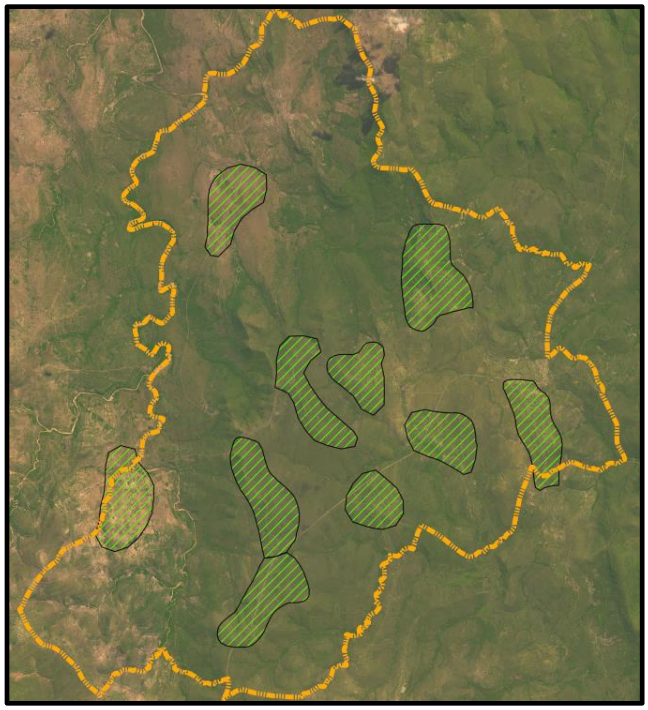
EZIDWADWENI RURAL SUBSIDISED HOUSING DEVELOPMENT

ENVIRONMENTAL MANAGEMENT PLAN



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1 INTRODUCTION AND BACKGROUND

1.1 BACKGROUND

A Preliminary Environmental Assessment Report for the Ezidwadweni Rural Subsidised Housing Project was prepared for GO BIG Construction & Projects as part of the rural PSL application for this project. The findings of the Preliminary Environmental Assessment Report have been incorporated into the Environmental Management Plan for the Ezidwadweni Rural Subsidised Housing Project. Correspondence received from the Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) indicated that the development proposal does not constitute an activity which is identified in terms of Section 24 of the national environmental management act (Act 107 of 1998) and consequently does not require environmental authorization.

DEDTEA however requested that an Environmental Management Plan (EMP) be prepared for the construction and operational phases of the development and submitted to the department for review. It was indicated that this EMP should contain the following:

- Mitigation measures for each identified environmental impact.
- Responsibilities of stakeholders.
- Site establishment and housekeeping plans for construction camps
- Landscaping and rehabilitation of the site.

The Environmental Management Plan (EMP) presented in this report should be read in conjunction with the Preliminary Environmental Assessment Report previously submitted to the Department.

Amafa aKwaZulu-Natali was also consulted with regards to the proposed development wherein it was indicated that no Heritage Impact Assessment would be required for the proposed project area.

According to this report no places, buildings, structures and equipment, places to which oral traditions are attached or which are associated with living heritage; geological sites of scientific or cultural importance; archaeological and paleantological sites; graves and burial grounds, movable objects or battle fields will be affected by the proposed development. This report recommended that the proposed development may proceed without further heritage resource mitigation but that the developer will cease all work immediately and notify Amafa-aKwaZulu-Natali should any

heritage resources as defined in the Act be discovered during the course of the development activities.

This report was submitted to Amafa-aKwaZulu-Natali for fulfillment of the requirements of the KwaZulu-Natal Heritage Act and a formal decision of council is currently awaited.

1.2 PROJECT DESCRIPTION AND LOCATION

The project area falls within the jurisdiction of the Nongoma Local Municipality, which is one of five local municipalities making up the Zululand District Municipality of north KwaZulu-Natal. The total extend of the project area is approximately 10 726.60 Ha and is situated in relatively mountainous areas, most of which still hold pristine natural character despite being inhabited by rural settlements of the various traditional areas.

