HAKAHANA SERVICE STATION
WINDHOEK

ENVIRONMENTAL IMPACT ASSESSMENT ON FUEL STORAGE ALTERATIONS AND UPGRADE OF AN EXISTING RETAIL FACILITY

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April 2008

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LIST OF ABBREVATIONS

EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
HES	Health, Environment and Safety
I&APs	Interested and Affected Parties
LRP	Lead Replacement Petrol
PPPPs	Projects, Plans, Policies and Programmes
RoD	Record of Decision
SABS	South African Bureau of Standards
ULP	Unleaded Petrol
UST	Underground Storage Tank

GLOSSARY OF TERMS

Assessment - The process of collecting, organising, analysing, interpreting and communicating information relevant to decision making.

Alternatives - A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The "no-go" alternative constitutes the 'without project' option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Cumulative Impacts - in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Evaluation – means the process of ascertaining the relative importance or significance of information, the light of people's values, preference and judgements in order to make a decision.

Environment – As defined in the Environmental Policy and Environmental Management Bill of Namibia - "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, palaentological or social values".

Environmental Impact Assessment – process of assessment of the effects of a development on the environment.

Environmental Management Plan - A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.

Hazard - Anything that has the potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was present.

Interested and Affected Party (I&AP) - any person, group of persons or organisation interested in or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.

Proponent (Applicant) – means a person who intends or undertakes a project, policy, programme or plan.

Significant Impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment

Sustainable Development - "Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs and aspirations" – the definition of the World Commission on Environment and Development (1987). "Improving the quality of human life while living within the carrying capacity of supporting ecosystems" – the definition given in a publication called "Caring for the Earth: A Strategy for Sustainable Living" by the World Conservation Union (IUCN), the United Nations Environment Programme and the World Wide Fund for Nature (1991).

1. BACKGROUND AND INTRODUCTION

1.1. Background to the development

An Environmental Impact Assessment (EIA) has been commissioned by Chevron (Pty) Ltd for Hakahana Service Station, in Windhoek (Namibia). A total rebuild of the site will take place. This entails demolishing the existing building structure, concrete floors and the removal of all existing fuel infrastructure. A new building with associated infrastructure will be erected. New pump islands, underground storage tanks and associated reticulation pipelines, spill control facilities and a canopy area will be constructed.

The EIA is thus conducted in line with Chevron's redevelopment efforts to determine all environmental, safety, health and social impacts associated with the proposed redevelopment. The proposed redevelopment forms part of Chevron's commitment to world-class standards of operation in safety, reliability and the environment. The development is currently supplying fuel to the general public and is expected to continue to do so after the redevelopment.

The aims of the EIA process are:

- to establish and describe the baseline of existing environmental, health and social conditions in the proposed redevelopment area;
- to define in an integrated way the environmental, safety, health and social impacts of the fuel facility, by evaluating their significance and proposing mitigation/minimization/offset measures that may correspond/apply to each of the said impacts;
- to identify sustainable HES improvements and proposals for the implementation thereof;
- to demonstrate that the EIA complies with current and/or expected Namibian legislative requirements for environmental, health and social performance, the Parties' respective environmental, social and health standards. Furthermore, to prevent unacceptable environmental, health or social effects;
- to engage stakeholders, including the public (direct neighbours), regarding the project and its environmental, social and health aspects;
- to optimise the project to prevent technical and/or economic constraints;
- to achieve full compliance with legal requirements on EIA ;
- to specifically obtain through the EIA the environmental permits (including RoD's) which will be needed for the STORAGE TANKS under country environmental legislation;
- to identify actions for the Environmental Management Plans (EMP's) of the retail sites (including safety, Social and Health management) - where applicable for the life of the development - including management, monitoring and contingency plans.

1.2. Introduction

As part of the above stated development, Geo Pollution Technologies (Pty) Ltd was appointed as the independent consultant to undertake the EIA on the proposed upgrade of the site. The site is situated on plot 8565, Hans-Dietrich Genscher Street in Windhoek (22.52510°S; 17.06780°E). See Figure A1, (Appendix A). The retail facility will be supplied with fuel from road tanker trucks.

1.3. Legislative requirements

To protect the environment and achieve sustainable development, all projects, plans, programmes and policies (PPPPs) deemed to have adverse impacts on the environment require an EIA according the Namibian legislation. The following legislations govern the process of EIA in the country pertaining to the proposed development:

- *Environmental Assessment Policy*
  - ✓ States that all PPPPs that have detrimental effect on the environment must be accompanied by an EIA. It further provides a guideline list of all activities requiring an impact assessment. The proposed development is listed as a project requiring an impact assessment.
  - ✓ Gives a broad definition to the term "*environment*" - broadly interpreted to include biophysical, social, economic, cultural, historical and political components
  - ✓ Gives reference to the inclusion of alternatives in all projects, policies, programmes and plans
  - ✓ Requires assessment of cumulative impacts associated with proposed developments
  - ✓ Provides for public consultation
- *Environmental Management Act, 2007, (Act No. 7 of 2007)*
  - ✓ Gives a broad definition to the term "environment" - land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, palaentological or social values. NOTE: this definition of "environment" was used throughout this report.
  - ✓ Gives a list of projects requiring an EIA. The proposed development is also listed as a project requiring an EIA under this Act.
  - ✓ Gives minimum contents of the EIA report
- *The Water Act, (Act No 54 of 1956)*
  - ✓ The Water Act No. 54 of 1956 as amended, aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users.
  - ✓ The Act broadly controls the use and conservation of water for domestic, agricultural, urban and industrial purposes; to control, in certain respects, the use of sea water; to control certain activities on or in water in certain areas; and to control activities which may alter the natural occurrence of certain types of atmospheric precipitation.
- *Hazardous Substance Ordinance, (Act No. 14 of 1974)*
  - ✓ Environmental aspects are not really explicitly stated in this act, however the transport, safe use, importing, storage, handling and disposal of hazardous materials etc. are set out.
- *Petroleum Products and Energy Act, (Act No. 13 of 1990)* – Regulations
  - ✓ Makes provision for impact assessment for new proposed retail facilities and petroleum products known to have detrimental effects on the environment.

