



## **Final Waste Management Plan for the Radisson Blu Safari Resort - Malelane, Kruger National Park**

Malelane Safari Resort Investments (Pty) Ltd

May 2011

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# QUALITY MANAGEMENT

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# 1 Preliminaries

## 1.1 PURPOSE OF THIS DOCUMENT

As part of the duty of care requirements of both the National Environmental Management Act (NEMA) (No. 62 of 2008) and the Kruger National Park (KNP) Operations Manual for Concessionaires (**Appendix B**), the Radisson Blu Safari Resort (the concessionaire), hereafter referred to as “the resort” is obligated to develop a waste management strategy and implement appropriate solutions for the cradle to grave management of the waste streams that are generated during the construction, operational and decommissioning phases of the resort. The NEMA and KNP Management Plan further recommend the identification of opportunities to reduce the creation and disposal of the waste generated at the resort.

This Waste Management Plan (WMP) is therefore a key management tool that will contribute towards achieving sustainable waste management throughout the operation of the resort. The WML focuses primarily on the operational aspects of the resort, however as required by the legislation, the construction and decommissioning phases are also addressed (**Appendix A**).

## 1.2 OBJECTIVES OF THE WMP

The objective of this WMP is to:-

- Formalise waste handling, transfer and disposal activities associated with waste from the resort;
- To prevent inappropriate management of waste and associated risk of pollution of the environment;
- To facilitate waste minimisation entailing avoidance, reduction, reuse, recycling or treatment before disposal;
- To streamline waste segregation, storage, and disposal and promote resource recovery from waste;
- To contain, control and dispose of waste in accordance with the required waste management practices (e.g. waste segregation);
- To define responsibility for waste management at the various levels of operation associated with resort;
- To provide a framework for the selection of waste management service providers in line with cradle to grave principles.
- To provide actions and guidelines to ensure that waste management is undertaken in line with:-
  - KNP Operations Manual for Concessionaires – Extracted Waste management guidelines (**Appendix B**);
  - SANParks Environmental Guidelines for Private Parties for the Construction and Operation of PPP Facilities;
  - Existing South African waste management legislation, waste management guidelines and policies; and international best practise (Waste Hierarchy).

# 2 Operational Overview and Waste Types

## 2.1 RESORT OVERVIEW

The resort comprises 240 beds and associated facilities including a clubhouse with a place of refreshment and pool area; restaurant and conference venue, and wellness centre / spa. Ancillaries include the sewage collection system<sup>1</sup> and treatment plant, grounds and maintenance facilities incl. workshops and stores.

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<sup>1</sup> The sewage treatment plant comprises a Biofilter Rotating Biological Contactor (RBC) package treatment plant and associated sewage network. The estimated total liquids waste generated per day amounts to 36kl/day with a maximum flow estimated at 70kl/day.

## 2.2 WASTE STREAMS

The following predominant waste streams are expected to be generated at the resort:-

- **Landscaping and Kitchen Wastes:** - Landscaping waste will include predominately vegetation wastes (straw, leaves grass cuttings, flowers or trimmings from bushes and hedges) and kitchen waste (include food wastes, fruit and vegetable peelings, leftovers (including meat and fish), egg and nutshells, coffee grounds, tea leaves, husks and seeds,) is expected to be a major component of the resort's solid waste stream. These wastes are grouped into one waste stream, on the basis that they are both amenable to composting and may be managed collectively. This waste stream specifically excludes kitchen cooking oil, grease and fat which is not suitable for composting.
- **General Waste:** - General waste refers to waste classified as non-hazardous and can be defined as waste that does not pose an immediate threat to public health or the environment if properly managed. The general waste stream generated at the resort is expected to consist of solid waste generated from daily operation activities wood, paper, cardboard metal and plastic packaging, glass etc.
- **Hazardous Waste:** - Hazardous Waste is defined as waste that has the potential, even in low concentrations, to have significant adverse effects on public health and the environment because of its inherent toxicological, chemical and physical characteristics. Common potential hazardous wastes that are expected to be generated at the resort include:
  - Unwanted, expired or contaminated chemicals including cleaning agents and detergents, disinfectants, oils, greases, solvents and solvent based paints, pool, landscaping and pest control substances.
  - Office products including expired printer cartridges and photocopying fluids, and waste electronic equipment;
  - General items such as batteries and fluorescent lamps.
  - Used cooking oils, fats and greases<sup>2</sup>.
- **Untreated Sewage:** - Sewage and waste water generated by ablutions and kitchens comprises a mixture of black (from toilets) and grey (e.g. from showers and sinks) constituents. Untreated sewage presents a biological / pathogenic health risk and is therefore categorised as a hazardous waste.
- **Sewage Sludge:** - The septic tanks associated with the sewage treatment plant will need to be periodically de-sludged (e.g. every 3-5 years); this will produce small quantities of sludge exhibiting similar toxicological characteristics as untreated sewage i.e. hazardous waste.
- **Treated Effluent:** - Although treated effluent is technically not regarded as a waste (i.e. due to the fact that it has been treated and rendered safe for environmental discharge or alternative uses (e.g. irrigation), it is considered in the WMP for the purposes of completeness i.e. in terms of the cradle to grave principle.

## 3 Waste Management Plan Principles

### 3.1 WASTE MANAGEMENT HIERARCHY

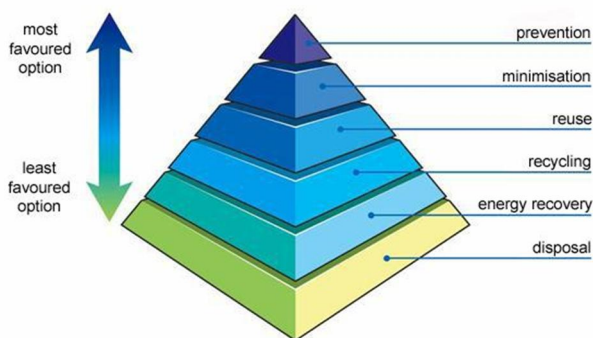
In accordance with international trends, the management of all waste streams that will be generated at the resort should demonstrate support for the Hierarchy of Waste Management (HWM) (Figure 2), which is the basic principle of this WMP. The HWM aims to promote the re-use and recycling of wastes, giving effect to the concept of 'cradle-to-cradle' waste management.

The HWM can be viewed as a straightforward set of management plans for waste. The hierarchy sets forth several waste management strategies or options according to importance and preference in a descending order. The aim is to extract the maximum practical benefits from the products and manage waste in the best possible manner, so that the minimum amount of waste is generated. Options of the hierarchy are listed as follows:

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<sup>2</sup> Although feasible that these wastes could be classified as non-hazardous waste for disposal via general landfill, the ecological risk, particularly within the KNP warrants a cautious approach i.e. categorisation as hazardous waste.

- **Prevention** is the best and most preferred strategy or option, and therefore ranks first. It is the most cost effective, as no waste means no cost is involved in its management.
- **Minimisation** the generation of waste is the first option that should be considered, refers to the prevention of wastes from arising and optimising material usage. This approach promotes the efficient use of resources and minimises the volume of waste material that must be handled by employees and hauled away from the resort's property. Responsibility for the minimisation of waste generation generally lies with management, who decides what is brought into the property and, thereby, determines what eventually leaves the property as waste.
- **Reuse** refers to the process of using existing material instead of disposing this material to landfill. Whenever possible, the Safari resort should reuse items in their original form for the same or a different purpose rather than discarding them. If an item cannot be reused on site, the resort operator should investigate the possibility of selling it or donating it to employees, charitable organisations, schools, businesses or other interested parties.
- **Recycling** is considered when reuse can no longer be carried out. Recycling refers to the collection of the recyclable waste streams that can be reused on site. The important step to ensure effective recycling practises is onsite waste segregation. This is the least favourable of the three waste management options and should be considered only if the reduce and reuse options are not applicable to specific waste streams. Encourages the separation at source of recyclable material from the general waste stream (waste separation at source is proposed, as the quality of recyclable materials is higher when separated there and not when mixed with other waste). It is also the waste management option that is most difficult to implement.
- **Energy Recovery** can be a viable option after reduction; reuse and recycling have been fully explored and generally is the final step in the exploitation of maximum benefits from waste. It can for example involve the incineration of waste (under strictly controlled conditions and licensing) and the recovery of the latent heat energy of the materials. The heat energy can then be converted into power to be used commercially or domestically.
- **Disposal** is the last and least preferred options in the hierarchy. There is always some residual material left over as waste. This is the case even after undergoing the preferred options in the solid waste management hierarchy. The left over waste occasionally requires treatment prior to disposal to safe guard against environmental risks, pest problems, social, health, and safety issues.



**Figure 2 – Typical Waste Management Hierarchy** (Image reproduced courtesy of the Image reproduced courtesy of the UK Environmental Protection Agency).