The Municipality has initiated a process to provide low cost subsidised housing within its area of jurisdiction in terms of the Rural Housing Subsidy Scheme (as described in Chapter 11 of the National Housing Code). The provision of rural housing in the Ezidwadweni area of the Nongoma Local Municipality forms part of this program. According to Chapter 11 of the National Housing Code, rural subsidies may be used for any purposes which, in the discretion of the Housing Board, amount to housing purposes. Without limiting the discretion of any particular Housing Board, the following purposes may be regarded as housing purposes:

- The provision of sanitation facilities
- The provision of roads and stormwater drains within the boundaries of any particular settlement.
- The provision of water
- The construction or upgrading of dwellings
- The purchase of building materials in order to enable a beneficiary himself or herself to construct or upgrade a dwelling

The number of beneficiaries that will form part of this project is approximately 2 000 families. The exact extent of the housing project in terms of the number of beneficiaries, the application of subsidies in terms of the potential purposes outlined above, and the exact location within the study area is depicted on the development plan.

2 APPROACH AND METHODOLOGY

2.1 PURPOSE AND CONTEXT OF EMP

An EMP can be defined as a detailed plan and programme of measures to prevent environmental degradation due to construction and operational phase development activities. Its purpose is to describe how negative environmental impacts will be managed, rehabilitated and monitored and how positive impacts will be maximized (Department of Environmental Affairs & Tourism 1992).

Ongoing monitoring forms part of the EMP and appropriate feedback procedures need to be identified. Monitoring of impacts may include the following (Department of Environmental Affairs & Tourism, 1992):

- A check that actions are consistent with the conditions of approval in the ROD or equivalent document and that mitigation measures are implemented during the construction phase.
- Monitoring of selected environmental variables and the duration for which monitoring should continue after the construction phase, or during which phases monitoring should occur.
- Details for monitoring actions.
- Delegation of responsibility for undertaking monitoring.
- Procedures to be followed if thresholds are exceeded or problems identified.
- Indication of the responsible environmental authority.

2.2 METHODOLOGY

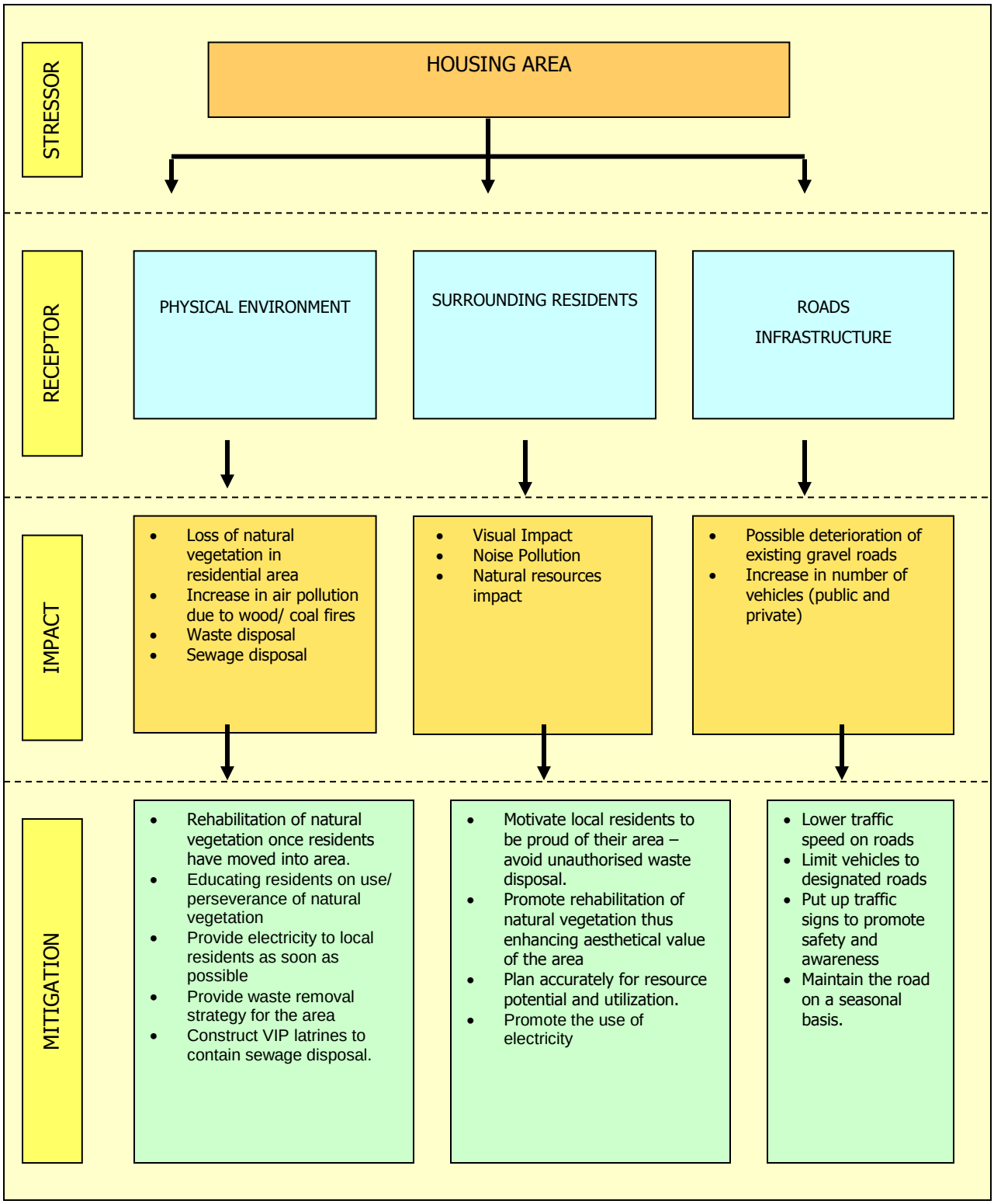
The preparation of this EMP was informed by the Preliminary Environmental Assessment Report, a visual survey of the proposed development and surrounding areas, and current available desktop information sources. The following information (as proposed by the IEM guidelines for Environmental Management Plans of the Department of Environmental Affairs and Tourism, 1992) is included:

