

**ENVIRONMENTAL MANAGEMENT
AND MONITORING PLAN
(EMMP)
FOR THE
ARCADES SHOPPING CENTRE
AND
PROTEA ARCADES HOTEL
FOR
ARCADES DEVELOPMENTS PLC**

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1.0 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMMP)

Environmental management is carried out at all stages of the project; the design and planning stage, construction phase and operational phase. For this project the planning, design and construction of the shopping centre part of the project, including consideration of various alternatives, have already been undertaken with a view to minimising or avoiding adverse environmental impacts and maximising benefits. Construction of the Protea Arcades Hotel is currently being undertaken.

The project has not caused significant adverse environmental effects, as the recommendations, including implementation of mitigation measures as identified during the early stages of the project have been incorporated.

This document will analyse and present the developer/operators proposed Environmental Management and Monitoring Plan for the Construction Phases of the Protea Hotel and the Operational Phase of the Shopping Centre and Protea Hotel

In this section, the following terms shall apply:

- The 'Owner' refers to the Arcades Developments Plc and Platinum Gold Equity Z Ltd who own the project.
- The 'Operator' refers to Arcades Developments Plc who operate the development
- The 'Contractor' refers to Velos Enterprises Ltd who are the appointed contractor for the Protea Hotel
- The 'Consultant' refers to the project professional team comprising Arcades Developments PLC project management office and locally appointed consultants.
- The 'Project Management Team' (PMT) refers to representatives from Arcades Developments PLC, Platinum Gold Equity Zambia Ltd, consultants representatives, contractor's representatives and the contractors SHE Manager.

Mitigation measures to be implemented during the construction and operational phases of the project are laid out in this section in an Environmental Management and Monitoring Plan (EMMP).

The Environmental Management and Monitoring Plan seeks to serve as a useful management tool to ensure successful implementation of these measures, monitoring and subsequent audits by outlining duties and responsibilities of key stakeholders with respect to environmental management at all project phases.

The key stakeholders in the environmental management activities will be: Arcades Developments PLC., the Consultant, the Project Management Team, the Contractor, the Environmental Council of Zambia, Hotels Board, Tourism Council of Zambia and local authorities such as Lusaka City Council, utility providers (e.g. ZESCO), and to some extent members of the public.

The EMMP will form part of the Contractor's working brief for contract management. The cost of implementing mitigation measures will thus be determined in the appointed contractor's bid.

1.1 Organization and Responsibilities

1.1.1. Construction Phase

Provisions of this EMMP during the **construction phase** will apply from **the beginning of Site Works to Completion of Construction.**

1. Compliance with the provisions of this EMMP will be the prime responsibility of the Contractor. Arcades Developments Plc will commit the Contractor to meeting the relevant environmental management responsibilities through an Environmental Management and Responsible Practise Code that will be included in all tender documents and contracts. Arcades Developments Plc. recognises that this does not absolve to company from responsibility for proper environmental management and monitoring of the project. Overall and ultimate responsibility for meeting all environmental management and monitoring commitments outlined in the EMMP lie with Arcades Developments Plc.
2. The Contractor's Site Manager will ensure the project's and Contractor's compliance with the requirements of the EMMP, ECZ and the Factories Inspectorate. The Contractor's Site Manager shall carry out inspection of the works and Arcades Developments Plc. reserves the right to audit safety and environmental issues of the site at any time.
3. The Contractor shall designate a suitably qualified person as Safety, Health and Environmental (SHE) Manager who will be responsible for implementing and enforcing the provisions as set out in this EMMP.
4. The Contractor's Site Manager (CSM) will be responsible for organising, managing, co-ordinating and controlling the entire Contractors' activities as regards Safety, Health and Environmental issues in accordance with the provisions as set out in this EMMP.
5. The occupational health and safety of the Contractor's employees as well as all authorised or non-authorised persons present at the work site is the sole responsibility of the Contractor.
6. Should the Contractor fail to enforce whole or part of the provisions of this EMMP, The Owner shall ask the Contractor in writing to take the appropriate corrective actions. If the Contractor fails to act, and in case of emergency, the

owner reserves the right to take these actions including stoppage of tasks. All costs directly related to the Contractor's failure will be borne by the Contractor.

7. The owner's site representative will function as a formal environmental liaison person who as part of the Project Management Team, will act as a link between the project, members of local communities and other identified stakeholders regarding environmental issues.

1.1.2. Operational Phase

Responsible persons will be held accountable for the implementation of the EMMP aspects that are applicable to their respective areas of responsibility. Duties and responsibilities of key persons will include:

- **The Owner** will be the overall operator in charge of the development
- **The Protea Hotel Manager** will be responsible for ensuring the hotel activities comply with the EMMP and all other statutory obligations
- **The Arcades Maintenance Manager** will work closely with the hotel and shopping centre tenants/owners/operators to ensure the required standard are maintained at all times
- **The Safety, Health and Environmental (SHE) Officer** will work closely with all line managers and supervisors on aspects of operation regarding Safety, Health and Environment and will form part of the ongoing management of the shopping centre and hotel. Responsibilities of the SHE Officer will include, and not be limited to:
 - Ensuring compliance with ECZ licenses and regulations.
 - Ensuring compliance with the requirements of the Factories Inspectorate
 - Ensuring adherence to the EMMP.
 - Ensuring Occupational Health and Safety in the plant
 - Monitoring of environmental issues e.g. Emissions to air, sewage and waste water quality, waste management and vector control.
 - To act as a liaison person between Arcades Developments PLC, regulatory authorities, members of the public and other relevant stakeholders regarding environmental issues.

