining and containing all chemicals such as paints from process line, cleaning of process line, packing all chemicals and chemical waste.

(4) Project Removal: As noted above, the removal of the project will be completed within six months.

(5) Post-Removal Activities: Post-Project removal monitoring will continue for one year.

12 CONCLUSION AND RECOMMENDATIONS

12.1 CONCLUSIONS

The study was undertaken for the purpose of identifying positive and negative impacts accruing from the construction of a bus depot at Jangwani Area in Dar es Salaam City Tanzania. All significant issues/impacts that which were identified have been assessed and described in detail to explore the deep understanding of the possible social and environmental impacts throughout all phases of this undertaking namely site selection to decommission phase.

The majority of stakeholders who were consulted throughout the execution of this study came out with a number of varying opinions concerning the development of this project at this site. Generally, they saw the construction of a depot as a necessity towards the effective implementation of the rapid transit project in this City.

Generally, as a summary these issues were raised as a support towards the development of a depot at this site, that the depot:

i) will help facilitate the attainment of the objective of the mother project in reducing congestion in the city;

ii) will create employment and help in boosting economic gains among the people to be employed;

iii) will enhance safety bus commuters as hitherto some of the buses are in poor running conditions;

iv) may help to improve security in the area;

v) will improve the appearance of the city in general and Jangwani valley

vi) Will help in the overall development of the city infrastructure.

As a rule of thumb, some raised the following concerns which they said that without taking them in consideration then Jangwani area could be affected.
The major concerns are:

i) Jangwani valley is a flood plain and according to the Land Act NO.4of 1999 it is categorised as a hazard land. However, the same legislation allows the transfer of land from one category to another that is from hazard to say general land in which development like the depot one is implemented.

ii) Construction may reduce floodable area hence interfere with the regular flow of water and hence promote more floods in adjacent areas;

iii) Pollution of Msimbazi river due to oil and fuel spills;

iv) Drying up of the mangroves located downstream due to heavy metals, oils and fuels spills from the depot;

v) The depot will affect the migratory birds that usually come to the area;

vi) Congestion at Morogoro Road Junction; and

vii) Jangwani flood plains is a recreational area for youths

Generally, majority of the raised concerns can be mitigated through a number of measures through civil engineering designs, good land use planning. All in all, the site to be used for

construction is too small to cause serious negative impacts to the whole area as feared by stakeholders. The developer has developed a detailed environmental and social management plan (ESMP) as her commitment towards mitigating the identified negative impacts while enhancing the positive ones.

The developer has also prepared an Environmental and Social Monitoring Plan which is commitment towards self monitoring of all parameters together with a list of those who will be responsible. A tentative budget is also shown although as times go there could be variations, thus it stands as an indicative.

The developer commits herself to address all significant concerns raised by the stakeholders during the EIA study. Besides, the developer intends to draw more awareness and publicity about this project through mass media and other popular mechanisms. The developer anticipates that things remaining constant all items proposed in this study will implemented as committed.

12.2 RECOMMENDATIONS

Based on the conclusion made above, findings from the field work and the views raised by the stakeholders consulted during the preparation of this study, the following are tabled as significant recommendations. These recommendations must be taken inboard by all actors concerned with the smooth development of the depot including the developer, the United Republic of Tanzania, Local Government Authorities in Dar es Salaam City and all surrounding communities.
These recommendations are categorised as general and specific.

12.2.1 General

Although most of the significant negative impacts can be mitigated It is recommended that the developer should work closer to the Local government authorities to see to it that the relevant communities are made aware of what is going on about the project so that at the end they can own and see the project as theirs.

12.2.2 Specific

In addition to the ESMP, it is recommended that the developer employs a Social and Environmental Manager or Officer (SEO) whose duties among others will be to facilitate the smooth and coherent implementation of the ESMP and other day to day matters. The proposed Environmental and Social Monitoring Plan should be implemented to ensure that the proposed mitigation measures are implemented.

13.0 POLICY AND LEGISLATIONS

URT (1997): the National Environmental Policy

URT (1995): the National Land Policy.

URT (1998): Tanzania Wildlife Policy

URT (1996): Sustainable Industrial Development Policy (1996)

URT (2000): The National Human Settlements Development Policy (2000)

URT (2003): The National Transportation Policy (2003)

URT (1998): The National Forest Policy (1998)

URT (2002) National Water Policy (2002)

URT (2004), Environmental Management Act Cap 191

URT (2005): The Environment Impact Assessment and Audit Regulations

URT (1999): Land Act, No. 4 of 1999

URT (2001) The land (assessment of land value for compensation) Regulations,2001.

URT (2002) National Water Policy, 2002

URT (1967): Highway Ordinance,

URT (1882): Local Government (District Authorities) Act No. 7 of 1982

URT (1982): Local Government (Urban Authorities) Act No. 8 of 1982

URT (2007): Land Use Planning Act No.6

URT (1998): Mining Act, 1998;

URT (2007): The Urban Planning Act No. 8

URT (2003): Occupation Health and Safety Act

Appendix A: Terms of Reference

A.1 INTRODUCTION

The government of United Republic of Tanzania through Prime Ministers' Office intends to apply part of its credit from International Development Association (IDA) towards the cost of Central Transport Corridor Projects (CTCP) and intends to apply part of the Proceeds of the Credit to cover eligible payments under the contract for construction works for Phase 1 of Dar Rapid Transit Project (DART).

The aim of the project is to modernize public transport system that meets International standards using modern high capacity buses operating on exclusive lanes at less travelling time, cost effective and environmental friendly.

DART will provide quality, accessible and affordable mass transport system for the residents of Dar es Salaam which will subsequently enable poverty reduction, improve standard of living, lead to sustainable economic growth and act as a pioneer of private and public investment partnership in transport sector in the city.

A.2 OBJECTIVE OF THE ASSIGNEMENT

These Terms of Reference (ToR) have been prepared as a guideline for development of a simplified Environmental and Social Impact assessment of the Jangwani Bus Depot to be implemented in the Jangwani flood plain in Dar es Salaam. This facility will consist basically of maintenance areas and a parking lot for 150 buses and constitutes an essential component of the DART Project. An area off – peak parking and a public parking area is also part of the proposed design. The TOR takes into account the limited size of the facility (about 75,000 m^2), and local nature of expected impacts, and incorporates World Bank Guidelines as pertinent.

ESIA Structure

The ESIA will follow a standard structure as prescribed by the EIA and EA Regulation GN 349 2005, and will include the following main sections:

- Project history (Precedents to date);
- Project Rationale;
- Alternatives – site selection process;
- Project description ;
- Baseline conditions;
- Area of Influence;
- Directly affected areas (site, borrow pit, access);
- Legal and Institutional Framework;
- Impact Identification;
- Environmental and Social Management and Mitigation Plan;
- Environmental and Social Monitoring Plan;
- Cost benefit analysis;
- Preliminary Decommissioning Plan; and
- Public Consultation and Disclosure Plan (PCDP)

Tasks

a) The project history must make brief reference to the DART Project in general, but must focus mostly on the Jangwani Bus Depot as such, explaining why site selection and other engineering aspects are being defined according to a time-chart different from the rest of DART Project, how this was dealt with in the DART Project's ESIA,

and why this has resulted in the need for an independent impact assessment. The chapter describing the Project Rationale must make clear the role of the Bus Depot in the context of DART operation and the potential impacts of its location on DART's operational costs. The main target dates of the depot's implementation schedule as they relate to the DART Project's implementation cycle in general should also be mentioned here.

b) The description of the site selection process will be an essential aspect of the assessment, since the decision to place the depot in the Jangwani flood plain results from lack of viable alternatives., Thus, the three alternative locations mentioned in the DART Project's ESIA (none of which proved viable), as well as others considered subsequently, need to be described, with an explanation of why they were discarded, A comparative impact assessment should be conducted with reference to an explicit list of assessment criteria.

c) Project description shall include the layout of the Bus Depot with indication of all on-site utilities and any off-site works. Cross sections showing the amount of fill should be provided and the total amount of fill (in m^3) indicated. The results of the site's geological survey should be analyzed in the assessment as necessary to identify any subsidence problems or the need for soil substitution. In this latter event the site of disposal of removed soils must be indicated and included as a Directly Affected Area for baseline purposes.

d) Any new access or improvement of existing roads should be described. The current and final condition at the selected borrow pit should be described (layout and cross-sections) Specification of planned environmental reinstatement should also be a part of the Project Description.

e) Baseline conditions will need to be described at two scales of analysis: one covering all the area which is likely to be affected by the project's direct and indirect impacts (i.e. the Area of influence) and the other describing exclusively the areas to be occupied (or altered) by the project.

f) The Area of Influence should include the Bus Depot site and its surroundings (500 meter buffer). It should also include the borrow pit from which the fill material for the site will be sourced and its surroundings (also 500 meter buffer).The access route between the borrow pit and the site, as well as the route to be used by buses to access the depot from Morogoro Road should be included. Finally, the Area of Influence should include sections of the Jangwani flood plain upstream and downstream of the site, as necessary to modal impacts on flood levels for 10, 25 and 100 year floods.

g) Directly Affected Areas shall include basically the Bus Depot site and the selected borrow pit. Any dedicated accesses or off-site utilities should also be included. With respect to the legal framework, a detailed investigation into all land-use restrictions applicable to the Jangwani flood plain should be conducted, this will require consultation with Dar Es Salaam City Council planning officials. Further to the legal norms, current plans and projects for the flood plain should be identified and discussed. Institutional responsibilities for urban planning, flood plain management and assistance during floods should be clearly identified as necessary to plan management and mitigation measures to be proposed in the assessment.

h) Impact identification should proceed according to internationally accepted methodologies and an Environmental and Social Management and Mitigation Plan (ESMP) should be proposed including strategies that effectively tackle all impacts

considered significant. The ESMP will also include a budget and description of the institutional arrangements necessary to ensure it is successfully implemented.

i) Finally, a Public Consultation and Disclosure Plan should be included in the assessment. This should contemplate not only a Public Hearing, but also liaison with the communities of adjacent urban areas and with local authorities. Public Consultation should take place as part of the ESIA development process This will include disclosure and consultation of the ESIA before it is concluded (draft version) in order to include results of consultation and description of any suggestions that were incorporated, in the final version of the ESIA.