- *Municipal By-Laws (City of Windhoek)*
  - ✓ Needs to be confirmed with the City of Windhoek's planning department.

2. SCOPE

The scope of the EIA is to determine the potential environment impacts emanating from the construction (upgrading) and operation of the proposed fuel facility thereafter. Relevant environmental data have been compiled by making use of secondary data and reconnaissance site visits. Potential environmental impacts and associated social impacts will be identified and addressed in this report.

3. METHODOLOGY

The following methods were used to investigate the potential impacts on the social and natural environment due to the re-construction and operation of the fuel storage facility:

1. Baseline information about the site and its surroundings was obtained from existing secondary information as well as from a reconnaissance site visit.
2. As part of the scoping process to determine potential environmental impacts, Interested and Affected Parties (I&APs) were consulted and their views, comments and opinions are put forward in this report.

4. INSTALLATION AND RELATED ACTIVITIES

4.1. Existing UST and Pump specifications

The site has been in operation for over fifteen (15) years. The aboveground infrastrucure consists of a canopy partially covering the forecourt area, with ten (10) dispensing points and five (5) pump islands.

The underground infrastructure at the site consists of five (5) UST's (underground storage tanks), namely;

- 4.5m^3 Illuminating Paraffin (IP) UST.
- 9m^3 Diesel UST.
- 14m^3 Lead Replacement Petrol (93 Octane) UST.
- 23m^3 Lead Replacement Petrol (93 Octane) UST.
- 23m^3 Unleaded Petrol (95 Octane) UST.

All existing infrastructures (i.e. UST's, pumps, fuel pipelines and associated buildings) will be demolished and removed from site.

4.2. Proposed Upgrade Specifications

The proposed installation will consist of four (4) 30m^3 (30 000 litres) double walled underground perma- tanks, which will be constructed according to the latest Chevron standards.

- Tank 1 – LRP (93)
- Tank 2 – LRP (93)
- Tank 3 – ULP (95)
- Tank 4 – Diesel

The new design specifications reveal that five (5) new pump islands will be constructed, with associated four (4) multi product dispensers and one (1) diesel single hose. A new

canopy is also envisaged for the proposed upgrade. This facility will be constructed according to relevant Chevron and SABS standards (or better), with special emphasis on SABS 089:1999.

Construction activities will include:

1. Excavation for new tank pits and pipeline trenches.
2. Transport and installation of new storage tanks and relevant material.
3. Installation of new fuel pipelines.
4. Constructions of new dispensing pump islands and installation of the pumps.
5. Construction of spill control measures.
6. Construction of the associated buildings and canopy.
7. Installation of associated electrical, water and sewerage reticulation.

Operational activities on the site will include:

1. Filling of the tanks from road transport tankers.
2. Retailing of fuel to the public.

5. STAKEHOLDER CONSULTATION

Consultation with the public forms an integral component of an EIA investigation and enables I&APs *e.g.* neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with the proposed development and to identify additional issues which they feel should be addressed in the EIA. A list of interviewed stakeholders is presented in Table 1.

The occupants of the residential properties north of the site welcomed the proposed upgrade, however a concern regarding long distance busses trying to access the fuel facility using their properties as parking areas was raised. According to the residence, passengers on board these busses urinate on their property walls. Mr. A.G Piet, the Jan Jonker Afrikaner School principal has no concerns regarding the upgrade and welcomed the development.

Discussions with Mr. F Koujo from the City of Windhoek indicated no obvious concerns from the side of the Municipality, as the upgrade of the facility will minimise the risk of subsurface pollution.

Photo 1. Property to the north

Photo 2. Property to the east

Photo 3. Property to the south

Photo 4. Property to the west

Table 1. Interviewed stakeholders

Name	Organisation/Position	Purpose of visit/contact
Mr. H. Vilho	Hakahana Service Station	Site Representative
Ms. Maggy Shikongo	Ministry of Mines and Energy	EA procedure, Consultation
Dr. F.M Sikabongo	Ministry of Environment and Tourism, Directorate of Environmental Affairs	EA procedure
Mr. F. Koujo	City of Windhoek	Interested and Affected Party
Mr. A. G. Piet	Jan Jonker Afrikaner School	Interested and Affected Party
Mr. K. Kasaveli	Windhoek, Shandubala, Erf 7151	Interested and Affected Party

6. ENVIRONMENTAL CHARACTERISTICS

This Section lists the most important environmental characteristics of the study area and provides a statement on the potential environmental impacts on each. The SABS 089 standards for the Petroleum Industry were consulted for the baseline assessment (reported on in this section) and subsequent impact assessment (reported on in Section 7) to incorporate all required and pertinent issues in the investigation.

6.1. Locality and surrounding land use

The facility (22.52510°S; 17.06780°E) is situated on plot 8565, Hans-Dietrich Genscher Street (Katutura), in Windhoek. The site covers an approximate area of about 101m X 85m X 70m.

Directly north of the site are residential properties. East of the site is a football sports field (recreation). South of the site is an open erven. Jan Jonker Afrikaner School is situated to west of the site. Land use in the area is mainly residential / commercial. See Figure A1 (Appendix A). No other fuel facility exists within 1km from the site.