1.2. Structure of the EMMP

The EMMP is divided broadly into an **Environmental Management Plan (EMP)** and an **Environmental Monitoring Plan**.

The Environmental Management Plan details mitigation and management measures to be undertaken during the **construction** and **operational** phases of the project in Tables 1 and 2 respectively.

The Environmental Monitoring Plan details monitoring activities and measures to be undertaken during construction and operation in Tables 3 and 5 respectively.

Cross referencing is used where possible to avoid undue repetition in the tables.

A brief outline of other stakeholders that will have monitoring roles during the construction and operational phases of the project is given in Tables 4 and 6 respectively.

Structure of Tables

Tables 1 and 2 (The Environmental Management Plan) and Tables 3 and 5 (Environmental Monitoring Plan) are laid out in columns with the following headings:

- **Affected Environment** – This corresponds to the standard environmental component headings used in an EIS.
- **Objective to Address Impact** – This is the objective needed to protect the environmental aspect indicated in the previous column. The objectives are directly linked to the impacts identified.
- **Measures to be Taken** – The commitments or requirements made to meet the objective
- **Responsibility** – This refers to the responsible person, group of persons or organisation who must ensure that the measure is implemented.
- **Due Date** – This is the due date by which the activity or measure must be in place or completed.
- **Frequency** – the frequency at which the activity should take place (for repetitive or ongoing activities).

1.3. Environmental Management Plan (EMP)

1.3.1. Environmental Management Plan for Construction Phase (Anticipated Period March 2006 – June 2007)

The term 'Contractor in this section refers to the main contracting firm as well as all sub-contractors during the construction phase of the project.

Table 1: Environmental Management Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
C1	Land and topography	To prevent soil erosion	All earthworks for site preparation and levelling will be carried out during the dry season (of 2006) and the permanent storm water, road and site drainage system will be in place before the onset of the following rains	Contractor's Site Manager	2 nd Quarter 2006	-
C2	Land and topography	To prevent soil erosion	Construction of temporary drains will precede the permanent drainage system such that storm water may be directed appropriately as required e.g. to existing works drainage system.	Contractor's Site Manager	3 rd Quarter 2006	-
C3	Land and topography	To prevent land degradation	Appropriate procurement and sourcing management will be undertaken by the Contractor to ensure a sustainable supply of local materials. All raw materials and construction inputs shall be procured from approved sources and ECZ authorized quarries.	Contractor's Site Manager	-	Ongoing
C4	Air Quality	To minimise dust nuisance	All work areas and access roads on site will be regularly watered by water bowser in order to reduce dust levels.	Contractor's Site Manager		Daily
C5	Air Quality	To minimise exhaust pollution	Equipment engine, fuel and emission systems of construction machinery and vehicles shall be well maintained and calibrated in accordance with manufacturers' recommendation to minimise exhaust smoke, fuel and oil leaks.	Contractor's Site Manager	-	Ongoing
C6	Air Quality	To minimise dust and exhaust nuisance	Designated access routes will be set and complied with by the Contractor.	Contractor's Site Manager	2 nd Quarter 2006	-
C7	Air Quality	To minimise air pollution	The burning of any kinds of waste or construction materials material shall not be permitted.	Contractor's Site Manager	-	Ongoing
C8	Noise Level	To minimise noise nuisance from construction activities	The Contractor shall restrict any of his operations, which result in undue noise disturbance to nearby communities and dwellings (e.g. operation of heavy machinery and construction traffic) between hours of 20:00 and 06:00.	Contractor's Site Manager	-	Daily

Table 1: Environmental Management Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
C9	Noise Level	To minimise noise nuisance from construction traffic	Designated access routes will be set and complied with as per Requirement C6.	Contractor's Site Manager	2 nd Quarter 2006	-
C10	Surface Water	To minimise risk of water logging due to changing surface drainage regime of site area	The permanent road and site drainage system will be preceded by temporary drains temporary drains (Requirement C2) to ensure that the site is at all times drained adequately and surface run off is directed appropriately to avoid water logging of the site or adjacent areas.	Contractor's Site Manager	2 nd Quarter 2006	-
C11	Surface Water	To prevent contamination of surface water	Temporary drains should be constructed and directed in such a manner as to reduce the risk of erosion and siltation of downstream water bodies i.e. the Thabo Mbeki Road drains	Contractor's Site Manager	3 rd Quarter 2006	-
C12	Surface Water	To prevent contamination of surface water	Stockpile areas for materials such as sand, gravel and stone laterite should be surrounded by perimeter drains with sediment and other pollutant traps located at drain exits.	Contractor's Site Manager	2 nd Quarter 2006	-
C13	Surface Water	To prevent contamination of surface water	The contractor shall observe waste management protocols as outlined in Requirements C16 to C20.	Contractor's Site Manager	-	-
C14	Ground Water	To prevent depletion of ground water resource / reduced availability to other users	The water supply demand, for construction, dust palliation and workers domestic usage will come from the existing water supply on site will not exceed 2l/s.	Contractor's Site Manager	-	Ongoing
C15	Ground Water	To prevent contamination of ground water	The existing water borne sewage system shall be extended to connect to and service the temporary workers camp. Adequate toilets, ablution and catering facilities, discharging to the same sewage system, will be established on site for workers. There shall be no construction of pit latrines or facilities employing soak away systems.	Contractor's Site Manager	2 nd Quarter 2006	-
C16	Ground Water	To prevent contamination of ground water	There shall be no littering by construction workers. Bins shall be provided on site for the disposal of refuse such as discarded packaging as well as the Contractor's domestic waste, e.g. from the preparation of meals.	Contractor's Site Manager	2 nd Quarter 2006	-
C17	Ground Water	To prevent contamination of ground water	Waste from the bins shall be collected on a regular basis and disposed of at ECZ approved dumping sites.	Contractor's Site Manager	-	Weekly