Information Requirements

Information requirements for the assessment will include a variety of project-related data, as well as detailed information on baseline conditions. The consultant will be responsible for gathering all this information. However, field surveys for engineering purposes (topography, geological investigations) will be provided by DART PMU. Some project-related data will need to be processed for use in the assessment. Project-related data requirements and baseline data requirements are specified below.

Project related data requirements:

Construction phase:

- Information on pertinent construction quantities and corresponding demand for construction support infrastructure (camps, quarries, borrow sites, dump sites for surplus excavated soil, etc.);
- Borrow pit exploitation plan, with indication of the final geometry of the area;
- Project logistics during construction, describing accesses to be used and volume of generated traffic per route or itinerary;

Brief description of main construction methods / procedures;

- Source of energy and water during construction;
- Handling of domestic effluents during construction;
- List of likely construction wastes;
- Labour requirements during construction (month by month basis);
- Detailed construction schedule.

Operation phase:

- Basic project engineering documents, including layout and cross-sections (as well as any off- site utilities);
- Bus Depot activity description;
- Traffic generation data;
- Water and energy consumption data and indication of sources;
- Effluent discharges and treatment;
- Operational noise generation;
- Fuel storage;
- Waste generation;
- Labour requirements during operation;
- Summary of investment costs per main component.

Baseline data requirements

Area of Influence:

- Jangwani river hydrology.
- Flood history.
- Current occupation of Jangwani flood plan.
- Urban drainage
- Current vegetation.
- Detailed land-use map of site and borrow pit buffer zones.
- Land-use along accesses to be used during construction and operation.
- Recreation and other public use of open spaces.
- Social survey of neighbouring communities as necessary to identify forms of economic activity which may be directly or indirectly disturbed by the project.

Stakeholder mapping.
Directly Affected Areas:

- Status of property ownership of site and access and/or utility corridor rights-of-way;
- Site topography.
- Geological survey of site.
- Preliminary liability assessment (as per ASTM E1527 - Phase I)
- On-site noise monitoring campaign.
- Water quality survey — Jangwani.
- Current site vegetation (both at site and at borrow pit).
- Current uses of site by the community.

DETAILED SCOPE OF WORK FOR UNDERTAKING ENVIRONMENTAL AND SOCIAL IMPACT ASSEESSMENT (ESIA)

Introduction

The detailed scope for undertaking Environmental and Social Impact Assessment is intended to guide the Consultant to address relevant environmental and social issues during the assessment process. Among others, the ESIA shall be conducted in accordance with the requirements of the National Environmental Impact Assessment Guidelines and Procedures and World Bank Safeguard Policies. The Consultant shall do everything necessary to meet the objectives of the services and not less than the following tasks that should be undertaken during the Environmental and Social Impact Assessment. In the process of consultation (Scoping process) with relevant stakeholders like environmental authorities, the Consultant may further be required to finalize the scope of undertaking the EIA and SIA according the agreement with these stakeholders.

Scope of Work

Task I: Description of the Proposed Project

The Consultant shall provide a brief description of the relevant parts of the project using maps of appropriate scale where necessary and include the following information:

- Project justification:
- Location;
- General layout, size, and capacity:
- Area of influence of the road works:
- Pre-construction activities:
- Construction activities:
- Schedule of project activities:

- Staffing and support:
- Facilities and services:
- Operation and maintenance activities:
- Required offsite investments:
- Life span.

Note: Specify any other type of information relevant to the description of the project category.

Task 2: Description of the Environment

Assemble, evaluate, and present baseline data on the relevant environmental characteristics of the study area. Include information on any changes anticipated before the project commences. Modify the lists below to show the critical information for this project category or which is relevant to it. Environmental characteristics of the study area shall be presented on a map to facilitate the understanding of the study area

a) Physical environment: This shall cover geology, topography: soils: climate and meteorology: ambient air quality: surface and groundwater hydrology: existing sources of air emissions: existing water pollution discharges: and receiving water quality.
b) Biological environment: flora: fauna: rare or endangered species: ecologically important or sensitive habitats, including parks or reserves, significant natural sites, species of commercial importance: and species with potential to become nuisances, vectors, or dangerous (of project site and potential area of influence of the project).
c) Socio-cultural environment: population; land use; planned development activities; community structure; employment; distribution of income, goods and services; recreation, public health; Gender issues and HIV/AIDS, cultural / historic properties; tribal peoples; and customs, aspirations, and attitudes to the project.

Task 3: Legislative, Policies, Administration Framework

Describe the pertinent regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, sitting, and land use control at international, national, regional and local levels. The Consultant shall undertake a review of policies, legislation and administrative framework within which the environmental management of the proposed road works will be carried out. The following and any other relevant legislation shall be reviewed:

- Environmental Management Act,
- Tanzania Wildlife Policy, 1998
- National Environmental Policy, 1997
- Environmental Impact Assessment Guidelines and Procedures,1997;
- Local Government Act; 1982
- Land and Village Land Acts, 1999;
- National Water Policy, 2002
- Highway Ordinance, Cap, 1967;
- National Forest Policy, 1998;
- Mining Act, 1998;
- Institutional arrangement for environmental management in Tanzania; and
- World Bank Safeguards policies.

Task 4: Assist in Inter-Agency Coordination and Public/ NGO Participation
Assist in coordinating the ESIA with other government agencies, in obtaining the views of local NGOs and affected groups, and in keeping records of meetings and other activities, communications, and comments and their disposition. Establish the views of the public with regards to the potential impacts of the proposed Bus Depot. Identify the different groups of stakeholders, and then use the most appropriate method to establish their views Particular attention shall be paid to the disadvantaged groups (e.g. children, the elderly and women) that may be affected by the proposed Bus Depot.

The Consultant shall undertake an open and transparent consultation process to ensure that the views of interested and affected parties are and approximately incorporated in the project design.

Minutes of the meetings conducted during this public involvement should be recorded for submission as part of the report. At least one meeting with Environmental Committee of district council(s) shall be held to obtain their views on the project and its implication to the environment and social aspects.

Task 5: Analysis of Alternatives to the Proposed Project
Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives, which would achieve the same objectives. The concept of alternatives extends to sitting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures Compare alternatives in terms of potential environmental and social impacts; capital and operating costs; suitability under local conditions; and institutional, training, and monitoring requirements When describing the impacts, indicate which are irreversible or unavoidable and which can be mitigated. To the extent possible, quantify the costs and benefits of each alternative, incorporating the estimated costs of any associated mitigating measures. Include the alternative of not constructing the project to demonstrate environmental and social conditions without the project.

Various environmental and social criteria should be developed to select the best alternatives.

Task 6: Identification, Analysis and Assessment of Potential Impacts
The Consultant shall identify, analyze and assess environmental and social impacts of the proposed Bus depot. The Consultant shall distinguish between positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts. Identify impacts that are unavoidable or irreversible. Wherever possible, describe impacts quantitatively, in terms of environmental components affected (area, number), environmental and social costs and benefits. Assign economic values when feasible. Characterize the extent and quality of available data, explaining significant information deficiencies and any uncertainties associated with the predicted impacts.

The Assessment should focus on the potential for negative environmental and social impacts caused by planned and unplanned (spontaneous) in-migration of people; clearing of lands for borrow sites; increased pressure on fuel wood, fodder and water resources; social disruptions and conflicts; and threats to woodlands and important wildlife species.

The assessment should also examine the potential for linear resettlement that usually involves projects producing linear patterns of land acquisition. An overview shall be provided of different groups of people and their cultural, ethnic, and socio-economic characteristics, and how they are likely to benefit and / or be negatively affected by the project. Negative impacts may include but not be limited to physical relocation, loss of land or other physical

assets, or loss of access to livelihood. The significance of impacts of the proposed Bus depot shall be assessed, and the basis of this assessment shall be specified. The Consultant should take into consideration existing by-laws, national and international environmental standards, legislation, treaties, and conventions that may affect the significance of identified impacts. The Consultant shall use the most up to date data and methods of analysing and assessing environmental and social impacts. Uncertainties concerning any impact shall be indicated.

The Consultant shall conduct a review of gender issues in the project area. The study shall include the road sections to and from Bus depot influence to the lives of men, women, children, the elderly and disabled so as to come up with a quantifiable analysis of the benefits which will accrue to them during and after the Bus depot construction.

Task 7: Mitigation Measure

The Consultant shall suggest cost-effective measures for minimizing or eliminating adverse impacts of the proposed Bus depot. Measures for enhancing beneficial impacts should also be recommended. The costs of implementing these measures shall wherever possible be estimated and presented. If compensation is recommended as one form of mitigation, the Consultant shall identify all the names and physical addresses of people to be compensated.

The Consultant shall review the ongoing measures on HIV/AIDS awareness creation within the project area and propose for the mitigation measures. The proposal shall include a plan f action, which will identify responsible key implementers, time frame and expected out put.

Proposed mitigation measures and cost estimate shall be grouped in a Bills of Quantities (BOQ) and should also include cost of supervision for the implementation of mitigation measures

Task 8: Environmental and Social Management Plan (EMP)

The Environmental Management Plan focuses on three generic areas: implementation of mitigation measures, and institutional strengthening and training. The Consultant shall prepare an Environmental and Social Management Plan, which will include proposed work program, budget estimates, schedules, staffing and training requirements and other necessary support services to implement the mitigation measures. Institutional arrangements required for implementing this management plan shall be indicated.

Identify institutional needs to implement environmental assessment recommendations. Review the authority and capability of institutions at local, regional, and national levels and recommend how to strengthen the capacity to implement the environmental and social management and monitoring plans. The recommendations may cover such diverse topics as new laws and regulations, new agencies or Agency functions, inter-sectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

Prepare detailed arrangements to monitor the implementation of mitigating measures and the impacts of the project during construction and operation. Include in the plan an estimate of capital and operating costs and a description of other required inputs.