6.2. Climate

Table 2: Summary Climate Data

Average annual rainfall (mm/a)	300-350
Variation in annual rainfall (%)	30-40
Average annual evaporation (mm/a)	3000-3200
Water deficit (mm/a)	1701-1900
Average annual temperatures (°C)	19-20

6.3. Topography and Surface water

The area is located in the Windhoek graben valley, mainly sloping to the north. Mountain ranges form the eastern flank of the valley, with a gentle rise to the west and the south. The site is located within the catchment of the Swakop River, an ephemeral river, draining in a western direction. Surface drainage from the site takes place to the east and southeast.

6.4. Geology and Hydrogeology

The general geology in the area consists of mica schist, minor quartzite, graphitic schist, marble of the Namibian Age – Kuiseb Formation [Nk].

All of the underlying formations are classified as hard rock formations. Groundwater flow would be mostly along fractures, faults (secondary porosity) and other geological structures present within the formations.

Groundwater flow from the site can be expected in a northerly direction. Local flow patterns may vary due to groundwater abstraction. Water is utilized in the area, with 3 boreholes known of within a 2km radius. Depth to water table was found between 16 and 20mbs during the Phase 2 drilling programme conducted on site, in December 2008.

This area does fall within the Windhoek-Gobabis Subterranean Water Control Area. - Government Notice 189 of 6 February 1970. This means that Government controls groundwater usage in this area i.e. drilling of boreholes, cleaning or deepening of boreholes and rates of water abstraction.

Table 3 gives groundwater statistics of boreholes contained in the DWA database. Note that this database is outdated and more boreholes might be present.

Table 3: Groundwater statistics

Query Centre:	Hakahana Service Station; -22.5251°S; 17.0678°E											Query Radius: 2.0km
	NUMBER OF KNOWN BOREHOLES	LATITUDE	LONGITUDE	DEPTH (mbs)	DIAMETER	YIELD (m^3/h)	WATER LEVEL (mbs)	STRIKE (mbs)	TDS (ppm)	SULPHATE (ppm)	NITRATE (ppm)	FLUORIDE (ppm)
Data points	3			2	2	2	2	1	3	3	3	3
Minimum		-22.507102	17.048315	59	168	38	8	64	990	172	0	2
Average				78	184	42	9	64	1608	322	10	3
Maximum		-22.543098	17.087285	96	200	45	9	64	2567	510	24	4
Group A				0.00%		100.00%	100.00%		33.33%	33.33%	66.67%	0.00%
Limit				50		>10	10		1000	200	10	1.5
Group B				100.00%		0.00%	0.00%		33.33%	66.67%	0.00%	33.33%
Limit				100		>5	50		1500	600	20	2.0
Group C				0.00%		0.00%	0.00%		0.00%	0.00%	33.33%	0.00%
Limit				200		>0.5	100		2000	1200	40	3.0
Group D				0.00%		0.00%	0.00%		33.33%	0.00%	0.00%	66.67%
Limit				>200		<0.5	>100		>2000	>1200	>40	>3

[S1]

6.5. Fauna and Flora

The site is located within the Savanna biome, with Thornbush shrubland type vegetation. The vegetation structure type is classified as dense shrubland, with a highest diversity of higher plants.

The immidiate locality of the site is an urban set-up, with paving and tarred roads present all around. A few palm trees are located on site, on the northwestern corner of the property. The tables below indicate the fauna and flora found in the biome in which the site is situated.

Table 4. General Flora Data

Biome	Savanna
Vegetation type	Thornbush shrubland
Vegetation structure type	Dense shrubland
Diversity of higher plants	Highest (Diversity rank = 1 [1 to 7 representing highest to lowest diversity])
Number of plant species	More than 500
Percentage tree cover	26-50
Tree height (m)	2-5
Percentage shrub cover	26-50
Shrub height (m)	1-2
Percentage dwarf shrub cover	2-10
Dwarf shrub height (m)	< 0.5
Percentage grass cover	51-75
Grass height (m)	0.5-1
Dominant plant species 1	Acacia mellifera
Dominant plant species 2	Acacia reficiens

Table 5. General Fauna Data

Mammal Diversity	61 - 75 Species
Rodent Diversity	20 - 23 Species
Bird Diversity	> 230 Species
Reptile Diversity	71 - 80 Species
Snake Diversity	35 - 39 Species
Lizard Diversity	> 35 Species
Frog Diversity	8 - 11 Species
Termite Diversity	7 - 9 Genera
Scorpion Diversity	18 - 21 Species

7. ASSESSMENT OF IMPACTS

The purpose of this section is to identify and assess the most pertinent environmental impacts and provide possible mitigation measures that are expected from the new fuel retail facility, service and maintenance activities. The following are a summary of impacts identified following site reconnaissance visits and from comments received from I&APs:

- Traffic safety, especially during construction
- Safety and Security of public
- Unstable soil conditions
- Surface and ground water contamination
- Impacts on Air quality
- Impacts on Visual & Light intrusion
- Noise impacts
- Economic Impacts
- Cumulative Impacts
- Health impacts
- Heritage Impacts
- Nuisance Impacts – inconvenience created by the redevelopment, especially for the current uses of the fuel retail facility.

These identified impacts will be assessed and evaluated in different phases of the development. Mitigation measures are also proposed for different impacts.