Table 1: Environmental Management Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
C18	Ground Water	To prevent contamination of ground water	All hazardous wastes, material soiled with hazardous wastes and non-biodegradable matter including empty containers of hazardous materials shall not be disposed of on site. All such waste shall be stored on site in an approved manner, and be removed at regular intervals to off site waste disposal facilities designed to handle such hazardous waste as required by law.	Contractor's Site Manager	-	Weekly
C19	Ground Water	To prevent contamination of ground water	Soil contaminated by fuel and oil leakage shall be removed and disposed of off site in an approved manner. Soil contaminated by cement or other chemicals (e.g. by spillage of paint) shall be removed and placed in approved disposal areas, identified by the Contractor.	Contractor's Site Manager	-	Ongoing
C20	Ground Water	To prevent contamination of ground water	Building rubble and spoil if not re-used on site as land fill shall be collected on a regular basis and disposed of at approved ECZ dumping sites.	Contractor's Site Manager	-	As required
C21	Traffic and Road Safety	To promote safety on public access roads	Designated access routes shall be set and complied with by the Contractor.	Contractor's Site Manager	2 nd Quarter 2006	-
C22	Traffic and Road Safety	To promote safety on public access roads	Prior warning should be given to shopping centre customers/tenants/operators of expected high levels of traffic	Contractor's Site Manager	2 nd Quarter 2006	Ongoing
C23	Traffic and Road Safety	To promote safety on public access roads	All public and private roads used by the Contractor or suppliers shall be kept trafficable and free of excessive dirt and mud arising from the works.	Contractor's Site Manager	-	Ongoing
C24	Traffic and Road Safety	To promote safety on public access roads	Damage arising to public access roads which is directly attributable to construction activities or to the Contractor's negligence, the Contractor shall be liable for its repair to the original specifications or the cost of repair.	Contractor's Site Manager	-	As required
C25	Traffic and Road Safety	To promote safety on public access roads	The Contractor must implement measures for ensuring safe passage of traffic on access roads and around the construction site wherever needed, or required by the local police authorities, at all times. In particular the following measures are recommended: • Slow down bumps on the Arcades access roads. • Warning signs along Arcades access roads • Barrier/security check point at entrance to the hotel construction road to regulate unauthorised traffic.	Contractor's Site Manager	2 nd Quarter 2006	-
C26	Traffic and Road Safety	To ensure traffic safety on construction site	All gravel access roads and exposed work areas on site shall be watered on a regular basis to minimise dust emissions.	Contractor's Site Manager	-	Daily

Table 1: Environmental Management Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
C27	Traffic and Road Safety	To ensure traffic safety on construction site	The Contractor shall ensure that personnel shall, at all times, wear high visibility fluorescent garments where work is carried out on or adjacent to trafficked roads.	Contractor's Site Manager	-	Ongoing
C28	Traffic and Road Safety	To ensure traffic safety on construction site	Clear markings directing traffic should be in place at all relevant places on site and a maximum speed limit of 20 km/h should be enforced.	Contractor's Site Manager	2 nd Quarter 2006	Ongoing
C29	Occupational Health and Safety	To ensure Health and Safety on the construction site	The Contractor shall ensure that all employees are made aware of and comply with safety rules and measures that will apply on site.	Contractor's Site Manager	-	Ongoing
C30	Occupational Health and Safety	To ensure Health and Safety on the construction site	All site safety rules must be strictly and permanently adhered to within the areas of the site. The Contractor must inform all employees that repeated violation of safety regulations or unsafe/disruptive behaviour will result in disciplinary action, which can include termination.	Contractor's Site Manager	-	Ongoing
C31	Occupational Health and Safety	To ensure Health and Safety on the construction site	Key personnel shall receive training in basic First Aid. The Contractor shall provide a First Aid post on site, which is appropriately equipped and staffed by fully trained First Aid personnel. In case of serious injuries on site, e.g. accidents with heavy machinery, etc., the Contractor shall formulate a plan to deal with such emergencies, prior to possession of the site.	Contractor's Site Manager	2 nd Quarter 2006	-
C32	Occupational Health and Safety	To ensure Health and Safety on the construction site	The contractor shall conduct risk assessment in the planning of potentially hazardous tasks to be done.	Contractor's Site Manager	-	Ongoing
C33	Occupational Health and Safety	To ensure Health and Safety on the construction site	Personal Protective Equipment (e.g. hard hats, gloves, overalls, boots, respiratory protection, hearing and eye protection, high visibility waist coats, fall protection harnesses) shall be issued as required to the various categories of the workforce and replaced when necessary.	Contractor's Site Manager	-	Ongoing
C34	Occupational Health and Safety	To ensure Health and Safety on the construction site	Good house keeping shall be strictly enforced to maintain a safe working environment. The Contractor shall adhere to waste management protocols as outlined in Requirements C16 to C20.	Contractor's Site Manager	-	Ongoing
C35	Occupational Health and Safety	To ensure Health and Safety on the construction site	All personnel performing welding and cutting or operating crane and mobile equipment shall be trained and qualified	Contractor's Site Manager	2 nd Quarter 2006	-
C36	Occupational Health and Safety	To ensure Health and Safety on the construction site	Fire drills shall be conducted by the contractor at regular intervals and the Contractor shall provide the necessary number of fire extinguishers. Burning of any kinds of wastes or construction materials is forbidden.	Contractor's Site Manager	-	4 times per year

