Appendix A: Facility Illustrations and Design Drawings

Refer to Appendix C of the dBAR (These are not duplicated in the dEMPr but will be provided for the Final EMPr)

Appendix B: EMPr Adoption and Declaration of Understanding

Declaration of Understanding of the EMPr

The following declaration of understanding of the EMPr will be required to be signed by the Client, Engineers, and Contractors.

DECLARATION OF UNDERSTANDING
OF THE CANELANDS EXTENSION
ENVIRONMENTAL MANAGEMENT PROGRAMME

I,_____

_____acting as Client / Engineer / Contractor / ECO representing

_____

_____

declare that I have read and understood the contents of the Environmental Specifications (which include the Environmental Management Programme, the Record of Decision and the Amended Environmental Authorisation, the Project Specifications and this guideline document) for:

Contract

_____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

Appendix C: Freshwater Habitat Impact Assessments

Refer to Appendix D3 of the dBAR (These are not duplicated in the dEMPr but will be provided for the Final EMPr)

Appendix D: Stormwater Management Plan

Refer to Appendix D8 of the dBAR (This is not duplicated in the dEMPr but will be provided for the Final EMPr)

Appendix E: Construction Method Statement
(To be provided in the Final EMPr)

Appendix F: Spill Contingency Plan

SPILL CONTINGENCY PLAN

Intent

A spill contingency plan is required for all undertakings involving the handling and storage of petroleum products or hazardous materials. Spill preventative measures are the best means of avoiding accidental release of fuel which can adversely affect the environment. This plan is intended to prevent spills and, in the event of a spill, to minimize the impact of the spill on the environment. The purpose of this Spill Contingency Plan is to:

- Facilitate the prompt, efficient and safe clean-up of materials spilled during the construction and operational phases during the development; and
- Identify the reporting procedures in the event of a spill.

This spill contingency plan is applicable to all site staff, contractors and service providers, employees and visitors to the site.

Material Safety Data Sheets

A register with details of all hazardous materials must be included in the Health and Safety File. The supplier of these hazardous materials must provide Material Safety Data Sheets (MSDS) for all products which must be displayed where hazardous materials are stored. The MSDS should include the following information:

- Product and Company Identification;
- Composition/Information on ingredients;
- Hazards Identification;
- First-Aid Measures;
- Fire-fighting measures;
- Handling and storage;
- Exposure control/personal protection;
- Physical and chemical properties;
- Stability and reactivity;
- Toxicological information;
- Ecological information;
- Disposal considerations;
- Transport information;
- Regulatory information; and
- Any other applicable information.

This should be provided free of charge from the supplier. Should a MSDS not be provided, the supplier should issue sufficient information to enable the Contractor to take the necessary measures as regards to health, safety and environmental.

Handling and Storage

All activities must be appropriately carried out as per the Hazardous Chemical Substances Regulations 1995, Section 14:

Labelling, packaging, transportation and storage

"An employer shall, in order to avoid the spread of contamination of an HCS1, take steps, as far as is reasonably practicable, to ensure:

a) *That the HCS in storage or distributed are property identified, classified and handled in accordance with SABS 072 and SABS 0228;*
b) *that a container or a vehicle in which an HCS is transported is clearly identified, classified and packed in accordance with SABS 0228 and SABS 0229; and*
c) *That any container into which an HCS is decanted is clearly labelled with regard to the contents thereof."*

Hazardous Materials

Hazardous materials should be managed as follows:

- Proper designated areas and storage facilities must be provided for all hazardous materials to prevent spillage into the environment;
- All hazardous materials storage facilities must be located on an impermeable surface and must be enclosed by a sealed bund wall. The bund wall must be capable of containing 110% of the maximum volumes stored to ensure that soil or watercourses are not polluted in the event of a spill in the storage areas;
- Rainwater contained within the bund wall is to be regarded as potentially contaminated and must not be released into the environment, unless it is established by chemical analysis (e.g. COD) that the water is not contaminated;
- Mixing of volumes of bitumen and asphalt cement must take place in a controlled environment on a designated impermeable surface equipped with an SOG trap. The trap must not overflow and the waste captured must be disposed of at a registered landfill site or recycled;
- The Depot Manager must ensure the all Safety, Health and Environmental risks of spills are communicated to all employees. All employees should also receive task specific training for handling of any hazardous material. Casual and contractors labourers' are to be familiarized with all the relevant precautions when they are employed (Occupation Health and Safety Act 85 of 1993, Section 13);
- The Depot Manager should ensure that a site-appropriate spill kit and relevant personal protective equipment (PPE) is readily available in the event of a spill;
- The transfer of fuel must be stopped prior to overflowing, leaving room for expansion;
- All machinery must be maintained in good working order as to prevent soil and groundwater pollution from leaks and spills;
- All hazardous waste must be stored in designated containers and be disposed of at a registered landfill site;
- Vehicles transporting dangerous or hazardous chemicals may only be washed in a designated washing bay, equipped with an SOG trap;
- Smoking must be prohibited near the use of any hazardous material and flammable substances;
- Fire Extinguishers must be readily available where any hazardous materials are being stored or used;

- The area where a spill has occurred must be rehabilitated after the spill has been cleaned up;
- Drip trays should be used under generators and cement/bitumen mixers to shield the soil or vegetation below; and
- Where possible, oil should be recycled.

Most spills are caused by operator error, poor operation practices and inadequate maintenance. Common operator errors are overfilling, valves left open, poor transfer procedures, lack of product monitoring, and poor maintenance practices. Operational errors can be greatly reduced through:

- Task specific training:
  - A list of emergency contacts and numbers for important on-site staff and their roles, chemical spill response agencies, waste companies, and necessary authorities must be displayed and communicated to all employees. A secondary staff member must be appointed to co-ordinate responses to spills and emergencies in the absence of the Depot Manager;
  - Location of spill kits should be communicated to operating personnel as well as other employees;
  - Spill response training will need to be provided for the person(s) that are appointed to attend to spills;
  - Task specific training must be provided for those employees monitoring and handling any hazardous material. Proof of this training should be kept in the Health and Safety File;
  - Safety training at each depot shall include operational procedures, emergency procedures, safe working procedures, information on specific hazards, first aid and fire-fighting, and proper use of PPE;
  - Unauthorized persons shall not be permitted access to storage areas;
  - Instructions and phone numbers shall be posted publicly regarding the report of a spill, particularly in residential areas; and
  - Routine sampling schedules (including groundwater monitoring where necessary) must be setup and implemented. A competent person must be appointed to undertake these tasks.
- Awareness of the critical nature of spill prevention:
  - Employees must be educated on the effects of the hazardous substances that are used to the local environment through discharge to stormwater systems, watercourses and beaches;
  - Employees must be educated on the nature of the product with regard to spills – Some of this information should be included in the Material Safety Data Sheet (MSDS); and
  - Employees must be educated on the toxicity of stored fuels and oils to humans, plants and animals. Petroleum contains a mixture of compounds that are hazardous to organism health. (eg. Benzene which are cancer causing agents, Hydrocarbons which are linked to problems ranging from headaches to respiratory diseases.)
- Proper and continuous supervision of procedures:

- Proper procedures must be in place for handling and storage of the hazardous materials. E.g. Portable equipment (e.g. generators and pumps) should be placed on impervious surfaces, alternatively adequate drip trays need to be provided; and when unreeling a fuel transfer hose, the nozzle must be in an upright position and be kept clear of the ground when returned to the storage position;
- Workers must know and follow all procedures;
- All employees must attend the procedural training as procedures may change; and
- All procedures and records must be checked to verify compliance and record all findings.

ENVIRONMENTAL EMERGENCY RESPONSE PLAN

Intent

The environmental emergency procedures for all sites must ensure appropriate responses to unexpected / accidental actions / incidents that could cause environmental impacts. Such incidents may include:

- Accidental discharges to water (i.e. into the watercourse / stormwater systems) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, diesel and bituminous products);
- Accidental toxic emissions into the air; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

Response Procedure

In the event of a spill, the following procedure should be followed:

- Isolate and demarcate the area to protect all employees or visitors to the site;
- Immediately contain the spill to the spill area – i.e. ensure that spill does not run/flow away: the most common method is to place either absorbent or non-absorbent dikes around the perimeter of the spill;
- Identify nature of spill, for example paint, bitumen or diesel;
- Identify the source of the spill and stop the leak if possible, and safe to do so;
- Remove any sources of ignition;
- Assess the level of the spill;
- Report spill to ECO and KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA);
- Locate spill kit where applicable or wait for the hazmat service provider/fuel company to arrive to assist;
- Consult the Material Safety Data Sheets (MSDSs): MSDS are used to determine the necessary PPE required for a response to spill situations (for example protective suits, boots, gloves and/or respiratory protection);
- Identify method of cleanup and potential hazards;
- Protect stormwater drains or sewers, or any other point of access to the environment;
- Proceed with recovery of spilled fuel and clean up;
- Arrange for the appropriate disposal of the spilled material;
- All hazardous waste must be contained in separated designated containers and disposed of at registered landfill sites;
- In the event of small spills, arrangements for remediation must be made immediately;

- Spills must not be washed off onto the street, into watercourses or stormwater systems. No spills should be hosed into the natural environment;
- Records of the spill must be maintained in an Incidents register with:
  - Nature of incident;
  - Cause of incident;
  - Clean up measures; and
  - Mitigation measures taken.
- Where relevant, record in non-compliance register;
- The Contractor must retain Safe Disposal Certificates for any materials associated with chemicals/chemical spills disposed to landfill, to submit to EDTEA
- Adjustments should be made, if necessary, to the operational and emergency procedures and the Environmental Management System to prevent future occurrences; and
- In the event of a significant spill, the Contractor is to raise an incident report and report to relevant authorities i.e. EDTEA, and Department of Water and Sanitation (DWS) should it be required.

Spill Response Supplies

An emergency spill kit (e.g. Drizit kit) and designated hazardous waste bin must be available and visible at each site. The following supplies should be maintained and records of inspections should be kept at all times:

- Spill kits;
- Sorbents, including hydrocarbon absorbent;
- Absorption pads and booms;
- Personal protective equipment (PPE);
- Caution tape and cones; and
- Tools, particularly a spade or scoop, and drums.

Notification

A list of the appropriate people to be notified in the event of a spill should be available on site with their contact details.

Conclusion

Any significant spill has the ability to endanger employees' health or lives, create environmental damage and have a large financial impact. Therefore it is imperative that all the necessary precautions are taken to prevent spillage.

Appendix G: EAP Curriculum Vitaes

Refer to Appendix G2 of the dBAR (These are not duplicated in the dEMPr but will be provided for the Final EMPr)

Appendix H: Industrial Building and Developments Minimum Sustainability Guidelines

MINIMUM SUSTAINABILITY GUIDELINES

Industrial Building and Developments

June 2015

Revision 0

Executive summary

Tongaat Hulett is well-placed to unlock value and show leadership by adopting and implementing sustainable principles and guidelines for all its current and future industrial buildings and developments. It is anticipated that these high-level sustainability guidelines will be incorporated into the development planning and implementation by the purchaser(s)/developer(s).

The key sustainability interventions addressed in these guidelines include:

- Space heating and cooling (including air-conditioning)
- Lighting
- Water heating
- Gas Cooking
- Laundry
- Onsite (renewable) energy generation
- Office equipment
- Electrical connection, distribution, and control systems

These guidelines are also differentiated on the basis of interventions which can be implemented at different stages of the overall development process, namely:

- the development planning stage (by Tongaat Hulett Developments)
- the building design and construction stage (by project design teams)
- the occupation and operational stage (by home or building owners and tenants)

Finally, it is suggested that the fundamental starting point for more sustainable industrial buildings is the consideration and incorporation of basic environmentally conscious design principles into the planning and design. Good basic design will inevitably result in less intensive or costly mechanical and electrical systems to maintain the desired levels of service for occupants (and owners) of buildings within Tongaat Hulett's developments'.