### 3.2 KNP ENVIRONMENTAL MANAGEMENT PLAN

Environmental management within KNP is guided by corporate environmental principles and the KNP's environmental objectives which aims to enable responsible tourism, ensure environmental best practice, legal compliance and due diligence, while environmental ethics are incorporated and practiced in all endeavours.

The core principles regarding solid and liquid waste management (**Appendix B**) were considered in the compilation of the WMP.



## 4 Management Actions

This section is the core of the WMP, and comprises steps to be taken by the resort operators in order to implement the objectives of WMP. The management actions take cognisance of the WMP principles, and provide steps to be taken at the generation, collection, transportation, recovery or disposal stages of the waste management process.

The following guidelines have been included in the WMP to as a source of information to the resort regarding best environmental practices. The guidelines present various waste management recommendations which would be selected for implementation based on their applicability to the resort operation at any given time. In this way the guidelines will allow the resort to continually evaluate options to improve waste management (i.e. continual improvement).

### 4.1 WASTE MANAGEMENT AREAS / FACILITIES

Wherever practical, waste should be transported by the resort operator (or appointed waste service provider) from the point of generation directly to the centralised waste storage area where it can be safely stored prior to offsite disposal. For efficiency it is permissible to establish intermediate storage areas / collection points; this would be at the discretion of the resort management, and all such areas would have to comply with safe storage requirements.

The WMP contains guideline specifications of temporary storage of waste at the central storage area, as well as at intermediate collection points (refer to **Appendix C**) prior to offsite disposal.

### 4.1 OFF-SITE (LANDFILL) DISPOSAL

Even though the WMP recommends efficient drivers in order to reduce and recover maximum value the amount of waste materials produced, a portion of the waste generated at the resort will still require to be disposed to a permitted landfill. It is WSP understanding that the closest landfill to the Malelane entrance gate is the TSB Sugar (TSB) operated landfill which is in the process of being permitted. This facility currently receives solid waste, commercial / non-hazardous industrial wastes, and construction waste generated in the Nkomazi Municipality. It must be noted that the TSB site is approaching its end of life due to dwindling available airspace. Upon communications with the Nkomazi municipality (on the 06 June 2011), it was established that the Steenbog landfill within the Malelane area is currently under construction and is expected to be commissioned in 2012. It is suggested that the resort obtains consent / confirmation from TSB to dispose their waste at the TSB facility; this is considered to be the most economical option until all the available permitted airspace at the TSB facility has been filled, thereafter the newly commissioned Steenbog landfill site should be considered as a longer term disposal option. The following waste disposal principles should be adhered to:

1. The legal requirements of cradle-to-grave principles (duty of care obligations) should be adopted and enforced by the resort – this means ensuring that only reputable waste transport companies and permitted waste disposal facilities are used.
2. Recordkeeping of the waste types and quantities must be as accurate as possible, as it is important for planning and reporting purposes. It is suggested that landfill waybills must be obtained and appropriately filled by the resorts management.

### 4.2 LANDSCAPING AND KITCHEN WASTE

Good management practises suggests that the solid wastes from the kitchen and landscaping activities, be macerated and the options of in-situ composting (recycling) should be investigated. Not all kitchens wastes are permitted to be used for the purpose of composting, it must be noted that meats, dairy products, eggs and cooking oils are cannot be composted. It is suggested that in order to effectively manage the organic waste stream, that the resort operator develop and implement a comprehensive system for organic waste separation, recycling, and composting. (See **Appendix D – Organic Waste Management Guidelines**); in consultation with these guidelines, the following should be adhered to:

3. The resort should develop a comprehensive system for waste separation at the relevant generation points to facilitate composting. Waste should be separated into items which can be reused, composted, or recycled, and the remaining portion sent to the general waste stream for disposal at landfill.



4. The resort's kitchens should make arrangements to donate un-served food to staff, local shelters, food banks or the adjacent communities, taking care to ensure that relevant food regulations are adhered to (e.g. maintenance of cold chains). A separate legal opinion should be obtained to ensure that the resort is not exposed to increased risk or liability as a result of this practice.
5. The resort should endeavor to compost as much suitable waste as possible. Composting activities can significantly reduce a resort's organic waste stream and eliminate the need to purchase fertilizer or mulch. It provides a useful way of reclaiming nutrients from organic refuse. The generated compost can be reused as fertilizer or in the resort's grounds maintenance.

#### 4.3 GENERAL WASTE

The KNP Operations Manual for concessionaries (**Appendix B**) requires that all solid wastes need to be stored safely before removed off site to accredited waste processing sites. Based on this, it is suggested that the inorganic waste should be segregated (into recyclable / non-recyclable components) onsite and transported to an approved re-cycling depot or to an approved landfill site outside the KNP. In order to effectively manage the general waste streams generated at the resort, it is suggested that the resort operator should apply waste management techniques that aim to avoid and reduce the volume of waste generated at the resort (See **Appendix E** – Guidelines for general waste management the recycling of general wastes); in consultation with these guidelines, the following should be adhered to:

1. The resort should adopt waste reduction procurement philosophy, also known as "Greener purchasing", "Pre-cycling", or "eco/green procurement". This outlook involves integrating environmental considerations into purchasing policies, programs and actions.
2. The resort should separate viable recyclable components from the general waste stream prior to disposal. The types of waste separation practices that should be considered should be based on the availability of an end-user or purpose. These options would typically be explored in conjunction with a private waste management contractor. Recyclables that are typically recovered from general waste include metals, plastics, glass, and paper / cardboard.
3. In order to facilitate recycling it will be necessary to employ waste segregation practices; using different skips / receptacles where possible. Waste storage receptacles must be covered or lidded to prevent scavenging by wild animals and vermin, and to prevent waste from being windblown into the adjacent sensitive areas; furthermore these skips / receptacles should be emptied on a weekly basis to prevent the formation of odour.

#### 4.4 HAZARDOUS WASTE

Considering the sensitivity of the KNP, the hazardous waste generated at the resort will require stringent control and management to prevent harm or damage and hence liabilities to this end a guideline has been prepared (**Appendix F** – Guidelines for the management of hazardous wastes), in consultation with these guidelines, the following should be adhered to:

1. As a minimum requirement, hazardous waste must be separated at source from the general waste stream. This will ensure that non-confirming waste does not enter the landfill site, as well as preventing cross contamination and potential risks to personnel and the environment.
2. In addition to the hazardous wastes identified in this WMP, the resort will be responsible for the identification of potential additional hazardous wastes associated with new practices, and the implantation of systems for their safe disposal.
3. The generation of hazardous waste should be avoided wherever possible. This would typically be implemented through procurement processes e.g. purchasing of less toxic / environmentally friendly products for use at the resort.
4. Unavoidable hazardous waste is to be handled, stored and disposed of / recovered in a manner that does not result in environmental pollution or health and safety hazards to personnel.
5. Only suitably qualified waste service providers should be used for the management of hazardous waste. This entails ensuring that all transportation and disposal / recovery permits and licenses are held by the service provider.

6. All hazardous waste transported from the resort must be reconciled with safe disposal certificates to be issued by the waste management service provider. These should be kept on file for inspection by the environmental authorities if required.
7. The disposal of hazardous waste is required to comply with all relevant Regulations, Norms and Standards pertaining to waste classification in order to ensure disposal at the correct landfill class.

#### 4.5 SEWAGE

Sewage from the resort is treated at the on-site sewage treatment plant, which has been designed to ensure that treated effluent meets or exceeds South African water quality regulations prior to discharge or reuse. All the bulk and reticulation systems conform to the guidelines set out in the Environmental Guidelines for Concessionaire's Operation within the South African National Parks. The following should be adhered to:

1. Water conservation practices should be encouraged wherever possible in order to reduce the amount of sewage requiring treatment.
2. In the event of a failure or overflow situation at the sewage treatment plant, the resort is required to implement a back-up system which will ensure that no sewage is discharged into the environment.
3. The sewage treatment plant is to be operated and maintained by suitably qualified personnel at all times, in strict accordance with the operating procedures.

In terms of treated effluent from the sewage treatment plant, the discharge / reuse of treated effluent is required to comply with the relevant water quality standards and/or guidelines. Further information in this regard is provided in **Appendix G** – Guidelines for the management of treated effluent).

## 5 Conclusion

In terms of NEMA, everyone is required to take reasonable measures to ensure that they do not pollute the environment. Reasonable measures include informing and educating employees about the environmental risks of their work and training them to operate in an environmentally responsible manner. Furthermore, in terms of NEMA, the cost to repair any environmental damage shall be borne by the person responsible for the damage.

If the abovementioned waste management recommendations are adopted, it is anticipated that the majority of negative environmental impacts caused by improper management of the various waste streams can be mitigated.