Table 1: Environmental Management Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
C37	Occupational Health and Safety	To ensure Health and Safety on the construction site	The contractor shall ensure that all equipment, tools, temporary facilities and other items used to carry out the works are in a safe sound and good condition.	Contractor's Site Manager	-	Ongoing
C38	Occupational Health and Safety	To ensure Health and Safety on the construction site	The Contractor will install temporary lighting for roads, pathways and work areas according to applicable local standards.	Contractor's Site Manager	2 nd Quarter 2006	Ongoing
C39	Occupational Health and Safety	To ensure Health and Safety on the construction site	A boundary fence shall be erected at site take-over by the Contractor.	Contractor's Site Manager	2 nd Quarter 2006	-
C40	Occupational Health and Safety	To ensure Health and Safety on the construction site	The Contractor must execute his obligations with due diligence and in accordance with Zambian for labour protection.	Contractor's Site Manager	-	Ongoing
C41	Public Health	To reduce health risk due to dust pollution	The Contractor shall observe measures for air pollution control	Contractor's Site Manager	-	Ongoing
C42	Public Health	To minimise risk of water borne diseases	The Contractor shall observe pollution control and waste management protocols as outlined in Requirements C21 to C29, including provision of sanitation facilities for workers.	Contractor's Site Manager	-	Ongoing
C43	Public Health	To reduce risk of malarial infection	The Contractor shall ensure adequate drainage of site to prevent stagnant water that can provide a breeding habitat for mosquitoes.	Contractor's Site Manager	4 th Quarter 2006	-
C44	Public Health	To reduce risk of malarial infection	Construction workers should also be made aware by the Contractor of preventative measures that can be taken to reduce the risk of malaria such as the use of treated mosquito nets.	Contractor's Site Manager	-	Ongoing
C45	Public Health	To reduce risk of HIV and communicable disease transmission	The Chilanga Cement Plc HIV/AIDS policy will be extended to in conjunction with the contractor to include all construction workers including the provision of condoms.	Contractor's Site Manager	-	Ongoing
C46	Public Health	To reduce risk of HIV and communicable disease transmission	Where practicable, and without prejudice to the Contractor's other contractual obligations, preferential employment should be given to members of local communities to reduce the risk of communicable diseases associated with migrant labour	Contractor's Site Manager	-	Ongoing

Table 1: Environmental Management Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
C47	General	To enhance environmental protection through training of employees	The Contractor in collaboration with the Project Management Team and relevant authorities shall arrange that all supervisory employees of the Contractor and his sub-contractors are trained to ensure the following: • A basic understanding of the key environmental features of the site and its environs. This will include sharing of information on bio-physical and socio-economic aspects of the environment to prevent misunderstanding. • Thorough familiarity with the environmental protection requirements as they apply to the works. • Awareness of archaeological artefacts. • Awareness of any other environmental matters which are deemed necessary by the Project Management Team (e.g. appropriate behaviour / community relations, public health issues). • Basic First Aid.	Contractor's Site Manager	2 nd Quarter 2006	Ongoing

1.3.2. Environmental Management Plan for Operational Phase (Shopping Centre March 2006, Protea Hotel June 2007)

Table 2: Environmental Management Plan for Operation

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
Op1	Natural Resource	To enhance energy efficiency and reduce consumption of non-renewable resources	Optimisation of the energy consumption of the hotel and shopping centre. Measures to achieve optimisation will include: - Efficient electricity consumption by the use of energy saving lights and photocells/timers to ensure lights are off when not required - Use of energy efficient and energy saving air conditioning systems.	Maintenance Manager	-	Ongoing
Op2	Natural Resource	To enhance energy efficiency and reduce consumption of non-renewable resources	Operators will be re-trained in the use of the modern technology.	Hotel Manager	2 nd Quarter 2007	-
Op3	Air Quality	To implement operating practices to minimise on fugitive dust emissions	Good house keeping practices including sweeping and/or cleaning of internal road network will reduce fugitive dust levels.	Maintenance Manager	-	Ongoing
Op4	Noise Level	To minimise noise emission from the plant / nuisance to neighbours	Engineering design features that will minimise noise emission from the hotel and shopping centre will be implemented.	Arcades Developments Plc	2 nd Quarter 2007	-
Op5	Noise Level	To minimise noise emission from the shopping centre and hotel / nuisance to neighbours	Trees will be planted as part of landscaping which will contribute to reducing potential noise disturbances for neighbouring communities and hotel residents	Arcades Developments Plc	2 nd Quarter 2007	-
Op6	Surface Water	To prevent contamination of surface water and the aquatic environment due to discharge of effluent and waste water	All waste water and sewage effluent will be discharged into Lusaka Water and Sewerage Truck Mains. Maintenance of the Sewer mains will include routine inspections and clearing of potential blockages..	SHE Officer	2 nd Quarter 2007	Ongoing
Op7	Surface Water	To prevent contamination of surface water by run off from parking areas	Maintenance of the drainage system will include routine clearing of drains of sediment and other waste.	Maintenance Manager	-	Quarterly