Industrial building

The office component of the Industrial building should, as far as is practicable, be located on the Northern side of the overall building and should incorporate some of the specific guidelines in Table 1.

The most important outcome of this variability in the specific requirements of different components of the industrial building is that:

- the overall building should be thermally efficient and environmentally conscious, and
- the energy infrastructure should be flexible as the energy service needs will change over the lifetime of the building.

Space heating and cooling

Industrial buildings generally have lightweight construction and large roof and wall areas. Specific guidelines include:

- Thermal modelling of these buildings is generally simpler and it is therefore very cost-effective to identify the high-return investment opportunities for more thermally efficient operation. It is highly recommended to ensure that the overall envelope performs well.
- It is likely that the roof will be the highest priority in terms of heat gains (in summer) and losses (in winter) and therefore attention to the roof design is likely to be very important.
- Insulation of walls and roof

➢ Guideline items 1.1, 2.1, 2.2 and 2.3 in Table 1

Lighting

Lighting in Industrial buildings is highly variable both in terms of level of illumination but also in terms of the areas / tasks which require illumination (see figure 1 below).

- Maximum use of roof monitors (and provision of mounting space for on-site solar PV generation in future) to provide natural daylighting in deep internal spaces of upper floors (or ground floor in single storey buildings)
- The roof apertures should be between 4 – 8 % of the floor area.
- Use diffuse glass to provide better distribution of light.
- Avoid horizontal skylights which will exacerbate heat solar gains in summer
- Skylights should optimally face south or in the range south east to southwest
- Maximise the use of task lighting for artificial lighting to maximise the efficiency of the artificial lighting.

➢ Guideline items 6.1, 6.2 and 6.3 in Table 1

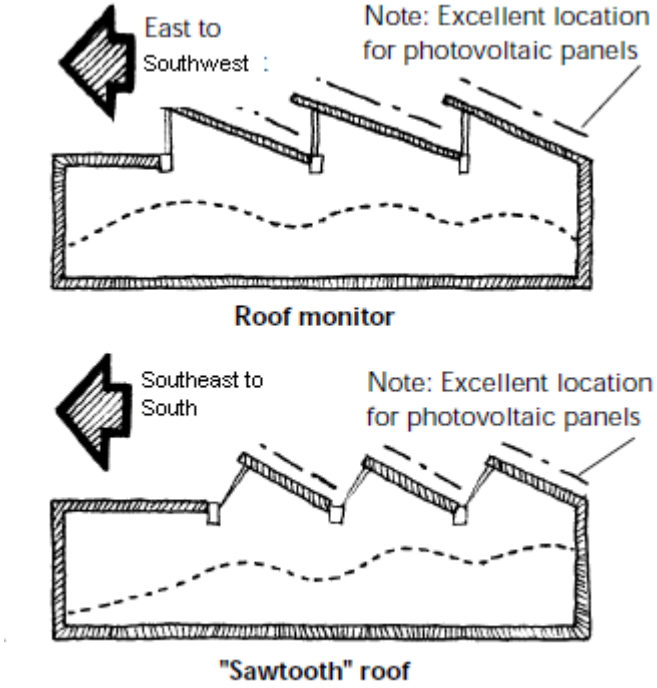


Figure 1: Roof monitors for day lighting for upper floors
Note that the dotted lines indicate the variation in the illumination levels across the building.

Electrical connection, electrical distribution and control systems

Eexcellent opportunities exist for more effective energy utilisation in office buildings by considering the electrical connection and electrical distribution systems (including sub-metering).

- sub-metering of each sub-lettable space in the building for HVAC, office equipment and lighting circuits. This will enable better energy monitoring of energy in tenant space.
- integration of the sub-metering with the building management system
- provision for sychronisation and parallel operation of any backup electricity generation

➢ Guideline item 11.1 in Table 1

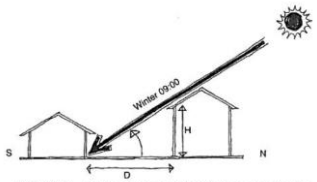
Onsite energy generation

Industrial buildings require thermal energy inputs for heating and cooling for processes in addition to electricity for lighting, office equipment and machinery. The requirement for thermal energy offers the opportunity for on-site co-generation and / or combined heating and cooling for more optimal energy efficiency.

- Particular design attention to the integration of industrial energy service needs and waste streams with the overall energy service infrastructure of the building
- Design for flexibility
- Integration of the energy infrastructure with the local authority's electricity planning, regulatory and operational activities

➢ Guideline items 8.1 and 8.2 in Table 1

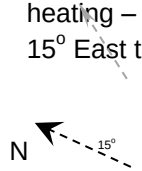
Table 1: Basic design guidelines for more sustainable energy services for generic buildings in Durban

	Phase of the design and implementation	**Development Planning**	**Building Design**	**Occupation / operation**	**Comments**
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
1.	**Space heating**				
1.1	Environmentally conscious design of the building – **Priority 1**	• Narrow plan shape • Urban design • Spacing of D = 1.8 x H for winter solar heating (where D is the distance between buildings and H is the height of the building on the northern side)  *Fig.6.9.5 – Solar access for building spacing in Durban. D = 1,8 H* source: Holm D (1996)	• Longer dimensions in East/West axis (longer North/South sides) • Uninhabited rooms on West and South facades • Other rooms to span plan for maximum cross-ventilation • Wide verandahs all round to provide rain protection • Lightweight (timber and non-masonry) construction for walls and roof • Use of shading elements (deep verandahs) to allow winter sun penetration • 16% of floor area for windows on North elevation for winter sun	• Use of curtains, internal window blind or shutters to minimise heat losses in winter • Use of internal elements (doors, sliding partitions, curtains) to manage air movement between rooms / volumes in winter and only heat occupied rooms	• In Durban the relatively low di-urnal temperature ranges mean that thermal mass is not effective in naturally ventilated spaces.

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			penetration • Use of high-performance glazing to maximise light and minimise heat and noise transmission		
1.2	Heating appliances – **Priority 2**			• Use of portable LPG heaters to provide localised radiant heating	• Space heating can largely be achieved by direct solar heating through North facing windows and consequently very little localised heating is required
2.	**Space cooling**				
2.1	Environmentally conscious design – **Priority 1**	• Layout of development to encourage free-standing buildings to allow air movement • Minimisation of hard standings around buildings and maximisation of planted landscaping to reduce 'heat island effects'	• East and West elevations should have minimised window areas to avoid glare and afternoon heating (on West) – although guidance from SANS 10400 requires a minimum 10% of floor area of the room or 0.2m^2 whichever is larger	• Open windows to encourage cross-flow natural ventilation	• In temperate climates with both heating and cooling seasons, select windows with both low U-factors and low SHGC's to maximize energy savings

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			• Openings on North and South elevations to encourage cross-flow natural ventilation • Consideration of double roofs or ventilated roofs spaces to maximise cooling • Use of light exterior colours (including roofs) to minimise heating • Use of shading elements (deep verandas) to exclude summer sun		
2.2	Mechanical ventilation and air-conditioning – **Priority 2**		• Use of mechanical ventilation if natural ventilation is not possible / insufficient • Use of thermal mass for rooms which will be totally airconditioned	• Use of ceiling fans to circulate air and promote cooling	
2.3	Air-conditioning – **Priority 3**		• Use mechanical air-conditioning (A/C) if heat loading cannot be	• Monitor the A/C plant performance	

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			managed by passive means • Use A/C in spaces which can have high occupancies – meeting rooms, auditoria • Use energy efficient displacement (with chilled ceilings) for larger volumes airconditioning or mixed flow VAV A/C for dedicated rooms or zones	• Perform regular (six-monthly) maintenance to keep the system operating optimally	
3	**Water heating**				
3.1	General – **Priority 1**		• Optimal location / 'clustering' of points of hot water use to minimise the hot water distribution lengths • Use of vertical hot water storage tanks with good diffusers to maximise the thermal stratification and efficiency in draw-offs • Insulation of hot water	• Use of efficient shower heads, mixers and taps/faucets • Implementation of water saving guidelines for more efficient use of hot water	• 'dead legs' in hot water distribution cause waste of cold water and energy in heat losses

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			system – including storage tanks and hot water distribution pipe systems • Consideration of locating water heating and refrigeration service needs in close proximity for use of heat pumps • Consider installing a waste heat recovery system to recover thermal energy in drain water		
3.2	Solar water heating – **Priority 2**	• Street and building layouts to allow for appropriate orientation of roof spaces which face north for solar water heating – ideally between 15^{o} East to 45^{o} West  	• North-facing roof surfaces tilted at 25^{o} to the horizontal for optimal solar energy collection (note that sub-optimal orientation can be accommodated by increasing collector areas) • Take cognisance of nearby shading (trees, buildings) – to avoid any	• Use of thermostatically – controlled in-line gas (LPG or biogas) for backup heating of water on overcast days • Use of thermostatically – controlled electrical heating in tank for backup heating of water on overcast days • Use of timers if electrical	• Lower angles of tilt (to the horizontal) will favour hot water outputs in summer and steeper angles of tilt will favour hot water outputs in winter

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
		 W	shading between 10:00 – 16:00 • Locate storage tank under roof / indoors to achieve an aesthetic integration into the design (split collector/storage configuration) • Structural capability of (roof) structures for 100 kg per 100 litres of stored water	back-up – for off-peak power use and optimal utilisation of solar heated water • Use of thermostatically – controlled in-line electrical heating for backup heating of water on overcast days (requires a 3-phase electrical connection)	
3.3	Instantaneous / localised water heating – **Priority 3**		• Provision of space close to the point of use for hot water for thermostatically controlled inline instantaneous LPG or electrical heating • Provision of 3-phase electrical connection for electrical inline heaters • Provision of extract duct	• Use thermostatically controlled inline gas heater(s) if LPG or biogas is available (also for cooking) • Use inline electrical heating if LPG or biogas is not available • Use small storage heating (urn, hydroboil)	• Typical accommodation requirements500 (H) x 300 (W) x 250 (D)

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			for exhaust on inline gas heaters	or a kettle if demand is variable / intermittent	
3.4	Heat pumps – **Priority 4**		• Locate water heating and refrigeration / space cooling service (for pantry / cold room / wine cellar) needs in close proximity		
4	**Cooking and food preparation**				
4.1	General – **Priority 1**		• Maximise the use of gas for cooking and minimise the use of electricity for cooking • Locate cooking areas together to optimise common services – for gas connections, gas piping and storage for cylinders (for LPG) • Locate hot water use points together to minimise energy losses		• Gas for cooking (and water heating) can be supplied as liquefied petroleum gas in pressurised steel cylinders (bottles) or as piped gas from a local (or on site) biogas plant • Electricity is appropriate for mixers, blenders, micro-wave ovens, kettles and other small kitchen appliances

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			in hot water systems • Arrange for waste separation and collection of organic wastes for onsite waste treatment (in a biogas system)		
4.2	Gas cooking – **Priority 2**		• Design gas distribution to optimise piping • Make provision for lockable and ventilated gas storage for LPG cylinders – twin 19 kg for households; 48 kg for businesses (check compliance with LPG Association)	• Use of gas appliances – especially hobs • Use electrical energy for small appliances such as micro-wave ovens, blenders, etc.	
4.3	Slow cooking / hot boxes – **Priority 3**		• Make provision for space in kitchens for the use of slow cookers and hot boxes	• Use hot boxes to maximise efficiency of stoves	• A hot box, also known as a haybox or a wonder box, allows for insulated cooking (or heat retained heat cooking). Typically it is a highly insulated container which allows

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
					food to cook slowly using the retained heat in the pot and contents after simmering
5.	**Refrigeration**				
5.1	Optimal location and efficient appliances – **Priority 1**		• Locate cold rooms / freezers / refrigerators on southern sides or internal rooms of buildings • Locate cold room refrigeration plant near water / air heating requirements for optimal use of waste heat from A/C or heat pump condensers	• Use efficient appliances – chest freezers rather than upright for < -18^{o}C • Operate fridges and freezers optimally – keep 75% filled and limit door opening	
6.	**Lighting**				
6.1	Natural daylighting – **Priority 1**	• Adhere to an over-arching lighting policy covering use of natural light, efficient artificial lighting, intelligent controls, provision of different	• Provision of windows on Northern elevations (the requirement of window areas of 16% of floor area for heating will ensure adequate natural	• Use timers and light / movement sensing switching off unoccupied areas • Window blinds can assist	• Deeper rooms can benefit from skylights or roof monitors • Vertical windows provide more effective lighting