# Appendix A - Construction Phase / Decommissioning Waste Management Plan

Construction waste consists of mostly inert, unwanted materials directly or incidentally produced during the construction phase. Waste generated from construction activities on-site may include, concrete; timber off-cuts; insulation; scrap metal; general building and office refuse; waste soils from excavations; waste building materials; residual vegetative material; and oil and diesel contaminated materials. Improper management of the construction wastes generated has the potential to result in contamination and pollution of soils, ground water; the adjacent water bodies (Crocodyle River and Timfenheni Spruit) and adjacent properties from litter and wind or scavenger distribution of construction waste. This could eventually pose a threat to sensitive ecology of the KNP. However, these potential impacts are anticipated to be minimal provided the implementation of the following mitigatory measures /actions are adhered to.

## CONSTRUCTION SITE REQUIREMENTS

- A copy of this WMP must accompany all subcontractor agreements and require subcontractor participation.
- Each subcontractor will be made aware of the intent of this project with respect to reduction of waste and recycling.
- The subcontractor will be expected to make sure all their crews comply with the WMP, by promoting good practice awareness as part of health and safety induction / training for workers onsite. The implementation of appropriate training and induction procedures should ensure that all sub-contractors adopt best practice waste minimisation procedures.
- Based on the sequence and timing of construction activities, material specific waste hauling containers will be strategically located on the site and will be clearly marked.

## NON-HAZARDOUS CONSTRUCTION WASTE

Non-hazardous waste refers to waste which is not classified as hazardous waste. Including concrete; timber off-cuts; insulation; scrap metal; general building and office refuse; waste soils from excavations and litter generated by the workforce.

- Metal waste is divided into ferrous (metals that consist primarily of iron and have low scrap value) and non-ferrous (metals and alloys not composed of iron e.g. copper, tin, aluminium, bronze, etc that have high scrap value). Metal waste does not pose any significant threat to public health or the environment if properly managed. Metal waste has commercial value and is to be sold on to a scrap metal contractor for recycling purposes.
- Wood waste includes oversized cable reels, wooden packaging boxes, pallets and other wood materials. The storage of wood waste poses a potential fire risk, but generally does not pose a risk to the environment.
- Pallets in good condition may be reused and are to be returned to materials suppliers on a return system – this will need to be negotiated with the relevant suppliers,
- Damaged wood waste is to be donated to local communities
- Keep the site tidy to reduce material losses and waste. The appointed contractor will ensure that all personnel immediately deposit waste in the waste bins provided,
- Recycle suitable spoil, demolition materials, prunings, and surplus construction material arising from the works on site to avoid the need to transport materials,

## HAZARDOUS CONSTRUCTION WASTE:

Hazardous waste can be defined as waste which can, even in low concentrations, have significant adverse effects on public health and/ or the environment.

- Waste from ablution facilities must be regularly removed and care must be taken to ensure that there is no spillage, which would result in possible soil or water contamination.
- Load and unload any solid hazardous materials in a manner that reduces potential spills.

- Hazardous waste disposal must be undertaken by an approved waste contractor.
- Hazardous substance containers, contaminated soil, clean-up materials, etc., must be transferred to an appropriate disposal site on a regular basis.
- Safe disposal certificates for any hazardous waste removed from the site must be kept on file.
- Complete waste transfer notes before any waste leaves the site
- Ensure all waste service providers have a valid waste carriers registration certificate
- Disused fuels, solvents and other liquid wastes (e.g., used oils from construction vehicles) maybe stored on site in vessels equipped with secondary containment structures to prevent contamination of soil, groundwater and surface waters due to accidental spills or releases.
- Ensure construction, demolition and refurbishment contractors have systems in place for ensuring waste materials (wood, metal, and concrete) are reused wherever possible, and/or recycled off site.
- Reduce the use of hazardous chemicals, and ensure staff use and dispose of chemicals properly.
- Any contaminated soil / substrate must be removed and stored in a skip until it can be disposed of at a permitted disposal site.
- The principal contractor must devise a procedure for dealing with clean-up of spills and appropriate disposal of the contaminated substrate.

#### GOOD MANAGEMENT PRACTISES (GMP)

- An adequate number of 'scavenger proof' refuse bins must be provided at the construction site and at the construction camp,
- Segregate different types of waste as they are generated using different skips where possible (General wastes, non hazardous wastes and hazardous wastes),
- At a minimum there should be skips for wood, metals, inert and mixed materials,
- If there is a shortage of space and not enough room for multiple skips the principal contractor should employ a licensed waste management company to deal with waste,
- The Waste Management Plan" shall be implemented and executed as follows:
  - Salvageable materials will be diverted from disposal to landfill where practical and possible and salvaged for reuse and or recycling where practical and possible.
  - There will be a designated area on the construction site reserved for materials that can be recycled.
  - Areas shall be marked to designate what recycle materials are to be stored there.
  - Hazardous waste will be managed by a licensed hazardous waste vendor.
- Onsite recycling containers and/or areas will be clearly marked.
- Safe disposal waybills for all waste and material loads removed from the site must be kept on file.
- Complete waste transfer notes before any waste leaves the site
- In order to adequately manage sewage wastes during the construction phase, a sufficient number of toilets must be provided for construction workers and use of the natural environment for ablutions must be prohibited,
- Ensure all waste service providers have a valid waste carriers registration certificate,
- The contractor may not dispose of any waste and / or construction debris by burning, or by burying.
- The contractor will maintain 'good housekeeping' practises as ensure that all work sites and construction camp are kept tidy and litter free.
- The working areas and storage sites must be cleared of litter on daily basis.
- Litter bins must be marked for separate types of waste e.g. glass, paper, plastic, etc.

- Collect maintenance and domestic refuse (scrap metal, packaging materials etc.) in appropriate bins for recycling or send to landfill for disposal in an approved manner.

## MANAGEMENT OF WASTE GENERATION DURING THE DECOMMISSIONING PHASE

At the time of preparation of this document there were no plans to decommission the resort or the sewage treatment plant; however, should this eventually be the case it is likely that the majority of the infrastructure and associated equipment would require to be removed from the site. Given the sensitivity of the environment within the KNP, the exception would probably be installed hard surfaces, ablution facilities and the office block, furniture from guest rooms all of which could be used by future users of the property e.g. furniture could be refinished and reused by other resorts in the KNP, or donated to worthy organizations (international relief agencies schools, hospitals, clinics, and homes).

General and hazardous solid wastes likely to be produced during decommissioning phase include demolished building materials, obsolete equipment and machinery, piping, fuel storage containers, electrical and electronic equipment. Where possible, these wastes should be recycled and if not possible, then should be disposed of appropriately. As discussed in previous sections, the surface of certain components of the resort may have become contaminated during the operation of the resort, and would need to be washed / decontaminated prior to disposal. The resulting wash water would need to be treated to the appropriate standard prior to disposal. The exact quantity of waste requiring disposal during decommissioning is not known but could be significant. It is suggested that a suitably qualified specialist be consulted to undertake a waste classification study prior to the initiation of any decommissioning activities.

## PERFORMANCE INDICATORS

- No non-compliances associated with transport, collection, storage and disposal/re-use of solid wastes;
- Completion of waste training and induction program by contractors;
- Establishment of separate waste stream management infrastructure;
- Use of different colour bins for collecting different categories of waste to promote the segregation of waste for efficient resource recovery; and
- Acceptable housekeeping across the site.
- Stockpile areas for construction material, generation and disposal of building waste & liquids and vehicle maintenance, and
- Clearly labelled recycling receptacles / bins

# Appendix B – Extracted Waste Management Guidelines- KNP Operations Manual for Concessionaires



- (i) The Concessionaire must install measuring equipment at all water sources providing water for the Lodge and associated infrastructure.
- (ii) The Concessionaire must measure the water consumption on a monthly basis.
- (iii) The Concessionaire should report the CA water consumption as part of the Concessionaire's Monthly Operations Report and provide the report to the SR.
- (iv) The SR should monitor this information and check the total water consumption per CA against the bed limits.
- (v) The SR or Manager: Water and Waste Management are allowed to monitor the measurements and do regular checks on the readings.
- (vi) The CA's must prevent diesel spills at diesel driven pumps
- (vii) Any moving parts at pumps must be enclosed to prevent injury to animals or persons.
- (viii) River extraction points must be protected against flood damage. Should any flood damage occur, the Concession Holder would be responsible to clear any rubble from the river, and also to re-construct the point.

## 7.4 COMMUNICATIONS INFRASTRUCTURE

### 7.4.1 PRINCIPLES

- (i) Radios - In addition to normal South African licensing, the Concessionaire will require permission from SANParks to operate any radio within the parks. Installation of radio masts is a prescribed activity under South Africa's EIA Guidelines.
- (ii) The CA radio frequencies must not interfere with KNP radio frequencies.
- (iii) A KNP radio will be installed at each concession for emergency communications. The cost of the radio and installation will be borne by the Concessionaire.