Table 2: Environmental Management Plan for Operation

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
Op8	Surface Water	To prevent contamination of surface water run off from parking areas	Surface water will be directed to purpose designed Storm water drains for future discharge into Lusaka City Council road Drainage systems.	SHE officer	-	Weekly
Op9	Surface Water	To prevent contamination of surface water due to solid waste	An approved waste removal company contracted by Arcades Developments Plc. will collect domestic waste for disposal at the ECZ approved refuse dumping site.	SHE Officer	-	Ongoing
Op10	Surface Water	To prevent contamination of surface water due to solid waste	An approved waste removal company contracted by Arcades Developments Plc. will collect domestic waste for disposal at the ECZ approved refuse dumping site.	SHE Officer	-	Weekly
Op11	Ground water	To prevent depletion of ground water resource / availability to other users	Water supply to the shopping centre and hotel will be supplied from the exiting water distribution network in the area which has ample capacity to cater for this development	Arcades Developments Plc	2 nd Quarter 2007	Ongoing
Op12	Ground water	To prevent contamination of ground water due to leaks in sewage mains	Sewer line maintenance will include routine rodding and flushing the sewer mains, service calls on potentially blocked mains and repair of damaged mains.	Maintenance Manager	-	As required
Op13	Land and Soil	To prevent contamination of soils	Fuel and waste products will be stored and handled as in Requirements Op6 – Op13	Maintenance Manager	-	Ongoing
Op14	Occupational Health and Safety	To maximise Health and Safety in the work environment	Procedures and practices at hotel and shopping centre will comply with the most stringent of local and international including: - The Protea Group Health, Environment and Safety Policy - Arcades Developments Works Safety Regulations. - All applicable Zambian safety standards.	Safety Officer	-	Ongoing
Op15	Occupational Health and Safety	To maximise Health and Safety in the work environment	The Arcades Developments Plc's Safety Committee will comprise a Arcades Management Officer, Tenant Representatives, Hotel operator representatives, Union members and Staff Association Representative. - The committee will conduct regular meetings to discuss accident prevention, safety promotion and education, injury records, etc, - The committee will conduct regular inspections of the shopping centre and hotel to detect hazardous conditions and submit recommendations for their elimination.	Safety Officer	-	Ongoing
Op16	Occupational Health and Safety	To maximise Health and Safety in the work environment	Risk Analysis will be conducted for major and repetitive operations activities as well as maintenance	All Tenants/Line Managers	-	As required

Table 2: Environmental Management Plan for Operation

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
Op17	Occupational Health and Safety	To maximise Health and Safety in the work environment	Root Cause Analysis is conducted to determine the underlying causes of accidents and their prevention.	All Tenants/Line Managers	-	As required
Op18	Occupational Health and Safety	To maximise Health and Safety in the work environment	Shop tenants, the hotel and cinema managers and their supervisors will be responsible for taking all possible action to safeguard all persons and property under their control.	All Tenants/Line Managers / Supervisors	-	Ongoing
Op19	Occupational Health and Safety	To maximise Health and Safety in the work environment	Line managers will be responsible for ensuring that each employee is fully conversant with safety procedures and regulations applying to his/her occupation in the factory.	All Tenants/Line Managers	-	Ongoing
Op20	Occupational Health and Safety	To maximise Health and Safety in the work environment	All employees will be trained and inducted in the Arcades Shopping Centre and Protea Hotels Group safety regulations and practices.	All Tenants/Line Managers	-	Ongoing
Op21	Occupational Health and Safety	To maximise Health and Safety in the work environment	All employees are required to acquaint themselves with company rules and procedures with respect to safety (including prevention of fires).	Safety Officer	-	Ongoing
Op22	Occupational Health and Safety	To maximise Health and Safety in the work environment	Health and Safety rules and procedures will cover: • Use of personal protective equipment (PPE), • Accident procedures, • Fire procedures and assembly points • Good house keeping • Other major safety points.	Safety Officer	-	Ongoing
Op23	Traffic and Road Safety	To ensure traffic safety in parking and access road areas	The internal road network will be operated in accordance with design specifications.	Arcades Developments Plc	2 nd Quarter 2007	Ongoing
Op24	Traffic and Road Safety	To ensure traffic safety in parking areas	A maximum speed limit of 40 km/h will be enforced within the shopping centre and hotel parking areas. Speed humps will be constructed to ensure further traffic calming measures.	Arcades Developments Plc	-	Ongoing
Op25	Traffic and Road Safety	To enhance traffic safety in parking areas	Public warning signs along the road will clearly indicate authorised speed limits and potential dangers	Arcades Developments Plc	2 nd Quarter 2007	-