In the case of land acquisition, a Resettlement Action Plan should be prepared and implemented in according to the National Land and Village Land Act 1999 and the World Bank Safeguards Policies

Task 9: Environmental and Social Monitoring Plan (ESMoP)

The Consultant shall prepare an Environmental and Social Monitoring Plan, which will include proposed parameters to be monitored, frequency of monitoring, areas of monitoring, responsibility, and budget estimates. Where monitoring and evaluation will require inter-Agency collaboration, this should be indicated.

Reporting

The ESIA reports should be concise and limited to significant environmental issues. The main text should focus on findings, conclusions, and recommended actions supported by summaries of the data collected and citations for any references used in interpreting data, Detailed or un-interpreted data are not appropriate in the main text and should be presented in appendices or a separate volume. Unpublished documents used in the EIA and SIA may not be readily available and should also be assembled in an appendices. Organize the EIA and SIA reports according to the outline below.

Environmental Impact Assessment Report

- Executive Summary
- Introduction
- Description of the Proposed Road Networks
- Description of Environmental Setting
- Policy, Legal and Administrative Framework,
- Public Consultation
- Selection of alternatives
- Identification, Assessment and Analysis of Impacts
- Mitigation measures
- Environmental Management Plan including resettlement action Plan
- List of References
- Appendices
  - List of names of the Consultant team
  - Records and/or minutes of public consultations
  - Data used during the analysis
  - Any technical explanation of methods used (optional)
  - Terms of Reference of this study.

Appendix B: List of Stakeholders consulted on EIA and SIA for DART bus depot project

Level	Stakeholders group	Name and Position
National level	1. Vice President's Office- Division of Environment	Mr. Stephen Nkondokayo, Principal Environmental Officer
	2. Prime Minister's office	Mr. J.P Shiyo, Assistant Director, Disaster Unit
	3. Ministry of Lands and Human Settlement	Mr. Geofrey Kanza, Principal Planner
	4. Ministry of Natural Resources and Tourism	Mr. M. Kaita, Principal Game Officer
	5. Ministry of Information, Culture and Sports	1.Ms Juliana Yasonda, Assistant Director of Sports Development 2. Charles Mattoke, Principal Sports Officer
	6. NEMC	Eng. Melania Sangeu, Senior Environmental Management Officer
	7. Ministry of Water and Irrigation	Mr. Segule Segule, Senior Hydro geologist
	8. Ministry of Infrastructure	Mr. Richard Kundi, Department of Planning
Regional level	9. Dar es Salaam Regional Commissioners office	Mr. D.M Nyakisinda, Regional Natural Resources Officer
Municipal Level	10. Ilala Municipal Council	1. Mr. Gombo Samandito, Municipal Town Planner, 2. Mr. Abdon Mapunda, Municipal Naturak Resources Officer 3. Mr. Harun Chacha, Municipal Sewerage Engineer
	11. Kinondoni Municipal Council	Mrs. Mary Komba, Senior Town Planner
Ward level	12. Jangwani Ward Executive officer	Mr. Abdul Msangule, Ward Executive Officer
	13. Mchikichini ward Executive officer	Mr. Geophrey Kahwa, Ward Executive Officer
Mtaa level	14. Msimbazi Bondeni mtaa office	Mr. Fadhil Kalugira, Mtaa Executive Officer
	15. Idrissa mtaa office	Mr. Ally Kondo, Chairman of Mtaa
	16. Mtambani B mtaa office	Mr. Tambaza M. Tambaza, Chairman of Mtaa
Universities	17. Ardhi University	Mr. George Joseph Kimaro Assistant Lecture, EE department
	18. University of Dar es Salaam-CoET	Dr. Karoli Njau, Lecturer and Environmental Engineer
Basin Management Authorities	19. Ruvu/Wami Basin Office	Mr. Salum Mtamanyagi Hydrology department

Utilities providers	20. DAWASCO	Mr. Jasper Kirango, Engineer
Public	21. NGOs	1.Ms Ednah Mndeme, Legal Officer of LEAT 2. Mr Gaston Gikaro, Project officer of TAEEs
	22. KAJIMA company	Mr R. Joseph, KAJIMA Manager
	23. Residents around the project site	1.Mr. Abdalah Ally 2. Mr. Rajab Omar 3. Mr. Mohamed Lipamba 4. Mr. Gabriel Kajiru 5. Mr Hashim Kibabani
	24. Small holder farmers	1. Mr. Steven Mbena 2. Ms. Zaina Mwilima
	25. Sand and stones Crushers	Mr. Godfrey John
	26. Truck drivers	1. Mr. Stamily Mtumbati 2. Mr. Issa Owdeny
	27. Religious institutions	1. Stephen Mhayaya

It can be seen from the table above that five local government officials from Ilala Municipal were individually consulted during the stakeholders consultation exercise as evidenced by the signed form. Specifically, comments from the following officials were taken:

1. Mr. Abdul Msangule - Jangwani Ward Executive Officer, Ilala
2. Mr. Geofrey Kahwa – Mchikichini Ward Executive Officer-Ilala
3. Ally Kondo – Chairman of sub ward office-Idrissa sub ward, - Ilala
4. Fadili Kalugira – Sub ward Executive Officer- Msimbazi Bondeni sub ward office
5. Tambaza M. Tambaza – Chairman of Sub ward office, Mtambani B sub ward - Ilala

Their comments can be seen in Appendix C.

Small holder farmers

There are approximately 10 small holder farmers in the whole area. Two small holder farmers found in the area, namely Ms Zaina Mwilima and Mr. Steven Mbena were consulted. Both showed disapproval of the project as their gardens would be taken up. Asked how they got the pieces of land, both said they had inherited from their parents who could no longer work in the farm due to old age. Asked whether they have other means of income, both said they have as farming in the flood plain is usually impossible during rain season. It should also be noted that no farmer lives in the area. This implies that should the area be converted into a bus depot they will only need an alternative source of income and not a place to live. The proposed option therefore is to ensure that all small holder farmers get employed by DART at the bus depot instead of finding another place for farming which might be difficult to find in the rapid expanding city

Appendix C: Details of interviews and discussion with stakeholders

Level	Consulted Institution/ Group	Views and Concerns of stakeholders
National level-	Prime Minister's office	The team managed to consult Mr. J. P. Shiyo who is the Assistant Director of the Disaster Management Unit. He was of the opinion that the project will help improve transportation in the city. Mr. Shiyo was also of the opinion that since Jangwani Flood Plain is a hazard land as per Dar es salaam master plan, proper design and utmost care should be taken to ensure that structures to be constructed do not block natural flow of water and lead to more floods
	Ministry of Lands and Human Settlements	The team met Mr. Geofrey Kanza, the Principal Planner f the Ministry of lands and Human Settlements. He pointed out that the Sustainable Cities Project developed a framework for land use among the government ministries whereby the Jangwani flood plains was allocated to the ministry of Sports and Culture for developing the area into recreational facilities such as a stadium. He wondered whether the area was relocated. He was also of the opinion that the area is best suited to be preserved for recreations and not built environment as it serves as a buffer zone for the city. He therefore, suggested that care should be taken to address the above concerns
	Vice Presidents Office- DoE	Consultation with the Principal Environmental Officer at DoE, Mr. Stephen Nkondokayo was held. He pointed out that the project will help in reducing congestion in the city. However, his concerns were as follow: -Pollution of Msimbazi river -Drying up of the mangroves located downstream due to heavy metals, oils and fuels spills is almost unavoidable with the bus depot in Jangwani flood plains - More floods in the area is likely to happen due to blockage of the natural flow of water He therefore, suggested that alternative site should be sourced
	Ministry of Natural resources and Tourism	The team met with Mr. M. Kaita, the Principal Game officer of the Ministry of Natural Resources and Tourism. He had reservations with the project site due to the following issues: -More floods in the area is likely to happen due to blockage of the natural flow of water -A bus depot will affect the migratory birds that usually come to the area from far -Pollution of the air will affect the oxygen-carbon balance in the city -The environmental damage that will happen at wetland is too costly He therefore, suggested that alternative site should be sourced
	Ministry of Information, Culture and Sports	Discussion with the assistant Director for Sports Development, Ms Juliana Yasoda was held, She was in support of the project as it will create employment and help in boosting economic gains among the people to be employed. However, she had the following views: -An alternative recreational grounds be sought -Jangwani flood Plains is a hazard land which should be handled with care during construction -Air pollution which may disturb oxygen-carbon balance in the atmosphere

	National Environmental Management Council	The team met with Engineer Melania Sangeu, the Senior Environmental Management Officer of NEMC. She was of the opinion that a bus depot may lead to pollution of the Msimbazi river due to seepage of pollutants into the soil and to the river. She also pointed that Jangwani flood plain is a wetland which need to be conserved at any cost. She further cautioned that creation of more floods as a result of blockage of natural run off is likely to happen. She therefore, suggested that an alternative site should be used
	Ministry of Infrastructure	The team managed to consult Mr. Richard Kundi from the Department of Planning. He was of the opinion that the project would create employment as many people will be employed to serve at the Depot once completed. However, he was concerned of the risks associated to the project during and after completion. He mentioned creation of more floods due to blockage of water as well as damage to the Morogoro road as among the risks that may be caused by the project. He also mentioned pollution of the Msimbazi river due to oil and fuel spills as another negative impact that may result from the project.
	Ministry of Water and Irrigation	The team met with Mr Segule Segule who is the senior Hydro geologist at the Ministry of Water and Irrigation. He was of the opinion that much as the project may lead to creation of employment for skilled and unskilled people during and after construction, there are also negative impacts associated to the project such as pollution of the Msimbazi river due to oil spills, noise pollution and air pollution.
Regional/city level	Regional Commissioners' office	The team met the Regional Natural Resource Officer named Mr. D. M. Nyakisinda. He was of the opinion that the Bus Depot may lead to pollution of Msimbazi river due to oil spills. He was also of the opinion that an alternative but appropriate site be found rather than Jangwani flood plains which, according to him is an ecologically sensitive area. He therefore, suggested that an alternative site should be used
District/Municipal Level	Ilala Municipal Council	The team met with three officers at Ilala municipal Council i.e. The town Planner, Mr. Gombo Samandito, the municipal Natural Resources Officer, Mr. Abdon Mapunda and the Sewerage engineer, Mr. Harun Chacha All three officials had reservations on the project basing on the following issues; **Town planner's concerns** -Jangwani Flood Plain is the only green belt in the city which helps to maintain oxygen-carbon balance in the air -Jangwani is the only largest open space which should be conserved for future generations at any cost -Lack of recreational facilities is a major issue in the city which need to be addressed by developing Jangwani into such rather than developing a bus depot -The environmental cost of turning Jangwani into a bus depot is much higher than compensating residents in other areas **Natural Resource officer of Ilala Municipal council** -Pollution of Msimbazi river is unavoidable with the bus depot in Jangwani flood plains -The clearance of vegetation that will go with depot construction will destroy the 'natural sense of the place' **Sewerage engineer of Ilala Municipal Council**