### 7.4.2 GUIDELINES

- (i) The Concessionaire must request permission from the PM to operate a radio within national parks.
- (ii) The PM must ensure that CA radio frequencies do not interfere with the KNP frequencies.
- (iii) Radio contact between the CA office and the ranger's office/house/vehicle is advisable for emergency situations.
- (iv) Masts and antennas must be as far as possible be placed on existing infrastructure.
- (v) Communication Infrastructure must not be visible from outside the CA, and must be camouflaged.
- (vi) Changes to the existing Telkom network that might impact on KNP or other users, must be done in consultation with such users.

## 7.5 WASTE MANAGEMENT

### 7.5.1 PRINCIPLES

- (i) Liquid Wastes – The use of french drains and septic tanks will only be allowed for smaller systems where reed beds or other waste systems is not feasible. (Refer to Guidelines for Sewerage Systems, KNP in Annexure A7) The EMP must include a liquid waste management plan for both the Construction and Operational Phases, which will be monitored by the ECO. SANParks encourages the use of recycled treated water systems.
- (ii) Solid Wastes - Landfills are not permitted. All solid wastes need to be stored safely before removed off site to accredited waste processing sites. Storage facilities must be secured from wildlife, to ensure pollution does not arise, problem animals develop and animals are injured.





## 7.5.2 GUIDELINES

The PM and SR must ensure that:

- (i) Concessionaire develop & apply procurement policy to minimize waste at source. It is recommended that the Concessionaire develop a waste management strategy that includes identifying opportunities to reduce the creation of waste e.g. through materials or packaging, reducing waste e.g. through returning containers to suppliers, recycling waste and composting waste. An implementation plan must be developed to demonstrate continued improvement through implementation of the strategy.
- (ii) The Lodge and whole CA is kept clean at all times.
- (iii) The Concessionaire sort waste according to type and store in containers to exclude wildlife. Where applicable, waste must be recycled.
- (iv) No solid waste is disposed of in KNP (no landfills, no burning or incineration).
- (v) Waste is only temporarily stored in the CA with regular trucking out of KNP.
- (vi) Waste is transported by serviceable vehicles.
- (vii) Waste transport complies with gate closing times, speed limits & other KNP rules.
- (viii) Waste transport drivers are schooled in & practice game reserve driving etiquette.
- (ix) No leakage or spillage or illicit dumping occurs when trucking out.
- (x) Waste contractor or empowered entity should comply with DWAF.

## 7.6 FIREBREAKS, ROADS AND TRACKS-CONSTRUCTION AND MAINTENANCE

### 7.6.1 PRINCIPLES

The Concession Contract states that the Concessionaire may utilise existing roads and tracks in its CA, but must take responsibility for maintaining them to the SANParks satisfaction. The roads of concern are firebreaks on the borders of CA's, and there will have to be agreement between the KNP and the Concessionaire on the use of these roads, i.e. downgrade and change it to a two track game viewing road, or maintain it as a firebreak, etc.

- (i) All roads will be constructed as per the Roads Specifications, in the areas as approved in the EIA process.
- (ii) The Concessionaire must abide by the limit of new road development specified in Schedule B to the Concession Contract. Requests for an additional road allocation must be forwarded to the PM: KNP, who will direct it to the relevant KNP staff (Road Evaluation Committee) for consideration and final decision.
- (iii) The design, layout, construction and maintenance of roads will vary between the CA's and needs to be done in consultation with the SANParks Technical Services Department.
- (iv) The Concessionaire will bear the cost of all new roads and agreement must be reached between the Concessionaire and the KNP (SR and Technical Services) with regards to the maintenance of certain existing firebreak roads that will be used by both parties.
- (v) Where possible, roads must be built with in situ material rather than by importing gravel into the area, because of the potential environmental impacts, possible introduction of alien species, and cost of transporting such materials.
- (vi) In some CA's, however, it may be necessary to import gravel for hardening and capping certain roads to ensure year-round access. The locations of 'borrow pits' or quarries for this purpose must be done in consultation with Park staff and subject to an EIA. If gravel must be imported from outside the Park, the Concessionaire must notify SANParks, and SANParks will ensure that the gravel comes from an acceptable source.
- (viii) Each Concession was given the opportunity to revise the allocated km's based on a set of principles developed. The final km's approved for each concession is:

Mpanamana: 75 km (Not amended yet)





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|                    |                         |
|--------------------|-------------------------|
| Lukimbi:           | 125 km                  |
| Jock Safari Lodge: | 35 km                   |
| Tinga:             | 50 km                   |
| Imbali:            | 80 km (Not amended yet) |
| Singita Lebombo:   | 147 km                  |

# Appendix C - Specifications of Temporary Waste Storage Areas

All waste/recycling storage areas are to be constructed according to the following guideline specifications: -

## SPECIFICATIONS:

- Of an adequate size to comfortably accommodate all general, hazardous waste bins and recycling bins associated with the operations of the resort, including any waste reduction equipment;
- The gradient of the floors of the storage areas and the gradient of any associated access ramps are to be sufficiently level so that access for the purpose of emptying containers can occur in accordance with the resort's management plan requirements;
- With the floor appropriately graded so that any water is directed to a central collection point / drainage connection located upon the site;
- With a durable walls/fences that extend to the height of any containers kept within; so as to enclose the storage area;
- With doors/gates to the storage area to be open able from both inside and outside the storage area and wide enough to allow for easy passage of waste/recycling containers;
- With a hot and cold water supply provided through a centralized mixing valve for washing purposes. The hose cock must be protected from the waste containers and must be located in a position that is easily accessible when the area is filled with waste containers;
- With clear signage that clearly describes the types of materials that can be deposited into recycling bins and general garbage bins;
- With convenient access from each operational area of the resort to the waste/recycling storage area(s) and step free access between the point at which bins are collected/emptied and the waste/recycling storage area(s);
- To allow access by collection vehicles used by the nominated contractor (collection vehicles should be travelling in a forward direction at all times while servicing bins), and;
- With the access driveways to be used of sufficient strength to support such vehicles.
- A designated area should be provided for the storage of hazardous waste. The hazardous waste storage area should comply with the following requirements:
  - *The storage area should be situated within an impermeable bund capable of containing 110% of the total volume of waste stored at any given time. One side of the bund should comprise a ramp to allow vehicular access if required.*
  - *The storage area should be clearly signposted as [HAZARDOUS WASTE], the capacity of the bund storage area as well as the PPE that should be used when handling hazardous waste.*

## OPERATIONAL MANAGEMENT CONSIDERATIONS:

- Arrangements must be in place for the regular maintenance and cleaning of waste/recycling storage areas. If the operation of waste storage areas is outsourced, details of the way in which waste is to be handled and stored within the storage area, should be included in the relevant contact agreement. Details may include:

- Number and size of bins to be used in the development, including any waste reduction equipment,
- Qualifications of person(s) responsible for the ongoing maintenance and cleaning of the waste storage area(s),
- Proposed collection methods (including location, truck paths, frequency of collections, etc).
- How the service provider will be expected to manage/transport the waste to the waste storage area.

#### LEGAL COMPLIANCE

- In order to comply with legislation, the following storage volumes may not be exceeded unless a Waste Management License has been granted in terms of GN. R.718 under the National Environmental Management Waste Act.
  - General Waste: - 100 m<sup>3</sup>
  - Hazardous Waste: - 35m<sup>3</sup>
- The resort should also continually check for potential licensing requirements associated with new waste handling and storage activities and potential updates to the legislation.

## Appendix D - Organic Waste Management Guidelines

This Organic Waste Management Guideline contains information on internationally recognised organic waste minimisation and recycling practices, as well as practical advice for the implementation of waste minimisation at the resort. The presented options are based on the principles of the Waste Management Hierarchy, and the specific requirements of the KNP Management Plan. While recommendations made in this Guideline are based on a general overview of the types of waste management systems suited to the resort, the best practicable option should be chosen by the resort operator. The two main sources of organic waste from the resort are kitchen wastes and vegetation wastes:

- **Kitchen waste:** Many types of waste may arise from the resort kitchens, some of which may be suitable for composting, and others not. It is therefore recommended that kitchen waste is separated into two categories:
  - **Composting and vermiculture waste:** This waste stream would include biodegradable food waste such as vegetable and fruit scraps, grains, breads, pastas, coffee grounds, tea bags, egg shells, etc.
  - **Landfill waste:** Kitchen waste also includes bones, meat, fish, eggs, dairy products and oils, which should be excluded from the composting waste stream as they decompose slowly, attract scavengers, and may carry disease.
- **Landscaping waste:** Landscaping waste comprises grass clippings, leaves and branches from trees and shrubs. With the exception of large branches and weedy roots (which may spread through the resorts' grounds if used in the compost), all garden waste can be set aside for composting.