Table 2: Environmental Management Plan for Operation

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
Op26	Public Health	To minimise health risks due to contamination of surface or ground water	Waste management protocols will be observed as outlined in Requirements Op6 – Op13.	Arcades Developments Plc.	-	Ongoing
Op27	Public Health	To minimise health risks due to contamination of surface or ground water	Sewage and waste water from the shopping centre and hotel will be discharged into Lusaka Water and Sewerage Company Trunk Mains.	Arcades Developments Plc	-	Ongoing
Op28	Public Health	To minimise health risks due to contamination of surface or ground water	Potable water supply is from a Lusaka Water and Sewerage Company mains distribution line.	Arcades Developments Plc	-	Ongoing

1.4. Environmental Monitoring Plan

1.4.1. Environmental Monitoring Plan Construction Phase (Anticipated Period March 2006 – June 2007)

Table 3 :Environmental Monitoring Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
CM1	General	To ensure project's and Contractors' adherence to the EMP and compliance with ECZ licences and regulations and Factories Inspectorate regulations.	Routine inspections of the site, routine environmental records (water, sanitation and waste management), Construction Materials Audits and Incident Reports as and when required (e.g. for pollution, accidents, etc.)	Contractor's Site Manager	-	Ongoing
CM2	Land and topography	To prevent soil erosion	Temporary drainage will be inspected routinely for suitability and erosion problems.	Contractor's Site Manager	-	Ongoing
CM3	Land and topography	To prevent land degradation from unapproved sources of materials	Records will be kept on site of delivery notes and invoices for all construction materials delivered to the site.	Contractor's Site Manager	-	Ongoing
CM4	Air Quality	To minimise dust nuisance	All construction work sites and all gravel access roads will be inspected routinely to ensure adequate watering for dust abatement.	Contractor's Site Manager	-	Daily
CM5	Air Quality	To minimise exhaust pollution	Maintenance records will be kept for all construction vehicles and plant equipment engines.	Contractor's Site Manager	-	Ongoing
CM6	Air Quality	To minimise dust and exhaust nuisance	Designated access routes will be stated in the contract documents.	Contractor's Site Manager	2 nd Quarter 2006	-
CM7	Noise Level	To minimise noise nuisance from construction activities	A log book will be maintained of blasting activities and of all vehicles entering and exiting the construction site at the main entrance.	Contractor's Site Manager	-	Ongoing
CM8	Surface Water	To minimise risk of water logging due to changing surface drainage regime of site area	Temporary drainage will be inspected routinely as per Requirement CM2	Contractor's Site Manager	-	Ongoing
CM9	Surface Water	To prevent siltation of surface water bodies	Temporary drainage will be inspected routinely as per Requirement CM2	Contractor's Site Manager	-	Ongoing
CM10	Surface Water	To prevent contamination of surface water	Sanitation, waste management and pollution control protocols will be monitored	Contractor's Site Manager	-	Ongoing

Table 3 :Environmental Monitoring Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
CM11	Ground Water	To prevent contamination of ground water	Sanitation facilities will be inspected routinely for compliance to public health standards	Contractor's Site Manager	-	Daily
CM12	Ground Water	To prevent contamination of ground water	Records will be kept on site of used oil and containers removed from site and disposed of in accordance with ERB standards.	Contractor's Site Manager	-	Ongoing
CM13	Ground Water	To prevent contamination of ground water	Records will be kept on site of collection and disposal of all solid waste as well as hazardous waste (e.g. empty chemical / pesticide containers) by an approved waste disposal company.	Contractor's Site Manager	-	Ongoing
CM14	Ground Water	To prevent contamination of ground water	Records will be kept on site of incidents such as oil/fuel spills and the treatment, removal, and disposal of contaminated soil.	Contractor's Site Manager	-	As required
CM15	Ground Water	To prevent contamination of ground water	Records will be kept on site of building rubble and spoil removed from the site for disposal	Contractor's Site Manager	-	Ongoing
CM16	Traffic and Road Safety	To promote safety on public access roads	Designated access routes will be determined in the contract documents	Contractor's Site Manager	2 nd Quarter 2006	-
CM17	Traffic and Road Safety	To promote safety on public access roads	Minutes and records will be maintained of community liaison meetings discussing traffic safety issues.	Contractor's Site Manager	-	As required
CM18	Traffic and Road Safety	To promote safety on public access roads	All public access roads shall be monitored on a day to day basis for damage to the road surface by construction traffic.	Contractor's Site Manager	-	Daily
CM19	Traffic and Road Safety	To promote traffic safety on site and public access roads	Regular inspections will be made of traffic and safety barriers and signs. A record will be kept of any traffic related accidents occurring on site or on access roads stating time, place and cause of accident.	Contractor's Site Manager	-	Daily inspection
CM20	Occupational Health and Safety	To ensure Health and Safety on the construction site	Site meetings between the Project Management Team and the Contractor will start with Health and Safety on the agenda. Specific Health and Safety meetings will be held at the request of the Contractor or the Contractor's Site Manager.	Contractor's Site Manager	-	Weekly or as required
CM21	Occupational Health and Safety	To ensure Health and Safety on the construction site	Regular inspections will be carried of the works to audit safety of the site including actual construction operations, workshops and storage facilities as well as administrative documents and documents required to certify conformity of equipment, tools and materials used by the Contractor.	Contractor's Site Manager	-	At any time
CM22	Occupational Health and Safety	To ensure Health and Safety on the construction site	A record will be kept of each accident or near miss accident that occurs under construction related activities and the cause of accident shall be ascertained. Accidents shall be reported within one working day to the Arcades Developments Plc Site Manager and immediately in the case of fatality.	Contractor's Site Manager	-	As required