7.1. Anticipated effects of the proposed development

Three different phases are associated with the proposed upgrade. Firstly the decommissioning of the existing facility (i.e. demolition of structures and removal of underground storage tanks) has to take place, before reconstruction and installation can commence followed by the operations of the facility. This section will look at the different stages of the development as well as the potential impacts, which may arise during the operational phase of the proposed project (*i.e.* long-term impacts) as well as potential decommissioning and construction related impacts (*i.e.* short-term). Possible mitigation measures are also put forward for the potential impacts identified. The following assessment methodology will be used to examine each impacts identified:

Table 6. Criteria for Impact Evaluation (DEAT 2006)

Assessment Evaluation Criteria	**Significance Rating**
Extent of impact being either	Immediate (the site and immediate surrounds) - I Local (Windhoek) - L Regional (Khomas Region) - R National (Country wide) - N International – I
Duration of impact being either	Short term (0-5 years) – ST Medium term (5-15 years) - MT Long term (lifetime of the development) – LT
Intensity of impact being either	***Low*** (where natural, cultural and social functions and processes are not affected) L ***Medium*** (where the affected environment is altered but natural, cultural and social functions and processes can continue) – M ***High*** (where the affected environment is altered to the extent that natural, cultural and social functions and processes will temporarily or permanently cease) – H

Probability of impact being either	***Low probability*** (possibility of impact occurring is low) – LP ***Probable*** (where there is a distinct possibility that it will occur) – P ***Highly probable*** (where the impact is most likely to occur) – HP ***Definite*** (where the impact will occur) – D
Significance of impact being either	***Low*** (where natural, cultural and social and economic functions and processes are not affected). In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming – L ***Medium*** (where the affected environment is altered but natural, cultural, social and economic functions and processes can continue). An impact exists but is not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort. – M ***High*** (where the affected environment is altered to the extent that natural, cultural, social and economic functions and processes will temporarily or permanently cease). In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time consuming or a combination of these. In the case of beneficial impacts, the impact is of a Substantial order within the bounds of impacts that could occur. – H

7.1.1. Construction phase

Potential effects on the environment and their mitigation measures during construction are:

- ***Noise impact***, although noise pollution exists at the site due to vehicles frequenting the site and those passing by. Construction should only be limited to normal working hours (08h00 to 17h00). Weekends should rather be avoided to give the public and surrounding residents some peace and tranquillity.
- ***Dust Pollution*** – construction activities are expected to generate dust. To minimise dust at the construction site, the area must be sprinkled with water to suppress dust. Care should be taken not to over sprinkle the area to such extend that standing water develops. Pools of water around the construction site must be avoided at all times. Construction must also be schedule for dry months, to avoid flooding.
- ***Vapour emissions*** – these are expected to be site specific and will most probably pose a nuisance and heath threat to those living nearby and those frequenting the site. Odour is expected to be site specific. Mitigation

measures proposed in the operational phase must be implemented to minimise the vapour emissions from the site.

- ***Generation of waste***, in the form contaminated soil and building rubble. Heavy vehicles will be required to transport the contaminated soil away from the site to an approved site. Care should be taken to treat contaminated soil before it is disposed at an approved municipal dump. The developer is further advised to source clean uncontaminated soil to replace soil that was taken out.
- ***Mud Pollution***, especially if the construction takes place during the rainy season. This can however be minimised by scheduling the construction phase during dry months.
- ***Safety and Security*** – the construction activities could lead to injuries to staff and the public. It is known that during construction, heavy instruments are used on site, which increases the probability of injuries. The responsibility lies with the contractor to ensure that his staff members are briefed about the potential risks of injuries on the site. The contractor is further advised that adequate emergency facilities, including First Aid Kit(s) must be available on site. Proper barricading of the construction site is important in ensuring safety to the public. Should there be a construction/worker camp, it should be located in such a way that it does not pose an aesthetic nuisance to the public. Equipment being locked away on site (camp) must be placed in a way that does not encourage criminal activities or attract vagrants.
- ***Impacts on Traffic***. The site is located at a busy intersection of Hans-Dietrich Genscher Street and Wilibald Kapuenene Street in Katutura. Construction related activities are expected to impact on the movement of traffic along the two above-mentioned streets. Diversion of traffic or closure of the street may be required, especially if heavy construction vehicles are to frequent the site. The responsible contractor must liase with the relevant traffic department to ensure that traffic flow along the affected route is accordingly channelled or diverted, when required.
- ***Groundwater Contamination***. Leakage might occur during removal of the existing tanks, therefore care must be taken to avoid contamination of soil and groundwater. Tanks and pipelines must be completely emptied / drained before they are removed to avoid any spillage.

Table 7. Impact Evaluation – Construction Phase

Identified Impact	Extent	Duration	Intensity	Probability	Significance
Noise	Site	Short term	Medium	Probable	Low
Vapour emissions	Site	Short term	Medium	Probable	Medium
Waste	Site	Short tern	Medium	Highly Probable	Medium
Mud Pollution	Site	Short term	Low	Low Probability	Low
Safety and Security	Site	Short term	Low	Probable	Medium
Traffic	Local	Short	High	Definite	High

		term			
Nuisance	Local	Short term	Medium	Low Probability	Low
Groundwater contamination	Local	Long term	Medium	Probable	Medium
Dust Pollution	Local	Short term	Medium	Probable	Medium

7.1.2. Impact Summary and Mitigation measures: Construction Phase

As depicted above in Table 7, impacts are expected to be low to medium (except traffic impacts), short lived and site to local specific. An Environmental Management Plan (EMP) will ensure that the impacts of the construction work is minimised and includes measures to reduce the identified impacts during construction while ensuring that vehicular and pedestrian traffic are suitably protected to avoid accidents and injuries. It is further advised that traffic signs and barricades be installed along the excavated route to ensure public safety.

All surfaces should be fully reinstated and stabilized after the installations of the tanks have taken place. It should also be noted that paving activity associated with the construction, may increase surface water flow during rainy seasons and may cause localised flooding around the site. To avoid the risk of flooding, storm water management plans must be in place. Landscaping and re-vegetation of cleared areas (if any) will reduce the velocity of storm water run-off and increase the infiltration of water. The implementation of a storm water management plan will also reduce the negative effects of increased runoff.