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
		circuits for task lighting and general lighting • Consider urban layouts to minimise outdoor lighting requirements at night – to avoid light pollution and energy wastage	lighting) • Minimise windows on East and West façades to reduce glare and heat gain (on West) • South lighting is more diffuse but needs insulated glazing to minimise heat transfer – due to heat losses through the fenestration • Undertake façade design to ensure that all windows are shaded in summer (between equinoxes mid-September – mid-March) • Use of light shelves to bounce light into deep spaces – careful design to ensure effective maintenance of reflective plane	to manage glare – horizontal blinds on Northern façades and vertical on East and West	than horizontal windows of the same area • Light interior surfaces enhance natural daylighting
6.2	Light circuits and controls – **Priority 2**	•	• Conscious design of lighting – general and		

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			task lighting • Use individual switching of light circuits or fixtures • Use dynamic lighting control for blending natural and artificial lighting • Use of motion / occupancy sensors • Use of daylight sensing switches • Consider metering to enable ongoing monitoring / management		
6.3	Light fittings – **Priority 3**		• Use of low energy lamp fittings – linear fluorescent T8; compact fluorescent (CFL) and light emitting diodes (LED's) with good reflectors and diffusers	• Operate lamps and lighting in an energy efficient manner – switch off when not needed	
7.	**Laundry and drying**				
7.1	Use of energy efficient		• Provide pre-heated water	• Use of cold water for	• About 90% of the energy

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
	appliances – **Priority 1**		for laundry machines • Provide for air-drying clothes on clothes lines or drying racks	domestic washing	used for washing clothes in a conventional top-load washer is for heating the water. There are two ways to reduce the amount of energy used for washing clothes—use less water and use cooler water
8.	**On-site energy generation**				
8.1	Backup electrical power – **Priority 1**	• Centralised back-up power capability - grid connected co-generation configuration for parallel operation and supply of electricity into the grid and provision of heat energy • Metering of centralised back-up at point of use	• Electrical circuits in distribution board (DB) separated into critical, essential and optional to allow dedicated UPS or generator back-up • Provision of space for a backup genset per building or functional group of buildings for critical loads • Make provision of space for UPS systems for short-term (< 15 minute) backup for IT and		• Grid connected centralised generator could act as a peak demand supplement for municipality • Significantly more cost-effective than large numbers of smaller individual backup systems

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			essential services		
8.2	Renewable energy generation – solar photovoltaic systems - **Priority 2**	• Street and building layouts to allow for appropriate orientation of roof surfaces which face north for solar photovoltaic (PV) modules – ideally between 30^{o} East to 15^{o} West[1]	• Make provision for solar photovoltaic power for building power in future (3 -5 years). Roof monitors provide an excellent opportunity to locate and support solar PV modules. • Use solar PV power for water pumping		• Solar PV modules operate most efficiently at low temperatures – orientation towards the morning sun is better than towards the afternoon sun • Solar PV systems require minimal planning approvals and are easy to integrate into buildings (even as a retrofit) • Solar PV technology costs are reducing rapidly and will be more cost effective within the next five years
9	**Waste to energy systems**				
9.1	Integrated sanitation /	• Choice of centralised,	• Separation of grey and	• Separation of wet and dry	• Indicative budgets for full

[1] Note that the solar water heaters and solar PV have conflicting biases for the tolerances for optimal performance in terms of azimuth angles – this emphasizes the benefits of the most optimal orientation, namely due North, for simplicity and optimal performance of the structure as well as the SWH and solar PV systems.

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
	bioenergy systems – **Priority 2**	multiple or stand-alone system(s) will affect sewage layout and gas distribution as well as the need for an EIA. • Use of topography for maximising gravity feed to the treatment plant and effluent flow (minimising pumping). • Separation of grey and black water lines (grey water to bypass the digester). • Site organic waste management layout to allow easy feeding of digester. • Enhancement of landscaping by integration of reedbeds	black water lines, installation of macerators in kitchens for pipe transportation of kitchen waste to the digester. • Low/dual flushing toilets to reduce volumes (thus treatment plant size)	waste. • Use of biodegradable cleaning products • Utilisation of treated water for irrigation • Utilisation of nutrients for urban agriculture / lanscaping	waste water and organic waste treatment plant as follows: • Central plant (high-tech) -approx. R5million for a 500 home development • Multiple plants (high-tech) - approx. R1.5million for a 100 home cluster • Multiple plant (low-tech) – approx. R1million for a 100 home cluster • Stand-alone (pre-fabricated)- approx. R25,000 per home
10	**Office/media appliances**				
10.1	IT / office equipment		• Provision of electrical circuits to provide backup	• Use of energy efficient appliances (such as	• For an explanation of Energy Star refer to:

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
			power for critical loads	Energy Star) • Ability to switch appliances off at the wall when not in use to prevent standby losses	www.energy star.gov
	TV / multi-media			• Use of energy efficient appliances • Ability to switch appliances off at the wall when not in use to prevent standby losses	
11	**Electrical distribution and control systems**				
11.1	Smart metering – **Priority 2**	• Develop a policy and make provision for accommodation of smart metering (installation in buildings and central communications of information)	• Electrical system designed around smart metering and sub-meters • Electrical distribution to provide for different circuits for critical and non-critical loads	• Understanding of smart and sub-metering and thus informing customers which will promote more efficient electricity use. • Central receiving facility, data analysis, control and feedback	• Smart meters provide improved feedback to customers on energy consumption and also offer the potential to introduce smart grids, which interconnect appliances and generators. This allows appliances and electricity suppliers (or owners) to switch devices on and off

	Phase of the design and implementation	Development Planning	Building Design	Occupation / operation	Comments
	Implementing agent for the intervention(s)	THDev	Project design team	Owner / tenant	
Item	**Energy service**				
					remotely to minimise peak loads and access cheaper tariffs

Appendix I: THD Standard Operating Procedures

ENVIRONMENTAL MANAGEMENT SYSTEM
ISO 14001

PROCEDURE 4.4.6.2

STORMWATER MANAGEMENT

Tongaat Hulett DEVELOPMENTS

Registration No. 81/12378/07

Date	Authorised Person	Responsible Person	Proposed review date	Procedure revision no.	Page No.
August 2012	Rory Wilkinson	Bheki Shongwe	August 2013	2	Page 1 of 6

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1.0 AIM

To provide a Standard Operating Procedure (SOP) for management of stormwater on a development site both during and after construction. The guiding principle behind stormwater management is to keep post development runoff similar to pre development runoff. Best practice suggests a passive management approach to stormwater management whereby stormwater is retained on site for as long as possible released slowly, thus high velocity flow and peak water flow events that could cause erosion and damage property on site and in surrounding areas are avoided. Ecological engineering recognises that natural systems should be mimicked to accommodate biological systems.

This procedure must be subject to engineer approval for each project as it only investigates environmental implications, which may or may not be suitable from an engineering perspective.

2.0 RESPONSIBLE PERSON/S

The Environmental Consultants are responsible for using the SOP in the EMPs and updating it where applicable.
The Town Planner (Planning Manager) is responsible for ensuring that SOP's are updated.
The Engineer is responsible for consulting with the Environmental Consultant on environmental suitability of system.

3.0 METHODOLOGY

This SOP should be used as a guideline for preventing and managing soil erosion on site. This guideline should be used in conjunction with Procedure 4.4.6.3 on Erosion control.

4.0 ENVIRONMENTAL IMPACTS

In general, soils in the areas most used by Tongaat Hulett Developments primarily tend to be unconsolidated dune sands and / or Berea red sands which are highly susceptible to wind and water erosion which means that stormwater management during construction is of particular importance as uncovering these soils exposes them to these erosive elements. Wherever poorly managed stormwater results in erosion, there is usually the additional impact of increased siltation of water ways and related wetland areas and this impedes the flow of water and thus the functioning of these systems.

5.0 PROCEDURE

A stormwater management plan should be created to manage stormwater on site both during and after construction. An effective stormwater management plan should work towards maintaining post development stormwater runoff at the same level as pre development run off. Key elements are the reduction of flow velocity which could cause erosion problems on site and down stream, keeping stormwater on site for as long as possible, avoiding points of concentrated flow, promoting recharging of natural water bodies without exceeding these requirements and altering flow regimes and downstream timing i.e. assessing the catchment as a whole.

5.1 Promoting Infiltration and Reducing flow velocity

The permeability of soils and infiltration potential of an area will have an effect on run off and the infiltration of stormwater. However, with development, a greater proportion of the site will be covered by hardened surfaces areas, which will promote an increase in the volume and speed of surface run off. Therefore, in order to mitigate the effect of development and reduce flow velocity and speed, stormwater should be encouraged to remain on site for as long as possible. This can be achieved by keeping hardened surface areas to a minimum and encouraging stormwater infiltration through the creation of larger open vegetated areas so that stormwater can slowly soak away to recharge streams and water bodies.

5.1.1 Vegetated stormwater detention ponds

Vegetated stormwater detention ponds are often a useful way to reduce flow velocity and retain stormwater on site for as long as possible. These can also be developed into attractive water features. By choosing appropriate plants (see wetland species template 4.4.6.14) and selecting the appropriate area on a site, detention ponds can provide a similar function to that of a wetland. As such they may act as sponges, slowly releasing water to recharge surrounding water bodies, filtering

suspended and dissolved solids from the water and slowing the rate of flow. If provision is made for keystone species such as the water moss other species will be encouraged to use the area. However placement of these ponds should take into account that loose and unconsolidated soils may be susceptible to collapse when moisture is added and are therefore not suitable for the creation of detention ponds as instabilities may occur on steeper slopes.

Although seen as a positive tool for the management of stormwater, there is a possibility that the use of stormwater ponds may cause secondary environmental impacts. Possible negative impacts of stormwater ponds may be changes to downstream water temperature regimes, downstream dry weather water quality, downstream bedload movement, down-stream trophic shifts, upstream fish passage, upstream channel degradation, and destruction of riparian cover and wetlands. Very little research has been conducted on these possible negative impacts, most of which have been inferred from research on the effects of larger impoundments (dams) on large river systems and it is uncertain how this research may be applied to stormwater ponds. For example, it has been suggested that stratification of such water bodies (layering of temperatures and nutrients) may ultimately affect water temperatures down stream. However, as depth has an effect on the level of stratification that the water body experiences and shallow stormwater ponds are only likely to be weakly stratified as opposed to deeper impoundments that can exhibit very strong seasonal stratification, it is uncertain if such inferences are indeed applicable.

5.2 Accommodating sensitive systems

Sensitive systems need to be taken into account when managing stormwater. Water requirements of surrounding areas and water bodies within the same catchments area should also be determined and accounted for i.e. stormwater management needs to be approached in a holistic manner incorporating the impacts it could have on the wider area within which the site operates. Certain systems such as wetlands and other water bodies will have specific water requirements which must be met and exceeding or undersupplying water to these water sources could have an impact on how they function. Other sensitive systems such as grasslands and forests also need to be considered and should not be used as dissipation areas for stormwater without careful consideration of their water requirements and what impact over supply of water could have on these systems.

5.2.1 Wetland

In terms of managing stormwater in and around wetland areas, the “Interim Guidelines for development that may affect wetlands” produced by the DAEA should be followed (see also SOP 4.4.6.8 Management of Sensitive Systems section 5.8). Specific requirements relating to stormwater management are that hardened surfaces should be at least 15m outside of the outer boundary of the seasonal / permanent wetland zone. It also states that stormwater outflows should not directly enter a wetland and that a vegetated buffer of 20m should be included between the stormwater outflow and the outer boundary of the wetland with mechanisms for dissipating water energy and slowing water flow. In cases where a high biodiversity exists within the wetland, a specialist will need to determine buffer widths.

