ENVIRONMENTAL MANAGEMENT PROGRAM FOR THE PROPOSED DEVELOPMENT OF APROXIMATELY 324 LOW INCOME HOMES IN VREDENBURG, SALDANHA BAY, SALDANHA BAY MUNICIPALITY, WESTERN CAPE.

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1. DETAIL AND EXPERIENCE OF THE EAP WHO PREPARED THE EMPR

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Jonathan Lassen obtained his Advanced Diploma in Marine Sciences from the Cape Peninsula University of Technology. Jonathan is a candidate EAP and is in the process of becoming fully registered with EAPASA.

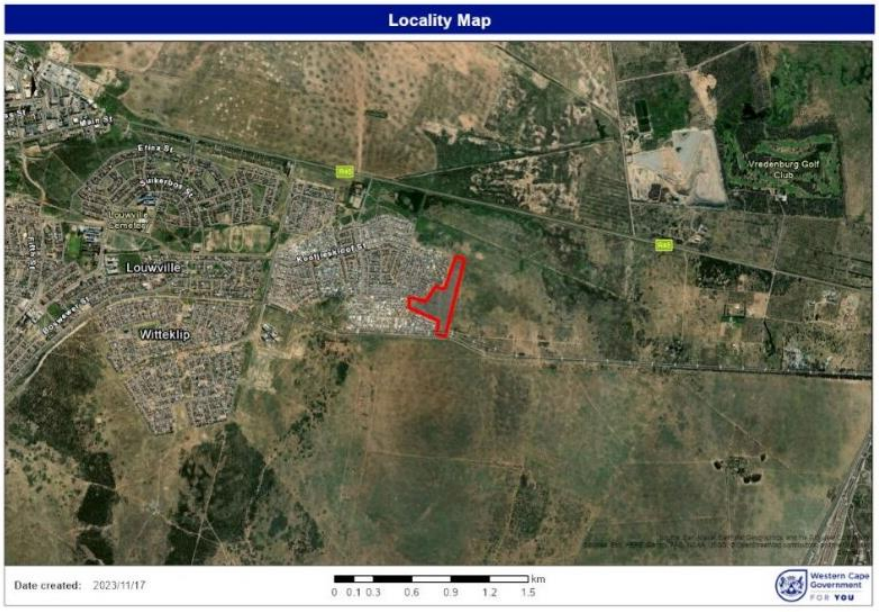
SEC has extensive experience in environmental impact assessment (EIA) procedures and has completed numerous such applications in most provinces of South Africa since 1998.

2. INTRODUCTION

The proposed development encompasses the establishment of low-income housing on Erf 8270 and Portion 4 of Farm 132, Vredenburg, comprising of the following:

- Approximately 324 Residential Zone IV erven (UISP) with an average size of 100m²
- 6 Open Space Zone 1 erven,
- 1 Institutional Zone II (Church)erf and
- 1 Institutional Zone I (Creche) erf;
  along with the necessary services and road infrastructure.

The overall development area is estimated to cover around 8.2575 hectares. Essential service facilities, including stormwater and sewage systems, will be situated within the road reserve of the planned internal roads of the proposed development. The mandated service infrastructure is designed with a diameter of less than 350 mm. The locality of the site can be viewed in Figure 1



below.

Figure 1: The location of the proposed development site (study site). The property borders are indicated in red. Please refer to appendices for the Locality Map and the proposed site layout plans.

Project Location:

The site (previously transformed from its natural state) is situated within Ward 9 of the Saldanha Bay Municipality at the following mid-point co-ordinates: 32.922587°S 18.030618°E.

This Environmental Management Programme (EMP) has been compiled in terms of the requirements of the National Environmental Management Act, 1998 (Act 107 of 1998) and the Environmental Impact Assessment Regulations, 2014, as amended.

This EMPr is intended to ensure compliance with the principles of sound environmental management and the general 'Duty of Care' specified in the National Environmental Management Act, so as to avoid or minimise potential negative impacts during the pre-construction, construction and operational phases of the proposed development. The scope and extent of mitigation measures contained herein are informed by the findings of the Final Basic Assessment Report and the approved specialist studies, which confirmed that the site is of low sensitivity and that no biodiversity-specific mitigation measures are required.

This document provides measures that should be implemented to ensure that any environmental degradation that may be associated with the construction activities is avoided, or where such impacts cannot be avoided entirely, are minimized and mitigated appropriately.

This EMPr forms part of the contractual obligations to which all persons including but not limited to, contractors/sub- contractors or employees involved in construction, operation, maintenance, or decommissioning work, must be committed. It also serves as a baseline information document for the project applicant and any entity working on behalf of the applicant, during the various phases of the proposed activity. The EMPr aims to comply with Section 24N of the National Environmental Management Act No. 107 of 1998, as amended (NEMA), as well as any additional specific information requested by any government department, including the regulating authority for this specific project, the DEA&DP.

The overall objective of the EMPr is to direct and guide all responsible parties, binding all contractors, sub-contractors, and all other persons working on the site to adhere to the terms and conditions of the EMPr during the construction, operation, maintenance, and anticipated demolition/decommissioning phases of the project. The overall outcome of the EMPr is to prevent avoidable damage and/or minimize or mitigate unavoidable environmental damage associated with the construction, operation, maintenance, and possible decommissioning phases of the proposed project. The specific outcomes of the EMPr will be achieved by ensuring that the mitigation and management measures detailed in the EMPr are implemented and adhered to throughout the project duration. Compliance monitoring and independent assessment/auditing allow the verification of achievement of the EMPr outcomes and ultimately, fulfilment of the EMPr objectives.

The EMPr:

- identifies project activities that could cause actual environmental damage (or potential environmental risks) and provides a summary of actions required;
- identifies persons responsible for ensuring compliance with the EMPr;
- provides standard procedures to avoid and/or minimize the identified negative environmental impacts and to enhance the positive impact of the project on the environment;
- provides the site and project-specific rules and actions required, including a site plan/s showing:
- areas where construction, maintenance, or demolition work may be carried out;
- areas where any material or waste may be stored;
- allowed access routes, parking, and turning areas for construction or construction-related vehicles;
- forms a written record of procedures, responsibilities, requirements, and rules for contractor/s, their staff, and any other person who must comply with the EMPr;
- provides a monitoring and auditing program to track and record compliance and identify and respond to any potential or actual negative environmental impacts; and
- provides a monitoring program to record any mitigation measures that are implemented

STRUCTURE AND CONTENT OF EMP

This EMP is structured as follows:

Section 1 & 2 provides a background of the proposed activity, the legislative framework, details of the EMP (author and related experience) as well as the content and structure of the Environmental Management Plan.

Section 3 deals with the various communication protocols, which must be implemented during the construction phase of the development

Section 4 documents the various social impacts associated with the proposed development (such as complaints from neighbouring landowners or any other party)

Section 5 aaddresses general environmental management considerations and potential construction and operational impacts associated with the proposed development. Based on the findings of the Final Basic Assessment Report and the approved specialist studies, the site was confirmed to be of low sensitivity for terrestrial fauna, flora, aquatic biodiversity, terrestrial biodiversity and agricultural potential.

Section 6 documents the impacts/issues associated with the pre-construction phase of the proposed development.

Section 7 provides an indication of the impacts/issues associated with the construction phase of the proposed development.

Section 8 documents the impacts/issues associated with the post construction phase of the proposed development.

Section 9 highlights the impacts/issues associated with the operational phase of the proposed development.

Conduct of Employees on Site

The following restrictions or constraints will be placed on all staff operating on the site in general:

- No illegal disposal of solid or liquid waste;
- No littering of the site or surrounding areas;
- No collection of firewood;
- No interference with any wildlife, fauna or flora;
- No use of toilet facilities other than the chemical toilets provided on site;
- No lighting of open fires; and
- No burning of any waste on site.
- Adherence to relevant health and safety standards and municipal bye laws

3. COMMUNICATION PROCEDURES

(a) Environmental Control Officer ("ECO") – the ECO must be appointed prior to commencement of operations. The ECO will advise the Principal Agent and Contractor of any environmental matters during construction and bulk landscaping phases of the development.

- The responsibilities of the ECO will include *monitoring* of compliance with the EMP, EA (If applicable) and supporting specialist studies (if applicable) by the Contractor.

- The ECO has the authority to recommend the cessation of works or any portion of construction related activity if in his/her opinion (and after discussion and agreement by the Principal Agent), the activity has caused or will imminently cause damage and/or harm to the environment deemed to be significant by the ECO or is in contravention to the relevant environmental legislation/permits/authorisations applicable to the site and/or activity/ies.

- If the Contractor fails to show adequate consideration to the EMP or the recommendations of the ECO, then the ECO may recommend to the Principal Agent, the Contractor's representative or any employee/s responsible for not showing adequate consideration to the EMP are removed from the site. Alternatively, the ECO may recommend that all work on site be suspended until the matter is remedied. All costs will be carried by the Contractor.