The appointed contractor should be made aware of the content and environmental requirements of this report so as to plan the construction phase accordingly. No wastewater is expected during the construction.

7.1.3. Operational phase

During operation, fuel products will be offloaded from road tanker trucks into the underground storage tanks. In terms of air quality hydrocarbon vapour will be released during delivery as liquid displaces the gaseous mixture in the tanks. These vapours are released through the vent pipes to be installed on the tanks. Vent pipes must be placed in such a manner as not to cause an impact on the workers on site and to neighbouring properties as per SABS standards. There are however specific policies and guidelines that address environmental issues associated with the installation, construction, use, and decommissioning of tanks and pumps for filling stations (liquid fuel facilities). They are as follows;

- SABS 0131:1999: The petroleum industry. Part 3: The installation of underground storage tanks, pumps/dispensers and pipework at service stations and consumer installations.

Specific impacts identified, associated with the operational phase are:

- **Spillage during delivery**
- **Leaks from pipework**
- **Leaks from dispenser pumps**
- **Overfilling of UST**
- **Overfilling of cars**

- **Compaction of soils**
- **Groundwater contamination**
- **Increase air and noise pollution** as more vehicles are expected to frequent the site.
- **Health Impacts** - According to a study done by Industrial Toxicology Research Centre (Oxford University), increase exposure of petrol attendants to petrol fumes are known to cause health impacts such as headaches, redness in eyes, lacrimation (the production, secretion, and shedding of tears) and signs like coated and/or furred tongue, throat and/or conjuctival congestion and carious teeth (Mohan Das *et al*, 1991). Environmental measurements done also revealed higher concentrations of benzene, sulphur dioxide and photoionizable dust in the air at petrol stations than normal air. Prolonged exposure to these fumes is known to have health consequences (Mohan Das *et al*, 1991), such as those mentioned above.
- **Economic Impacts** – creation of new employment opportunities. This is deemed to be a positive impact. Clean and revamped service stations are known to attract more customers compared to dilapidated stations. Thus the proposed redevelopment is expected to increase usage of the Service Station.
- **Impacts on Tourism** – no major impacts on tourism are expected.

Table 8. Impact Evaluation – Operational Phase

Identified Impact	Extent	Duration	Intensity	Probability	Significance
Spillage	Site	Short term	Medium	Probable	Medium
Overfilling of cars	Site	Short term	Medium	Highly Probable	Medium
Overfilling of UST's	Site	Short term	Medium	Highly Probable	Medium
Compaction of soil	Site	Long term	Low	Probable	Low
Groundwater contamination	Local	Long term	Medium	Probable	Medium
Noise Pollution	Site	Long term	Low	Probable	Low
Air Pollution	Site	Long term	Low	Probable	Low
Leaks from pipework	Site	Long term	Medium	Probable	Medium
Leaks from dispenser pump	Site	Long term	Medium	Highly Probable	Medium

7.1.4. Mitigation measures: Operational Phase

Spillages might occur during delivery to the tanks. Risk of impact from this can be lowered through proper training of staff and the installation of suitable containment structures. Overfilling of the tanks may also take place and proper monitoring of the product levels in the tanks must take place to eliminate overfilling. Regular tank and pipeline tightness inspections are advised to eliminate the risk of impact on the environment. Further impact might emanate from the overfilling of vehicles on site. This impact can be reduced by the installation of spill containment areas around the pumps and through proper training of the operators.

To reduce the increase expose of petrol attendants to petrol fumes and reduce health threats, the following equipment should be considered:

- vapour recovery systems at the tanks;
- vapour recovery system at the fuel point; and
- carbon filters on the vents.

Experience and past studies on petrol stations has shown that dispenser pump leaks are the most common form of containment failure at fuel dispensing facilities. As these pumps can be set over open soil, any leak may go straight to the ground. It is therefore recommended that all dispensers should be fitted with a proof drip tray or membrane arrangement beneath the dispenser to ensure that product from the small internal leaks flow onto the forecourt surface where it can easily be noticed and diverted to a site drainage system (Institutive of Petroleum, 2002)

Another source of soil and ground water pollution are leaking pipes due to rupture or corrosion. If steel pipes are to be used, they need to be protected against corrosion. The installation contractor is strongly advice to opt for non-corrosive pipes. The same should be applied to USTs.

The buildings and tank installation could result in compaction of soils, which can change the topsoil structure. The increased paved areas could lead to increased surface run-off, which could create erosion gullies if not monitored (only if area was not previously paved). These erosion gullies have the potential to affect the soils stability. This however is not possible for the proposed site as all areas surrounding the proposed facility are already paved.

7.1.5. Decommissioning phase

The impacts associated with this phase will be similar to that of the construction phase. These impacts will include noise, possible fires and explosions. Guidelines for tank removal must be followed to reduce the risk of fuel spillage and groundwater contamination. Rubble and waste will be created, as buildings are dismantled. These should be contained and disposed of at an approved waste facility and not dumped in surrounding areas. Once all structures have been removed from the site, re-vegetation (where vegetation was removed – care must be taken not to introduce alien vegetation into the area) should be done where possible to avoid soil erosion

Potential impacts during decommissioning are evaluated summarised in Table 9.

Table 9. Impact Evaluation – Decommissioning Phase

Nature of impact	Extent of Impact	Duration of impact	Intensity of Impact	Probability	Significance
Noise Site	Site	Short term	Low	Probable	Low
Visual Site	Local	Short term	Medium	Probable	Low
Fires/Explosions	Site	Short term	Medium	Probable	Medium
Soil and Groundwater contamination	Site	Short term	Medium	Probable	Medium
Traffic	Local	Short term	Medium	Highly Probable	Medium
Health	Site	Short term	Low	Probable	Low
Waste	Site	Short term	Medium	Highly Probable	Low
Hygiene	Site	Short term	Medium	Probable	Low

7.1.6. Cumulative Impacts

These are impacts on the environment, which results from the incremental impact of the action (proposed upgrade) when added to other past, present, and reasonably foreseeable future actions regardless of what person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In relation to an activity, it means the impact of an activity that in itself may not be significant, may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area (Endangered Wildlife Trade and Regenesis, 2006).