5.2.2 Discharging water into water bodies

Discharging stormwater into natural watercourses is only acceptable under certain conditions (requirements of the National Water Act should be followed at all times). Stormwater entering a natural water course must be of acceptable quality (as per DWAF requirements, see attached extract from old Water Act which is stil being used as a water quality guideline), no pollutants i.e. soaps, car washings, paints or any other domestic pollutants can be allowed to enter the natural system. Stormwater entering the system should not significantly alter the natural timing and flow of the stream as this could cause flooding and erosion further downstream. It may be advisable to slow and filter water prior to allowing it to enter the natural water course. Prior to discharging water to a water body, requirements for permits should be investigated.

References

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19) HAWAAN FOREST ESTATE ENVIRONMENTAL IMPACT ASSESSMENT REPORT DESIGN DEVELOPMENT By Geoff Nichols May 2003

http://www.environment.gov.za/Enviro-Info/nat/erod.htm

http://sacoast.uwc.ac.za/education/resources/sacoast/Biophysical/sandybeaches.htm
http://www.csir.co.za

http://www.stormwatercenter.net/Library/Practice/79.pdf

http://www.durban.gov.za/eThekwini/

http://sacoast.uwc.ac.za/coastal%20maps/spaceindex.htm

ENVIRONMENTAL MANAGEMENT SYSTEM
ISO 14001

PROCEDURE 4.4.6.3

SOP EROSION CONTROL

Tongaat Hulett DEVELOPMENTS

Registration No. 81/12378/07

Date	Authorised Person	Responsible Person	Proposed review date	Procedure revision no.	Page No.
August 2012	Rory Wilkinson	Bheki Shongwe	August 2013	2	Page 1 of 6

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1.0 AIM

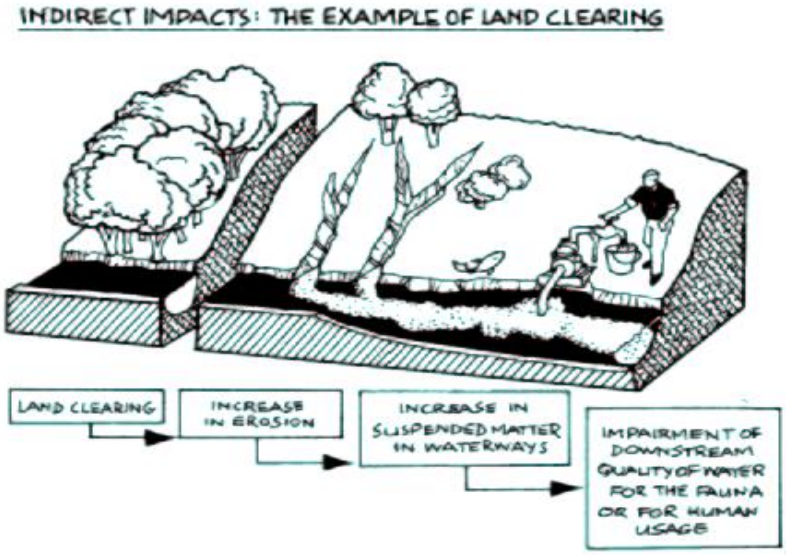
To control soil erosion and conserve valuable topsoil. Stormwater management is a key factor in handling erosion on site and the SOP on stormwater management (4.4.6.2) should be considered in conjunction with this SOP (other key factors in soil erosion control related to vegetative cover). Please refer to the appropriate vegetation templates. Although the following provides a general approach typical situations encountered and provides control measures, specialist studies should always be carried out and each site should be judged on an individual basis.

2.0 RESPONSIBLE PERSON/S

The Environmental Consultants are responsible for using the SOP and updating it where applicable.
The Town Planner (Planning Manager) is responsible for ensuring that SOP's are updated.

3.0 ENVIRONMENTAL IMPACTS

The erodibility of soils can be described as their sensitivity to the effects of wind and water on the soil structure. This can be expressed as an erodibility index that is determined by combining the effects of slope, soil type, rainfall intensity and land use. Soils found on the south east coast of SA are considered to have a medium susceptibility to erosion with the Durban are not considered as having a high erosion potential. Due to the length of time that it takes for soils to be formed, they should be seen as an important natural resource. Soil erosion through poor management can result in loss of valuable topsoil, damage to property through slope destabilisation, collapsing of banks and in extreme cases mudslides. Erosion can also result in material being deposited into watercourses or wetlands silting up these resources and impairing their function. Where erosion has occurred, there is a greater likelihood that exotic plant species will gain a foothold.



The coastal belt soils are vulnerable to erosion by wind and water and soil erosion is more likely to occur in summer months due to higher rainfall and temperatures causing shrinkage and collapse of soils. Soils are particularly vulnerable to erosion during construction as they are exposed to the elements while changes in surface run off patterns due to construction activities often increase the likelihood of erosion.

4.0 PROCEDURE

Top soil conservation

In order to conserve valuable top soil, it is advisable to remove the topsoil layer (upper 30cm) before commencing work in an area. This top soil can then be stored away from working area and can be used to in landscaping or as required. The top soil pile should not exceed 2m in height and should not be placed either on a slope or at the bottom of a slope where it may cause erosion and instability problems.

Soil exposure

Soils most often encountered in the coastal belt area of the north coast of Durban (Umhlanga) are red Berea type soils. These soils usually have little cohesion, are easily drained and tend to have high erosion potential especially when denuded of vegetation. Therefore it is important that the time that the soil is exposed is reduced i.e. no clearing should take place until work is ready to begin, vegetation should only be removed before the area is to be worked and vegetation should only be stripped as required. Once work is complete, vegetation should be re-planted immediately to cover soil surfaces. Other precautions should include the restriction of heavy vehicle movement near unstable, uncovered soils.

Side tipping of spoil and excavated materials shall not be permitted – all spoil material shall be disposed off as directed by the Engineer.

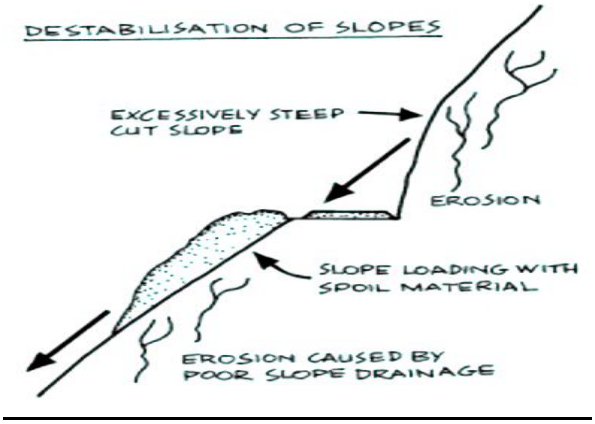


Figure1: Problems caused by side tipping.

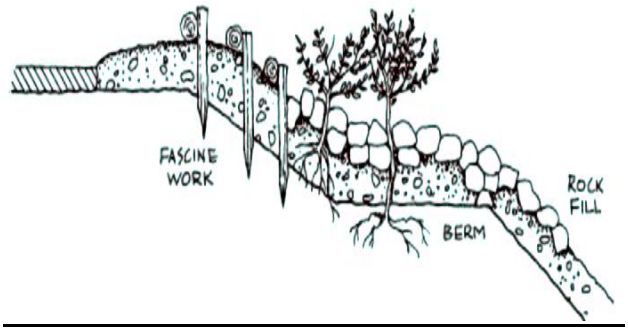
Battering of all banks shall be such that cut and fill embankments are no steeper than previous natural slopes unless otherwise permitted by the Engineer. Cut and fill embankments steeper than previous ground levels shall be revegetated immediately on completion of trimming or shall be protected against erosion using bioengineered stabilisation measures as shown in figures 2 & 3. Deep-rooted vegetation such as Vetiver grass is effective to stabilise steeper embankments.

Soil protection during construction

During construction when soil is unavoidably exposed, temporary soil erosion control measures should be put in place where required. Wind screening can provide protection from winds to control soil loss in exposed areas that may be prone to wind exposure. During heavy rainfall events, stormwater control measures should reduce flow velocity and ensure that large volumes of water are not channeled onto unprotected soil surfaces (See Stormwater Management SOP 4.4.6.2). At the same time, particularly vulnerable areas can be covered with hessian to prevent soil from being washed away. It may also become necessary to put siltation traps in place to capture any eroded material during rainfall events and these can be designed and constructed as and where necessary according to the engineer's specifications.

Examples of methods used to slow down erosion, pending on the type of soil and slopes gradient.
Figure 2 = Clay, less permeable / porous soils.
Figure 3 = Gravel, highly / more porous soil.

Figure2: Bioengineering Stabalisation
By stepping the slope using logs, one is able to form soil sediments (catch soil). Placing (pilling) rocks at the foot a slope, allows the waters speed / strength to be interrupted, thus avoiding further (vertical) erosion,



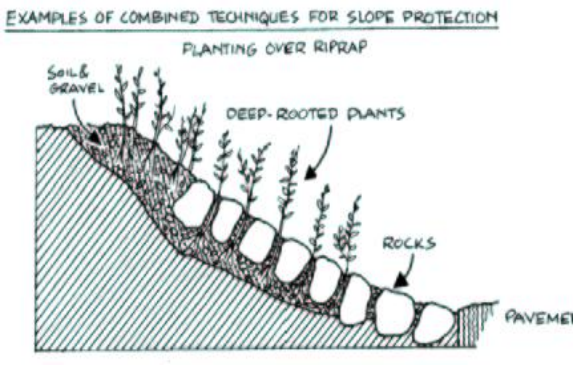


Figure3: Bioengineering Stabalisation
Vegetation is a good source of water retention. Areas with humus and permeable soil, can have erosion levels reduced through the introducing of deep rooted plants,
The staggering of rocks (rocks acting as speed humps) and planting of vegetation between rocks further allows for siltation.

Long term control measures
Of primary importance is to ensure that appropriate stormwater controls are in place (See Stormwater Management SOP 4.4.6.2). Earthworks and changes to the natural form of the ground should be kept to a minimum and where earthworks have created embankments higher than 1m, these should be re-contoured to approximate the form of the natural landscape. Untreated embankments and embankments with retaining walls greater than 1m should be avoided.
Final soil erosion measures may include soil percolation trenches for run off from paved areas and rain water piping to accept run off from roofs.
Where extensive grassed areas have been planned, grass sods should be used as opposed to runners or seeds to provide more immediate protection.

References

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http://www.wzw.tum.de/vegoek/forschun/feuchtge/maputaland.html

ENVIRONMENTAL MANAGEMENT SYSTEM
ISO 14001

PROCEDURE 4.4.6.4

SOP EMP MONITORING

Tongaat Hulett DEVELOPMENTS

Registration No. 81/12378/07

Date	Authorised Person	Responsible person	Proposed review date	Procedure revision no.	Page No.
August 2012	Rory Wilkinson	Bheki Shongwe	August 2013	3	Page 1 of 5

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1.0 AIM

To provide a Standard Operating Procedure (SOP) for monitoring of Environmental Management Plans (EMP's). Although each EMP will be project specific, this will provide a standard to which all EMP's must comply.

2.0 RESPONSIBLE PERSON/S

The Town Planner (Planning Manager) and ESH Officer are to ensure that Consultants use and review SOP's and templates in EIA's and EMP's and add to these where applicable.
The Project Managers are to ensure implementation of the EMP.
The Environmental Consultant is to develop the EMP and audit compliance with the EMP on a regular basis and provide audit reports to the Planning Administrator.
The ECO is to monitor compliance with the EMP on a regular basis and is responsible for ensuring that the contractor and construction staff are trained and understand the EMP and relevant SOPs.
The Contractors are responsible for ensuring conformance with the EMP.

3.0 METHODOLOGY

This SOP should be used as a guideline for monitoring and ensuring compliance with the EMP.