- Should modifications to this document be required, these must be agreed to by all parties concerned, namely the Principal Agent, the Contractor, ECO and the relevant authority.

(b) The Developer – the Developer is responsible for employing the ECO, Principal Agent, Contractor and Engineer for the duration of the construction contract. The Developer will also ensure, as a signatory to the EMP, that the Principal Agent and Contractor fulfil their obligations in terms of this EMP.

(c) The Principal Agent – the Principal Agent is appointed by the Developer and is responsible to the Developer for ensuring that the construction contract is carried out to completion on time, in budget and that the Contractor fulfils their obligations in terms of the EMP. The Principal Agent and ECO are expected to develop a close working relationship and to communicate frequently. The Principal Agent must be recognised as the senior authority on site and all communications and instructions between the ECO and the Contractor must occur via the Principal Agent. The Principal Agent is also responsible for deducting environmental penalties from the Contractor. The Principal Agents must ensure that the Contractor has a copy of this EMP and all approved Method Statements and that the Contractor is familiar with the relevant documentation.

(d) The Contractor – the Contractor will adhere to the conditions of this EMP and ensure that all of its sub-Contractors, employees, suppliers, agents and so forth, for whom the Contractor is fully responsible for their actions on site, are fully aware of this EMP, its requirements and the consequences of any breach of the requirements of this EMP. The Contractor is fully responsible for *implementing* the EMP. The Contractor will ensure that works on site are conducted in an environmentally responsible manner and in accordance with the requirements of this EMP.

(e) Council Representative – will be an appropriately qualified environmental officer of the Saldanha Bay Municipality. This representative will monitor compliance of this EMP by the Developer through the ECO.

(f) Problematic Issues – should problematic issues arise, as identified by the ECO, the ECO has the authority to call a special meeting with the Principal Agent to address and rectify the matter.

(g) Environmental register - an environmental register must be kept on-site. The register will provide a record of all actual impacts that are generated as a result of the proposed activity and observations made by the ECO. This may include information related to such aspects as spillages, dust generation and complaints from adjacent neighbours. It must also contain information relating to action taken/mitigation measures employed. Any party on-site may complete the register; however, it is envisaged that the Principal Agent, Contractor and ECO will be the main contributors. The Principal Agent must ensure that the Contractor implements recommendations made by the ECO within an agreed reasonable time frame.

(h) Method Statements – Method Statements (a template for these purposes is appended to this EMP) will be required for activities that may result in significant impacts according to the ECO. These must address the following aspects:

- What – a brief description of the work to be undertaken
- How – a detailed description of the process of work, methods and materials
- Where – a description of the location of the work (if applicable)
- When – the sequencing of actions with commencement and completion date estimates

All Method Statements must be approved by the ECO prior to being implemented. An example of a Generic Method Statement has been included in **Appendix A**.

4. HANDLING OF COMPLAINTS RELATED TO THE PROJECT

All forms of complaint must be forwarded to the site Principal Agent and ECO. These must be entered into the environmental register and all responses and actions taken to address these must also be recorded. All issues raised must be addressed. It is important that the complainant feels that their concerns have been listened to and that appropriate action (within reason) has been taken to address these.

5. SITE SPECIFIC ENVIRONMENTAL CONTEXT

The surrounding land uses consist primarily of low-income housing developments towards the Western and Southern portions of the site and the land toward the Northern and Eastern sections consisting of open/vacant landscapes. The prevailing wind direction is South-East and North-West; therefore, noise and dust impacts should be carried away from the low-income housing development. Due to the nature of the surrounding land-use, it is recommended that the Western and Southern section be sufficiently screened with the implementation of shade cloths and a clear site boundary. Additionally clear signage needs to be erected in case of emergencies and if the surrounding landowners need to contact the developer. If access to the site is to be gained via established routes within the community, drivers need to be cautious of other road users and pedestrians commuting to and from their residential homes.

6. ENVIRONMENTAL SENSITIVITY AND MITIGATION MEASURES

Based on the findings of the Final Basic Assessment Report and the approved specialist studies (including the updated and peer-reviewed Animal Species Compliance Statement and the EnviroSwift Aquatic Biodiversity Compliance Statement), the site was confirmed to be of low sensitivity for terrestrial fauna, flora, aquatic biodiversity, terrestrial biodiversity and agricultural potential. The measures below therefore represent general environmental management and construction best-practice controls rather than biodiversity-specific mitigation.

POTENTIAL IMPACT	EMP REFERENCE
PRE-CONSTRUCTION	
Services/Routes	Refer to Section 7
Site Boundary	Refer to Section 7
“No-Go” areas	Refer to Section 7
Site Layout	Refer to Section 7
Architectural and Design Guidelines	Refer to Section 7
Screening and Strategic Placement	Refer to Section 7
Phased Development & Monitoring	Refer to Section 7
Working Hours	Refer to Section 7
CONSTRUCTION PHASE	
Visual	Refer to Section 8
Appropriate Machinery	Refer to Section 8
Topsoil stockpile	Refer to Section 8
Storm water outfalls	Refer to Section 8
Erosion	Refer to Section 8
Fires and Firefighting Equipment	Refer to Section 8
Safety and First Aid	Refer to Section 8
Dust Control	Refer to Section 8
Water Quality Impacts	Refer to Section 8

Conservation of the Natural Environment	Refer to Section 8
Heritage Impacts	Refer to Section 8
Materials & Waste Management	Refer to Section 8
Chemical Toilets	Refer to Section 8
Machinery Management	Refer to Section 8
Noise	Refer to Section 8
Drilling	Refer to Section 8
Lighting	Refer to Section 8
Traffic Impacts	Refer to Section 8
Geotechnical Measures	Refer to Section 8
Environmental Control Officer	Refer to Section 8
Matters Pertaining to Non-Conformance	Refer to Section 8
POST CONSTRUCTION	
Site Clearance	Refer to Section 9
Rehabilitation	Refer to Section 9
Waste Management	Refer to Section 9
OPERATIONAL PHASE	
Maintenance Management Activities	Refer to Section 10
Waste Management and Disposal	Refer to Section 10
Lighting/Visual	Refer to Section 10
Water Quality Impacts	Refer to Section 10
Stormwater management	Refer to Section 10
Vegetation and Landscaping Management	Refer to Section 10
Noise	Refer to Section 10

It is understood that **Saldanha Bay Municipallity** (the Applicant) will be fully responsible for any environmental rehabilitation should an environmental incident occur at the site as required in terms of Section 28 (*Duty of Care and Remediation of Damage*) of the National Environmental Management Act, (Act No. 107 of 1998).

7. PRE-CONSTRUCTION PHASE IMPACTS/ISSUES

(a) **Services/Routes –** the location of existing services must be determined to prevent accidental damage to and or duplication of these. A preliminary route should be established to avoid conflict with known pedestrian routes, in addition scheduled material delivery times should be established outside of school peak hours (07:00-08:00 & 13:00-14:30), where applicable traffic marshals need to be present to caution pedestrians and other road users.

(b) **Site boundaries** - the site boundaries within which the Contractor may operate must be agreed to by the ECO, Principal Agent and Contractor prior to the start of the site operations. The Contractor must fence or demarcate the site boundaries at the very start of the project. Access to the site must be restricted to ensure that members of the public are not able to gain access other than via the designated, controlled access points. Any construction activities taking place prior to the above will constitute a serious violation of this EMP and is liable to a fine as detailed within this EMP.

(c) **No-go areas** - No ecologically sensitive or heritage 'no-go' areas were identified through the environmental assessment process or specialist studies. Any 'no-go' or restricted access areas demarcated on site shall therefore relate strictly to

construction safety, protection of services, or temporary operational requirements, unless otherwise identified by the Environmental Control Officer (ECO) during construction.

(d) **Site Layout -** Designated areas must be set-aside within the site for various types of activities. The location of the Contractor's camp, toilet facilities and storage areas must be agreed to by the ECO, Principal Agent and Contractor prior to the commencement of work at the site. These must all be kept neat, sanitary and in good condition throughout the project. Any construction activities taking place prior to the above will constitute a serious violation of this EMP and is liable to a fine as detailed within this EMP.

(e) **Architectural and Design Guidelines -** where applicable & possible, Earth-Tone Colours: Buildings should adopt natural, non-reflective colours that complement the local landscape. Low-Impact Materials: Use sustainable and visually recessive materials (e.g., timber cladding, textured facades). Variation in Rooflines and Facades: Avoid monotonous designs by incorporating staggered facades, varying heights, and setbacks.

(f) **Screening and Strategic Placement -** where applicable & possible, Screening Walls and Fencing: Use natural materials or vegetation-covered fencing instead of stark concrete or metal barriers. Setback Regulations: Ensure buildings are set back from key viewpoints to minimize skyline interruptions. Lighting Control: Avoid excessive night-time lighting glare by using downward-facing and shielded fixtures.

(g) **Phased Development & Monitoring -** where applicable & possible, Gradual Development: Implement phased construction with early-stage landscaping to integrate the development with minimal disruption. Visual Monitoring: Regularly assess the effectiveness of mitigation measures and adjust strategies if necessary.