### WASTE MINIMISATION

As per the Waste Management Hierarchy, the prevention, minimisation or reuse of waste is the most favourable option of waste management. There are a number of options for reducing the amount of organic waste produced at the resort:

- **Landscaping waste**
  - Significant quantities of vegetation trimmings can be shredded and used to stabilise the entrances and access paths.
  - Landscapers should be made aware of the efforts to reduce vegetation waste, and should make use of plant varieties that do not require intensive management and trimming.
- **Kitchen waste**
  - The resort's kitchens should make arrangements to donate un-served food to staff, local shelters, food banks or the adjacent communities, taking care to ensure that relevant food regulations are adhered to (e.g. maintenance of cold chains). A separate legal opinion should be obtained to ensure that the resort is not exposed to increased risk or liability as a result of this practice.
  - Vegetable scraps and peels (such as carrot, potato, herbs, celery, onions, etc) can be kept aside in the kitchen in a separate bin, and used to make vegetable stock for soups and stews. This reduces the cost of buying stock, and reduces the amount of waste leaving the kitchen. Similarly, meat scraps such as meat, chicken, bones and fat can be set aside for making meat stock.
  - Avoid purchasing unnecessarily large amounts of fresh produce or other food products which cannot be frozen or preserved. If there is any fresh produce which is not being used, it should be distributed to staff or nearby communities rather than disposed of.

The resort operations will generate a number of other wastes which can be included in the composting waste stream, such as vacuum cleaner 'dust', lint from tumble driers, and organic waste collected in guest rooms, staff quarters, hotel bars and offices (such as fruit peels, coffee grounds and tea bags). These should be separated from general waste and included in the composting bin.

## WASTE SEGREGATION AT SOURCE

Vegetation waste should be kept separate from other waste types before it is added to the composting system. If necessary, a stockpile of landscaping waste can be created, with large branches and weedy roots disposed of separately.

- Kitchen waste should be separated into a number of bins as follows:
  - Vegetable stock bucket: This small bucket for vegetable scraps can be kept in the kitchen and used for vegetable stock. It should have a tightly fitting lid and should be cleaned out on a day to day basis. Any leftover scraps should be added to the composting bin.
  - Meat stock bucket: This small bucket for meat scraps such as meat, chicken, bones and fat can be kept in the kitchen and used for meat stock. This bucket must have a tightly fitting lid to prevent flies being attracted to the meat, and should be cleaned out on a day to day basis. Any leftover scraps should be added to the rubbish bin.
  - Composting bin: The composting bin will contain all kitchen waste which can be placed into the composting systems, such as leftover vegetable and fruit scraps, grains, breads, pastas, coffee grounds, tea bags, egg shells, etc. If the composting bin begins to produce a bad odour, a scoop of soil or worm castings can be placed on top of the waste. It is useful to keep a small bucket of soil next to the composting bin for this purpose. The composting bin should be situated in a convenient location for kitchen and housekeeping staff, and should be sealed with a tightly fitting lid to prevent pests from accessing the food.
  - General waste bin: This bin will contain any non-recyclable kitchen waste, such as fish, eggs, dairy products and oils.
  - Any recyclable items such as glass, plastic, cardboard, paper or metals must be set aside in their respective recycling bins, as described in the respective guideline. Some cardboard and paper can be set aside for shredding and adding to the composting systems.
- Grinding or shredding of landscaping waste:
  - A grinder or shredder may be purchased by the resort for shredding landscaping waste such as branches and leaves, before they are added to the composting bins. While this may require a significant amount of initial capital, the shredding of waste is important in maximising surface area for decomposition. Another option is that branches chopped manually, although this would be fairly labour intensive.

## RECYCLING OF ORGANIC WASTE

The principle of organic waste recycling reduces the amount of waste leaving the property and taken to a landfill, and eliminates the costs of buying compost and fertilisers for use in the resort grounds. Recyclable organic waste includes vegetation waste and kitchen waste, but excludes meat, dairy and oils (as described above). Any animal excrement should be kept separate from the compostable waste stream. This guideline recommends two types of organic waste recycling for use in the safari resort: composting and vermiculture.

### ■ Composting

Composting uses a mixture of vegetation and kitchen waste, and produces decomposed plant matter (compost) which can be used as a soil ameliorant. The raw organic waste is broken down by worms, insects, fungi, bacteria and microbes, producing heat, carbon dioxide, and compost. The process of decomposition requires water and proper aeration. Besides the types of compostable waste described above, there are a number of general waste items which can also be recycled in this stream, such as: egg boxes, shredded cardboard and newspapers, kitchen paper and unbleached napkins. Composting can be in the form of an agricultural windrow system, industrial system, or smaller scale composting operations:

- Agricultural windrow composting is used to produce large quantities of compost, and uses the method of piling organic waste in long rows or 'windrows'. The rows are turned regularly to improve porosity and oxygen content, as well as to redistribute heat throughout the pile. The windrow method is not recommended as part of this Guideline, as it is aimed at large-scale agricultural applications.
- In the case of the industrial system, waste is sorted mechanically and treated with anaerobic digestion or in-

vessel composting. An example of in-vessel composting is presented in Figure 1. The in-vessel system uses perforated barrels which are turned mechanically to aerate the organic material. The initial capital to install this type of system can be high, although they require minimal labour and are resistant to scavengers. This Guideline recommends the in-vessel system in cases where volumes of organic wastes are too great to be processed manually.

- Smaller scale operations can make use of composting bins, piles, trench composting or sheet composting. These methods require less initial capital and are useful for smaller amounts of organic waste, but can be fairly labour intensive. In compost piling, organic waste is ‘piled’ in an area and left to decompose anaerobically and over a long period of time. In trench composting, organic waste is simply buried in a trench and allowed to decompose underground. Sheet composting is the method of spreading the organic waste over an area of soil in layers and tilling it into the soil. Composting bins can either be one, two, or three bin systems. The one bin system is similar to the compost pile, with the exception that it is enclosed and thereby not an attraction for rodents and other scavengers. The two and three bin systems are used when the material is turned in batches. Regular turning ensures that bacteria have sufficient air to decompose the material quickly. Figure 2 illustrates the three bin system, whereby:
  - *Organic material is stockpiled in the first bin. Material is added in layers of two to three inches, alternating layers of kitchen and garden waste. Layers can be moistened if necessary.*
  - *The temperature within the stockpile will increase to 60°C - 70°C, and should be carefully monitored. When the temperature decreases, the material should be aerated and turned into the second bin.*
  - *The temperature of the material will again increase and decrease and the material should then be turned into the third bin. This material should then be left to mature for three months. If necessary, the ‘processed’ material can be stockpiled in a separate bin until ready for use.*
- This Guideline recommends the three bin composting system in cases where volumes of organic wastes are small enough to be processed manually.

Plate 1



Figure 1: Example of the In-Vessel Composting system (Source: University of Georgia, College of Agricultural & Environmental Sciences)



Figure 2: Example of the three bin composting system (Source: Klickitat County, Solid Waste)

#### ■ Vermiculture

Vermiculture refers to using red worms to break down and transform organic waste into a useable soil amendment. Vermiculture makes use of kitchen waste primarily, but can include some garden waste and shredded paper. One of the benefits of using the vermiculture system is that the size of the wormery can be scaled to match the amount of food waste produced. The composting worm is *Eisenia fetida*, which lives in the top layer of the soil and composting material. The wormery system requires regular feeding and monitoring of conditions to ensure sufficient moisture and oxygen supply. The wormery should be protected from direct sunlight and pests (such as rodents, ants, and birds).

The moisture level can be maintained by spraying water onto the trays when necessary. Examples of wormery systems are presented in Figures 3 and 4 below.

Plate 2



Figure 3: Example of a commercial wormery for use in hotels and resorts (Source: <http://www.worm-farm.co.za>)

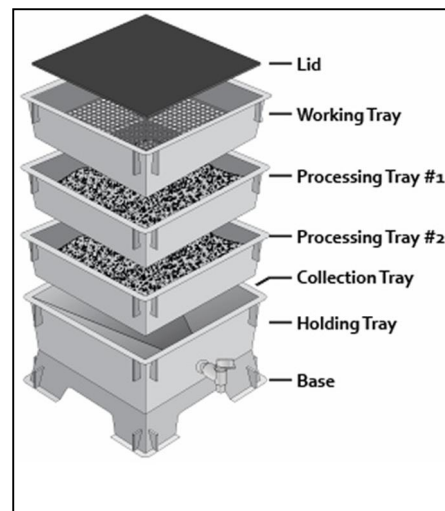


Figure 4: Example of the wormery composting system (Source: <http://www.wormerycompost.com>)

Figure 4 illustrates the typical process of composting in a wormery. Leachate drains from the upper trays of the wormery into the Collection Tray. Most systems make use of a tap in this tray, through which the leachate can be drained for use as a liquid fertiliser. Worms and bedding are placed into Processing Tray #2. Suitable bedding materials include peat moss, straw, autumn leaves, sawdust, shredded newspaper, bark, or grass clippings. Processing Tray #1 holds kitchen waste covered with a layer of damp hessian or newspaper. When this tray contains at least 2cm of worm castings, additional kitchen waste may be placed in the working tray. Once the Processing Tray #2 contains only worm castings and all worms are contained in the upper levels, worm castings from Tray #2 can be used as vermicompost. The empty Tray #2 is then placed on the top level and the rotation of trays continues.