4.0 ENVIRONMENTAL IMPACTS

An EMP is designed with a view to managing construction activities so as to avoid and minimise environmental impacts during development. Non compliance with the EMP can therefore result in severe environmental impacts. EMP compliance is usually stipulated in the Record of Decision for most EIA's. Therefore failure to follow the directives of the EMP can result in the provincial department closing the site and halting development. EMP compliance can ultimately save on costly rehabilitation and ensure that sensitive systems are maintained in their original state.

5.0 PROCEDURE

5.1 The Environmental Consultant is to prepare the EMP (refer to SOP 4.4.6.9 Guideline EMP). The Environmental Consultant may refer to the eThekwini Municipality Generic EMP for Construction Activities and use it as a basis for developing the EMP provided that the EMP is specific to the nature of the site. The consultant may not copy the Generic EMP verbatim.

5.2 The Environmental Consultant and Project Manager must hold a meeting with all primary suppliers and contractors prior to start of construction in order to discuss the EMP.

5.3 Suppliers and contractors are to be provided with a copy of the EMP, Tongaat Hulett Development's environmental policy (Record 4.2) and Ground Rules (Record 4.2.1.1) and a list of their responsibilities in terms of maintaining the ISO 14001 program (Record 4.4.1), copy of the non-conformance report and instructions for filling this out (Record 4.5.2) and a copy of the complaints register (Record 4.4.3.1). They must also be supplied with a list of Tongaat Hulett Development's significant aspects as these apply to their own work.

5.4 Suppliers and contractors to be made aware of the consequences of non –compliance with the EMP and are to be held responsible for ensuring compliance of all sub contractors.

5.5 Suppliers and contractors are to refer to the Raw Material SOP (4.4.6.5) and complete the Raw Material Record (4.5.1.3.1) to ensure that raw materials are appropriately sourced.

5.6 Records of on site training must be kept.

5.7 The Environmental Consultant will carry out environmental audits of the site on a regular basis (time period according to stipulations of ROD and the activities occurring at a point in time but should be done at least once a month). Audit reports will be submitted to Tongaat Hulett Development and to DAEA. The consultant must schedule audit dates and ensure that all necessary parties are made aware of these dates. The consultant must consult with DAEA compliance officer to ensure that the officer is able to attend some of the audits.

5.8 Any suggestions regarding changes to the EMP must be submitted in writing to the environmental consultant for approval. A record of this must be kept.

5.9 All issues of non-conformance must be added to the non conformance/incident Record. The EMP Compliance/Non Compliance Record must also be maintained.

References

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ENVIRONMENTAL MANAGEMENT SYSTEM
ISO 14001

PROCEDURE 4.4.6.5

SOP RAW MATERIAL SOURCING

Tongaat Hulett DEVELOPMENTS

Registration No. 81/12378/07

Date	Authorised Person	Responsible Person	Proposed review date	Procedure revision no.	Page No.
August 2012	Rory Wilkinson	Bheki Shongwe	August 2013	2	Page 1 of 7

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1.0 AIM

To ensure that raw materials are obtained from appropriate sources and are obtained in a sustainable manner i.e. appropriate licenses and permits have been obtained. This is vital to ensure that development is carried out in a sustainable manner.

2.0 RESPONSIBLE PERSON/S

The Primary Contractor must be able to produce all necessary documentation proving that all raw materials being used on the site have been obtained in a sustainable manner.
It is the Primary Contractor's responsibility to obtain this documentation from either the Sub Contractor, Cartage Company or directly from the supplier of the material if necessary.
No material will be used unless the responsible parties can provide the necessary permits, licences (see below). This documentation must be provided prior to material being brought on site and should be included into any contractual agreement.
The ECO is responsible for obtaining proof of raw material sourcing from the Primary Contractor and providing these to Tongaat Hulett Developments' own Planning Administrator for the purposes of record keeping.
The Environmental Consultant is responsible for checking availability of these documents during the EMP audit.

3.0 ENVIRONMENTAL IMPACTS

Use of materials obtained in a non-sustainable manner promotes these non-sustainable practices, enabling activities that negatively impact the environment, the affected environment being the area where the material is being obtained.

Sand, stone, rock, gravel, clay, soil

In the Mineral and Petroleum Resources Act, mining is seen as any operation or activity carried out for the purpose of winning any mineral from on, in, or under the earth. The act defines "Mineral" as any substance whether solid, liquid or gas that occurs naturally in or on the earth or in or under water, that is formed or is subject to geological processes including sand, stone, rock, gravel, clay, soil and any mineral occurring in residue stockpiles or is residue deposits excluding water, petroleum or peat. Therefore, under the Mineral and Petroleum Resources Act, the removal of sand, stone, rock, gravel, clay or soil are mining activities and as such are required to adhere to the requirements of the act.
Mining activities are known to negatively impact the environment i.e. sand winning in rivers can alter flow paths and result in large-scale erosion and riverbank degradation and can affect water turbidity (water clarity), which impacts various aquatic life forms. However, if the mining activity is controlled and carried out in accordance with the requirements of the act, negative environmental impacts can be controlled and mitigated. Under the act, an EIA and environmental authorisation is required before mining can commence. In addition the mining activity needs to be licensed, the quarry or area where the mining activity is being carried out must operate according to an EMP and the mine or site of the activity must be rehabilitated after mining is complete. By ensuring that materials are obtained from licensed mining activities, Tongaat Hulett Developments ensures that it does not support any illegal mining operations that may not be operating according to these requirements.

Bitumin

The production of bitumen can have significant impact on air quality. Therefore manufacturers of this material need to be operating within the requirements of the law i.e. appropriate permits etc.

Indigenous vegetation, rocks, wood

Such materials must be obtained from a proven legitimate source. If vegetation or wood is obtained illegally from a protected area or open space area there may be damage to plants, disruption of species reliant on that vegetation, soil erosion due to loss of plants and unspecified damage to the area. Uncontrolled removal of weathered rocks for landscaping from either slopes or streams could result in damage to the source area as a result of the activity while removing the rocks and soil erosion as a result of removing embedded rock. If rock is harvested from streams there may be alteration of stream flow, erosion of the streambed and banks and damage to the stream ecosystem.

Pesticides, herbicides

The use of herbicide and pesticides needs to be strictly controlled as incorrect use can lead to environmental pollution and poisoning of sensitive systems on site, added to which certain substances such as DDT persist in the environment and can have harmful long term consequences. These materials if stored or handled incorrectly can also impact soil and water quality i.e. through spills or fire. There is legislation regulating the use of these substances and professional services handling these substances should be able to provide the appropriate permits as detailed below.

Fuels
The storage of fuel on site i.e. diesel and petrol poses a threat to the environment in terms of spills impacting soil and water quality as well as the risk of fire. As such, suppliers have certain responsibilities.

4.0 PROCEDURE

Sand, stone, rock, gravel, clay, soil
In terms of the Mineral and Petroleum Resources Act, the mining of minerals requires a permit. As such, it is necessary that proof of the permit be provided. The following raw materials must be mined in accordance with, and licensed by the Department of minerals and energy:

- **River sand**
- **Stone**
- **Rock**
- **Clay**
- **Gravel**
- **Cement constituent**
- **Soil**

In terms of the Durban Metro Scheduled Trade by-laws, suppliers of Natural sands, Concrete / Cement, Aggregate and Stone must be able to provide a scheduled trade permit. The selected relevant sections are included below (see attached schedule for full list of activities).

- Cement products and pre-mixing works
- Quarrying
- Sandwinning (as defined in the Licences and Business Hours Ordinance, No. 11 of 1973)
- Stone crushing and dressing works
- Stone masonry

In terms of other materials requiring scheduled trade permits the following are also listed

- Brick and tile works
- Building services contractor (as defined in the Licences and Business Hours Ordinance, No. 11 of 1973) in respect of the base premises
- Ceramic works

According to the Atmospheric Pollution Prevention Act, a 'scheduled process' means any works or process specified in the Second Schedule Any company that carries out a scheduled process needs to have a scheduled process permit. Once the new Air Quality Bill comes into effect, certain activities that result in atmospheric emissions will become listed activities and any company carrying out a listed activity will require an atmospheric emission licence.

Suppliers of cement must also produce a scheduled process certificate (Atmospheric emission licence). Below are the applicable sections from the list of scheduled processes (see attached for full list of scheduled processes).

> *22. Cement processes: That is to say, processes in which argillaceous or calcareous materials are used in the production of cement clinker, and processes in which cement clinker is ground or cement is packed, and also processes in which metallurgical slags are treated for the purpose of making cement or cement additives.*

Bitumin
In terms of the Durban Metro Scheduled Trade by-laws, suppliers of Bituminous products are also required to provide a scheduled trade permit. The selected relevant sections are included below (see attached schedule for full list of activities).

- Bitumen works, including the transportation and operation of mobile bitumen kettles
- Asphalt plant, permanent and mobile

Suppliers of bituminous products, tar, creosote or cement must also produce a scheduled process certificate under APPA (Atmospheric Emission Licence under the Air Quality Bill). Below are the applicable sections from the list of scheduled processes (see attached for full list of scheduled processes).

> *16. Tar processes: That is to say, processes in which tar, creosote or any other product of the distillation of tar is distilled or is heated in any manufacturing process.*
>
> *No 58. Macadam preparation processes: That is to say, processes in which crushed stone is heated or dried, with or without the addition of tar or bituminous binders, for the purpose of preparing road surfacing or paving material.*

Indigenous vegetation, rocks, wood
Although permits may not be required, suppliers of other natural materials such as weathered rock, wood and indigenous vegetation must be able to provide proof that this material was obtained in a sustainable manner and from an approved source i.e. to ensure that natural vegetation, wood and rocks have not been removed illegally from a protected site or that in the removal, the environment was damaged in any way.

Pesticides, herbicides, fuels etc
In terms of the Durban Metro Scheduled Trade by-laws, operators involved in pest control i.e. handling pesticides / herbicides must be able to provide a scheduled trade permit. The selected relevant sections are included below (see attached schedule for full list of activities).

- Fungicide manufacture, and bulk-handling, storage and commercial usage of fungicides
- Herbicide manufacture, and bulk-handling, storage and commercial usage of herbicides
- Pesticides manufacture, and bulk-handling, store and commercial usage of pesticides

As well as a scheduled trade permit, operator's involved in pest control i.e. handling of pesticides / herbicides must provide a Material Safety Data Sheet (MSDS) for the chemicals used. This is a requirement of the Occupational Health & Safety Act's Hazardous Chemical Substance regulations, which require that suppliers of hazardous substances provide MSDS's to their customers, and that these be kept on the premises with the substances in case of emergency.
These operators must also provide proof of registration as an operator with the Department of Agriculture and Environmental Affairs (DAEA). A copy of the MSDS must be kept on site.

Fuels
Suppliers of fuel i.e. petrol or diesel must provide a Material Safety Data Sheet (MSDS) which should be kept on site.

References

Every effort has been made to reference all sources used, however, some of the information gathered was taken from our own reports and sources of information and have not been referenced here.

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ENVIRONMENTAL MANAGEMENT SYSTEM
ISO 14001

PROCEDURE 4.4.6.6

SOP FOR CONTROL AND ERADICATION OF ALIEN INVASIVE VEGETATION

Tongaat Hulett DEVELOPMENTS

Registration No. 81/12378/07

Date	Authorised Person	Responsible Person	Proposed review date	Procedure revision no.	Page No.
August 2012	Rory Wilkinson	Bheki Shongwe	August 2013	2	Page 1 of 10

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1.0 AIM

The aim of this document is to provide a guideline for the eradication and control of alien invasive plant species. This is a baseline document to which consultants, ecologists and landscapers working on Tongaat Hulett Developments projects should add and especially make comment with regards the success of various control methods etc.

2.0 RESPONSIBLE PERSON/S

The Environmental Consultant, Specialist Ecologist and Environmental control officer are responsible for implementing this procedure and developing it where appropriate.