(h) **Working Hours –** The hours of operation shall be restricted to those stipulated by the Local Authority. If the associated impacts of the said operation during normal working hours are unacceptable and mitigation measures proposed by the ECO are not sufficient to address the impact effectively then the ECO, in conjunction with the Local Authority may stipulate revised operating hours depending on the impacts associated with the normal working hours as allowed for by the local authority.

8. CONSTRUCTION PHASE IMPACTS/ISSUES

Overview of Impacts and Issues associated with the construction phase

8.1.1. Visual –

- Visual scarring will occur as a result of the process of clearing and levelling to prepare the area for development. To mitigate this, it is therefore recommended that a clear site boundary be established and shade cloth be erected to mitigate the negative visual impact on the surrounding community toward the western and southern portions of the site.

- The ECO must be consulted with to determine the appropriate location for the site camp (if required).

- The site camp must be always kept neat and tidy and free of litter.

- Good housekeeping practices on site must be maintained to ensure the site is kept neat and tidy.

- The site camp, storage facilities, stockpiles, waste bins, and any other temporary structures on site should be located in such a way that they will present as little visual impact to surrounding residents and road users as possible.

- Work on site must be well-planned and well-managed so that work proceeds quickly and efficiently, thus minimizing the disturbance time.

- The site camp will require visual screening via shade cloth or other suitable material.

- Special attention should be given to the screening of highly reflective material.

- The use of lighting (if required) should consider surrounding land users and should present little or no nuisance. Downward facing, spill-off type lighting is recommended.

- Construction vehicles must enter and leave the site during working hours.

- The appointed Environmental Control Officer (ECO) must undertake at least one site inspection bi-weekly for the duration of the construction phase, and produce a short ECO report monitoring the compliance of the property developer with the conditions of the approved EMP/EA.

8.1.2. Appropriate Machinery - The Contractor shall at all times carefully consider what machinery is appropriate to the task in the context of this EMP while minimising the extent of environmental damage.

8.1.3. Topsoil stockpile – Prior to construction or earthworks commencing on site, topsoil material must be stripped from work sites and separately stockpiled for later use in landscaping or site stabilisation. This measure is implemented as general construction best practice and not as ecological rehabilitation, as the site has been confirmed to be highly transformed. All stockpiled material must be covered or wet daily as required to prevent windblown soil impacts. All stockpiled material must be stored in a dedicated and demarcated stockpiling area and not be higher than 4 metres in height.

8.1.4. Storm water outfalls –If the storm water is of such a quality that suspended solids are present then detention ponds for removal of suspended solids must be considered. To prevent storm water damage, the increase in storm water runoff resulting from construction activities must be estimated and the drainage system assessed and implemented accordingly by the Principal Agent. Temporary cut off drains and berms may be required to capture storm water. Storm water outfalls should be designed to reduce flow velocity and avoid downstream stream bank erosion and soil erosion.

8.1.5. Erosion – during construction, all material excavated must be protected, screened or covered to prevent off site movement (primarily wind blown soil or surface runoff) and the surplus material must be removed from site weekly to a licensed waste disposal site.

8.1.6. Fires and Firefighting Equipment – no fires will be allowed outside the construction area. Welding and cutting activities will only be permitted inside the working areas. Adequate firefighting equipment must be available on site and be in good working order. In this regard the SABS 0400 Code of Practice will be implemented on site in addition to adherence by the Contractor to the Community Fire Safety By-Law for the Western Cape Province.

8.1.7. Safety and First Aid – all people working on site are responsible for their own safety on site. Contractors and Principal Agent/s shall comply with the relevant regulations including the Occupational Health and Safety Act (Act 85 of 1993). A comprehensive site specific first aid kit and suitably trained personnel must be available on site at all times. Emergency evacuation procedures must also be established at the start of operations of the site.

8.1.8. Dust Control

- During the construction phase, windblown dust and sand may generate considerable negative impacts (e.g. reduced visibility for vehicles travelling along adjacent roads and nuisance to neighbours/adjacent erven). Mitigation measures such as the use of water bowsers and wetting down, as well as the erection of shade netting screens to prevent off-site movement of dust may also be required. The use of straw stabilisation or mulching of exposed sandy areas must also be considered in consultation with the ECO. Surrounding landowners are present towards the Western and Southern boundaries of the site and as a result it is recommended that shade cloth be erected along the site boundary in these portions. The prevailing wind direction is South-East and North-West, it is therefore envisioned that dust will be carried towards the vacant portions of land along the Northern and Eastern sections of the site.

- A Complaints Register must be available at the site office for inspection by the ECO of dust complaints that may have been received.

- The appointed ECO must undertake regular site inspections for the duration of the construction phase, and to produce regular ECO monitoring reports, auditing on the compliance with the conditions of the Environmental Authorisation and the approved EMP.

- If dust issues occur, dust can be suppressed on access roads and the construction site during dry periods by the regular application of non-potable water or a biodegradable soil stabilisation agent. Under no circumstances should potable water be used for dust suppression. Potable water should not be used for anything other than drinking.

- Dust suppression measures such as the wetting down of sand heaps as well as exposed areas around the site must be implemented especially on windy days.

- The use of straw worked into the sandy areas may also help and the ECO must advise when this is necessary.

- If dust appears to be a continuous problem, shade cloth can be used to cover open areas where necessary or the erecting of shade netting above the fenced-off areas may need to be considered.

- All vehicles transporting sand/waste need to have tarpaulins covering their loads which will assist in any windblown sand occurring off the trucks.

- Dust levels specified in the National Dust Control Regulations (GN 827 of November 2013) may not be exceeded.

8.1.9. Water Quality Impacts – No watercourses, wetlands or aquatic features occur on site or within 32 m of the development footprint. The nearest mapped FEPA wetland is located approximately 100–120 m northwest of the site boundary and will not be impacted by the proposed development. The measures below are therefore applied as general precautionary pollution-prevention controls

Site staff shall not be permitted to use any nearby stream, river, other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing, or for any construction or related activities. Municipal water (or another source approved by the Principal Agent and ECO) should instead be used for all activities such as washing of equipment, or disposal of any type of waste, dust suppression, concrete mixing, compaction, etc.

8.1.10. Conservation of the Natural Environment – While specialist studies confirmed the absence of Species of Conservation Concern and a highly transformed ecological state, general environmental protection measures remain applicable as a precautionary measure. Where feasible, existing trees or vegetation not requiring removal should be clearly marked and protected during construction.

8.1.11. Heritage Impacts – An NID to HWC was submitted and the relevant authorities clarified that no further measures were required. As a precautionary measure, if any heritage or palaeontological remains are uncovered during the construction phase of the project, the ECO must be advised immediately and the area demarcated until the relevant specialist advises the way forward.

8.1.12. Materials Management

Liquids:

- Liquid dispensing receptacles (e.g. lubricants, diesel, shutter oil etc) must have drip trays beneath them/beneath the nozzle fixtures.

- A spill management protocol must be produced by the Contractor and approved by the ECO.

- Material safety data sheets must be available on site where products are stored, so that in the event of an incident, the correct action can be taken.

- Depending on the types of materials stored on site, suitable product recovery materials (such as Spillsorb or Drizit products) must be readily available.

- A designated, bunded area is to be set aside for vehicle washing and maintenance. Materials caught in this bunded area must be disposed of to a suitable waste site or as directed by the Principal Agent.

- Cement contaminated water must be fed to a container, neutralised and suitably disposed of (to sewer if acceptable to the Municipality) or sent to a suitable landfill site. In the latter case, chain of custody documentation must be provided to ensure a suitable end recipient. The latter must be kept with the environmental register.

- The Contractor shall ensure that any wastewater generated during construction activities feeds to a suitable containment area such as a container or lined sedimentation pond prior to disposal. This pond or ponds must be allowed to dry out on a regular basis to allow for solid material removal. The wastewater must be disposed of in a suitable manner (possibly to the sewer system following Municipal approval) and must not be directed to a storm water drain.

- Storm water must be managed in such a way that no overland flow is possible onto any area of the site which could contain potential contaminants (such as concrete mixing areas, material and hazardous storage areas from any adjacent area.

Solids:

- Waste must be categorised by the Contractor and disposed of in a suitable manner into separate waste streams (including general and hazardous waste).

- The Contractor must provide an adequate number of waste receptacles for general waste at points around the construction site, and a single collection point for hazardous waste.

- General waste is to be collected either by the Municipality or via a waste disposal Contractor.

- The frequency of collections/emptying of waste receptacles will be at least once per week or at such a frequency that waste receptacles do not overflow.

- Particular care shall be taken with the disposal of materials that could be wind-borne or waterborne to ensure that the release of these materials is minimised (the latter is a requirement for hazardous waste).

- The use of netting covers or sealed containers must be considered.

- Areas demarcated for specific activities including food consumption must have suitable waste receptacles provided.