### COMPOST USES

The compost produced by the above methods will have a number of different uses in the resort. Besides reducing wastes and costs, this greening initiative has pronounced benefits in marketing. The compost can be used in the resort gardens as a potting soil, germination mix, lawn dressing, or in vegetable gardens, orchards, and flower beds. Vermicompost is a particularly beneficial fertilizer, and also contains soil microbes, bacteria and enzymes. In cases where surplus compost is produced at the resort, this should be distributed amongst nearby communities for use in community projects such as vegetable gardens and farming initiatives. These kind of initiatives will add to the marketing value of organic waste recycling.

### DISPOSAL

As per the Waste Management Hierarchy, waste disposal is the least favoured option. While there will be certain organic wastes that cannot be recycled or re-used, this Guideline emphasises that where disposal does occur it must be done according to the correct procedures.

### REFERENCES:

<http://www.benefits-of-recycling.com/typesofcomposting.html>

[http://www.caes.uga.edu/publications/pubDetail.cfm?pk\\_id=6288](http://www.caes.uga.edu/publications/pubDetail.cfm?pk_id=6288)

<http://www.klickitatcounty.org/solidwaste/ContentROne.asp?fContentIdSelected=1939319116&fCategoryIdSelected=965105457>



<http://www.wormerycompost.com/how-do-i-start-a-worm-farm-5/>

<http://www.worm-farm.co.za>

# Appendix E - General Waste Management Guideline

## INTRODUCTION

This Guideline contains information on internationally recognised general waste minimisation practices, as well as practical advice for their implementation at the Resort. The presented options are based on the principles Waste Management Hierarchy adopted by the KNP Waste Management Plan. While recommendations made in this Guideline are based on a general overview of the types of waste that might be produced at the resort, the best practicable option should be chosen by the resort operator.

General wastes will be generated from the administrative offices, kitchens, restaurants, bars, guest rooms, housekeeping, workshop and maintenance areas of the resort.

## GENERAL WASTE REDUCTION

There are a number of options for reducing the amount of waste produced at the resort:

- Awareness: - Staff must be made aware of the aim to reduce, minimise and reuse waste by means of posters, training, staff meetings, etc.
- Greener Purchasing:
  - Purchase recycled, durable and repairable products;
  - Use an environmentally friendly manufactured paper product range to replace conventional paper stationary;
  - Buy products with less packaging, or packaging that can be recycled;
  - Buy in bulk and in larger sizes;
  - Purchase products in a concentrated form (e.g. cleaning products);
  - Refillable amenity dispensers should replace soap, lotion, shampoo and conditioner bottles in the resort's guest rooms;
  - Avoid purchasing disposable items;
  - Avoid all polystyrene for packaging food and drinks. Use paper wrappers and bags for takeaway food and mugs instead of polystyrene cups;
  - Purchase bio-degradable bags for waste bins;
  - Order the amount of materials needed as accurately as possible based on occupancy and delivery restrictions;
  - Ensure that deliveries are immediately rejected if damaged or incomplete;
  - Eliminate the use of single-serve items such as individual butter, jam, honey, etc.
- General Office and Housekeeping practices
  - The safari resort operator should develop an office paper reduction programme including the reuse of paper, double sided copying, smaller fonts, email versus print-out policy and eliminate unrequested newspapers etc.;
  - Based on the level of services offered, provide newspapers, magazines, etc. only in common areas or upon guest request;
  - The resort management should aim to reuse toner printer cartridges by shipping them to companies that remanufacture them. They can close this product lifecycle loop by purchasing remanufactured toner cartridges, at a fraction of the original price;
  - Reuse office equipment, files, folders, boxes, etc. wherever possible;
  - Reuse stained cloths and towels for cleaning;

- Avoid replacing toilet rolls unless empty or almost empty, and leave toilet rolls in rooms for guest to replace themselves. If the resort policy is to replace toilet rolls before they are empty, these must be redistributed to staff or nearby communities;
- Donate useful products, such as electronic equipment, linens and furniture, to charities or nearby communities;
- Redundant mechanical equipment such as pumps, valves, pipes, motors and chain blocks could potentially have value through reuse or refurbishment. Redundant equipment should be assessed for its reuse value at the relevant facilities before new equipment is purchased. If possible all mechanical waste is to be repaired and reused in the complex or sold to the local community. Any hazardous or contaminated mechanical equipment must be disposed of correctly in a permitted hazardous landfill site.

## RECYCLING OF GENERAL WASTE

Potential recyclables from the general waste stream includes: paper, cardboard, glass, metal and plastic. The waste service provider should however be consulted to confirm which materials can be recycled, and how they should be separated. This guideline recommends the following methods for general waste recycling at the resort:

- Awareness:
  - Staff should be made aware of the aim to recycle waste by means of posters, training and staff meetings.
  - Guests should be made aware of the resort's recycling programmes by means of recycling instructions in rooms and in strategic locations.
- Recyclables and non-recyclables:
  - A general guideline of which materials can/cannot be recycled is as follows:

| Material         | Accepted for Recycling   | Not Accepted for Recycling   |
|------------------|--|--|
| <b>Paper</b>     | Newspaper; office paper; envelopes; magazines; telephone books; post-it notes.   | Waxed or laminated paper; used paper towels, napkins, plates and cups; carbon paper; food wrappers; adhesive tape; glossy fax paper; paper bags; poly-fibre envelopes. |
| <b>Cardboard</b> | Cardboard boxes; paper tubes; toilet roll tubes; brown paper bags; file folders; cereal boxes; food boxes; paper flour and sugar bags. | Boxes containing food or liquid; wax coated boxes.   |
| <b>Glass</b>     | Containers for drinks and food   | Dishes; ceramics; container lids; window glass; mirrors; crystal; glass containing liquid or food.   |
| <b>Metal</b>     | Aluminium cans and containers; steel food cans; metal container lids.  | Cans for chemicals or fuels; cans containing food or liquid; batteries; appliances; power tools; silverware; cooking utensils; aerosol cans.                           |
| <b>Plastic</b>   | PET containers; cleaning products containers; plastic bags; cling wrap; polystyrene cups and packaging.                                | Soft bags for milk and drinks; oil or fuel containers; flower pots.  |

- Separating Materials
  - Preparing materials: All food, drink or chemical containers and cans must be washed/rinsed; plastic wrapping, lining and binding must be separated from materials; rubber bands, paper clips and staples must be removed; and boxes must be flattened.
  - Any organic recyclable waste collected in the rooms, restaurant, bar or elsewhere in the resort should be disposed of in the kitchen composting bin.
- Recycling bins: - Recycling bins should be placed in strategic and convenient locations throughout the resort, and in sizes suitable to their location. They should be lidded and appropriately labelled or colour coded (e.g. Bin#1:

Recyclables (paper, glass, plastic, cans) and Bin #2: Mixed Waste). These bins must be emptied on a daily basis and taken out to the Central Recycling Centre (CRC) for sorting. Figures 1 and 2 show examples of recycling containers.

- Guest rooms: - Small recycling bins should be placed in guest rooms alongside mixed waste bins. Alternatively, there are a number of recycling bins on the market with divided sections which can be used for different waste types.
- Office and bar: Slightly larger bins should be placed under counters in the office and bar, which follow the same principle of dividing waste types.
- Kitchen: Besides the organic waste bins containing food waste, general waste recycling bins must be placed in the kitchen alongside rubbish bins.
- Staff Quarters: Recycling bins should be placed alongside rubbish bins a convenient and central area of the staff quarters.

■ Recycling Area:

- This area is usually a designated section of the central waste storage area where all recyclable general waste is brought and sorted before it is removed by the waste service provider.
- This area should be located 'out of sight' of guests and main entrances.
- All waste should be sorted as per the requirements of the waste contractor, and all bins must be properly sealed to prevent pests from getting into the bins. Depending on the quantity of waste produced and the requirements of the waste contractor, large plastic bins or metal skips can be used to store the materials. These bins should be cleaned out regularly to prevent odours.



Figure 1: Example of a divided recycle bin for use in hotels and resorts (Source: Easy Recycling)



Figure 2: Example of larger recycling bins for outdoor use (Source: Easy Recycling)

## DISPOSAL OF GENERAL WASTE

As per the Waste Management Hierarchy, waste disposal is the least favoured option. While there will be certain types of general waste that cannot be recycled or re-used, this Guideline emphasises that where disposal does occur it must be done according to the correct procedures.