3.0 ENVIRONMENTAL IMPACTS

Alien invasive plant species are known to possess a variety of physiological adaptations to disturbance and their invasive potential is exacerbated by the fact that they have a common ability to spread and reproduce rapidly and resist all but the most determined control attempts. Collectively these factors enable alien invasive species to penetrate and replace natural vegetation threatening natural ecosystems by reducing biodiversity), changing natural fire nutrient and hydrological regimes, increasing soil erosion, increasing transpiration rates in wet areas and modifying aquatic ecosystems. They increase the cost of water treatment and of managing the land, and also threaten agricultural productivity. Therefore alien pant control must be given high priority.

Furthermore, studies have shown that removal of alien venation is a financially sound practice as alien vegetation can decrease the financial value of an ecosystem by 140% in terms of the services it provides to the community (e.g. tourist interest, water quality and quantity, wildlife habitat, indigenous craft materials etc.) The cost of removal and control of alien invasive species is comparatively negligible at around 1and 5% of the net present value of the ecosystem.

4.0 PROCEDURES

Most eradication and control occurs using a combination of the techniques described below which can be collectively termed integrated control.

1) Mechanical eradication - physical removal or damage to the species. This includes procedures such as cutting, ring barking and uprooting. Clearance by hand is selective and leaves desirable species untouched. It is more effective in small invasions of shallow rooted plants. Most invaders will coppice when cut but if repeated during growing season cutting results in a depletion of root reserves which often results in death. Felling does not eliminate alien tree species by itself. Coppice growth usually results and is more difficult to control than the original problem. Coppice growth can however be prevented by striping bark off the remaining stump to below ground level. Ring barking of large trees can be successful but is a slow process. Every trace of the cambium must be removed from a ring of at least 0.5m wide. Felling of dried out trees is more difficult than living trees. The disadvantage of using this technique is that it is costly due to it being labour intensive and slow, it can also cause soil disturbance and improve conditions for germination of seeds from other undesirable species and risk of soil erosion.

2) Chemical eradication - the use of chemical agents to prevent growth and/or cause death of species. This includes stump poisoning; painting herbicides into cuts on the bark, basal bark spraying, and foliar spraying. Only herbicides registered for use against the specific weed to be eliminated should be used as they have been rigorously tested and the optimum mode of use has been determined (see SOP on raw material sourcing 4.4.6.5). Prior to use the following should also be noted: the level of persistence of the herbicide, residual herbicides preclude immediate re-growth or replanting; the degree of selectivity of herbicide is also critical as some kill all plants while others have no effect on non target species; the effect of the herbicide on animals and the effect that weather conditions will have on use, for example rain immediately after the treatment could nullify the treatment or in windy weather non target species may be reached by the spray. Two of the most commonly used herbicides are Roundup (Glyphosate) and Garlon (Triclopyr). Roundup kills all green plants and is usually applied as a spray. It is not poisonous to animals and deactivates on contact with the soil therefore land reclamation can begin as soon as the target species have died.

Garlon kills only broad-leaved plants and is harmless to grasses and animals. The residual effects are short lived and is applied as a leaf spray or painted on cut stumps

Special equipment and training and supervision of skilled and semi-skilled labour is required. Another disadvantage of this technique weather conditions and physiological conditions of the plant need to be correct. Certain application techniques are not target specific and can lead to environmental contamination and damage to desirable species. Best used conservatively.

3) Biological eradication - the use of natural processes or species to counter growth. Different methods include insect and plant diseases, seedling suppression, fire, and incorporating browsers Fire is used at the moment to control bush encroachment, but more research and finance will be needed before diseases and browsers can be introduced.

It is relatively cheap over the long term. The disadvantage is that most agents are not effective when plants have a low density and slow process unsuitable when rapid control is required.

4) Integrated Control
Combination of two or more of the above methods. Mechanical control may be used to prepare a plant for the application of herbicides. Similarly, fire can be used to reduce initial heights of plants or kill seeds and seedlings. Bio-control agents attack the seed can be used to reduce seedlings, in combination with herbicides on standing trees.

Species specific control

1) *Lantana camara*: hand pull seedlings; bush cutters and slashers for the initial control of large bushes and selective weeding as a follow up method should be burnt as it takes to long to break down naturally chemical treatment of coppice and small bush (3% solution of Roundup) chemical treatment of cut stump (1% Tardon Super:Diesel).

2) *Chromolaena odorata*: hand pull seedlings; mechanical control of large plants same as *Lantana camara*; chemical control of coppice and small bush plants (3% Roundup or 1% Garlon) chemical treatment of cut stump (2% Garlon:Diesel) *Chromolaena odorata* is moderately easy to remove but requires repeated follow-up operations. In certain areas where *Chromolaena* and *Lantana* have been burnt the use of herbicide on the coppice rootstock has been very effective. This is especially important around forest and bushclump edges, where to disturb the soil by digging stumps would only encourage alien plant seedling growth.

3) *Acacia mearnsii*: handpull seedlings; mature trees can be ring barked and /or felled with a chain saw and left to rot as they do not burn easily; chemical control of seedlings (1% Roundup:Water); chemical treatment of cut stump (2% Garlon:Diesel). *Acacia mearnsii* is difficult to control and time-consuming follow-up is essential

4) *Melia azedarach*: handpull seedlings; ringbark mature trees chemical control of seedlings (1.5% Roundup spray)(Conant 1985).

5) *Solanum mauritianum*: handpull seedlings; cut down mature plants to 10cm for chemical treatment; chemical control of seedlings and coppice (1.5% Roundup) chemical treatment of cut stump (2% Garlon:Diesel).

6) *Ricinus communis*: handpull seedlings, chemical control of seedlings (Roundup 1.5%).

7) *Rubus cuneifolius*: repeated mowing; chemical control (0.5% Garlon:Water) sprayed on leaves.

8) *Schinus terebinthifolius*: Handpull seedlings or burn; fell large trees and apply 2% Garlon:Diesel to cut stump.

10) *Eucalyptus* spp: Ring bark or felling of large trees, chemical treatment of seedlings or coppice (0.75% Roundup or Garlon:Water); chemical control of cut stump (2% Garlon:Diesel).

11) *Sesbania punicea*: handpull seedlings; uproot plants: Chemical control of coppice (0.5% Garlon:Water); chemical treatment of cut stump (1.5% Garlon:Water).

Category specific control methods for alien invasive species are given in the Agricultural Resources Act, the relevant sections of which have been included below. Please refer to the template of alien invasive plant species (procedure 4.4.6.7).

Declaration of weeds and invader plants

15. (1) Plants of the kinds specified in column 1 of Table 3 as category 1 plants are hereby declared weeds to the extent indicated in column 3 of the said Table opposite the names of the respective kinds of plants.

(2) Plants of the kinds specified in column 1 of Table 3 as category 2 plants and as category 3 plants are hereby declared invader plants to the extent indicated in column 3 of the said Table opposite the names of the respective kinds of plants.".

Combating of category 1 plants

15A. (1) Category 1 plants may not occur on any land or inland water surface other than in biological control reserves.

(2) A land user shall control any category 1 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E.

(3) No person shall, except in or for purposes of a biological control reserve –

(a) establish, plant, maintain, multiply or propagate category 1 plants;

(b) import or sell propagating material of category 1 plants or any category 1 plants;

(c) acquire propagating material of category 1 plants or any category 1 plants.

(4) The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with the requirements of sub-regulation (1) on such conditions as the executive officer may determine in each case.

Combating of category 2 plants

15B. (1) Category 2 plants may not occur on any land or inland water surface other than a demarcated area or a biological control reserve.

(2) (a) The executive officer may on application in writing demarcate an area as an area where category 2 plants may occur, be established and be maintained.

(b) An area in respect of which a water use license for stream flow reduction activities has been issued in terms of section 36 of the National Water Act, 1998 (Act No. 36 of 1998) shall be deemed to be a demarcated area.

(3) The executive officer shall demarcate an area for the occurrence, establishment and maintenance of category 2 plants only if –

(a) the category 2 plants in the area are cultivated under controlled circumstances; and

(b) the land user concerned has been authorised to use water in terms of the National Water Act, 1998 (Act No. 36 of 1998); and

(c) the category 2 plants or products of category 2 plants in the area are demonstrated to primarily serve a commercial purpose, use as a woodlot, shelter belt, building material, animal fodder, soil stabilisation, medicinal or other beneficial function that the executive officer may approve; and

(d) all reasonable steps are taken to curtail the spreading of propagating material of the category 2 plants outside the demarcated areas.

(4) When an area is demarcated for the occurrence, establishment and maintenance of category 2 plants the executive officer may impose such additional conditions as may reasonably be deemed necessary to keep the category 2 plants in the area in check.

(5) No person shall sell propagating material of category 2 plants or any category 2 plants to another person unless such other person is a land user of a demarcated area or of a biological control reserve.

(6) No person shall acquire propagating material of category 2 plants or any category 2 plants unless such material or such plants are intended for use in a demarcated area or in a biological control reserve.

(7) Propagating material of category 2 plants or category 2 plants shall only be imported or sold in accordance with the provisions of the Plant Improvement Act, 1976 (Act No. 53 of 1976), the Agricultural Pests Act, 1983 (Act No. 36 of 1983) and the environment conservation regulations.

(8) A land user shall control any category 2 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E.

(9) Unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland.

(10) The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with one or more of the requirements of sub-regulations (1), (3), (5), (6), (8) and (9) on such conditions as the executive officer may determine in each case.

Combating of category 3 plants

15C. (1) Category 3 plants shall not occur on any land or inland water surface other than in a biological control reserve.

(2) Subject to the provisions of sub-regulation (3), the provisions of sub-regulation (1) shall not apply in respect of category 3 plants already in existence at the time of the commencement of these regulations.

(3) (a) No land user shall allow category 3 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland.

(b) The executive officer may impose such additional conditions as may reasonably be deemed necessary with regard to category 3 plants already in existence at the time of the commencement of these regulations.

(c) A land user must take all reasonable steps to curtail the spreading of propagating material of category 3 plants.

(d) The executive officer may, after consultation with the land user, issue a direction in terms of section 7 of the Act that category 3 plants in existence at the time of the commencement of these regulations must be controlled by means of the measures prescribed in regulation 15F.

(4) No person shall, except in or for purposes of a biological control reserve –

(a) plant, establish, maintain, multiply or propagate category 3 plants;

(b) import or sell propagating material of category 3 plants or any category 3 plants;

(c) acquire propagating material of category 3 plants or any category 3 plants.

(5) The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with one or more of the requirements of sub-regulations (1), (3) and (4) on such conditions as the executive officer may determine in each case.

Designation of biological control reserves

15D. (1) The executive officer may on application in writing designate an area as a biological control reserve.

(2) The executive officer shall designate an area as a biological control reserve only if –

(a) the area concerned is used for the breeding of biological control agents by a biological control expert; and

(b) no other measures that may destroy or render the biological control ineffective are applied in that area; and

(c) the area concerned serves as a refuge from where biological control agents can move or be distributed to other infestations of category 1, 2 and 3 plants.

Methods of control

15E. (1) Where category 1, 2 or 3 plants occur contrary to the provisions of these regulations, a land user shall control such plants by means of one or more of the following methods of control as is appropriate for the species concerned and the ecosystem in which it occurs:

(a) Uprooting, felling, cutting or burning;
(b) Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer;

(c) Biological control carried out in accordance with the stipulations of the Agricultural Pests Act, 1983 (Act No. 36 of 1983), the Environment Conservation Act, 1989 (Act No. 73 of 1989) and any other applicable legislation;

(d) Any other method of treatment recognised by the executive officer that has as its object the control of the plants concerned, subject to the provisions of sub-regulation (4);

(e) A combination of one or more of the methods prescribed in paragraphs (a), (b), (c), and (d), save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.

(2) The methods contemplated in sub-regulation (1) shall also be applied with regard to the propagating material and the re-growth of category 1, 2 and 3 plants in order to prevent such plants from forming seed or re-establishing in any manner.