Possible cumulative impacts associated with the proposed development include expansion of other similar fuel facilities in the future. Introduction of these facilities means more risks to the environment and character change to the natural environment. Other developments not related to the proposed development may occur in surrounding open land parcels.

Other impacts include increase in traffic frequenting the site, therefore increase in emmisions from these vehicles, decreasing the air quality around the proposed establishment.

7.1.7. Heritage Impacts

There are no known heritage areas or artefacts in the area.

7.2. Ecological issues

Due to the urban environment in which the proposed site is located, there is no known conservation worthy vegetation on site. Limited impact on the flora can be expected, as minimal vegetation will be removed for the construction of the facility.

7.3. Potential surface and groundwater pollution

Due to the design of the facility, it is unlikely that a release of fuel would cause an impact on any surface water or groundwater for that matter. Proper containment

mechanisms installed should contain any release that might take place from spillages during operation of the facility.

Prevention of potential leakages and or spillages that could lead to surface water and groundwater pollution

1. All fuelling should be conducted on surfaces provided for this purpose.
2. Spillage control procedures must be in place according to SABS 089-1:1999 and SABS 089-3:1999 standards or better, including impounding around the loading areas by bunding with appropriate slopes of 1:100.
3. Observation wells must be installed in the tank pits as per SABS 089-3:1999 standards, for monitoring of tank leakages.
4. The procedures followed to prevent environmental damage during service and maintenance, and compliance with these procedures, including the correct use of sumps and regular reporting of spillages must be audited and corrections made where necessary.
5. The condition of the fuel reticulation system, both existing and new, will have to be checked regularly and repaired if necessary to prevent leakages.
6. Proper training of operators must be conducted on a regular basis.
7. Any spillage of more than 200litres must be reported to the relevant authorities and remediation instituted.[S2]

7.4. Provision of Municipal Services

7.4.1. Electricity Supply

Hakahana Service Station is currently sourcing its electricity from the City of Windhoek. The establishment is expected to continue sourcing its electricity from the town council.

7.4.2. Potable water supply

The City of Windhoek provides water supply to Hakahana Service Station at present and will continue to do so for the proposed development.

7.4.3. Sewage

The site is currently connected to the main sewage network of the City of Windhoek. The proposed upgrade is expected to pose minimal additional stress to the existing system as no major ablution or toilet facilities are planned.

7.4.4. Waste Removal

Waste removal at the site is currently the responsibility of the City of Windhoek. A few local dumping sites are currently being used by the municipality to dispose off different waste types accordingly.

7.5. Safety Issues

7.5.1. Fire hazard

Hydrocarbons are volatile under certain conditions and their vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.

It must be assured that sufficient water is available for fire fighting purposes. The developer should ensure that with future expansion of additional facilities, this

volume of water remains adequate for fire protection and are according to the SABS 089-1:1999 specifications.

In addition to this, all personnel have to be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation, and hydrocarbon-soaked soil from the vicinity of the installation. Regular inspections should be carried out to check for these materials at the site.

All fire precautions and fire control at the new site must be in accordance with SABS 089-1:1999, or better.

7.5.2. Other safety and protection issues

The handling of the fuel during operation also deserves consideration. Regulations related to receiving bulk cargoes from tank vehicles and dispensing thereof are of importance. These include all regulations in the International Safety Guide for Oil Tankers and Terminals, those of the fire authorities and the Health and Safety Regulations.

The operations of a fuel tank facility can cause serious health and safety risks to workers on site. For this reason adequate measures must be brought in place to ensure safety and compliance with Health and Safety Regulations, including:

1. Proper training of operators
2. First aid treatment
3. Medical assistance
4. Emergency treatment
5. Prevention of inhalation of fumes
6. Protective clothing, footwear, gloves and belts; safety goggles and shields.

To prevent contact with fuel, correct handling of materials and packages should be in place and monitoring should be carried out, including accident reports and material safety data sheets.

8. ENVIRONMENTAL MANAGEMENT PLAN

The purpose of this section is to provide management options to ensure impacts of the development are minimised. The Environmental Management Plan (EMP) is to take pro-active route by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The EMP acts as a stand-alone document, which can be used on the site during the various phases (planning, construction and operational) of the development. All contractors and sub-contractors taking part in the construction of the fuel retail facility should be made aware of the contents of the EMP, so as to plan their activities accordingly in an environmentally sound manner.

The proponent is encouraged to develop an EMP (if not already existing) to complement the findings of the EIA and ensure that construction related impacts are kept to its minimum.

[S3]See Appendix B, Table B1 for potential threats, their impacts and management.

9. CONCLUSIONS

In general, the fuel retail facility would pose limited environmental risks. The facility would serve as development for the area and create much-needed jobs.

The site is generally suitable for the fuel storage and retail facility. All environmental risks can be minimised and managed through implementing preventative measures and sound

management systems. It is recommended that environmental performance be monitored regularly to ensure compliance and that corrective measures be taken if necessary.

Fire prevention should be adequate, as specified by the SABS 089 standards.

Health and safety regulations should be adhered to in accordance with the Regulations pertaining to Health and Safety.

The Environmental Management Plan should be used as an on-site reference document during all phases (Planning, Construction and Operation) of this development, and auditing should take place in order to determine compliance with the EMP. Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken. The proponent is also adviced to ensure that contractors and sub-contractors be made aware of the contents and environmental requirements of this report.