- Each bin must have a cover to prevent scavenging by monkeys (and other scavengers) and prevent waste from being windblown;
- All general waste that cannot be reused or recycled should be stored temporarily in a designated area and transported to the closest permitted landfill.
- Ensure that the waste is removed by a suitably qualified waste service provider and that the relevant documentation with proof of proper waste disposal is available.
- Safe disposal waybills for all waste loads removed from the site must be kept on file.
- A manifest indicating the volume (monthly) of disposed general waste should be kept on file.

## REFERENCES

*Georgia Hospitality Environmental Partnership: Waste Reduction in Hotels and Motels, A Guide for Hotel and Motel Managers.*

<http://web.mit.edu/urbanupgrading/urbanenvironment/sectors/solid-waste-sources.html>

<http://www.karmayog.com/cleanliness/hotelwaste.htm>

[http://www.recyclingbins.co.nz/hotel\\_recycling\\_bins.html](http://www.recyclingbins.co.nz/hotel_recycling_bins.html)

[http://www.recycleaway.com/Keene-Sideload-Triple\\_p\\_268.html](http://www.recycleaway.com/Keene-Sideload-Triple_p_268.html)

# Appendix F - Hazardous Waste Management Guideline

## INTRODUCTION

This Guideline contains information on internationally recognised hazardous waste minimisation, recycling and disposal practices, as well as practical advice for the implementation of these practices at the resort. The presented options are based on the principles adopted by the KNP Management Plan: prevention; minimisation; reuse; recycling; energy recovery; and disposal.

While recommendations made in this Guideline are based on a general overview of the types of waste that might be produced at the resort, the best practicable option should be chosen by the resort operator. Common potential hazardous wastes that are expected to be generated at the resort include:

- Chemical waste: - This includes chemicals, chemical storage containers and cleaning agents.
- Used oil waste: Used lubricant, spent lubricant, hydraulic oils and hydrocarbon based solvents produced during the maintenance of mechanical equipment. (i.e. generators, motors, pumps).
- Oil contaminated waste: This is solid waste that has been contaminated with and / or contains traces of oil or grease. This typically includes contaminated soil (where a spill has occurred), oily rags, spill cleanup sawdust or similar, workshop floor sweepings, empty oil and grease containers etc.
- Used cooking oils: Used cooking oils from the resort kitchens (e.g. from fryers).
- Fats and Greases: Extraction fans/filters in all kitchens will include oils, fats and greases extracted from the vapour fumes etc. from cooking activities. An estimated amount of 1m<sup>3</sup> of fats is generated on a weekly basis within these filters. These fats and greases must be kept separate from used cooking oils.
- Paint waste: Paints and contaminated paint brushes or containers.
- Fluorescent Bulb waste: Fluorescent bulb waste material is to be considered as a hazardous waste due to the threat of the toxic materials which they contain, such as mercury, cadmium (a known carcinogen) and lead entering the atmosphere or sensitive watercourses.
- Battery waste: Battery waste includes lead acid automotive type batteries, and Nickel Cadmium rechargeable or 'secondary' batteries commonly used in power tools. Most batteries contain heavy metals and corrosive chemicals that are potentially harmful to humans and the environment.
- E-waste: E-Waste is waste generated from electronic equipment. Certain electronic components may be considered as hazardous waste due to the presence of toxic substances (e.g. lead).

## HAZARDOUS WASTE REDUCTION

There are a number of options for reducing the amount of hazardous waste produced at the resort:

- Awareness: Staff must be made aware of the aim to reduce and minimise hazardous waste production by means of posters, training and staff meetings.
- Avoiding Contamination: Forecast and prevent potential situations in which accidents and spills can mitigate against unwarranted waste emissions.
- Purchasing:
  - Contact suppliers to determine if less toxic or non-toxic alternative products can be used. There are a number of non-toxic replacement products on the market which can be used throughout the resort which will add to the marketing value of 'greening initiatives' at the resort. There are a number of organic certifications which can be found on eco-friendly products (e.g. BDOCA, AFRISCO).
  - Housekeeping: Environmentally friendly, organic and non-toxic washing powder, fabric softener, dish washing liquid, toiletries, air and linen sprays, toilet paper, furniture polish, turpentine, drain cleaner and many other cleaning products (e.g. Triple Orange, Ophopho Group, Proteco - Pro To Go Green, Beauty By Nature, Faithful to Nature, ENJO).

- Non-toxic pool cleaning solutions (e.g. Blue Lagoon, Eco H<sub>2</sub> Zero, Activator D).
- Lead free and non-toxic paints and finishes (e.g. ProNature, B-Earth Paints, Auqacoat, BreatheCoat).
- **Battery Waste:**
  - Use solar-powered rather than battery-powered items to reduce battery waste.
- **Fluorescent bulb waste:**
  - Due to the energy efficiency of fluorescent bulbs it is often not considered feasible to reduce waste through switching to non-fluorescent lighting techniques. The following suggestions can however be implemented at the resort to reduce the volume of used fluorescent bulb waste:
    - Replace 38mm fluorescent bulbs with 26mm fluorescent bulbs which have a longer lifespan (this may not be possible in some older fittings).
    - Encourage staff and guests to reduce the use of light bulbs and use natural light wherever possible.
    - Make sure lights can be switched off manually, particularly near windows.
    - Run a 'Switch Off' campaign. It has been noted that it is cheaper to switch off lights, however short the time period.
    - Ensure that lighting levels are not excessive. It may be able to reduce the level of background lighting in some areas by removing alternate bulbs.
    - The resort operator should consider the installation of presence detector lighting controls in places not in constant use, such as lavatories and meeting rooms, in order to reduce light bulb waste. This will also lead to an energy saving.

## HAZARDOUS WASTE RECYCLING

- Certain hazardous wastes, including used oil, batteries and light bulbs, can be recycled through reputable agents. Where possible, all hazardous wastes, including hydrocarbon wastes such as oils, should be recycled either by a recognized recycling company or returned to the supplier.
- If contaminated equipment (e.g. oil and grease contained in old pumps) can be cleaned of any hazardous materials, it can be disposed of or recycled as non-hazardous waste.
- Used cooking oils from the kitchens should be set aside and sold to a biofuel producer if a viable outlet can be found. This would not include fats and greases from extraction fans/filters which should be disposed of via landfill.

## PROCEDURES FOR HANDLING AND STORAGE OF HAZARDOUS WASTE

The following procedures should be observed when handling hazardous waste:

| Waste   | Handling and Storage Procedure   |
|---|--|
| <b>Used Oil and Oil Contaminated Material</b> | <ul style="list-style-type: none"> <li>– Used oil should be stored away from drains or watercourses in bunded roofed and sealed areas.</li> <li>– Used oil waste storage areas should be colour coded and clearly signposted as "USED OIL WASTE". They should be concreted and bunded to be able to contain 110% of the total volume of the largest used oil waste container being stored. Storage areas must be protected from the elements (rain, sun etc), away from open flames and should be accessible for removal trucks.</li> <li>– Sufficient absorbent spill cleanup kits should be placed nearby the used oil waste storage area.</li> <li>– All areas where oil contaminated waste is generated should have designated areas for the storage of oil contaminated waste. They should be clearly signposted "OIL CONTAMINATED WASTE". The area should be protected from the elements, away from open flames and should be accessible by vehicles for the transfer to the collection</li> </ul> |