Table 3 :Environmental Monitoring Plan for Construction

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
CM23	Occupational Health and Safety	To ensure Health and Safety on the construction site	Records of daily site safety talks will be maintained	Contractor's Site Manager	-	Daily
CM24	Occupational Health and Safety	To ensure Health and Safety on the construction site	A record will be maintained of personnel's certification and training (including training as First Aid Officers.)	Contractor's Site Manager	2 nd Quarter 2006	Ongoing
CM25	Occupational Health and Safety	To ensure Health and Safety on the construction site	Minutes of risk assessment will be maintained	Contractor's Site Manager	-	As required
CM26	Occupational Health and Safety	To ensure Health and Safety on the construction site	A record will be kept of Personal Protective Clothing issued to the work force.	Contractor's Site Manager	-	Ongoing
CM27	Occupational Health and Safety	To ensure Health and Safety on the construction site	Sanitation, waste management and pollution control protocols will be monitored	Contractor's Site Manager	-	Ongoing
CM28	Occupational Health and Safety	To ensure Health and Safety on the construction site	Records of fire drills conducted will be maintained	Contractor's Site Manager	-	Ongoing
CM29	Occupational Health and Safety	To ensure Health and Safety on the construction site	Documents to certify conformity of tools, equipment and materials used by the Contractor shall be kept on site and be available for inspection.	Contractor's Site Manager	2 nd Quarter 2006	-
CM30	Public Health	To reduce health risk due to dust, waste and other pollution	Sanitation, waste management and pollution control protocols will be monitored as indicated in Requirements.	Contractor's Site Manager	-	Ongoing
CM31	Public Health	To reduce risk of malarial infection	The construction site will be inspected regularly for stagnant water and measures put in place for adequate drainage as indicated in Requirement CM2	Contractor's Site Manager	-	Daily

1.4.2. Other Stakeholders in Environmental Monitoring During Construction

Other major stakeholders apart from the Developer (Arcades Developments Plc.) have a monitoring role and responsibility during development, construction and operation of the project. This includes the Contractor, the Environmental Council of Zambia (ECZ) and the Factories Inspectorate.

Traffic Police, local authorities, health authorities and other public authorities as well as various utility providers will automatically monitor some of the effects of the project during their daily work. On a regular basis, this information should be collected and analysed by those with a formal monitoring responsibility.

Table 4 below shows other stakeholders and their monitoring responsibilities and reporting during the construction phase.

Table 4 : Other Stakeholders in Construction Phase Monitoring

Responsible	Parameters to be Monitored	Output
ECZ	Overall environmental performance of the project.	Discussions
Contractor	1. Implementation of mitigation measures. 2. Occupational health and safety. 3. Traffic and worksite accidents. 4. Environmental performance of equipment. 5. Air quality.	- Maintenance records - Accident record / reports - Mitigating actions
Traffic Police	Traffic safety on Main Roads around the Development	- Directing Traffic - Attending to accidents - Ensuring Road Safety

Responsible	Parameters to be Monitored	Output
Local Authorities	Negative social and environmental impacts.	Complaints to Contractor and Project Management Team

1.4.3. Environmental Monitoring Plan for Operational Phase (Anticipated July 2007 – Ongoing)

Prime responsibility for monitoring activities during operation of the new facility will lie with the Arcades Developments Plc manager, Maintenance Manager, SHE Officers, Safety Committee, tenants, Protea Hotel Management and all Line Manager and Supervisors.

Monitoring data should be analysed and reviewed at regular intervals and compared with operating standards so that the necessary corrective actions can be taken.

Records of monitoring results should be kept in an accessible format. Results should be reported to the ECZ, Tourism Council of Zambia, Lusaka City Council and other relevant or responsible authorities as required.

The monitoring plan for operation is laid out in Table 5 below.

Table 5: Environmental Monitoring Plan for Operation

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
OM1	Natural Resource	To enhance energy efficiency and reduce consumption of non-renewable resources	Performance of all equipment where possible will be logged and records maintained	Maintenance Manager	-	Daily
OM2	Natural Resource	To enhance energy efficiency and reduce consumption of non-renewable resources	Records will be kept of the re-training and up-skilling of operators in the use of the modern technology.	Line Managers/Tenants	-	Ongoing
OM3	Natural Resource	To ensure sustainable use of raw materials	Records will be kept of delivery notes and invoices for all materials delivered to the shopping centre and hotel to document approved sources.	All Line Managers/Tenants	-	Ongoing
OM4	Air Quality	To implement operating practices to minimise on fugitive dust emissions	Transport routes within the shopping centre and hotel will be inspected routinely to ensure adequate dust abatement.	Maintenance Manager	-	Daily
OM5	Air Quality	To implement operating practices to minimise on fugitive dust emissions	The parking areas will be inspected regularly for adequate dust abatement.	Maintenance Manager	-	Daily