- Wherever possible recycling must be carried out.

- No dumping within the surrounding area is to be permitted. No burning of solid waste is allowed.

- All material used by the Contractor during the construction phase shall be managed in such a way that it does not cause pollution, or that minimises pollution. In the event of a spillage, the Contractor should have suitably trained personnel who can correctly clean up any spillage in an efficient and environmentally sound manner.

Hazardous:

- Storage areas that contain hazardous substances must be bunded with an approved impermeable liner or have some form of secondary containment.

- The Contractor shall keep Material Safety Data Sheets on-site for all potentially hazardous materials used.

- Suitably trained personnel shall be available on the site during working hours so that in the event of human exposure to any hazardous materials that the correct first aid actions are taken. This training should also include spill containment procedures.

- Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after detection as possible to minimize pollution risk and reduced bunding capacity.

- If an "incident" takes place on site, the main contractor must within 14 days of the incident, report to the Director General, the provincial head of department and the municipality such information as is available to enable an initial evaluation of the incident, including:

    1. the nature of the incident.

    2. the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects.

    3. initial measures are taken to minimise impacts.

    4. causes of the incident, whether direct or indirect, including equipment, technology, system or management failure.

    5. measures taken and to be taken to avoid a recurrence of such incident.

- Chain of Custody documentation must be provided for any hazardous substances disposed of as proof of end recipient.

Concrete works – cement powder has a high alkalinity, which can contaminate and dramatically affect both soil and groundwater. The following recommendations are made:

- Mixing areas must be defined on site an approved by the ECO.

- No mixing of cement on is allowed on bare soil and a lined bund or bunded portable mixer must be used.

- The use of ready mix concrete must be considered.

- Cement bags must be disposed of in demarcated waste receptacles and the used bags disposed of via the hazardous substances waste stream.

- Excess or spilled concrete must be disposed of to a suitable landfill site, with chain of custody documentation provided.

8.1.13. Chemical Toilets

- Chemical toilet facilities are to be supplied and managed by the Contractor. These are to be in a specific area agreed to by the ECO prior to placement and to be used by all personnel.

- The number of chemical/portable toilets required on site (i.e. the ratio of persons working on site to number of toilets) must be determined in conjunction with the Saldanha Bay Municipality prior to works starting on site. This is typically one toilet per 15 workers.

- These toilets are to be secured by at least four separate cables or guy ropes to ensure that they are not knocked over or blown over by the wind.

8.1.14. Machinery Management

- Machinery must not be located beneath the foliage of any trees.

- Construction machinery must be located away from sensitive areas when parked for extended periods of time. A dedicated parking area must be defined with drip trays beneath any leaking equipment.

- Fuel/lubricant absorbing media (peat/moss type products) within these drip trays must be used to contain any spilled liquids. These materials must be replaced regularly to prevent over-saturation and potential spillage of free product. This material must be disposed of as hazardous waste and be collected by an approved Contractor/delivered to a suitable waste site. Chain of custody documentation must be provided as proof of final end recipient.

- All spills are to be recorded in the Environmental Register, including any clean-up actions taken to remediate the spillage. Such actions are to be agreed with the ECO prior to taking place.

8.1.15. Noise

- Noise generation is likely to be one of the biggest impacts at the site during the construction phase.

- Every attempt must be made to reduce noise levels and maintain appropriate directional and intensity settings to ensure minimum nuisance by the noise source.

- The Contractor must use modern equipment, which produces the least noise.

- Any unavoidably noisy equipment must be identified and located in an area where it has least impact.

- The use of noise shielding screens must be considered and the operation of such machinery restricted to when it is actually required.

- Vehicles and equipment should be kept in good working condition. If deemed necessary, machinery and equipment should be fitted with mufflers/ exhaust silencers. No unnecessary disturbances should be allowed to emanate from the construction site.

- Noise levels must comply with the relevant health & safety regulations and SANS codes and should be monitored by the Health & Safety Officer as necessary and appropriate.

- No amplified music shall be allowed on site. The use of radios, tape recorders, compact disc players, television sets etc shall not be permitted unless the volume is kept sufficiently low as to avoid any intrusion on members of the public within range. The Contractor shall not use sound amplification equipment on site unless in emergency situations.

- Construction activities generating output levels of 85 dB (A) or more, in residential areas, shall be confined to the hours 07h30 to 17h30 Mondays to Fridays.

- No noise generating work is to be conducted outside of normal working hours as approved by the local authority.

- A noise complaints register must be maintained within the site office.

- Surrounding landowners are present towards the Western and Southern boundaries of the site and as a result it is recommended that shade cloth be erected along the site boundary in these portions to assist in both dust and noise mitigation measures. The prevailing wind direction is South-East and North-West, it is therefore envisioned that construction related noise will be carried towards the vacant portions of land along the Northern and Eastern sections of the site.

- The appointed ECO must undertake regular site inspections for the duration of the construction phase, and produce regular ECO monitoring audit reports, auditing the compliance of the property developer with the conditions of the Environmental Authorisation and the approved EMP.

Drilling

- In the event that rock drilling are required, the following recommendations will be implemented in addition to normal health and safety requirements as stipulated in the Occupational Health and Safety Act (Act No. 85 of 1993).
- These activities will only take place through a competent and appropriately qualified Contractor.

- The Contractor shall take all necessary precautions to prevent damage to special features and the general environment, which includes the minimisation of, and if required the removal of any fly rock.
- Environmental damage caused by the above activities shall be repaired and/or rehabilitated at the Contractor's expense to the satisfaction of the ESO and Principal Agent.
- None of the above activities may be done on Sundays or Public Holidays.

8.1.16. Lighting

Any lighting required by the Contractor shall be aimed at the area to be lit on site and the over spillage must be kept to a minimum. The Contractor should be made aware of the residential nature of the area to the west of the site, especially when considering lighting at night.

8.1.17. Traffic Impacts (Access and Traffic Control)

Traffic management measures implemented during construction shall align with the recommendations of the Traffic Impact Assessment prepared by Urban Development Solutions (Appendix G8).

- **Intersection Upgrades**
    - Southern Bypass St / Kootjieskloof St: Recommended upgrade to a roundabout to address LOS F and improve safety; alternatively, a signalised intersection can be considered.
    - Toermalyn St / Kootjieskloof St: Upgrade to a raised intersection to improve pedestrian and public transport safety.
    - R45 / Toermalyn St: No upgrades required, but monitoring should continue.

- **Internal Road Layout & Safety**
    - Provide traffic calming (speed humps, raised crossings) along longer straight routes.
    - Ensure turning areas at cul-de-sacs to accommodate refuse trucks and emergency vehicles.
    - Radii of internal roads must accommodate refuse collection vehicles (kerbside collection planned).

- **Non-Motorised & Public Transport**
    - Provide unsurfaced sidewalks along internal roads for pedestrian safety.
    - Future public transport study required as part of area-wide planning, especially due to informal taxi rank activity nearby.

- **Parking Provision**
    - Residential: 1 parking bay per unit (sufficient given low vehicle ownership).
    - Church: 1 bay per 8 seats.
    - Crèche: 1 bay per classroom + 10 bays.

- Parking provision aligned with municipal by-law and socio-economic context.

- **In addition, the following must be implemented to reduce traffic impacts:**

  - All drivers will be competent and in possession of an appropriate valid driver's license.
  - All vehicles travelling on site will adhere to the specified speed limits.
  - The movement of all vehicles will be controlled such that they remain on designated routes.
  - No member of the workforce will be permitted to drive a vehicle under the influence of alcohol or narcotic substances.

8.1.18. Geotechnical Measures (Mitigation & Management)

- Excavations & Earthworks

  - Excavation constraints may be expected at depths >1.5 m.
  - Excavations must be adequately drained if filled with rainwater or groundwater.
  - Most sidewalls collapsed, while some remained stable. Excavations on site needs to be battered or protected to avoid injuries during construction.
  - Clayey materials (where encountered) should be cut to spoil and not reused in fills.
  - Excavations exceeding 800 mm may face constraints; planning for intermediate to hard excavation is required.

- Foundation Recommendations

  - Site classified as NHBRC Site Class S2.
  - Reinforced strip footings are recommended; foundation design must be confirmed by the appointed structural engineer.
  - All trenches must be inspected by the structural engineer before placement of reinforcement and pouring of concrete.
  - Bearing capacities are on the low side (100–200 kPa) – loads must be checked during structural design.

- Construction Materials

  - In-situ materials have low expansiveness and can be used as floor fill.
  - Clayey soils (if present) must be removed and replaced with suitable engineered material.
  - Materials show mild corrosivity – service infrastructure (pipes, cables) should be corrosion-protected.

8.1.19. Frequency of visits by the Environmental Control Officer

- The frequency of visits by the ECO must be agreed with the Principal Agent, but as an initial starting point, it is recommended that short inspections (of approximately one hour duration) be carried out bi-weekly, or as required.

- An initial meeting with the ECO, Principal Agent and Contractor must be held to familiarise each of the parties with each other, the site, the EMP and to confirm communication methods.