(3) The performance of an act of control is not in itself proof that the objects of the control methods have been achieved and follow-up operations are mandatory to achieve the appropriate level of combating.

(4) Where uncertainty exists about the presence or efficacy of any biological control agent, a biological control expert shall be consulted.

(5) Any action taken to control category 1, 2 and 3 plants shall be executed with caution and in a manner that will cause the least possible damage to the environment.

Application of other laws

15F. Nothing contained in this regulation shall derogate in any way from any obligation imposed on any land user in terms of any other law.".

Indicators of bush encroachment

16. (1) Indigenous plants of the kinds specified in column 1 of Table 4 are regarded as indicator plants indicating bush encroachment in the areas specified in column 2 of the said Table opposite the names of the respective kinds of plants.

(2) A land user of an area in which natural vegetation occurs and that contains communities of indicator plants shall follow practices to prevent the deterioration of natural resources and to combat bush encroachment where it occurs.

(3) One or more of the following practices shall be followed with regard to communities of indicator plants contemplated in sub-regulation (2) in order to remove the cause of the deterioration of the natural resources and to improve and maintain the production potential of the natural pastoral land:

(a) Uprooting, felling or cutting;

(b) Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer;

(c) The application of control measures regarding the utilisation and protection of veld in terms of regulation 9;

(d) The application of control measures regarding livestock reduction or removal of animals in terms of regulations 10 and 11;

(e) Any other method or strategy that may be applicable and that is specified by the executive officer by means of a directive.".

References

Every effort has been made to reference all sources used, however, some of the information gathered was taken from our own reports and sources of information and have not been referenced here.

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ENVIRONMENTAL MANAGEMENT SYSTEM
ISO 14001

PROCEDURE 4.4.7

EMERGENCY RESPONSE

Tongaat Hulett DEVELOPMENTS

Registration No. 81/12378/07

Date	Authorised Person	Responsible Person	Proposed review date	Procedure revision no.	Page No.
August 2012	Rory Wilkinson	Mahomed Alli	August 2013	3	Page 1 of 2

CONTENTS

1.0 AIM

To develop procedures for:

1) The effective response to emergency incidents at Tongaat Hulett Developments (office) and on project sites.
2) The control of emergency incidents at Tongaat Hulett Developments (office) and on project sites
3) Recording incidents and ensuring that where possible, all measures are taken to prevent them from re-occurring

A copy of this procedure as well as a Master Emergency Response Record will be kept at Tongaat Hulett Developments. All project sites will have a copy of this emergency procedure and an emergency response record must be present on each project site. The Main Contractor for each project site will provide the Project Manager with updated project site Emergency response records each month who shall forward such reports to Tongaat Hulett Developments' ESH Department. The ESH Officer will update the Master Emergency Response Record from all project site records on a monthly basis.

All emergency response procedures submitted by contractors must comply with or exceed the requirements set out in this procedure.

All contractors must comply with The Occupational Health & Safety Act and its regulations.

2.0 OFFICE EMERGENCY PROCEDURES

2.1 FIRE DRILLS

Emergency fire drills are run on a biannual basis. Staff are informed by e-mail of the month in which the fire drill will take place but not given specific dates. Records of fire drills are kept by the ESH Officer and system input notes are copied into the ISO 14001 folder. Records not available electronically are kept by the ESH Officer. These are available on Sharepoint and contains fire drills for THDev House and onsite records of fire drills.

At the time of the drill, the fire siren goes off, all staff head to emergency exists. Plans have been put in place to have access doors open automatically in case of emergency. Assembly points are marked on plans throughout the building.

2.1.1 RESPONSIBLE PERSON/S

The fire is to be reported to Mahomed Alli as the person directly responsible for implementing the emergency procedure. The fire should also be reported to the Executive in charge of Health and Safety (Rory Wilkinson). *Where the Executive in charge of Health and Safety is not available, the fire incident shall be reported directly to the ESH Officer* (Mahomed Alli)

All employees should be made aware of the procedure in case of fire.

2.1.2 PROCEDURE

1. Identify source and nature of fire
2. In the case of small fires, extinguish with material appropriate to the nature of the fire
3. Immediately contact ESH Officer-Mahomed Alli (083 243 1786). In case of a large fire contact Fire Department (031-361 0000)
4. If fire occurs outside the building, seal off exposed stormwater drains to ensure material used to extinguish fire does not cause any external contamination
5. Ensure that cleanup measures are taken if any contamination has occurred
6. Record in incident register: Nature of fire
   Cause of fire
   Cleanup measure taken
7. Where relevant record in non-compliance register
8. The ISO/Safety & Health Committee will review all fire reports
9. Adjustments will be made, if necessary, to the operational and emergency procedures and the Environmental Management System to prevent future occurrences.

2.1.3 RECORDS

Emergency Response Record	Record # 4.4.7.1
Incident reports record	Record # 4.5.3

3.0 ON SITE EMERGENCY PROCEDURES
EMERGENCY DRILLS

All contractors are responsible for on site emergency response, which is stated in the tender documentation and in the contract documentation. See Development Checklist

http://thd-sharepoint/projectmanagement/default.aspx?RootFolder=%2Fprojectmanagement%2FProject%20Management%20Document%20Library%2FStandard%20Documentation&FolderCTID=0x01200060E69E7160672444A4DE527FEC987E2E&View={B534685F-9B00-40F3-A362-2FD7AE1E7B7A}

3.1 SPILL RESPONSE
3.1. (a) SPILL CONTINGENCY PLAN
3.1.1 RESPONSIBLE PERSON/S

The spill is reported to the Main Contractor's Site Agent who reports it directly to the fuel company in the event of a diesel spill, to the Tongaat Hulett Developments Project Manager and to Tongaat Hulett Developments' Environmental Consultant.
The Project Manager shall report the spill to the Environmental Manager.
Where the Project Manager is not available, the spill shall be reported directly to the Environmental Manager.
All employees should be made aware of the procedure in case of a spill. The contractor is responsible for immediately containing the spill and for ensuring that it is adequately cleaned up, with the assistance of the service provider (fuel company) if necessary, and the affected area rehabilitated and measures instituted to ensure that such incident does not re-occur.

3.1.2 PROCEDURE

1. Identify nature of spill e.g. paint, diesel, etc.
2. Report spill to Site Agent who shall contact the service provider/fuel company and advise Tongaat Hulett Developments' Project Manager and the Environmental Consultant
3. Immediately contain spill, to spill area – ie ensure that spill does not run/flow away.

4. Locate spill kit where applicable or wait for the service provider/fuel company to arrive to assist
5. Ensure spill does not cause any external contamination (such as storm/ground water or soil). Where there may be contamination, the environmental consultant shall investigate and assess (and test if necessary) any potential seepage/contamination and prepare an Environmental Management Plan to address the issue -ie remedying any impacts, removing pollutants to a registered landfill site and advising on what will be required in order to ensure that such an incident does not re-occur.
6. Ensure that cleanup measures are taken if any contamination has occurred
7. Polluted areas to be removed to a registered landfill site and the area rehabilitated
8. Record in Incidents register
   Nature of incident
   Cause of incident
   Clean up measures
   Mitigation measures taken
9. Where relevant record in non-compliance register
10. The Environmental Manager shall review spill reports
11. Adjustments will be made, if necessary, to the operational and emergency procedures and the Environmental Management System to prevent future occurrences
12. The Environmental Consultant is to raise incident report and report to relevant authorities i.e. DAEA, DWAF and Pollution Control should it be required.

3.2 FIRE

3.2.1 RESPONSIBLE PERSON/S

The fire is reported to the Main Contractor's Site Agent who reports it to Tongaat Hulett Developments' Project Manager and to Tongaat Hulett Developments' Environmental Consultant.
The Project Manager shall report the fire to the Environmental Manager.
Where the Project Manager is not available, the fire shall be reported directly to the Environmental Manager.

All employees should be made aware of the procedure in case of fire.

3.2.2 PROCEDURE

1. Identify source and nature of fire.
2. In case of small fire extinguish with material appropriate to the nature of the fire
3. Report fire to Site Agent who shall contact the Tongaat Hulett Developments' Project Manager and the Environmental Consultant
4. In case of a large fire contact Fire Department
5. Seal off exposed stormwater drains to ensure spill does not cause any external contamination
6. Ensure that cleanup measures are taken if any contamination has occurred
7. Record in incident register:
   Nature of incident
   Cause of incident
   Clean up measures
   Mitigation measures taken
8. Where relevant record in non-compliance register
9. Environmental Manager shall review all fire reports
10. Adjustments will be made, if necessary, to the operational and emergency procedures and the Environmental Management System to prevent future occurrences.

3.2.3 RECORDS

Primary Emergency response record	Record # 4.4.7
On site Emergency Response Record	Record # 4.4.7.1
Incident reports record	Record # 4.5.3

3.3 EROSION INCIDENT / LANDSLIDE

3.3.1 RESPONSIBLE PERSONS

The landslide or erosion event is reported to the Main Contractor's Site Agent who reports it to Tongaat Hulett Developments's Project Manager and to Tongaat Hulett Developments' Environmental Consultant.
The Project Manager shall report the incident to the Environmental Manager.
Where the Project Manager is not available, the incident shall be reported directly to the Environmental Manager.

All employees should be made aware of the procedure in case of a landslide or erosion event.

3.3.2 PROCEDURE

1. Report landslide/erosion to Site Agent who shall contact the Tongaat Hulett Developments' Project Manager and the Environmental Consultant
2. Contain slide/erosion incident to affected area
3. Determine reasons for landslide / erosion and damage i.e. inappropriate stormwater control measures taken
4. Where eroded material has covered a road / neighbouring property or has moved off site, remove as quickly as possible and relocate material to an appropriate location on site
5. Make reparations to damaged property
6. Rehabilitate eroded area using eroded material where possible
7. Immediately institute measures to prevent erosion / landslide from re-occurring

11. Record in incident register:
    - Nature of incident
    - Cause of incident
    - Clean up measures
    - Mitigation measures taken

3.3.3 RECORDS

Primary Emergency response record	Record # 4.4.7
On site Emergency Response Record	Record # 4.4.7.1
Incident reports record	Record # 4.5.3

3.4 ACCIDENTAL WATER RELEASE (MAJOR)

3.4.1 RESPONSIBLE PERSONS

A major accidental release of water is to be reported to the Main Contractor's Site Agent who reports it directly to the Tongaat Hulett Developments Project Manager and to Tongaat Hulett Developments' Environmental Consultant.
The Project Manager shall report the incident to the Environmental Manager.
Where the Project Manager is not available, the incident shall be reported directly to the Environmental Manager.

All employees should be made aware of the procedure in case of an accidental water release or leak

3.4.2 PROCEDURE

1. Determine source / cause of water release / leak
2. Immediately remedy source of water release i.e. if a pipe is leaking turn of water at main release valve, if water leak is from a containment tank, immediately carry out necessary emergency

8. Report incident to Site Agent who shall contact the Tongaat Hulett Developments' Project Manager and the Environmental Consultant
3. Record in Incidents register
   Nature of incident
   Cause of incident
   Clean up measures
   Mitigation measures taken repairs

3.5.3 RECORDS

Primary Emergency response record	Record # 4.4.7
On site Emergency Response Record	Record # 4.4.7.1
Incident reports record	Record # 4.5.3

3.5 INJURY/FATALITY

3.5.1 RESPONSIBLE PERSONS

A (Lost Time) injury or fatality reported to the Main Contractor's Site Agent who reports it to the Tongaat Hulett Developments Project Manager and to Tongaat Hulett Developments' Safety Agent.
The Project Manager shall report the incident to the ESH Manager.
Where the Project Manager is not available, the incident shall be reported directly to the ESH Manager.