|                               |   |
|-------------------------------|---|
|                               | <p>area. The storage area should be situated on a concrete base.</p> <ul style="list-style-type: none"> <li>Oil contaminated waste should be disposed of into durable (HDPE) good quality wheelie bins. These should be colour coded, fitted with lids, and labelled as "OIL CONTAMINATED WASTE".</li> </ul>  |
| <b>Used Cooking Oil</b>       | <ul style="list-style-type: none"> <li>All used cooking oil generated from the kitchen must have a designated area for the storage of used cooking oil waste. This area should be clearly signposted "COOKING OIL WASTE". The area should be protected from the elements, away from open flames and should be accessible by vehicles for the transfer to the collection area.</li> <li>The storage area should be situated on a concrete base. These oils must be kept separate from fats and greases extracted from kitchen fans and filters.</li> </ul>   |
| <b>Fats and Greases</b>       | <ul style="list-style-type: none"> <li>Fats, greases and oils extracted from kitchen fans and filters should be stored separately and appropriately labelled. These fats cannot be recycled as used cooking oil, and should be disposed of at a hazardous landfill site.</li> </ul>   |
| <b>Chemicals</b>              | <ul style="list-style-type: none"> <li>Chemical waste (unwanted, expired etc. chemicals) should: <ul style="list-style-type: none"> <li>be stored in labelled, closed containers within designated areas, preferably sheltered, with sealed floors.</li> <li>be stored in colour coded, not corrosive containers, clearly signpost as "CHEMICAL WASTE". Care must be taken to not store incompatible chemicals together or close to one another.</li> <li>be stored away from any source that releases heat, especially flammable chemicals.</li> <li>not be stacked on top of one another, especially chemicals stored in glass containers.</li> <li>not be stored in walkways, entrances or windowsills. Stock only in shelves available.</li> </ul> </li> </ul>  |
| <b>Fluorescent Bulb Waste</b> | <ul style="list-style-type: none"> <li>Spent bulbs should be removed from light fixtures and packaged in the same cardboard boxes in which the replacement bulb is packaged to prevent breakage.</li> <li>Boxes containing spent bulbs should be returned to the appropriate storage area or workshop. Care must be taken during the handling, packaging, and transportation of the boxes to prevent breakage.</li> <li>Tubular bulbs are to be removed from the cardboard boxes and placed in a fluorescent bulb crusher device. Tube crushers usually fit atop a 210l, open-topped drum, and feature a long tube that angles out the top of the unit. As the spent bulb is fed through the tube, the crusher breaks up the bulb into the drum, which should be labelled as "HAZARDOUS: FLUORESCENT BULB WASTE".</li> <li>Since the mercury vapour in the light bulb is released in a crushing device, staff should be aware that worker safety is an issue and that correct PPE should be worn (gloves, masks and eye protection).</li> <li>Bulbs that will not fit into a tube crusher (non-tubular bulbs) should be stored in the replacement boxes in a place where they cannot be broken. The area where boxes are stored is to be labelled as "HAZARDOUS: FLUORESCENT BULB WASTE".</li> <li>If tubes are broken on arrival at the resort, they should be placed in a heavy plastic bag placed inside a rigid container.</li> <li>When collecting the full drum, the crusher head lid is to be removed from the full drum, and transferred to an empty drum. Employees must take care not to disturb the contents of the full drum. The full drum must be sealed with a metal lid and clamp system. Worker safety during this activity is an issue and the correct PPE must be</li> </ul> |

|                      |   |
|----------------------|---|
|                      | worn (gloves, face mask and eye protection).  |
| <b>Battery Waste</b> | <ul style="list-style-type: none"> <li>– All batteries should be stored in a cool dry place, away from flammable materials and heat sources.</li> <li>– Spent batteries must be placed in a plastic bag or have non-conductive electrical tape over the terminals. Lead acid batteries should be stored with the terminals on top to prevent spillage.</li> <li>– Batteries should be sorted according to their chemistry / supplier, disposed in non-metal or lined steel containers, and labelled as “USED BATTERIES”.</li> </ul>   |
| <b>Sewage Sludge</b> | <ul style="list-style-type: none"> <li>– The septic tanks will need to be de-sludged periodically (e.g. every 3-5 years), it is recommended that an approved sludge removal contractor must be appointed to undertake the de-sludging; and</li> <li>– Although sewage sludge is considered as having valuable agronomic properties, the quantities of sludge emanating from the RBC is considered to be insignificant, as a result the best practical option will be to appoint a sludge removal contractor to remove the sludge off site.</li> </ul>   |
| <b>E-Waste</b>       | <ul style="list-style-type: none"> <li>– E-waste is waste generated from electronic equipment. Electronics are potentially recyclable but contain lead, which can be harmful to the environment if disposed of improperly.</li> <li>– Before disposing of “old” electronic equipment it should first be determined if it still has value. It is often possible to donate usable or repairable items to charities, schools, or other foundations that specialize in refurbishing equipment.</li> <li>– If donation or reuse of electronic equipment is not practical, then the equipment should be collected by the waste contractor for possible recovery of metals, plastics, glass, and other materials.</li> </ul> |

## DISPOSAL

- All hazardous wastes that cannot be reused or recycled should be labelled correctly and stored in the designated waste storage area until collected for correct disposal. No hazardous waste disposal in any form, or burning of waste, is permitted in the Kruger National Park under any circumstances.
- Hazardous waste disposal must be undertaken by an approved waste contractor, and waste must be disposed of at a permitted hazardous waste disposal facility (H:H or H:h – landfill operator to be contacted for verification). It is recommended that hazardous waste contractor(s) be identified in advance, should their services be required at short notice.
- Safe disposal certificates for any hazardous waste removed from the site must be kept on file, as well as a manifest indicating the volume (monthly) of disposed hazardous.
- Vehicles transporting hazardous waste must have the appropriate safety signs and equipment on the vehicle in case of a spillage or accident.

## Appendix G - Treated Effluent Management Guideline

This Guideline contains practical advice for the management of treated effluent from the on-site sewage treatment plant. The estimated total treated effluent volume amounts to 36kl/day with a maximum flow estimated at 70kl/day. The treated effluent is proposed to be reused for the purpose of irrigation of the adjacent properties or for the provision of water for game.

### EFFLUENT QUALITY

- Environmental Discharge: - As a minimum requirement treated effluent must comply with the relevant discharge standards set out under the National Water Act.
- Game drinking water: - The use of treated effluent for game drinking water is required to comply with the Department of Water Affairs South African Water Quality Guidelines / Volume 5 – Agriculture, livestock watering.
- Irrigation: - The use of treated effluent for irrigation within the resort is required to comply with the Department of Water Affairs South African Water Quality Guidelines / Volume 4 – Agriculture, Irrigation.

**Table 1: Water Quality Guidelines for Livestock Watering and Irrigation (DWAF, 1996)**

|                                      |                                     | Livestock Watering   | Irrigation  |
|--------------------------------------|-------------------------------------|--|---|
| <b>Microbiological Water Quality</b> | E. Coli, Faecal and Total Coliforms | 0 – 200 Counts/100ml   | < 1 (Faecal coliforms) Counts/100ml               |
|                                      |                                     |  |   |
| <b>Physical Water Quality</b>        | Total Dissolved Solids              | 0 – 1000 mg/l (Dairy, pigs & poultry)<br>0 – 2000 mg/l (Cattle & horses)<br>0 – 3000 mg/l (Sheep)      | ≤ 40 mg/l   |
|                                      | pH                                  | NA   | 6.5 – 8.4 pH                                      |
|                                      | Turbidity                           | NA   | NA  |
|                                      |                                     |  |   |
| <b>Chemical Water Quality</b>        | Arsenic                             | 0 - 1 mg/l   | 0 – 0.01 mg/l                                     |
|                                      | Cadmium                             | 0 - 10 µg/l  | 0 – 10 µg/l                                       |
|                                      | Calcium                             | 0 – 1000 mg Ca/l   | NA  |
|                                      | Chloride                            | 0 – 1500 mg/l (Monogastrics & Poultry)<br>0 – 3000 mg/ (Other livestock)                               | 0 – 100 mg/l                                      |
|                                      | Copper                              | 0 – 0.5 mg/l (Sheep & pre-weaned calves)<br>0 – 1 mg/l (Cattle)<br>0 – 5 mg/l (Horses, pigs & poultry) | 0 – 0.2 mg/l                                      |
|                                      | Fluoride                            | 0 - 2 mg/l (All other livestock)<br>0 – 6 mg/l (Ruminants)   | 0 – 2 mg/l  |
|                                      | Iron                                | 0 – 10 mg/l  | 0 – 5 mg/l  |
|                                      | Magnesium                           | 0 – 500 mg/l   | NA  |
|                                      | Manganese                           | 0 - 10 mg/l  | 0 – 0.02 mg/l                                     |
|                                      | Nitrates And Nitrites               | 0 – 100 (NO <sub>3</sub> )<br>0 – 10 (NO <sub>2</sub> )  | 0 – 0.5 mg/l (NO <sub>3</sub> & NO <sub>2</sub> ) |
|                                      | Potassium                           | NA   | NA  |
|                                      | Sodium                              | 0 – 2000 mg/l  | ≤ 70 mg/l   |
|                                      | Sulphate                            | 0 – 1000 mg/l  | NA  |

|      |             |            |
|------|-------------|------------|
| Zinc | 0 – 20 mg/l | 0 – 1 mg/l |
|------|-------------|------------|

*Note: NA = Not available*

Besides managing treated effluent to comply with the above Water Quality Guidelines, the resort operator must comply with the Record of Decision from the Department and all other relevant legislation pertaining to water quality standards, such as the General Standard of water quality, which forms part of the National Water Act.

### PERFORMANCE INDICATORS

- No breaches associated with transport, collection, and disposal of sludge;
- Well maintained historical monitoring data;
- No significant odours emanating from the septic tank area;
- No failure of the system i.e. the clogging of septic tanks, pumps and pipework;
- Clearly labelled STP components;
- Adequate volume records and safe disposal waybills for the removed sludge and,
- Records of all pipe ruptures, pump and mechanical failures of the STP including remedial action.