- The frequency of subsequent meetings and ECO visits must be agreed, depending on the performance of the Contractor. If required the Principal Agent may introduce some form of penalty system if compliance with the EMP proves problematic.

- A brief summary of the findings and any recommendations made by the ECO per visit should be emailed to all parties including the Principal Agent and Contractor.

8.2. Matters Pertaining to Non-Conformance

"Non-conformances" would occur when there are deviations from any of the construction requirements of this EMP. This may also include non-compliance with the relevant environmental regulations.

The Contractor is responsible for reporting non-conformance with the EMP, to the ECO. The applicant and Contractor, in consultation with the ECO must, thereafter, undertake the following activities:

- Investigate and identify the cause of non-conformance;

- Report matters of non conformance to the local municipality (within a suitable timeframe, dependant on the severity of the incident);

- Implement suitable corrective action as well as prevent recurrence of the problem.

- Assign responsibility for corrective and preventative action.

- Any corrective action taken to eliminate the cause/s of non-conformance shall be appropriate to the magnitude of the problems and commensurate with the environmental impact encountered.

Records

The Contractor must maintain and update the register of non-conformance. The record shall specifically contain a list the instances of non-conformances found in the EMP, the date of their occurrence, date of corrective action, and date of completion of preventive action. In addition, matters of non-conformance and corrective action must be included within the audit reports. Records must be are legible, identifiable, protected and easily retrieved for review.

Fine and Penalties relating to non-conformance/contraventions

The Contractor must comply with the environmental requirements of the construction phase requirements of this EMP on an ongoing basis and any failure on his part to do so will entitle the ECO and Principal Agent to impose a fine subject to the details set out below. Moneys from fines/penalties will be managed and allocated at the discretion of the Principal Agent.

1) Spot fines

Spot fines will be issued per incident in addition to any remedial costs incurred as a result of non-conformance with the EMP, at the discretion of the Principal Agent and ECO. The ECO may *recommend* the imposition of fines and penalties but the Principal Agent will be responsible for imposing such fines or penalties against the account of the Contractor. Fines will be imposed on the Contractor for contraventions of the EMP by individuals or operators employed by the Contractor and/or any sub-Contractors. The Principal Agent will inform the Contractor of the EMP contravention and the amount of the fine. These monies will be recovered by the Principal Agent from the Contractor.

Failure by the Contractor to pay fines imposed by the Principal Agent within 14 days of the fine being imposed may result in a "Stop Works" order being issued by the Principal Agent until the matter is resolved. Any costs incurred as a result of the "Stop Works" order will be for the account of the Contractor.

The following spot fines are recommended for contraventions (plus any rehabilitation costs if applicable):

a. Any individual/s littering on site: R50 on first offence and R250 on further offences.

b. Any individual/s burning waste on site: R250 on first offence and R1000 on further offences.

c. Any individual/s dumping waste on site: R250 on first offence and R1000 on further offences.

d. Any violation of a Method Statement: R250 for first offence and R1500 on further offences.

e. Any individual causing avoidable disturbance to fauna and flora on site: R250 on first offence and R1000 on further offences.

2) Penalty fines

Penalty fines will be implemented where the Contractor repeatedly fails to comply with the specifications of this EMP the Contractor will be liable to pay a penalty fine over and above any other contractual consequence.

The following penalty fines (per repeat offence) are recommended for transgressions:

a. Ongoing littering on site: R2500 plus any rehabilitation costs, if applicable.

b. Ongoing dumping of any waste on site: R10 000 plus any rehabilitation costs, if applicable.

c. Ongoing burning of any waste on site: R10 000 plus any rehabilitation costs, if applicable.

d. Ongoing transgression of a Method Statement: R10 000 plus any rehabilitation costs, if applicable.

e. Ongoing disturbance to Fauna and Flora on site: R5000 plus any rehabilitation costs, if applicable.

3) Other fines

a. Any individual/s causing damage to identified sensitive natural areas: R5000 plus any rehabilitation costs.

b. Any individual/s causing damage to identified sensitive heritage areas: R5000 plus any rehabilitation costs.

c. Any individual/s causing irreparable damage to the environment: R10 000.

d. Injuring or killing of any wildlife: R5000 plus any rehabilitation costs, if applicable.

The above recommended fines are applicable and relevant to the construction phase of this EMP and as such do not exempt the Developer from other legal obligations such as *Section 24(h)* National Environmental Management Second Amendment Act, Act No. 107 of 1998, which states that it is "*an offence for any person to contravene conditions applicable to any environmental authorization granted for a listed activity. A person convicted of an offence is liable to a fine not exceeding R5 million or to imprisonment for a period not exceeding ten years, or to both such fine and such imprisonment"*

An Environmental Management Plan constitutes a *Condition* applicable to an *Environmental Authorisation* and any transgression would thus trigger *Section 24(h)* of the above-mentioned Act. The exact penalty and fines will be decided on, subsequent to consultation with DEA&DP and the local municipality.

All staff working on-site must be made aware of the penalties and fines associated with non-conformance. The ECO will be responsible for ensuring that the penalty system is maintained and enforced. Should disputes arise between the Developer, Engineer, Contractor or ECO with respect to the above then the matter will be referred for arbitration at the Developer's account.

9. POST CONSTRUCTION & CLOSE OUT PHASE

(a) Final site cleaning - the Contractor shall clear and clean the site and ensure that everything not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.

(b) Rehabilitation - The Contractor shall be responsible for stabilising, levelling and landscaping all areas disturbed during construction to the satisfaction of the Principal Agent and ECO. These measures do not constitute ecological rehabilitation, as the site has been confirmed to be highly transformed and of low ecological sensitivity.

(c) All rubble and waste material is to be removed from the site to an approved disposal site. Burying or burning rubble or waste on the site is prohibited.

(d) The site is to be cleared of all litter.

(e) Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the Principal Agent.

(f) All areas where temporary services were installed are to be rehabilitated to the satisfaction of the Principal Agent.

(g) All surfaces hardened due to operational activities must be ripped and imported materials thereon removed.

(h) Fences, barriers and demarcations associated with the operational phase must be removed from the site unless stipulated otherwise by the Principal Agent.

10. OPERATIONAL PHASE IMPACTS

10.1. Maintenance Management Activities for Open Spaces

Vegetation Management

- Saldanha Bay Municipality must regularly mow and trim grassed areas to maintain aesthetics and usability.
- All trees and shrubs are to be pruned as needed to promote plant health and ensure public safety.
- Invasive alien plant species must be identified and removed in accordance with national legislation and best practices.
- Indigenous and drought-resistant plant species must be planted and maintained to promote biodiversity and water efficiency.
- Organic mulch should be applied to planting beds to conserve soil moisture and suppress weed growth.

Soil and Erosion Control

- The Municipality must monitor open space areas for signs of soil erosion and compaction.
- Where required, erosion control structures (e.g., gabions, swales) must be installed and maintained.
- Degraded or bare patches of soil must be rehabilitated using suitable vegetation or erosion blankets.
- Embankments and slopes must be routinely assessed and stabilized as needed.

Waste Management

- Litter bins must be installed and serviced on a regular schedule.
- Routine litter collection and removal of illegally dumped waste is required.
- Signage promoting anti-littering behaviour must be erected and maintained.
- Waste sorting and recycling initiatives should be supported where feasible.

Infrastructure Maintenance

- All pedestrian paths, benches, signs, fences, and other infrastructure must be inspected regularly and repaired promptly.
- Hard surfaces such as paving and boardwalks should be cleaned and maintained.
- Lighting and other safety infrastructure must be kept in good operational condition.
- Stormwater drainage systems must be maintained to ensure free flow and prevent flooding.

Habitat and Biodiversity Conservation

- No sensitive habitats, ecological corridors, buffer zones or wetlands were identified on site through specialist assessment. The operational-phase measures below therefore constitute general environmental stewardship and open-space management practices applicable to an urban residential development, rather than biodiversity-specific mitigation measures.

Fire Management

- The Municipality must establish and maintain firebreaks where necessary.
- Fire management measures must comply with applicable legislation and fire authority guidelines.

Monitoring and Reporting

- Routine site inspections must be conducted to assess maintenance effectiveness.
- Records of all maintenance and management activities must be kept.
- Compliance with the EMP must be reviewed and reported on regularly.
- Findings should inform adaptive management and updates to maintenance protocols.

Community Engagement and Education

- The Municipality is encouraged to involve local communities in clean-up events and environmental stewardship programs.
- Educational signage should be installed to inform the public about the ecological value of the open space areas.
- Awareness campaigns promoting responsible environmental behaviour should be developed and implemented.

10.2. Waste Management

(a) The Generic Water Demand Management Plan as contained in **Appendix B** must be followed.

(b) The Generic Energy Demand Management Plan as contained in **Appendix C** must be followed.

(c) The Municipality will collect solid waste from the site on a regular basis.