All employees should be made aware of the procedure in case of an injury

3.5.2 PROCEDURE

Injury

1. Identify extent of injury
2. Determine whether injury can be dealt with as a first aid case or if a doctor is required
3. Report the injury to the Site Agent who shall, in the event of a Lost Time Injury, report such injury to Tongaat Hulett Developments' Project Manager and to Tongaat Hulett Developments' Safety Agent.
4. Take injured person to onsite first aider or to the nearest doctor/hospital where required
5. Record in Incidents register
   Nature of incident
   Cause of incident
   Clean up measures
   Mitigation measures to ensure an injury does not re-occur

Fatality

1. Report the fatality to the Site Agent who shall report it to Tongaat Hulett Developments' Project Manager and to Tongaat Hulett Developments' Safety Agent.
2. Report the fatality to the Department of Labour and SAPS if required.
3. The body(ies) shall not be touched or the surrounding area interfered with until Tongaat Hulett Developments' Project Manager and Safety Agent have inspected the site and until the Department of Labour has given its approval.
4. Record in Incidents register
   Nature of incident
   Cause of incident
   Clean up measures
   Mitigation measures to ensure that fatality does not re-occur

3.6.3 RECORDS

Incident reports record Record # 4.5.3

Dust Management Procedure

1. Every development to have an Environmental Management Plan (EMP) that includes specific details in regard to management of dust impacts on site
2. Adequate and appropriate training of contractors in regard to the provisions in the EMP for each development
3. Identification of high risk areas to be undertaken upfront and on an ongoing basis where such areas are to be dealt with specifically and additional measures implemented if necessary.
4. Areas adjacent to existing residential properties are to be provided with sufficiently high dust fence
5. The stockpiling of material to be limited as far as possible and where such is to be in place for a period of time, then suitable measures are to be implemented to ensure that such do not generate dust – eg covered, seeded, sod ding etc.
6. A sufficient number of watering carts/trucks are to be implemented from the commencement of construction and the effectiveness of such to be monitored on a regular basis and additional carts/trucks added where necessary
7. Exposed areas are to be covered and/or seeded
8. Primary movement routes to be kept regularly watered by a dedicated truck/cart
9. Trenches to be backfilled and seeded as promptly as possible
10. Weather conditions to be monitored by contractors ahead of time and suitable plans implemented in times of high wind - Contractors to daily check weather forecasts (windguru.com etc(to plan watering operations.
11. Vehicles travelling to and from the construction site must adhere to speed limits so as to avoid [reducing excessive dust.Any person found to be contravening this provission shall be fined.A fine of R5000 will be issued by the ECO – ESH Officer and paid to the Developer for use in the management and restoration of the forest and open space.
12. Water trucks/carts to be on standby during times of high winds over weekends
13. Measures under investigation,to improve the turn around time of water carts,include the use of an additional (closer) water source,and reducing the time of extract required by using an additional,or bigger pump.
14. All contractors working within the Development are to implement the dust control measures as covered in the EMP.

Noise Management Procedure

1. Every development to have an Environmental Management Plan (EMP) that includes specific details in regard to management of noise impacts on site
2. Adequate and appropriate training of contractors in regard to the provisions in the EMP for each development
3. Identification of high risk areas to be undertaken upfront and on an ongoing basis where such areas are to be dealt with specifically and additional measures implemented if necessary.
4. Working hours are to be strictly adhered to and are as follows – 07:00 – 17:00 during work days and 07:00 – 13:00 during Saturdays
5. If work outside of the above hours to be formally applied for and the surrounding residents notified.
6. Reverse Hooters to be turned off during any weekend work
7. Machinery and construction vehicles should be fitted with silencers/noise reduction filters
8. Construction workers must be sensitized to the need to limit unnecessary noise whilst working in close proximity to existing residences

SPILL CONTINGENCY PLAN

1 INTRODUCTION

1.1 Objectives

A spill contingency plan is required for all undertakings involving the handling and storage of petroleum products or hazardous materials. Spill preventative measures are the best means of avoiding accidental release of fuel which can adversely affect the environment. This plan is intended to prevent spills and, in the event of a spill, to minimize the impact of the spill on the environment. The purpose of this Spill Contingency Plan is to:

- Facilitate the prompt, efficient and safe clean-up of materials spilled during the construction and operational phases during the development.
- Identify the reporting procedures in the event of a spill

This spill contingency plan is applicable to the developer, the contractors and service providers, employees and visitors to the site.

2 HAZARDOUS MATERIALS INFORMATION (MSDS)

Details of all Hazardous materials must be included in the Health and Safety File as well as displayed where and hazardous materials are stored. The supplier of these hazardous materials must provide Material Safety Data Sheets (MSDS) for all products. The MSDS should include the following information:

- Product and Company Identification
- Composition/Information on ingredients
- Hazards Identification
- First-Aid Measures
- Fire-fighting measures
- Handling and storage
- Exposure control/personal protection
- Physical and chemical properties
- Stability and reactivity
- Toxicological information
- Ecological information
- Disposal considerations
- Transport information

- Regulatory information
- Any other applicable information

This should be provided free of charge from the supplier. Should a MSDS not be provided, the supplier should issue sufficient information to enable the user to take the necessary measures as regards to health, safety and environmental.

3 HANDLING AND STORAGE

All activities must be appropriately carried out as per the Hazardous Chemical Substances Regulations 1995, Section 14:

Labelling, packaging, transportation and storage

"An employer shall, in order to avoid the spread of contamination of an HCS[1], take steps, as far as is reasonably practicable, to ensure:
(a) That the HCS in storage or distributed are property identified, classified and handled in accordance with SABS 072 and SABS 0228;
(b) that a container or a vehicle in which an HCS is transported is clearly identified, classified and packed in accordance with SABS 0228 and SABS 0229; and
(c) That any container into which an HCS is decanted is clearly labelled with regard to the contents thereof."

3.1 Hazardous Materials

Construction Phase

- Proper designated areas and storage facilities must be provided for all hazardous materials to prevent the spread of the spillage into the environment.
- All hazardous materials storage facilities must be located on an impermeable surface and must be enclosed by a sealed bund wall. The bund wall must have the capacity to contain 110% of the maximum volumes stored to ensure that soil or watercourses are not polluted on the event of a spill in the storage areas.
- The contractor must ensure the all Safety, Health and Environmental risks of spills are communicated to all employees. All employees should also receive task specific training for handling of any hazardous material. Casual and contractors labourers' are to be familiarized with all the relevant precautions when they are employed (Occupation Health and Safety Act 85 of 1993, Section 13).
- The contractor should ensure that a site-appropriate spill kit and relevant personal protective equipment (PPE) is readily available in the event of a spill.
- The transfer of fuel must be stopped prior to overflowing, leaving room for expansion.

- Any fuel operated machinery or vehicle is not to be overfilled. All machinery must be maintained in good working order as to prevent soil and groundwater pollution from leaks and spills.
- All hazardous waste must be stored in designated containers and be disposed of at a registered landfill site.
- Smoking must be prohibited near the use of any hazardous material and flammable substances.
- Fire Extinguishers must be readily available where any hazardous materials are being stored or used.
- The area where a spill has occurred must be rehabilitated after the spill has been cleaned up.
- Drip trays should be used under generators and cement mixers to shield the soil or vegetation below.
- Where possible, oil should be recycled.

Operational Phase

Most spills are caused by operator error, poor operation practices and inadequate maintenance. Common operator errors are overfilling, valves left open, poor transfer procedures, lack of product monitoring, and poor maintenance practices. Operational errors can be greatly reduced through:

Task specific training

- Emergency contacts and phone numbers must be displayed. The details of the person responsible for the cleaning up of spills must also be displayed and communicated to all employees. Location of spill kits should be communicated to operating personnel as well as other employees.
- Spill response training will need to be provided for the person that is appointed to attend to spills.
- Task specific training must be provided for those employees monitoring and handling any hazardous material. Proof of this training should be kept in the Health and Safety File
- Safety training on site shall include operational procedures, emergency procedures, safe working procedures, information on specific hazards, first aid and firefighting and proper use of PPE.
- Unauthorized persons shall not be permitted access to the storage areas.
- Instructions and phone numbers shall be posted publicly regarding the report of a spill.
- Routine groundwater monitoring and sampling schedules must be setup and implemented. A competent person must be appointed to undertake these tasks.

Awareness of the critical nature of spill prevention

- Employees must be educated on the effects of the fuel to the local environment through discharge to stormwater systems and watercourses.
- Explain the nature of the product with regard to spills – Some of this information should be included in the Material Safety Data Sheet (MSDS).
- Toxicity of stored fuel to humans, plants and animals. Petroleum contains a mixture of compounds that are hazardous to organic health. (eg. Benzene which are cancer causing agents, Hydrocarbons which are linked to problems ranging from headaches to respiratory diseases.)

Proper and continuous supervision of procedures

- Ensure that proper procedures are in place for handling and storage of the hazardous materials *E.g. When unreeling a fuel transfer hose, the nozzle must be in an upright position and be kept clear of the ground when returned to the storage position.*
- Ensure that workers know and follow all procedures
- Ensure that all employees attend the procedural training as procedures may change
- Check all procedure and records to verify compliance and record all findings.

3.2 Fuel storage: Underground storage tanks

The design and implementation of the underground storage tanks must comply with SANS 10089-3 and SANS 1535. The additional requirements below must also be considered:

- The conditions of the tank, associated piping and the monitoring wells must be inspected on a regular basis.
- Any storage tanks must be fitted with and overfill protection device.
- All transfer of fuel shall be controlled by a competent person. The attendant must be aware of proper fuel handling procedures to minimize the risk of a spill and shall continuously check the areas adjacent to the storage tanks for possible leaks or spills.
- Absorbent pads should be placed around the fuel inlet prior to dispensing.
- Welding and/or burning operations should not take place within 6 metres of the storage tanks.
- Fire extinguishers must be located at significant points on the site. The worker required to operate the extinguisher must receive firefighting training. Details of this must be included in the Health and Safety File.
- Smoking **WILL NOT** be permitted during or near any fuelling operation. “No Smoking” signs are to be posted around the storage area.

- Written procedures or work instructions are required for the inspection of the underground tanks. Tanks must be dipped daily and reconciled against volume to check the losses that may have occurred due to leakage. The following additional inspections may also be undertaken:
  - Corrosion
  - Damages to the tanks, valves, pipes or hoses
  - Blockages to valves, pipes or hoses
  - Any other factors that may lead to leakage
- Records of these inspections should be kept on site, in the Health and Safety file.
- Access to these tanks should be limited to operating personnel.

4 EMERGENCY RESPONSE PLAN

4.1 Response procedure

In the event of a spill, the following procedure should be followed:

- Isolate the area to protect all employees or visitors to the site.
- Identify the source of the spill and stop the leak if possible.
- Remove any sources of ignition.
- Assess the level of the spill.
- Review Material Safety Data Sheets (MSDSs): MSDS are used to determine the necessary PPE required for a response to spill situations (e.g., protective suits, boots, gloves, respiratory protection, etc.).
- Identify method of cleanup and potential hazards.
- Protect storm drains or sewers, or any other point of access to the environment.
- Contain the spill: the most common method is to place either absorbent or non-absorbent dikes around the perimeter of the spill.
- Proceed with recovery of spilled fuel and clean up.
- Arrange for the appropriate disposal of the spilled material.
- In the event of small spills, arrangements for remediation must be made immediately.
- All hazardous waste must be contained in separated designated containers and disposed of at registered landfill sites.
- Spills must not be washed off onto the street, into watercourses or stormwater systems. No spills should be hosed into the natural environment.
- File a Spill Report and report as necessary to the Department of Water Affairs and eThekwini Municipality (Environmental Section). Records of any environmental incident must be reported to Tongaat Hullet. Records of the spill must be maintained.

4.2 Spill Response Supplies

The following supplies should be maintained and records of inspections should be kept at all times:

- Spill kits
- Sorbents
- Absorption pads
- Personal protective equipment (PPE)
- Caution tape and cones
- Tools and drums

4.3 Notification

A list of the appropriate people to be notified in the event of a spill should be available on site with their contact details.

5 CONCLUSION

Any significant spill has the ability to endanger employees' health or lives, create environmental damage and have a large financial impact. Therefore it is imperative that all the necessary precautions are taken to prevent spillage