		-With a bus depot in place, Pollution of Msimbazi river due to Oils spills is imminent -Congestion of Morogoro road is likely to worsen -More floods in the area is likely to happen due to blockage of the natural flow of water -Jangwani floods plain is a hazard land which should not be tempered with
	Kinondoni Municipal Council	The team consulted the Senior Town Planner, Mrs Mary Komba. She was of the opinion that the project will create employment to skilled and unskilled people. Traffic congestion and improvement of commuter's services will be the key indicators after the completion of the project. She also pointed out that there will be enhanced safety of the people as buses will be maintained at the depot. However, she pointed out negative impacts such as Noise pollution, Air pollution and possibilities of more floods in the area. She further pointed out the possibility of congestion along Morogoro road due to turning of buses, proliferation of unplanned settlements around the depot premises.
Ward level	Jangwani ward	The team met and had discussion with the Ward Executive Officer (WEO) of Jangwani ward. Mr. Abdul Msangule who viewed the project as one of the sources of youth's employment. He also viewed the project as one of the ways to show that land reclamation is possible in Tanzania. However, he had the following concerns: -Jangwani flood plains is a recreational area for youths in his ward. He wondered whether there is an alternative space for the purpose. -He was of the opinion that the development of a bus depot would block the natural flow of runoff water thus causing more floods during rain seasons. - Pollution of the Msimbazi river due to oil spills from the bus Depot is an imminent danger
	Mchikichini ward	The ward executive officer of Mchikichini, Mr. Geofrey Kahwa pointed out that the project may help to improve security in the area. -He was of the opinion that the development would block the natural flow of run off water thus causing more floods during rain seasons. - He was of the opinion that the project may lead to pollution of the Msimbazi river due to oil spills from the bus Depot -Noise pollution was another issue of concern that he mentioned
Mtaa level	Msimbazi Bondeni mtaa	Mr Fadhili Kalugira who is the Msimbazi Bondeni Mtaa Executive officer was interviewed. He was of the opinion that much as the project will improve the appearance of the city in general and Jangwani flood plains in particular, but he was concerned with the following negative impacts that may result from the project: ▪ Crime rate escalation ▪ Loss of recreational areas ▪ Loss of farmland for gardening
	Idrissa Mtaa	Discussion with the chairman of Idrissa mtaa was held. Mr. Ally Kondo Had the following concerns: -The project will deepen the problem of scarcity of recreational areas in the city -The bus depot may block the natural flow of water hence cause more floods -Crime will escalate due to the project
	Mtambani B mtaa	The team met with Mr. Tambaza M. Tambaza the chairman of Mtambani B mtaa. He had the following concerns:

		-The project will deepen the problem of scarcity of recreational areas in the city -The bus depot may block the natural flow of water hence cause more floods during rain seasons
Basin Management authorities	Ruvu/ Wami basin Office	The team met with Mr. Salum Mtamanyagi of Hydrology department at the sub office in Dar es salaam. He was of the opinion that much as the project will create employment opportunities to people, it will lead to more pollution of the Msimbazi river which is already polluted.
Universities	Ardhi University	The team met with the assistant lecturer from the department of environmental engineering of Ardhi University. Mr. George Joseph Kimaro was of the opinion that employment will be created and income of many people will be improved. Also, he pointed out that the development of the area will help in the overall development of the city infrastructure. However, he had the following issues which he thought need to be considered first. These are: -Pollution of Msimbazi river due to Oils spills -Loss of recreational areas -Air pollution especially during maintenance of the buses
	University of Dar es salaam-CoET	Dr Karoli Njau of University of Dar es Salaam was interviewed as one of the stakeholders. He was opposed to the project due to the following issues: -Pollution of Msimbazi river and drying up of the mangroves located downstream due to heavy metals, oils and fuels spills is almost unavoidable with the bus depot in Jangwani flood plains - The project will deepen the problem of recreational areas scarcity in the city - The bus depot may block the natural flow of water hence cause more floods -The natural beauty of the area will be lost He therefore, suggested that an alternative site should be sourced
Utilities providers	DAWASCO	The team met Mr. Jasper Kirango, the sewerage engineer with DAWASCO. He was opposed to the project and highlighted the following issues: Pollution of Msimbazi river due to oils and fuels spills is an imminent danger with the bus depot in Jangwani flood plains -The river may also be polluted by domestic waste water from the flooding of septic tanks during rain seasons - The bus depot may block the natural flow of water hence cause more floods -The environmental buffer will be replaced by the built environment, which is too expensive cost to pay for the depot - Congestion of Morogoro road is likely to worsen -The environmental buffer will be lost
NGOs	Lawyers Environment Action Team(LEAT)	The representative of LEAT was interviewed. Edna Mndeme, the legal officer of LEAT had reservations on the project and also had the following concerns: -Bus depot may attract more unplanned settlements close by -Air pollution due to maintenance during operation phase. -Congestion of Morogoro road is likely to worsen -Pollution of Msimbazi river due to Oils spills -Loss of recreational areas -Air pollution She therefore, suggested that an alternative site should found
	Tanzania	The held discussion with the Project officer of TAEEs, Mr Gaston

	Association of Environmental Engineers(TAEEs)	Gikaro who was in support of the development but had the following concerns: -Congestion of Morogoro road is likely to worsen -Pollution of Msimbazi river due to Oils spills -Disturbance of the natural greenery site -Air pollution due to emission of gases
Public	Residents of Mtambani B and Msimbazi bondeni	Consultation with Mr. Abdalah Ally who is a residens in Mtambani B and Mohamed Lipamba of Msimbazi Bondeni mtaa revealed the following issues: -The project will deepen the problem of recreational areas scarcity in the city -The bus depot may block the natural flow of water hence cause more floods in the area during rain seasons
Users of the area	Small holder farmers	The team met with peasants whose livelihood depends on gardening activities in the project area. Mr. Steven Mbena was opposed to the project given the fact that his small garden will be taken up by the project thus rendering him jobless.
	Sand vendors and stone crushers	Among the interviewed stakeholders was a sand vendor named Mr. Godfrey John who considers the Jangwani flood plain as a strategic location to display his wares. He was concerned that the project will take up the very area that he uses to display sand and crushed stones for his customers
	Truck Drivers	The team met with truck drivers whose livelihoods depend on the business situated at the project area. Mr. Stamily Mtumbati was opposed to the project given the fact that the same area which he parks his lorry will be taken up by the project.
	Religious leaders	Discussion with religious leaders who use the area for religious rallies was held. Mr. Stephen Mhayaya, an evangelist of the Tanzania Assemblies of God Church was opposed to the project and had the following concerns: -The only largest open space is reduced -Congestion of Morogoro road is likely to worsen -Pollution of Msimbazi river due to Oils spills -Disturbance of the natural greenery site -Air pollution due to emission of gases He therefore, suggested that care should be taken to address the above concerns
Neighboring institutions	KAJIMA	Discussion with KAJIMA manager, Mr. R. Joseph was held. He was of the opinion that it is possible to have structures built in the area just as Kajima did but had the following views: -The project will cause noise pollution to neighbors -Crime rate will escalate due to increase of activities and people -blocking of the natural flow of water thus causing more floods

Appendix C: Public Notices

ATTENTION! ATTENTION! ATTENTION!

PUBLIC NOTICE

ENVIRONMENTAL IMPACT ASSESSMENT FOR JANGWANI BUS DEPOT FOR DAR RAPID TRANSIT [DART]

The Tanzania Prime Ministers' Office - Regional Administration and Local Governments (PMO-RALG) through the Dar es Salaam Bus Rapid Transit Agency (DARTA) intends to develop a Bus Depot at Jangwani flood plain area along Morogoro Road, Ilala Municipality, Dar es Salaam, as an integral part of the Dar es Salaam Bus Rapid Transit System (DART). The Jangwani Bus Depot – (about 75,000m^2 land space) will form a critical segment of the DART infrastructure that will provide spaces and facilities for the periodic maintenance, cleaning, fuelling and parking of 150 buses for the efficient running of the Bus Rapid Transit (BRT) system. The Depot is also expected to accommodate facilities for DART management and employees including all necessary support facilities. An area for off-peak parking and a public parking is also part of the proposed design.

On behalf of Dar Rapid Transit [DART], JSB EnviDep is undertaking an Environmental Impact Assessment to ascertain that the project does not cause adverse environmental and social impacts as required by the government (Environmental Management Act No. 20, 2004).

If you have any issue or concern regarding this project, express /send them to the below offices where details of the project are also found.

- **The Chief Executive**
  DAR Rapid Transit Agency
  P. O. Box 724
  Dar es salaam
- **EIA Consultants, JSB EnviDep Ltd, P.O.BOX 32312 Dar es Salaam, Tel: 255 (022) 2452137, email: jsbenvidep@africaonline.co.tz, Directors: 0754 291997, 0754 265864**
- **Director General, National Environment Management Council (NEMC), P.O.Box 63154 Dar es Salaam, Tel: 255 (022) 2127817, 0713 608930: email: nemc@nemctz.org**

ATTENTION! ATTENTION! ATTENTION!