(d) An Integrated Waste Management Plan must be implemented which will include waste recycling programmes. **Appendix D** contains the Generic IWMP.

(e) The site environmental register must be kept permanently on site once the development is commissioned.

(f) All incidents with potential environmental impacts must be entered into this document, which is the responsibility of the site operator.

10.3. Lighting/Visual Impacts

As far as possible, the architectural and cultural heritage of the area must be included in the design guidelines for the development. In addition

- The applicant must use low reflective materials on buildings;
- The applicant must use colours on buildings that are neutrally toned and suit the surrounding landscape;
- Light sources must be protected to prevent light spillage.

10.4. Water Quality and Storm Water Management

- The applicant must ensure that pollution of water resources is avoided.

10.5. Vegetation and Landscaping Management

- Vegetation and landscaping measures implemented during the operational phase are intended to support visual amenity, urban functionality and general environmental stewardship, and do not constitute biodiversity offsetting or habitat rehabilitation.
- All landscaped and gardened areas should, where feasible, consist of vegetation indigenous to the Western Cape. Planting is intended to enhance visual amenity and urban functionality and does not constitute biodiversity offsetting or habitat rehabilitation.
- Landscaped areas must be well maintained.
- Water saving technologies such as but not limited to drip irrigation, rainwater collection tanks and grey water recycling systems should be encouraged throughout the development.
- Tree Planting: Introduce indigenous and fast-growing trees along the periphery and internal road networks to soften the visual impact.
- Green Corridors: Integrate green spaces and buffer zones to break up the built environment and provide visual relief.
- Retention of Existing Vegetation: Where possible, retain existing trees and natural vegetation to blend the development into the landscape.
- Vertical Greening: Encourage climbing plants, green walls, or roof gardens on buildings to reduce stark visual contrast.

10.6. Noise

- There will be noise associated with the operation of the proposed development and the applicant must establish a firm set of “house rules” to govern nuisance noise.

- These rules must align with local authority by-laws on noise.

APPENDIX A

METHOD STATEMENT FOR THE:

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This method statement is to be completed by the Contractor (in consultation with the Principal Agent and ECO) at least 5 days prior to the proposed commencement date of the said work and represents a binding agreement to the Method Statement by all site Contractors and sub-Contractors involved in the work for which the Method Statement is submitted.

DATE OF SUBMISSION:……..

LEAD CONTRACTOR:……

OTHER CONTRACOTRS AND/OR SUB-CONTRACTORS:……

……

A) Describe in detail ***what*** work is to be undertaken?

b) Describe in detail ***where*** on the site the works are to be undertaken and the ***extent***? Provide sketch plan and grid block reference.

B) ***When*** will the works start and what is the anticipated finishing date of these works?

C) How are the works to be undertaken?

1) Lead supervisor/ foreman name and contact details:

2) Number of personnel:

3) Construction activities:

4) Plant and machinery to be used:

5) Materials to be stored (specify hazardous materials):

6) other:

e) What ***environmental impacts are anticipated and what precautions*** are proposed to prevent these impacts? (refer to the relevant sections of the EMP for guidance and provide a general camp layout)

Camp site demarcation:

Toilet facilities:
Litter:
Security:
Plant/machinery (operation, servicing, management, storage, refuelling etc.):
Emergencies and fire:
Hazardous materials (handling, management, storage etc.):
Have all personnel involved have been through environmental induction course?
Petrochemical spill remediation and containment measures:
Other:

DECLARATIONS BY PARTIES

1) CONTRACTOR

I UNDERSTAND THE CONTENTS OF THE METHOD STATEMENT AND THE SCOPE OF THE WORKS REQUIRED OF ME. I FURTHER UNDERSTAND THAT THE METHOD STATEMENT MAY BE AMENDED ON APPLICATION TO THE ABOVE SIGNATORIES, AND THAT THE ENVIRONMENTAL CONTROL OFFICER WILL AUDIT MY COMPLIANCE WITH THE CONTENTS OF THIS METHOD STATEMENT.

_____ (PRINT NAME)

_____ (SIGNED) DATED: _____

2) ENVIRONMENTAL CONTROL OFFICER (ECO)

THE WORK DESCRIBED IN THIS METHOD STATEMENT, IF CARRIED OUT ACCORDING TO THE METHODOLOGY DESCRIBED, IS SATISFACTORILY MITIGATED TO PREVENT AVOIDABLE ENVIRONMENTAL HARM.

_____ (PRINT NAME)

_____ (SIGNED) DATED: _____

3) PRINCIPAL AGENT

THE WORK DESCRIBED IN THIS METHOD STATEMENT, IF CARRIED OUT ACCORDING TO THE METHODOLOGY DESCRIBED, IS SATISFACTORILY MITIGATED TO PREVENT AVOIDABLE ENVIRONMENTAL HARM.

_____ (PRINT NAME)

_____ (SIGNED) DATED: _____

APPENDIX B

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ENVIRONMENTAL CONSULTING

GENERIC WATER DEMAND MANAGEMENT AND CONSERVATION PLAN

INTRODUCTION

This document has been prepared by Sillito Environmental Consulting (Pty) Ltd (SEC) as a guide to the main contractors during construction phase as well as to the building users of the new George Kerridge Housing Development during construction and operational phase.

The purpose of this management plan is to simultaneously reduce impacts of water use during construction as well as reduce the demand for potable water during operational phase of the development by means of proposed measures such as rainwater harvesting, recycling waste water, water efficient fixtures and water efficient irrigation measures.

Globally, water consumption has risen almost ten-fold in the last decade and many parts of the world are now approaching their full utilisation of available water resources.

South-Africa has always been one of the water scarce countries and as such, water has long been considered a precious and high-demand resource, essential for all living things.

The pressures on fresh water supply are ever-increasing and are affected by many different factors including catchment locations, contaminated freshwater sources, drought and the rising demand on services as government embarks on projects to provide potable water to all communities throughout South Africa.

Sustainable use of potable water in South Africa would not only protect our already stressed resources but will also ensure the availability of the precious resource for future generations.

"All consumers and institutions have the duty towards our country, our environment and themselves to implement adequate measures that contribute to water use efficiency through Water Conservations and Water Demand Management." (Minister of Water Affairs and Forestry: Buyelwa Sonjica, August 2004)

WATER MANAGEMENT MEASURES

By implementing effective water management measures “Unaccounted-for Water” as well as total demand can be significantly reduced.

CONSTRUCTION PHASE

The following initiatives and management measures can be implemented during the construction phase to ensure sustainable water consumption and prevent water wastage:

Objective 1: Avoid Contamination and Pollution of the Surface and Groundwater Resources

Construction activities will generate waste. In addition, fuel, oil, lubricants and other pollutants may leak from vehicles/ machinery and contaminate both surface and groundwater resources. Pollution and the contamination of freshwater resources could also occur from chemical toilets; cement mixing directly on the soil and stormwater runoff may flow over the site camp area and carry contaminants off-site.

Impact Management Outcome:	To avoid the contamination of surface and groundwater resources by inappropriate waste management practises, fuel and oil spills, chemical toilet spills and inappropriate cement mixing.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
➢ The appointed Environmental Control Officer (ECO) must undertake at least one site inspection per month, for the duration of the construction phase, and to produce a short ECO monitoring audit report, auditing on the compliance of the property developer with the conditions of the Environmental Authorisation and the approved EMPr. 1) Liquid Waste: • Liquid dispensing receptacles (e.g. lubricants, diesel, shutter oil etc.) must have drip trays beneath them/beneath the nozzle fixtures. • A spill management protocol must be produced by the Contractor and approved by the ECO prior to works commencing on site. • Material safety data sheets (MSDS) must be available on site where products are stored, so that in the event of an incident, the correct action can be taken. • Depending on the types of materials stored on site, suitable product recovery materials (such as Spillsorb or Drizit products) must be readily available. • A designated, bunded area is to be set aside for vehicle washing and maintenance (if required).	Construction Contractor	Construction Phase

Materials caught in this bunded area must be disposed of to a suitable waste site or as directed by the Principal Agent. Vehicles should ideally be washed at their storage yard as opposed to on site. • Cement contaminated water must be fed to a container, neutralised and suitably disposed of (e.g. sent to a suitable landfill site). In the latter case, chain of custody documentation must be provided to ensure a suitable end recipient. The latter must be kept with the environmental register. • The Contractor shall ensure that any wastewater generated during construction activities feeds to a suitable containment area such as a container or lined sedimentation pond prior to disposal. This pond or ponds must be allowed to dry out on a regular basis to allow for solid material removal. The wastewater must be disposed of in a suitable manner (possibly to the sewer system following local authority approval) and must not be directed to a storm water drain. • Storm water must be managed in such a way that no overland flow is possible onto any area of the site which could contain potential contaminants (such as concrete mixing areas, material and hazardous storage areas from any adjacent area). 2) Solid Waste: • Waste must be categorised by the Contractor and disposed of in a suitable manner into separate waste streams (this includes general, hazardous and recyclable waste). • The Contractor must provide an adequate number of waste receptacles for general waste at points around the construction site as well as for hazardous and recyclable waste. • Waste is to be collected either by the Municipality or via a licensed waste disposal Contractor. • The frequency of collections/emptying of waste receptacles will be of such a frequency that waste receptacles do not overflow. • Particular care shall be taken with the disposal of materials that could be wind-borne or waterborne to ensure that the release of these materials is minimised (the latter is a requirement for hazardous waste). • The use of netting covers or similar sealed containers must be implemented as and when required by the ECO. • Areas demarcated for specific activities including food consumption must have suitable waste receptacles provided.		