With future expansion of the fuel storage facilities, compliance with environmental, health and safety issues must again be checked and improved where necessary.

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B.Sc. (Hons.) Hydrogeology
April 2008

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Appendix A

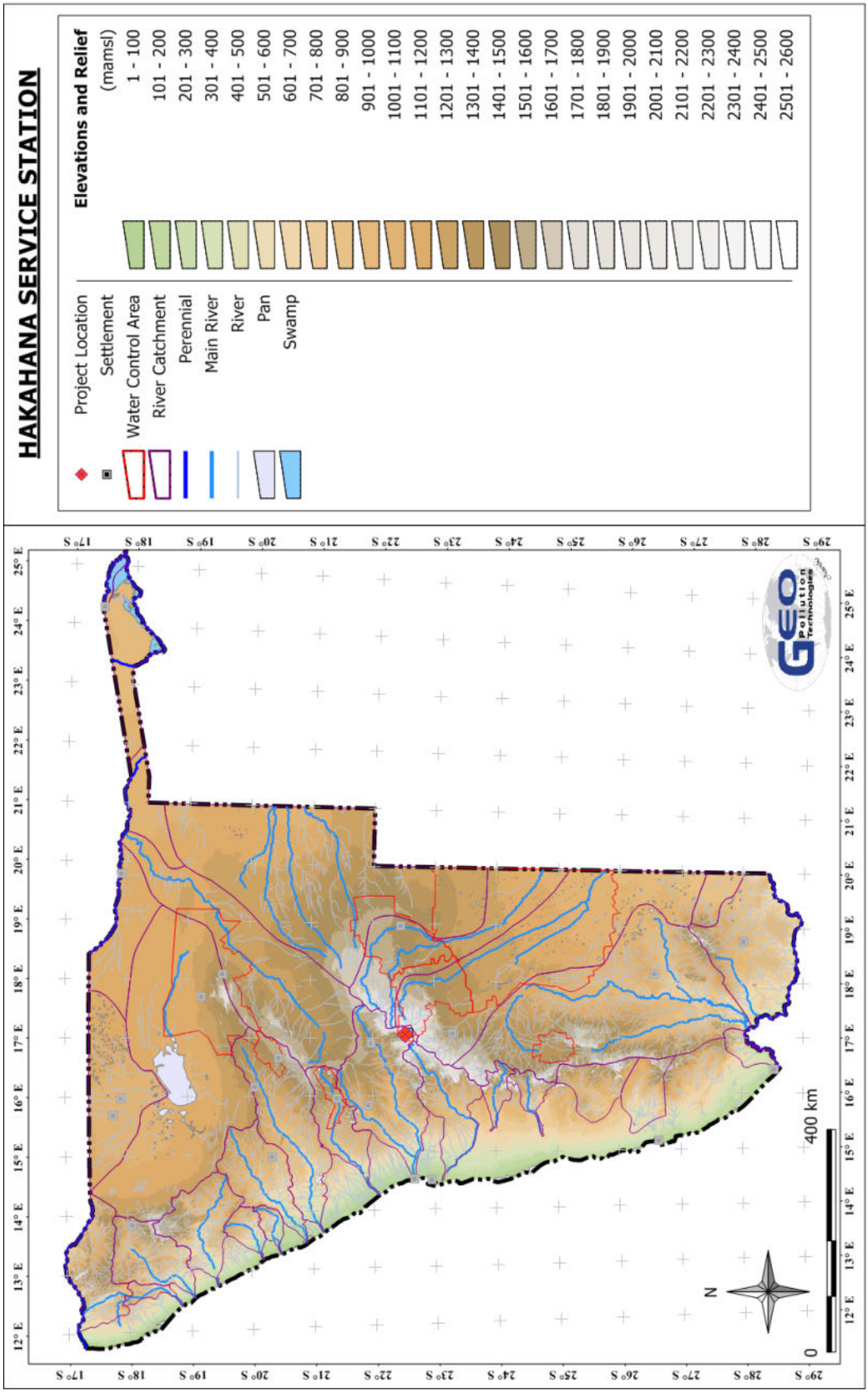

Figure A1. Location Map

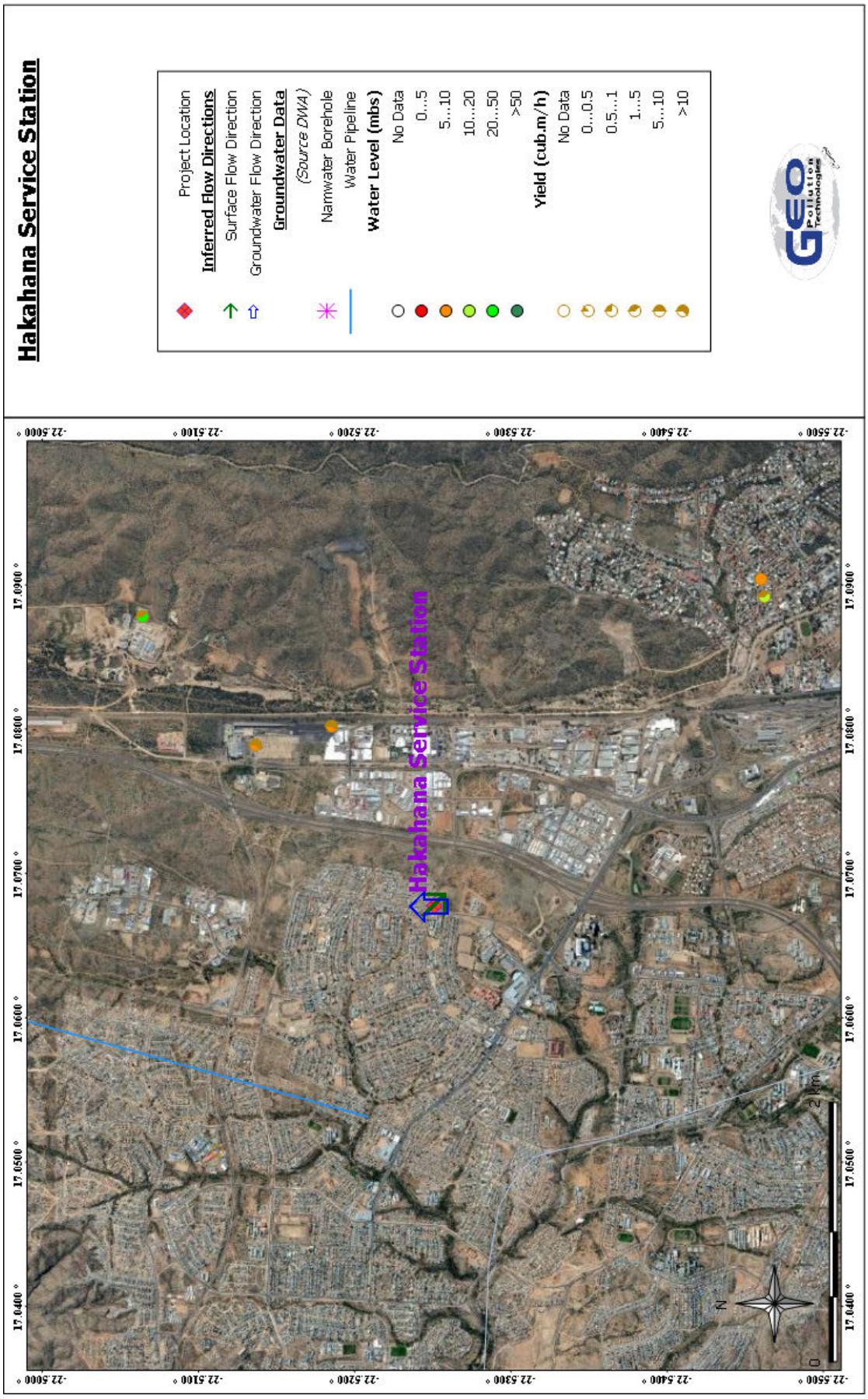

Figure A1. Location map.

Appendix B

Table B1. Potential Threats, Impacts and their Management

Threats	Consequences	Controls (for Threats)	Recover	Areas for Improvement
Breakage of off loading pipe	Spill	Plant inspection and maintenance.	Spill recovery plan.	Regular plant inspections and maintenance.
Falling off the tanker truck (Operator) or tank structure.	Injury	Operational procedure. Rails on top of tanker truck. Protective clothing (Safety boots and Hard hat)	Medical emergency plan. Local hospital. First aid	Drawn up procedures for safe off loading. Ensure trucks fitted with rails and raised it before off loading. Ensure protective clothing is worn.
Overfilling of tank	Spill	Filling procedures. Physical inspection of tank. Spill containment structures.	Spill recovery plan	
Failure to stop pumps to tank.	Spill. Damage to property.	Mechanical and electrical inspections. Emergency stops. Spill containment structures.	Spill recovery plan	Need for regular electrical inspections.
Valve malfunction	Spill	Spill containment structures.	Spill recovery plan	Regular plant inspections and maintenance.
Gasket or valves plus pump seals leaks	Spill with possibility of fire	Spill containment around valve. Preventative maintenance.	Spill recovery plan	Preventative maintenance.
Driving off with off loading pipe and earth cable connected.	Spill with possibility of a fire.	Operational procedure and training. Spill containment structures.	Spill recovery plan. Fire fighting plan.	Enforce Operational procedure and Training.