ILANI ! ILANI ! ILANI !

TANGAZO

TATHMINI YA ATHARI KWA MAZINGIRA NA JAMII MRADI WA KITUO CHA MABASI YANAYOKWENDA KASI CHA JANGWANI

Dar Rapid Transit [DART] inakusudia kujenga kituo cha mabasi yanayokwenda kasi katika sehemu tifutifu za bonde la Jangwani, wilaya ya Ilala, mkoa wa Dar es salaam. Eneo la mradi lipo karibu na majengo ya kampuni ya Kajima kwa upande wa kaskazini ,viwanja vya kuchezea mpira na watoto upande wa kusini na makazi ya watu upande wa Magharibi na kaskazini vyote vikiwa takribani Umbali wa mita 500 kutoka maeneo ya makazi ya watu. Kituo hiki kitatumika kuegesha na kukarabati mabasi 150 makubwa yanayokwenda kasi wakati yanapokuwa yanatumika na wakati yanapokuwa hayatumiki.

Kampuni ya JSB EnviDep Ltd kwa niaba ya [DART] Dar Rapid Transit, inafanya tathmini ya athari ya mradi huu kwa mazingira na jamii, kama ilivyoagizwa na serikali (Sheria ya Mazingira Na. 20 ya 2004). Kama una maoni kuhusu huu mradi unaweza kuyatoa/kuyatuma katika ofisi zifuatazo ambapo taarifa zaidi za mradi zinapatikana.

- **The Chief Executive**
  DAR Rapid Transit Agency
  P. O. Box 724
  Dar es salaam

- **Washauri, JSB EnviDep Ltd,**
  S.L.P 77266 Dar es Salaam,
  Simu: 255 (022) 2450213,
  barua pepe: jsbenvidep@africaonline.co.tz ,
  Wakurugenzi: 0754 291997, 0754 265864

- **Mkurugenzi Mkuu, Baraza la Taifa la Hifadhi na Usimamizi wa Mazingira (NEMC), S.L.P 63154 Dar es salaam,**
  Simu 255 (022) 2127817, 0713 608930:
  barua pepe: nemc@nemctz.org

ILANI! ILANI! ILANI!

14/05/03

Appendix D: Signatures of stakeholders consulted

List of Stakeholders to consulted on
Environmental and Social Impact Assessment for the DART project

S/N	Name	Institution and Position	Address	Signature
1.	ABDUL MSANGI	WEO Jangwani WARD	P.O. Box 15571 Cell 0784264867 DSM	[signature]
2	[illegible]	EMC / Assistant Director	0713 [illegible] Box 3021 Dsm	[signature]
3	Eng. MM Singa [illegible]	NEMC (SEMC)	Box 63154 DSM	[signature]
4	HASHIM [illegible]	Resident Mtambani B	Box 22378 0715 660329	[signature]
5	RASADU OMARI	Resident Mtambani B	Box 15010 0713 461939	[signature]
6	TAMBAZA M [illegible]	CHAIRMAN OF LOCAL GOV. [illegible]	Box 15010 0754 480171	[signature]
7	ABDALAH ALLY	Resident Mtambani B	Box 21531 0773421708	[signature]
8	Gombo Samuhe ndeleu	Town Planner Ilala MC	0756 368522	[signature]
9	Abdon Mapunda	Environmental Officer-IMC	0754 464941	[signature]
10	[illegible]	IMC [illegible]	[illegible]	[signature]
11	NYAKISINDA AM	RNRO	0784 260977	[signature]
12	[illegible]	[illegible]	[illegible]	[signature]
13	JASPER M KIRANGO	DAWASCO ENGINEER	Box 5340 DSM 0753 791645	[signature]
14	Dr. K. [illegible]	Environmental [illegible]	Box 35131 [illegible]	[signature]
15	LAMAI [illegible]	IFA Legal Officer	0756213007 Dar es Salaam	[signature]

List of Stakeholders to consulted on
Environmental and Social Impact Assessment for the DART project

S/N	Name	Institution and Position	Address	Signature
16	[illegible]	[illegible]	071[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	Mohamed Lipembe	Resident, Msimbazi	0787722229	[illegible]
19	Gabriel Kajiru	Bonde la Msimbazi	0734468991	[illegible]
20	Ally Kondo	Idrissa - Mtaa Mwenyekiti	0713 201583	[illegible]
21	Joseph Ryama	Kajima Manager	0784 506622	[illegible]
22	Godfrey John	Sand Dealer	0787 487063	[illegible]
23	[illegible]	[illegible]		[illegible]
24	[illegible]	[illegible]	0754 [illegible]	[illegible]
25	Salum [illegible]	[illegible]	[illegible]	[illegible]
26	Zaina [illegible]	[illegible]	[illegible]	[illegible]
27	Steven Mbena	Peasant at the project	Box 1806 Dar es Salaam 0787 922521	[illegible]
28	Stanley [illegible]	Bereva Lori	0755 685059	[illegible]
29	Issa Cwdeny	Bereva Lori	0717-794647	[illegible]
30	Juliana J. Massaka	Ass. Director	0754 532852	[illegible]
31	Charles Y Matiore	Principal Officer	0784230924	[illegible]
32	Stephen Nkondokaya	Vice President's office Principal Environment Officer	0754817572	[illegible]
33	[illegible]	Principal Game Officer	[illegible] 0754 852233	[illegible]
34	Stephen Mhagama	Evangelist TAG Church	P.O. Box 55004 DSM	[illegible]

Appendix E: Sustainable Drainage System to Manage Floods at the New Depot

Sustainable Drainage Systems (SUDS) is a hierarchy of techniques to manage surface water drainage. These include minimizing irnpermeable surfaces and controlling site runoff. SUDS aim to reduce flood risk by controlling the rate and volume of surface water run off from developments (the bus depot in this case), in addition to managing the quantity of surface water more effectively one of the primary benefits of SUDS is the potential enhancement of water quality. SUDS improve water quality by mirroring nature in providing filtration and allowing for natural bio-degradation of hydrocarbons and the dilution of other contaminants as water passes through the system.

The SUDS concept adopts a management train approach to minimize the impact of surface water run off on the environment, this typically incorporates a series of techniques to drain, filter and store surface water run-off at source. SUDS are now recognized as one of the most effective ways to reduce flood risk and pollution transfer; [21] this has been confirmed through Government Legislation and Planning Guidance such as Planning Policy Statement (PPS) 25 'Development and Flood Risk' of the United Kingdom. PPS 25 sets out Government policy in England on development and flood risk. The main aim is to ensure that flood risk is taken into account at all stages of the planning process.

The Policy states that:
"New development on the functional flood plain will not only be at risk itself, but will add to the risk downstream, and therefore development should not take place unless it is proven to be essential or incapable of being located elsewhere. These criteria mean that such areas are generally not acceptable for essential civil infrastructure. Where a case has been made for allowing development[22] it should be designed to remain operational in times of flood, not impede water flow and have a negligible effect on the land's capacity to store flood water."

Furthermore the policy states that:

Proposals for landraising to elevate a site above the functional flood plain must be linked to the provision of compensatory flood water storage to replace that lost to development. This should generally be at the same level and have the same volume as the storage being replaced (e.g. on the opposite bank of a watercourse). Such schemes must have a neutral or better effect on the probability of flooding and on the need for flood prevention works elsewhere. However, Landraising should not create 'islands' of new development but should adjoin developed areas outside the functional flood plain.

Culverts are a frequent cause of local flooding and pollution. Watercourses shall not be culverted as part of the new depot. The existing culvert, i.e. the one crossing Morogoro Road will not be disturbed, since the introduction of SUDS will minimize the amount of surface run off as a result of project construction, it capacity to convey the additional water is considered adequate.

Flood alleviation measures shall include (i) land raising (ii) under building (iii) channel improvements (iv) rain water harvest (v) restoration of existing watercourses (vi) provision of

[21] http://www.charcon.com/products/suds_range.aspx
[22] The case was made for the DART to be constructed at Jangwani, see section 6.3 and based on that the President gave an approval for the Jangwani grounds to be used for the deport.

additional flood water storage and attenuation reservoirs. Guidelines for construction of these measure exist.[23]

SUDS range tailored to meet site specific requirements

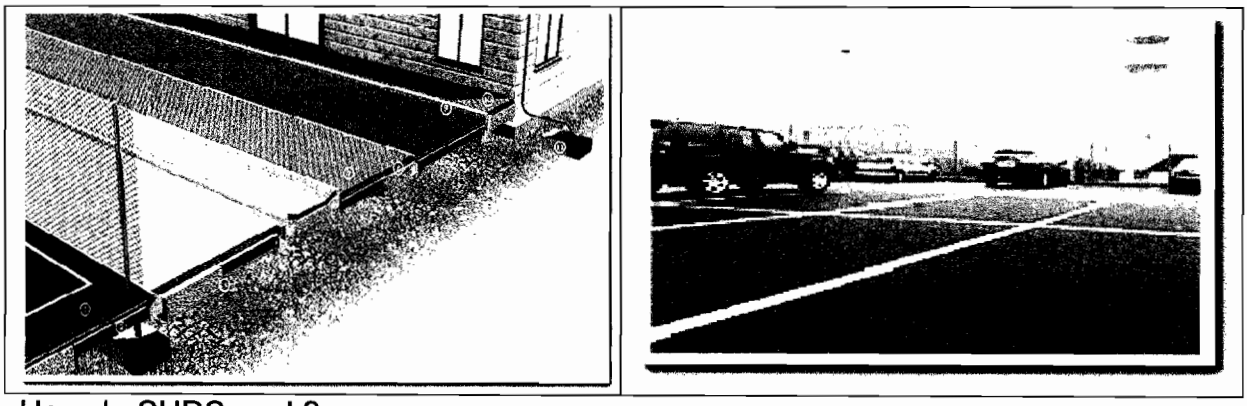
Aggregate Industries' SUDS product range shall include a choice of pervious surfacing materials, including permeable concrete block paving, porous asphalt and porous concrete suitable for project Depot design criteria and site conditions. Water quality improvements including hydrocarbon removal from surface water draining from the parking area shall be a key consideration. Hydrocarbon contamination shall be addressed through the use of Aggregate Industries' pervious surfacings in conjunction with careful pavement design.