• Wherever possible recycling must be carried out. • No dumping within the surrounding area is to be permitted. • No burning of solid waste is allowed. • All material used by the Contractor during the construction phase shall be managed in such a way that it does not cause pollution, or that it minimises pollution. In the event of a spillage, the Contractor should have suitably trained personnel who can correctly clean up any spillage in an efficient and environmentally sound manner. 3) Hazardous Waste: • Storage areas that contain hazardous substances must be covered and bunded with an approved impermeable liner or have some form of secondary containment. • The Contractor shall keep MSDS on-site for all potentially hazardous materials used. • Suitably trained personnel shall be available on the site during working hours so that in the event of human exposure to any hazardous materials that the correct first aid actions are taken. This training should also include environmental spill containment procedures • Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after detection as possible to minimize pollution risk and reduced bunding capacity. • Chain of Custody documentation must be provided for any hazardous substances disposed of as proof of end recipient. 4) Cement/concrete mixing areas Cement powder has a high alkalinity, which can contaminate and dramatically affect both soil and groundwater. The following recommendations are made: • Mixing areas must be defined on site and approved by the ECO. • No mixing of cement is allowed on bare soil and a lined bund or bunded portable mixer must be used. The use of ready-mix concrete must be considered. • Cement bags must be disposed of in demarcated hazardous waste receptacles and the used bags disposed of via the hazardous substances waste stream.		

• Excess or spilled concrete must be disposed of to a suitable landfill site, with chain of custody documentation provided. 5) Ablution Facilities • Chemical toilet facilities are to be supplied and managed by the Contractor. These are to be located in a specific area agreed to by the ECO prior to placement and to be used by all personnel. • The number of chemical/portable toilets required on site (i.e. the ratio of persons working on site to number of toilets) must be determined in conjunction with the Saldanha Bay Municipality prior to works starting on site. This is typically one toilet per 15 workers. • These toilets are to be secured by at least four separate cables or guy ropes to ensure that they are not knocked over or blown over by the wind.		

Performance Indicator:	➢ The ECO will monitor the site to check that the measures have been implemented. ➢ The environment is not polluted or contaminated as a result of construction activities on site. ➢ Spillage incidents are effectively contained and do not lead to pollution of the water resources. ➢ Waste is reduced, reused and recycled where possible.

Objective 2: Avoid High and Inefficient Water Usage

Impact Management Outcome:	To avoid high and inefficient water usage during construction. To avoid any non-compliance with the local authority by-laws and any other statutory requirements relating to water efficiency.	
IMPACT MANAGEMENT ACTIONS:		
Mitigation Measure	**Responsible**	**Time Period**
➢ The appointed Environmental Control Officer (ECO) must undertake at least one site inspection per month, for the duration of the construction phase, and to produce a short ECO monitoring audit report, auditing on the compliance of the property developer with the conditions of the Environmental Authorisation and the approved EMP. 1) Water Efficient Technologies • Most construction activities on site demand water in one form or another. Potable water does however not be used for most of these activities	Construction Contractor	Construction Phase

with the exception of cases where hygiene, health or product quality will be compromised. • The demand and use of potable water should be reduced at all times. This should be done by the identification of alternative water sources (other than potable water) for as many of the construction activities on site as possible as well as possibilities for re-use of water on site during construction. **Site office:** • Potable water should be used only for drinking. • Chemical toilets must be used on site during construction. **General cleaning:** • Tool rinsing and plant and equipment washing must be done with non-potable water. • A closed water recycling system is recommended for cleaning activities during construction. **Dust suppression:** • Should dust suppression by means of damping and misting be required this must be undertaken by using non-potable water sources. • Other means of dust suppression such as the use of netting and/or straw/hay.		

Performance Indicator:	➢ The ECO will monitor the site to check that the measures have been implemented. ➢ Efficient water use is being undertaken on site at all times.

OPERATIONAL PHASE

The following design initiatives, building features and management measures can be implemented during operational phase to ensure sustainable water consumption and prevent water wastage:

Rainwater harvesting

Collecting rainwater from roofs and other impervious surfaces can add to the amount of non-potable water available for use in buildings.

The harvesting of rainwater for use of e.g. toilet flushing and irrigation should be encouraged.

Greywater recycling

Greywater can be harvested from sinks and showers, washing machines and other sources that do not contain human wastes. Greywater can also be used for irrigation if used immediately and not stored. Greywater harvesting and re-use should be encouraged.

Water efficient design and building features

The housing units should be designed and built to include water saving features and fixtures.

These include, but are not limited to, the following:

Design:

The housing units should be designed in a manner that provides the occupant with a degree of flexibility to incorporate water efficient technologies and measures. These include, but are not limited to, the following:

- The building design and layout should allow the occupant to implement rainwater harvesting with minimal adjustments to the system i.e. the occupant should be able to implement minor adjustments to the design i.e. install a Jo-Jo tank for storage and then easily collect rainwater from the roof and gutters for short-term storage and use for irrigation and other purposes.
- The plumbing installation should allow the occupant to implement greywater harvesting with minimal adjustments to the plumbing system so that greywater from the sinks , showers and washing machines can be re-used for the flushing of toilets, irrigation etc.

As Built:

Water efficient fixtures should be installed in all sanitaryware applications such as low-flow taps and shower heads, dual flush toilets etc.

Occupants should be encouraged to implement the following water consumption minimization measures:

- Take 4-minute or shorter showers;
- Turn-off all manually operated taps when not in use; and
- Report any leaks or unnecessary water use identified in the building.

APPENDIX C

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GENERIC ENERGY DEMAND MANAGEMENT PLAN

Glossary

Active Solar Strategies
Mechanisms, such as photovoltaics, which are designed to actively collect the energy of sunlight and use it.

Alternative Energy
Energy from a source other than the conventional fossil-fuel sources of oil, natural gas and coal.

Greenhouse Gas
(1) The warming of the earth's surface and lower atmosphere as a result of carbon dioxide and water vapour, which absorb and reradiate infrared radiation, in the atmosphere;
(2) An intensification of this warming effect from human-induced increase in carbon dioxide and other greenhouse gases in the atmosphere from the burning of fossil fuels.

Greenhouse Gas
Trace gases such as carbon dioxide, water vapour, methane and CFCs that are relatively transparent to the higher-energy sunlight but trap the lower energy infrared radiation.

Passive Design
Design that reduces the energy consumption of a building by taking advantage of natural heating, cooling and lighting.

Passive Solar Design
Design that uses the inherent characteristics of a building rather than mechanical systems to capture heat and light from the sun.

Photovoltaics
The use of semiconductor technology to generate electricity directly from the sunlight.

Renewable Energy
An energy source that, form an earth perspective, is continually replenished.

Solar Reflectance Index
A value that incorporates both solar reflectance and emittance in a single value to represent a material's temperature in the sun. SRI quantifies how hot a surface would get relative to standard black and standard white surfaces. It is calculated using equations based on previously measured values of solar reflectance and emittance as laid out in the American Society for Testing and Materials Standard E 1980. It is expressed as a fraction (0.0 to 1.0) or percentage (0% to 100%)

INTRODUCTION

This document has been prepared by Sillito Environmental Consulting (Pty) Ltd (SEC) as a guide to the main contractors during construction phase as well as to the building users of the new George Kerridge Housing Development during the operational phase.

The purpose of this document is to ensure the overall reduction in energy consumption during construction as well as the reduction in energy consumption during operational phase by means of increased energy efficiency in heating, cooling, lighting and hot water systems.

Building consumes up to 40% of the world's end-use energy and nearly 60% of the world's electricity is consumed by residential and commercial buildings. Production of South Africa's electricity is still predominantly from non-renewable fossil fuels and as such this is the country's greatest contributor of greenhouse gas emissions.

Energy demand for low income and high-medium income electrified urban dwellings in South Africa can be readily minimised through energy efficient systems and utilisation of renewable resources. This can be done by implementing design measures and initiatives that ensure increased passive thermal performance, increased lighting efficiency and increased hot water generation efficiency.

ENERGY MANAGEMENT MEASURES

The following initiatives/ design features should be incorporated where possible to enhance energy efficiency and minimise greenhouse gas emissions:

Lighting:

Design

- Lighting should be designed and installed that effectively helps to reduce energy consumption.
- The housing units should be designed to maximise views to the outside and to promote the use of natural light.
- Low voltage, energy efficient lighting should be installed.
- Other energy efficient appliances such as ovens and extractor fans can also be installed in order to ensure energy efficiency.
- Materials with an appropriate solar reflectance index should be implemented within the project wherever possible.