Table 5: Environmental Monitoring Plan for Operation

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
OM6	Noise Level	To minimise noise emission from the plant / nuisance to neighbours	Ambient noise levels will be monitored to ensure compliance with acceptable standards.	SHE Officer	-	Quarterly
OM7	Surface Water	To prevent contamination of surface water and the aquatic environment due to discharge of effluent and waste water	All treated waste water and sewage effluent will be discharged into the Lusaka Water and Sewerage Company trunk mains	SHE Officer	-	Table 17
OM8	Surface Water	To prevent contamination of surface water by run off from parking areas	The drainage system will inspected regularly and cleared of sediment and other waste	Maintenance Manager	-	Quarterly
OM9	Surface Water	To prevent contamination of surface water by industrial waste water / run off from plant area	Records will be kept of used oil and containers that are stored removed from the shopping centre and hotel and disposed of in accordance with ERB and ECZ standards.	SHE Officer	-	Ongoing
OM10	Surface Water	To prevent contamination of surface water due to solid waste	Records will be stored of collection and disposal of refuse by approved waste removal company.	SHE officer	-	Ongoing
OM11	Ground water	To prevent depletion of ground water resource / availability to other users	Records will be maintained of daily water supplied from the LWSC mains.	Maintenance Manager	-	Daily
OM12	Ground water	To prevent contamination of ground water from point or diffused sources	Measures to monitor potential contamination of surface water (and subsequent contamination of ground water) will be carried out	SHE Officer	-	Ongoing
OM13	Ground water	To prevent contamination of ground water due to leaks in sewage mains	The flow within the sewage mains within the shopping centre and hotel will monitored at several locations in order to ascertain leaks in the system.	Maintenance Manager	-	Quarterly
OM14	Occupational Health and Safety	To maximise Health and Safety in the work environment	Records will be maintained of work procedures and practices, isolation procedures and permits-to-work issued to employees and sub-contractors to document compliance with: • The Protea Group Standards • Arcades Developments Works Safety Regulations. • All applicable Zambian safety standards.	SHE Officer	-	Ongoing

Table 5: Environmental Monitoring Plan for Operation

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
OM15	Occupational Health and Safety	To maximise Health and Safety in the work environment	A file of minutes will be maintained of all meetings of the Safety Committee	Safety Officer	-	Every month or as required
OM16	Occupational Health and Safety	To maximise Health and Safety in the work environment	The committee will conduct regular inspection of plant installation to detect hazardous conditions and submit recommendations for their elimination.	Safety Officer / Committee	-	Weekly
OM17	Occupational Health and Safety	To maximise Health and Safety in the work environment	Minutes of Risk Analysis will be maintained	All Line Managers	-	As required
OM18	Occupational Health and Safety	To maximise Health and Safety in the work environment	Records will be kept of all accidents and near miss accidents that may occur under works related activities and the cause of accident shall be ascertained. Minutes of Root Cause Analysis will be maintained	SHE Officer	-	As required
OM19	Occupational Health and Safety	To maximise Health and Safety in the plant work environment	Safety Log Books will be provided and maintained wherein employees can record any safety matter they believe requires attention by the Safety Officer / Committee.	All Supervisors	-	Inspected daily
OM20	Occupational Health and Safety	To maximise Health and Safety in the work environment	All work areas will be inspected frequently and safety inspection tours will be carried out to ensure that all aspects of safety are being observed.	All Line Managers / Supervisors	-	At least once per week
OM21	Occupational Health and Safety	To maximise Health and Safety in the work environment	Records will be kept of training and attendance of all employees in safety regulations and practices.	All Line Managers / Supervisors	-	Ongoing
OM22	Occupational Health and Safety	To maximise Health and Safety in the work environment	Records will be kept of all Personal Protective Equipment issued to employees	SHE Officer	-	Ongoing
OM23	Traffic and Road Safety	To enhance traffic safety on access roads and parking areas	Regular inspection will be made of the access roads and parking areas to ensure adequate cleaning for dust abatement.	Maintenance Manager	-	Daily
OM24	Traffic and Road Safety	To enhance traffic safety on access roads and parking areas	Speed limits for all vehicles will be enforced	Maintenance Manager	-	Weekly
OM25	Traffic and Road Safety	To enhance traffic safety on access roads and parking areas	Regular inspections will be made to ensure public warning signage is intact and in place.	SHE Officer	-	Weekly

Table 5: Environmental Monitoring Plan for Operation

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
OM26	Public Health	To minimise health risks due to contamination of surface or ground water	Waste management protocols will be monitored	SHE Officer	-	Ongoing
OM27	Public Health	To minimise health risks due to contamination of surface or ground water	Potable water supply from Lusaka Water and Sewerage Company will be checked to ensure water quality standards are maintained.	SHE Officer	-	weekly

1.4.4. Other Stakeholders in Environmental Monitoring During Operation

Table 6 below shows other stakeholders in monitoring apart from Arcades Developments Plc. and their monitoring responsibilities and reporting during the operational phase.

Table 6: Other Stakeholders in Operational Monitoring

Responsible	Parameters to be Monitored	Output
ECZ	- Overall environmental performance of project. - Monitoring of emissions to air, waste water quality, sewage quality, and waste management.	- Discussions - Inspections and testing - Annual audits - Issuing of licences and permits
Factories Inspectorate	- Factory working conditions - Condition of plant installation - Condition of specific equipment such as pressure vessels and boilers, chains and hoists	- Discussions - Inspections of installation - Inspections and Certification of equipment - Inspection of records - Issuing of licences and permits
Utility Providers (e.g. ZESCO, LWSC)	Routine monitoring of electrical distribution and water reticulation infrastructure	Maintenance records
Lusaka City Council / Local Health Authorities	Public health.	Surveys and Results
Traffic police / Road Traffic	- Traffic accidents. - Traffic nuisance. - Traffic safety measures.	Police reports