As an alternative to the use pervious surfacing to treat surface water runoff, Charcon Perma-channel™ which integrates with conventional impermeable hard surfaces and has an integral silt and oil separation mechanism which treats surface water run off at source, eliminating the need for additional conventional oil water interceptors and providing ease of maintenance shall be used.

Aggregate Industries' SUDS products are based on the 'source control' approach, shallow storage and conveyance systems can be designed using Charcon Permavoid™ minimising pavement construction depths and reducing excavation volumes. The overlying pavement layers can be as thin as 130mm and the overall pavement as slender as 280mm, depending on the nature of traffic loading and underlying soil CBR values. Aggregate Industries' product offer is augmented by Industry leading technical expertise to ensure the correct product selection and pavement design taking into account both structural and hydraulic requirements.

A range of SUDS options

Aggregate Industries has combined a number of its product technologies to offer a wide range of Sustainable Drainage options that can be used to construct Infiltration or Attenuation drainage systems. Infiltration SUDS disperse the water by allowing it to gradually seep into the ground, this option is suitable in areas that have free draining ground conditions and is particularly applicable in situations where additional discharge to drainage networks is prohibited. Attenuation SUDS store water within the system and then conveys the water to a discharge point where the water is dispersed into a conventional drainage system or watercourse in a controlled manner as the rainfall subsides; this option is applicable for areas with poor soil permeability or on certain sites where groundwater protections apply. Attenuation systems offer the additional benefit of providing the facility to store water for recycling purposes if required. The figures below show typical SUDS.



How do SUDS work?

[23] www.althon.co.uk/products/althon-suds/sel-source-control-system

Sustainable drainage systems (SUDS), are made up of one or more structures built to manage surface water runoff, used in conjunction with good management of the site. There are four accepted methods of control:

- Prevention – managing the site well can improve quality. Prevention includes design, maintenance and the education of users;
- Filter strips and swales - vegetated surfaces that allow water to drain evenly off impermeable areas; swales are long shallow channels, filter strips are gently sloping areas of ground. Both of these features mimic natural drainage patterns by directing runoff through vegetation, slowing and filtering the flow;
- Permeable surfaces and filter drains - have a volume of permeable material below ground to store surface water. Runoff flows into this storage area via a permeable surface, such as; Grass, Gravelled areas and Paving blocks;
- Infiltration devices - soakaways, infiltration trenches and infiltration basins which drain water directly into the ground. Infiltration devices can easily be integrated into landscaped areas;

These controls should be located as close as possible to where the rainwater falls, providing varying degrees of treatment for surface water through natural processes of sedimentation, filtration and biological degradation.

APPENDIX F: GOVERNMENT APPROVAL FOR DEPOT DEVELOPMENT

JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA WAZIRI MKUU

Simu.: 026-2323164/2322848

Fax: 026- 2322116/2321013
E-mail: ps@pmoralg.go.tz
ralgdodoma@intafrica.com

Tawala za Mikoa na
Serikali za Mitaa
S. L. P. 1923.

DODOMA.

MKURUGENZI WA JIJI
14 SEP 2007
P.O. Box 9084
D'SALAAM

Unapojibu tafadhali taja:
Kumb. Na. BC: 98/298/01/52 14 Septemba, 2007

Mtendaji Mkuu,
Wakala wa Mabasi yaendayo Haraka (DART),
S. L. P 9084,
DAR ES SALAAM.

YAH: ENEO LA JANGWANI – DAR ES SALAAM KUTUMIKA KAMA KITUO CHA KUEGESHA MABASI YA MRADI WA DART

Ninakutaarifu rasmi kwamba Mheshimiwa Rais amekubali ombi la kutumia eneo la Jangwani lililoko katika Manispaa ya Ilala mkoani Dar es Salaam, kama kituo cha kuegesha magari ya Mradi wa DART.

Nakala ya barua kutoka kwa Katibu wa Waziri Mkuu inayotoa kibali hicho, nimeambatanisha pamoja na barua hii.

Tafadhali endelea na mchakato wa kulifanya eneo hilo lifae kwa matumizi hayo.

F. E. Mbonde
Kny: KATIBU MKUU

Nakala: Katibu Mkuu, Wizara ya Ardhi na Maendeleo ya Mkazi
S.L.P. 9132,
DAR ES SALAAM.

FROM : DPP(PO-PALG) PHONE NO. : 0262322446 MAY. 15 2008 01:16PM

Katibu Tawala (M),
S.L.P. 5429,
DAR ES SALAAM.

Mkurugenzi wa Jiji,
S.L.P. 9084,
DAR ES SALAAM.

Mkurugenzi,
Halmashauri ya Manispaa ya Ilala,
S.L.P. 20950,
DAR ES SALAAM.

1c-SEP-2007 18:09 FROM:PRIVA 02550222116798 10:255 2116 P.

Kumb. Na. PM/P/2/567/38

Katibu wa Waziri
Ofisi ya Waziri Mkuu,
Tawala za Mikoa na Serikali za Mitaa,
S. L. P. 1923,
DODOMA.

YAH: OMBI LA KUTUMIA SEHEMU YA ENEO LA JANGWANI KAMA KITUO CHA KUEGESHA MABASI YA MRADI WA DART

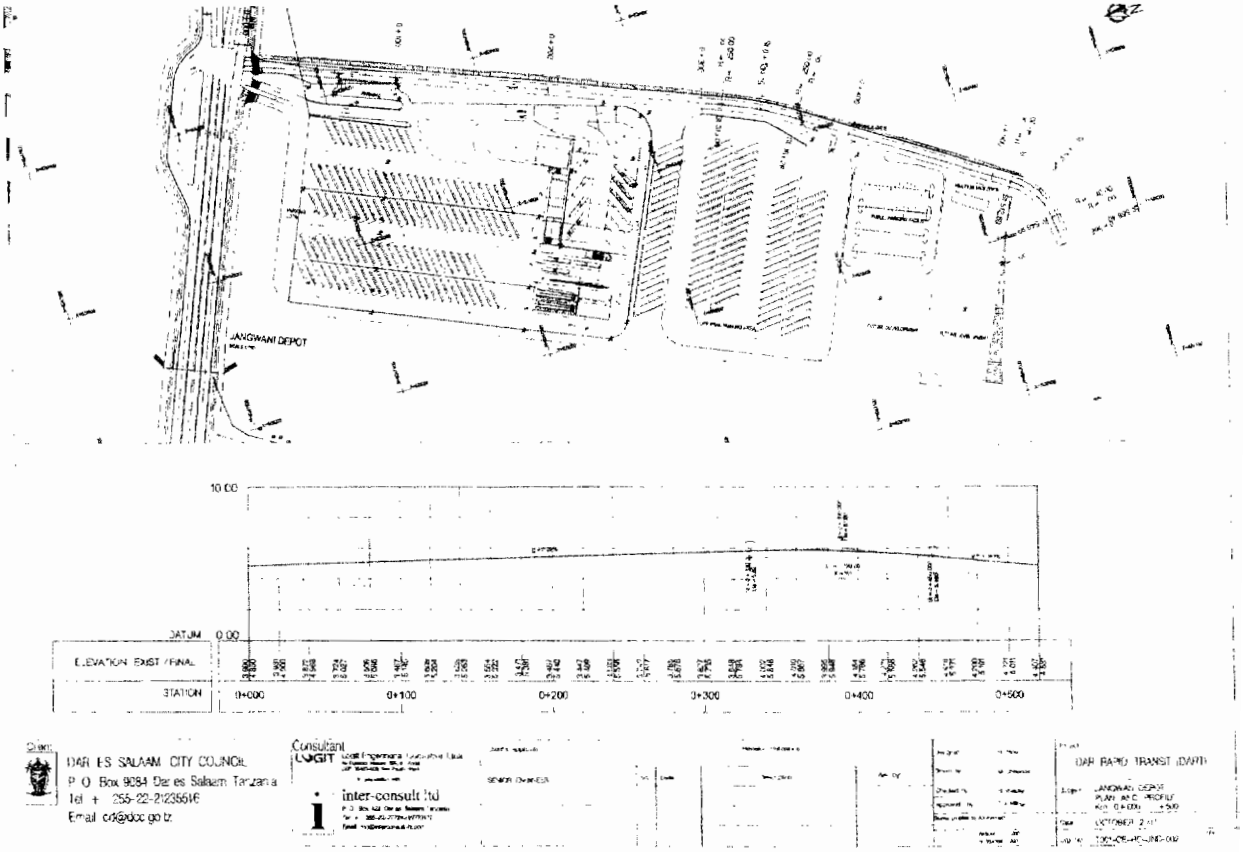
Tafadhali rejea somo lililotajwa hapo juu.