Operation

- The occupants should be encouraged to switch off all non-essential appliances such as computers, kitchen equipment and televisions when not in operation.

Thermal control:

- The housing units should be designed to include sufficient levels of insulation in the form of roof insulation and well-sealed building structures to control infiltration.
- The housing units should be appropriately orientated so as to ensure improved passive performance.
- Appropriate glazing should be installed within the housing units.

Hot water generation:

- Alternative Energy uses such as Active Solar Strategies should be incorporated in the design of the housing units.
- Solar geysers should be installed within all of the housing units
- Where appropriate, geyser heat sensors, geyser blankets and geyser timers should be installed in the housing units.

APPENDIX D

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ENVIRONMENTAL CONSULTING

GENERIC INTEGRATED WASTE MANAGEMENT PLAN

INTEGRATED WASTE MANAGEMENT PLAN

1. OVERVIEW

This integrated waste management plan is prepared in respect of a residential development project (George Kerridge Housing Development) which is being project managed by the Saldanha Bay Municipallity. The project involves the construction of single storey, free standing, affordable homes in Vredenburg.

2. WASTE CATEGORISATION

Waste has been categorised into three main types: Hazardous, General and Builders Rubble for the construction phase with Green Waste included for the operational phase. Waste items produced from the construction activities are identified and subsequently categorised into one of these three types. Typical waste items that have been identified at the site have been categorised below:

1. **Hazardous**: cement, cement bags, paint and other chemical products.
2. **Recyclable**: wrapping from suppliers, paper, cardboard, cans, glass.
3. **Building Rubble**: concrete, bricks.
4. **General**: Food waste.
5. **Green Waste**: garden waste

The waste items identified above are not an exhaustive list. A change in the nature or location of works may result in a change in the type of waste produced and therefore the site manager must continuously monitor waste production in order to determine if the existing waste management plan is fit for purpose or requires amendment.

3. WASTE PLANNING & STORAGE

The developer is to create dedicated waste streams which are safely stored, protected from the weather and the storage containers are of adequate size and fit for purpose. The developer is advised that the waste stream storage is to be contained in seven 240 litre Municipal type wheelie bins. All waste containers are to be marked Hazardous, Recyclable or Building Rubble (full names used and not abbreviations).

In the case of Builders Rubble, due to the magnitude of the potential volume of waste in this waste stream, skips, larger containers and or refuse bags (for dry waste) may need to be used. These should all be covered and protected from the weather, including rain and wind.

The Site Manager should be notified if more waste bins are required or if bins are broken or stolen. If required, the site manager will make an application to the City for replacement or additional waste bins (See Appendix B for contact details).

A designated site camp area should be established where workers can rest, have lunch breaks and use portable toilet facilities. One of the purposes of a designated site camp is to contain refuse generated by workers in an enclosed area where it can be collected and disposed of via the relevant waste stream.

All waste activities shall be in line with this Integrated Waste Management Plan.

All waste service providers used shall be appropriately licensed and registered with the relevant authorities in accordance with relevant statutory requirements.

SEPARATION OF WASTE

All waste shall be separated into the appropriate categories, these shall include:

- Recyclable
    - Metals
    - Plastics, including wrapping from suppliers
    - Glass
    - Paper
    - Cardboard
    - Wood
    - Oil and Oily Water
- General Waste
    - Food/cooking waste
    - Non-recyclable plastics
    - Cigarette buts
- Hazardous waste
    - Cement and cement bags
    - Paint
    - Batteries
    - Florescent light fittings
    - Surplus or used chemicals and their containers
    - Hazardous material contaminated soil or water

- Other hazardous waste
- Waste water from wash-downs as well as from bunded areas

All waste and recycling shall be separated into the various categories in the appropriate bins, skips and storage containers by dedicated staff. These containers should be located in a dedicated waste storage area which is protected from the weather. This area will also be secure and will have sufficient natural ventilation in order to prevent the build-up of offensive smells and odours.

4. POTENTIAL WASTE REDUCTION, RECOVERY AND RECYCLING

Various waste reduction methods may be used in order to reduce the volume and the hazardous nature of wastes wherever possible and will include:

- Where possible all paint used will be lead free and will be solvent free or Low VOC (volatile organic compounds)
- Green cleaning products and materials will be used wherever possible
- Use of reusable pallets and materials containers wherever possible
- Recycling and reuse of materials as described in **Table 1** below if possible if sufficient volumes of recyclables are available.

Table 1: Potential Recycling and Reuse of Materials

Material	Detail
Cardboard	Cardboard is an excellent candidate for recycling because it is easily separated from other materials. It is bulky and it is possible to generate revenue from this waste stream if managed correctly.
Paper	Waste paper is likely to BE generated by the on-site office. Office paper is usually collected in two grades: high-grade and mixed paper. High-grade paper typically consists of white copier paper, white computer paper, white office stationery, and white note paper. Mixed office paper includes all other paper generated in an office, including white and coloured paper, file folders, manila envelopes, etc. newspapers and magazines may be collected separately, as they are a different type of fibre.

	Mixed paper is considered low quality and generally yields low market prices. The highest prices are paid for high-grade paper with little contamination.
Glass	Glass is readily recyclable. Depending upon the vendor and the quantity of material, glass containers may have to be separated from other containers or separated by colour. Non-bottle glass, such as window glass or light bulbs, should not be mixed in a bottle recycling program.
Plastics	The most easily recycled plastics are containers comprised of polyethylene terephthalate (PET)—primarily and high density polyethylene (HDPE). PET bottles are marked number 1; HDPE bottles are marked number 2.
Metals	Metal tins/cans and other scrap metals are readily recyclable. They can usually be mixed with aluminium because they are easily extracted from the recycling stream with magnets.
Used Oil	Used oil is readily recyclable, this can be cleaned and processed into fuels for various appliances such as boilers, incinerators, etc.
Builders rubble or builders waste	Construction, demolition, and/or renovation of a structure can produce an enormous amount of waste known as builder's rubble or builders waste. Much of this material can be reused or recycled. There are two types of waste created on a project site: (1) non-hazardous waste; (2) hazardous waste. It is important that all contractors are aware of all relevant regulations that impact the generation, storage, transport and disposal of hazardous waste items, such as lead-based paint, mercury, tires, and oil.
Oily rags	Oily rags can be cleaned and returned for reuse.
Pallets	Wooden pallets may be used for material transport. When an untreated wooden pallet can no longer be reused or repaired, it can be managed as any other clean wood waste. As long as it is not chemically treated wood, it can be ground up for use as landscape mulch, animal bedding, compost, soil amendment, boiler fuel or core material for particleboard. Pallet users can avoid end-of-life issues by opting to lease their pallets, using a pallet management company, or switching to reusable plastic pallets. Any treated wooden pallets should be segregated from untreated pallets.

5. DISPOSAL OF WASTE

The following are conditions of the EA related to waste disposal:

- All building material and rubble is removed upon completion of construction activities.
- Any solid waste must be disposed of at a licensed landfill.

All waste for landfilling will be disposed of at the appropriate waste disposal site. General waste will be disposed of via the Saldanha Bay Municipalities solid waste management collection system wheelie bin collection). Hazardous waste and builder's rubble type waste is to be collected by specific contractors as required.

6. WASTE SERVICES AND VENDORS

A variety of waste service providers will be utilised to remove waste and recycling from the George Kerridge site. All providers will have the following requirements:

- To be appropriately licenced and registered with the various authorities. These being the local, provincial and national organs of state and the Integrated Pollution and Waste Information System (IPWIS).
- To supply certificates of safe disposal for hazardous waste and recycling removed from site.
- To provide chain of custody documentation of all non-hazardous waste and recycling removed from site.
- All scrap metal recyclers to be registered in terms of the Second-Hand Goods Act and Regulations.

i. Recycling companies:

- Consol Glass, Greens Bottle Recyclers, etc.
- Mpact, etc.
- Atlantic Plastic Recycling, etc.
- SA Fine Trading, L.O. Rall, SA Metal
- Rags4us
- Green Office
- Manila Productions
- African Green Oil
- Fuel 44

ii. Waste transport/disposal Companies

- Waste Busters
- Enviroserv
- Averda
- Saldanha Bay Municipal Waste Collection and disposal

7. TRACEABILITY

All waste removed from the site will be traceable from its removal to its final disposal to a landfill, incineration, recycling, or any other type of final disposal facility. This traceability will be provided by unique numbering on a manifest, safe disposal certificates, etc. These should be kept on site as cradle to grave and cradle to cradle proof.

8. TRAINING AND COMMUNICATION

All employees will be trained and educated in relation to the waste management systems by management. Attendance registers will be kept relating to the training.

All contractors will be expected to ensure all their employees are trained and comply with the requirements of the Waste Management Plan with the help of Inductions and Toolbox talks.