Pipe coupling/nozzle jumping off of tank nozzle.	Possible spill/fire.	Spill containment structures. Regular equipment inspection.	Spill recovery plan. Fire fighting plan.	Ensure nozzle compatibility
Not following procedures.	Spill. Injury.	Written instructions on delivery. Spill containment structures.	Spill recovery plan. Medical emergency plan.	Ensure procedures are followed. Re-enforce training.
Overfilling of vehicle tank results in fire	Fire	Loading procedures. Fire extinguishers. Trained people. Spill containment structures.	Emergency plan	Training for overloading and fire fighting. Ensure that procedures are followed.
Driving off with dispensing pipe.	Spill with possibility of a fire.	Operational procedure and training. Spill containment structures. Cutt-off valve.	Spill recovery plan. Fire fighting plan.	Enforce Operational procedure and Training.
Cell phones and open flames	Fire	Operational procedure and training.	Fire fighting plan.	Enforce Operational procedure and Training. Erect symbolic signs.
Spilled product from leaking valves and nozzles.	Slip hazard, personal injury. Fire	House keeping. Reporting of leaks/spills.	Medical emergency plan. Fire fighting plan.	Training staff. Maintenance.
Housekeeping.	Injury.	Written procedures.	Medical emergency plan. Terminal inspections.	Need for regular inspections. Operational procedure and training.
Contractors and staff not wearing protective clothing.	Injury.	Work permits. Safety procedures.	Medical emergency plan.	Adherence to work permit regulations. Supervision.
Unauthorized entry	Theft of equipment and or product and fire hazard.	Security procedures	Security procedures	Ensure proper security measures are in place.
Leaking tanks	Groundwater pollution	Dip readings, product reconsiliation, tank tightness testing. Spill containment structures.	Spill recovery plan	Regular plant inspections and maintenance.
Leaking pipelines	Groundwater pollution	Dip readings, product reconsiliation, line tightness testing. Spill containment structures.	Spill recovery plan	Regular plant inspections and maintenance.