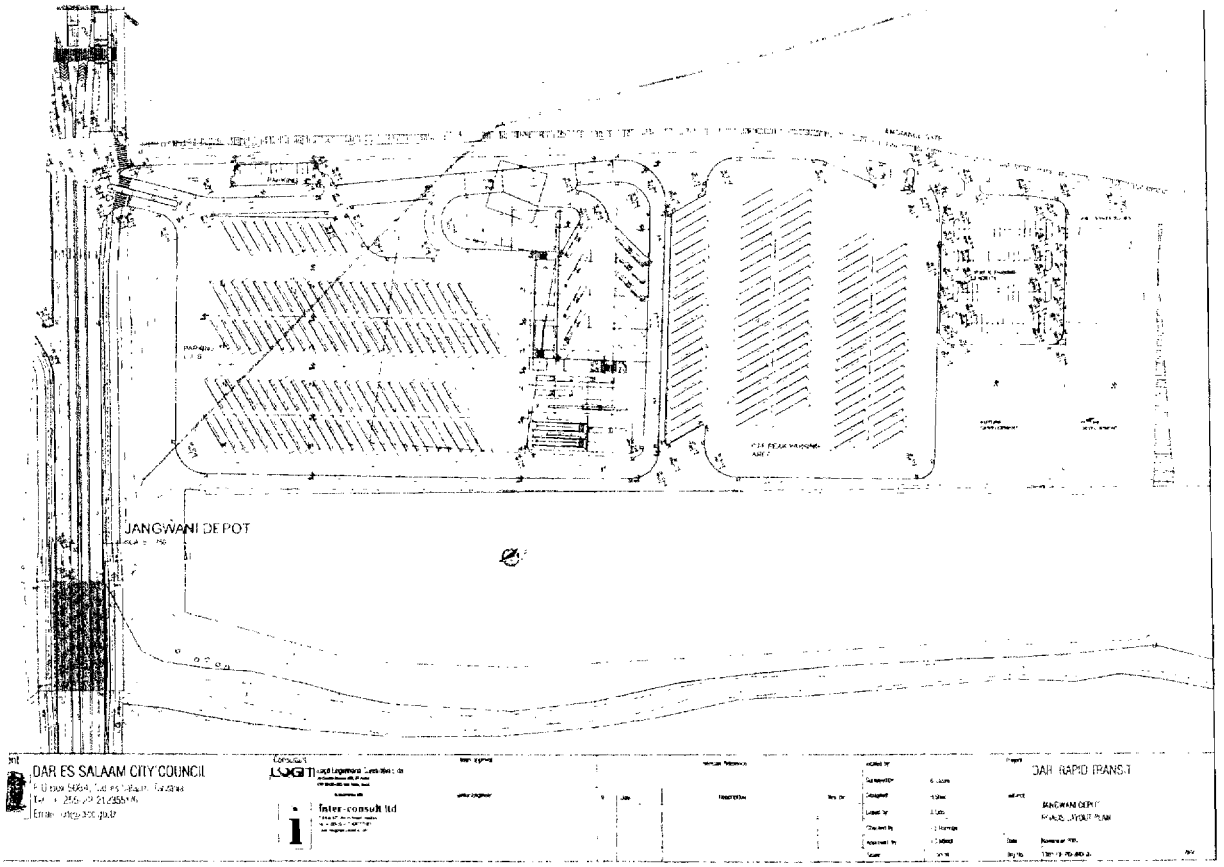
Mheshimiwa Waziri Mkuu ameelekeza Waziri wa Nchi, Ofisi ya Waziri Mkuu – TAMISEMI ajulishwe kwamba Mheshimiwa Rais amekubali DART watumie sehemu ya Jangwani kama kituo cha kuegesha magari.

Tafadhali mfikishie Mheshimiwa Waziri ujumbe huo wa Mheshimiwa Waziri Mkuu.

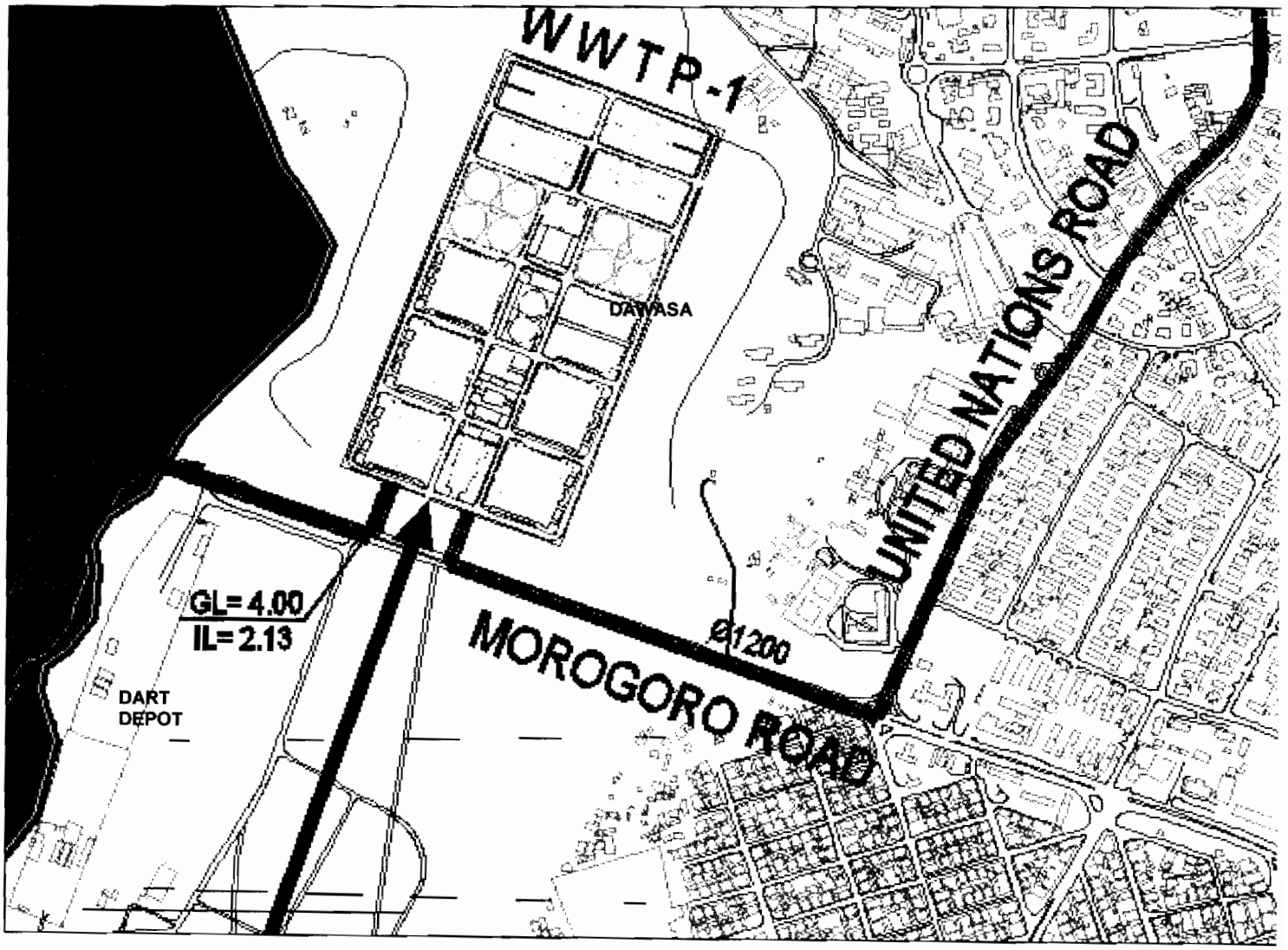
(F. E. Ngoiya)
KAIMU KATIBU WA WAZIRI MKUU

APPENDIX G: LAYOUT OF JANGWANI BUS DEPOT AND OTHER FACILITIES




JANGWANI DEPOT
DAR ES SALAAM CITY COUNCIL
Inter-consult ltd
DAR RAPID TRANSIT

APPENDIX H: DAWASA CONVENTIONAL WATER TREATMENT PLANT



Appendix I: CVs of the Consultant

Position: **Environmental Engineer**

Name of the Consultants: **Prof. JHY Katima**
Profession: Industrial and Environmental Engineer
Date of Birth: 6th April 1955
Years with Firm/Entity: 9 Years
Nationality: Tanzania

Membership in Professional Societies: FIET, MIChemE UK, Registered Consulting Engineer with ERB (T), International Water Association (**IWA**), International Association for Impact Assessment (**IAIA**)

Detailed Tasks Assigned: Overseeing the execution of the project; Liasing with the Client on all technical matters, Preparation of EIA Checklist, Quality assurance, to prepare reports as per the agreed schedule, to prepare an EIS, ESMP, to assess Environmental feasibility of the project, Environmental and Social Impact assessment, Mitigation measures with cost estimates

Key Qualifications:
Prof. Dr. Katima: a chemical engineer by training, has worked for the University of Dar es Salaam since 1982 as a Tutorial assistant and raised through ranks to the post of Professor. Over the years, his research, training and consultancy interests have focused more on environmental management and conservation, environmental impact assessment, climate change and its associated sciences, project evaluation and planning, plant commissioning, CDM, industrial-processes troubleshooting and designing of new production lines. He has offered several consultancies to national and international organisations in above-mentioned areas. Prof. Katima is a registered expert with the Scientific and Technical Advisory Panel (STAP) of the Global Environmental Facility (GEF), Registered UNFCC Expert – CDM Methodologies. He was one of the Lead Authors of Chapter 4 (which dealt with atmospheric chemistry) of the IPCC Third Assessment Report. He is a Bureau Member of the IPCC – Task Force Bureau for the Greenhouse Inventories. Prof. Katima is the Vice President of the Intergovernmental Forum on Chemical Safety (IFCS) representing Africa Region. Prof. Katima was one of the Review Editors of Chapter 5 on Cross Cutting Issues for the Land Use, Land Use Change and Forestry inventory guidelines and was one of the Review Editors of the GL2006 (inventory guidelines to be completed in 2006). He is a Registered Consulting Engineer with the Tanzania Engineering Registration Board and a Fellow of the Institution of Engineers Tanzania. Prof. Katima is the Executive Chairman of AGENDA, an NGO with international repute in promoting responsible development and also is the Secretary General of The Tanzania Greenhouse Action Trust. Prof. Katima has been involved in more that 30 EIA assignments mainly in Tanzania.

Consultancy Job/Client/Completion date

YEAR	NAME OF THE ASSIGNMENT/CLIENT
1993 - 1994	• Environmental Impact Assessment of the Mine Development Project - Merelani Block "C" Kiteto District, Arusha Region/ Graphtan Ltd. • Estimation of Green House Gases from Agricultural Waste, CEEST. • Rapid Assessment of Ozone Depleting Substances in Dar Es Salaam, CEEST. • Consultant to Tanzania Country Study on Sources and Sinks for Greenhouse Gases in Tanzania, Sponsored by UNEP.
1994 –1995	• Cleaner Production Project for Tanzania Industries, Sponsored by DANIDA. • Tanzania Country Study for Greenhouse Gases: Costing of Mitigation Options, Sponsored by GTZ. • Environmental Impact Auditing for ASBESCO, National Environment management Council. • Environmental Impact Auditing for the Tanzania Italian Petroleum Refinery (TIPER), National Environment Management Council. • Environmental Impact Auditing for the Tanzania Chemical Industries Ltd., National Environment Management Council. • Environmental Impact Auditing for AFRO Tanneries Ltd, National Environment

management Council.

1996
- Evaluation of Dar es Salaam Air Quality, National Environment Management Council 1996

1997
- Ubungo (Power Plant) Ambient Air Quality Assessment, Norplan.
- Songo Songo Island Pre-Acquisition Environmental Site Assessment (Project No. E401), CEEST.
- Inventory of Monitoring, Needs and Possibilities for Key Environmental Issues in Tanzania, the Royal Netherlands Embassy.

1998
- The Yield Monitoring of an Oribi/Iranian Heavy Blend Crude Oil, Tanzania Petroleum Development Corporation (TPDC).
- Disposal of Chlorine Gas from a damaged cylinder. Nedloyd (T) Ltd.
- Lead Author, Chapter 4 of the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

1999
- Evaluation of Contaminated Oil from MV Hightide to AGIP, GAPOIL, Ocean Consult (on behalf of The National Insurance Company).
- Environmental Impact Assessment of the Replacement of the Single Point Mooring & Onshore/Offshore Pipeline System, TAZAMA Pipelines.
- Environmental Impact Assessment of Tanzanite Mining, AFGEM (Tz) Ltd.

2000
- Songo Songo Pre-acquisition Environmental Site Assessment. Songas.
- Environmental Social Marketing Research. GreenCom/Tanzania.
- Environmental and Social Management Plan for Songo Songo Gas-to-Electricity Project.
- Environmental and Investment Guidelines for Marine Parks and Reserves.
- Assessment of Source of Fire, and Evaluation of Degraded Polypropylene Woven Bags at Bora Industries Limited / Client: InterState Surveyors (T) Ltd

2001
- Environmental Impact Assessment of the proposed Moshi Municipality landfill. Urban Sector Rehabilitation Program (USRP)
- EIA for the Proposed Water and Environmental Sanitation for the Shinyanga Municipality. Oxfam GB
- EIA for the Proposed Mini-Hydropower Project at Liuiga River in Iringa. Green Growth Ltd.
- Evaluation of Factors Leading to Maize Spoilage in Makambako. Interstate Surveyors and Loss Adjusters, Dar es Salaam.
- EIA Training Manual for the District EIA Process in Tanzania, NEMC,

2002
- Market study on the Feasibility for Compost Derived from Organic Municipal Solid Waste, EAWAG - SANDEC (Switzerland) AGENDA (Tanzania), 2002.
- Assessing the Cause of Fire at Jengela Trading Co. Ltd. /Interstate Insurance Adjusters / June 2002
- Assessing the Cause of Fire at Hi-Bro's Enterprises /Interstate Insurance Adjusters / May 2002
- Assessing the Cause of Fire at Temeke Confectionery and Bakery /Interstate Insurance Adjusters / June 2002
- EIA for the proposed Cold Rolling Plant at Mikocheni Dar es Salaam/ M.M. Integrated Steel Mills Ltd./ October 2002
- EIA for the proposed Dodoma Abattoir in Dodoma Municipality/ Tanzania Livestock Marketing Project/ December 2002

2003
- Environmental Impacts Assessment of the Proposed Shinyanga Landfill / Oxfam Tanzania /April 2003
- EIA for the proposed Eco-tourism Project at Sinda Island/ Pamaka/February 2003
- EIA for the Proposed Bus Stop in Bagamoyo / Swedish Embassy/ May 2003
- EIA for the Proposed Diamond Mining Project/ El-Hilal Minerals Ltd. / April 2003
- Annex 1 Countries GHG Inventories – Desk Review/UNFCCC / September 2003
- EIA for the Proposed Textile Project, Temeke District, Dar es Salaam/ Nida Textile (T) Ltd./ September 2003
- EIA for the Proposed Export Processing Zone, Dar es Salaam/ Tanzania Airport authorities/ September 2003
- EIA for the Proposed Tank Farm for Bulk Oil Storage/ Gulf Streams Investment

Tanzania Ltd. December 2003

2004
- EIA for the proposed National Museum and House of Culture/Swedish Embassy/ November 2004
- EIA for the Proposed African Pride Textile Mills/African Pride Textile Mills Ltd./ June 2004
- Social Economic Studies for the Proposed Mtwara Gas to Power Project/ Artumas / September 2004
- Environmental Audit for an Oil Processing Factory/ Mkwano Industries Ltd. / On going
- Review of GHG Mitigation Methodology for the Aluminium Smelting/ UNFCCC/ August 2004

2005
- Public Consultation for the Proposed Mtwara Gas to Power Project / Artumas / January 2005
- Review of GHG emission reduction at ALUAR Alumino Argentino Project/ UNFCCC/ January 2005
- Preparation of National Environmental Management Act Cap 191191, Audit Regulations/ NEMC/ July 2005

2006
- Design of sewerage system for industrial area and Bombo Hospital, Design of stormwater drainage for part of the city of Tanga and Design of Wastewater treatment plants for Bombo hospital and industrial wastewater treatment plants. Preparation of bill of quantities and tender documents / Tanga Sustainable City Project / April 2006
- Trans-boundary Diagnostic Analysis for the Lake Victoria Basin / LVEMP / August 2006
- National/Regional Management Framework: Monitoring and Communication for the Lake Victoria Basin / LVEMP / September 2006.
- Applied Research Programme for the Lake Victoria Basin/ LVEMP/November 2006.
- EIA for the Proposed Bongoyo Ecological Luxury Camp / Msasani Slipway Ltd / June 2006

2007
- Environmental Impact Assessment of the Drilling Project Mandawa, Mandawa Psa, Kilwa District, Tanzania/ Dominion Petroleum (Tz) Ltd./ February 2007
- Environmental Impact Assessment Report For The Proposed Arusha – Musoma – Mwanza Optic Fibre Cable Project / TTCL/ September 2007
- Environmental Impact Statement Of The Proposed The Kabulo Coal-Fired Power Generation Project (Kyela & Ileje Districts, Mbeya Region)/ Tan Power / October 2007
- Environmental Impact Assessment *For* The Proposed Project For Construction/ Installation Of I-Burst Wireless Internet Communication Infrastructure In Dar Es Salaam / Africa Online / September 2007
- Environmental Impact Assessment of the Proposed Commercial and Leisure Development Project / GH Group (Pty) Ltd. / December 2007
- Environmental Impact for the Proposed of the Proposed Mtwara Energy Project Phase III Activities / 3D Seismic Survey, Well Drilling, Pipeline for SCADA and Way Leave/ December 2007

2008
- Environmental Impacts Assessment of the Proposed Tanga Cement Power Generating Plant/ Tanga Cement Company Ltd./ June 2008
- Environmental Impacts Assessment of the Proposed Gurumeti Tented camp / Rough Tracks/ On going
- Environmental Impact Assessment of the Propose Serengeti Eco-Lodge/Rough Tracks / On going
- Environmental Impacts Assessment of the Proposed Oil Exploration Drilling / Dominion / On going
- Environmental Impacts Assessment of the Proposed Cultured Marble manufacturing Project in Morogoro / ATMA / On going
- Environmental Impact Assessment Toolkit for Micro-Small-Medium Enterprises Operations under SIDO/ IFAD / May 2008

Education:

1. Leeds University / PhD / 1990.
2. Loughborough University / MPhil / 1986.
3. Dar Es Salaam University / BSc. (Eng. Hons.) / 1982.

Other specialized training

1. International Workshop on Training Approaches for Environmental Management in Industry, UNEP, WHO and ILO/ Mauritius/ 4-8th October 1993.
2. Greenhouse Gas Mitigation Assessment Workshop/ USA/ Berkeley / 19 - 28th April 1995.
3. International Workshop on Energy and Environment for Sustainable Development: Planning for Energy and Environment / Technology Development Group & International Institute for Aerospace Survey and Earth Sciences/ Enschede , The Netherlands/ 15 May - 17th June 1995.
4. UNEP Workshop on Cleaner and Safer Industrial Production foe Eastern and Southern African Countries /UNEP / Nairobi, Kenya/ 21 - 24th November 1995.
5. International Workshop on hazardous waste Management/ Basel Institute of Technology/ Basel, Switzerland/ 2 - 27th September 1996.
6. Environmental Management Seminar (African Countries)/JICA/Osaka, Japan/7th June -20th July 1997.
7. Implementing Environmental Management System/Christchurch, New Zealand/19 –20th April 1998.

Employment Record:

As Employee of the University of Dar es Salaam
Professor 2000 to date
Associate Professor / July 1996 to 2000.
Senior Lecturer / July 1992 to June 1996.
Lecturer / July 1989 to June 1992.
Assistant Lecturer / July 1986 to June 1989.
Tutorial Assistant / April 1982 to June 1986.

Administrative posts at the University of Dar es Salaam
Dean, Faculty of Mechanical and Chemical Engineering, January 2001 to date
Ag. Co-ordinator for the Centre of Environmental Studies, September 2000 to December 2000
Head of Chemical and Process Engineering Department, August 2000 to December 2000
NORAD Project Co-ordinator, August 2000 to date
Project Supervisor: UDSM-MHO Environmental Engineering Project, January 1997 to date.
Editor in Chief - UHANDISI Journal, July 1994 to September 1997.
Assistant to Project Co-ordinator, TAN 047 NORAD Project, Jan. 1993 to June 1997
Departmental Undergraduate Studies Co-ordinator, Oct. 1991 to June 1996.
Departmental Examination officer, Oct. 1991 to Sept. 1992.
Head, CPE Laboratory, October 1992 to June 1996.
Head, Faculty Environmental Engineering Unit, Feb. 1992 to date.
Founder Member JSB-Envidep. Currently Director of Finance, Administration and Planning.

Languages:

LANGUAGES:	**SPEAKING**	**WRITING**	**READING.**
English	Excellent	Excellent	Excellent
Kiswahili	Excellent	Excellent	Excellent