- Potential environmental impacts of the proposed development.
    - Construction phase
    - Operational phase
- Details of mitigation measures and management actions.

- Parties responsible for implementing mitigation measures and management recommendations.
- Guidelines for monitoring and auditing of compliance.

The anticipated impacts of each aspect are evaluated by means of the conceptual model shown in Figure 1:

Figure 1: Example of a conceptual model used to consider the possible impacts during the relevant phases of the project.



Stressor: Indicate the aspect of the proposed development, which, initiates and cause impacts on elements of the environment.

Receptor: Highlight the recipient and most important components of the environment affected by the receptor.

Impacts: Indicates the net result of the cause-effect between the receptor and receptor.

Mitigation: Impacts need to be mitigated to minimize the effect on the environment.

The process aims at focusing on the most significant impacts in order to determine whether the proposed mitigation measures would be sufficient.

This EMP is subject to similar assumptions and limitations as was the Preliminary Environmental Assessment Report. It is also assumed that the environmental management actions required for the proposed development will be similar to those identified for similar types of rural housing projects. Construction site safety issues are not addressed specifically in this EMP and it is the responsibility of the developer and contractor to ensure that all relevant legislation is complied with regarding management and safety issues during the construction phase.

The focus of this EMP is on the construction phase, during which it is possible to fully implement recommended mitigation measures. Although mitigation is possible for potential *negative* impacts during the operational phase, the implementation of these mitigation measures will depend on the housing beneficiaries, since the developer and contractors will have completed their tasks and the development will be in the hands of housing beneficiaries

Compliance with the requirements of this EMP will be monitored and audited on a regular basis

2.3 AMENDMENTS DURING IMPLEMENTATION

Although no change of scope is anticipated during the construction phase of the proposed housing development, some controls may need to be incorporated to check such changes. Any changes to the scope of the project during construction will have to be reflected in an updated EMP which will subsequently have to be approved by the DEDTEA.

3 ENVIRONMENTAL MANAGEMENT COMPLIANCE

3.1 ENVIRONMENTAL CONTROL OFFICER (ECO)

The designated official from the developer who will be responsible for the implementation of the EMP must ensure compliance and monitoring of this EMP and will be responsible for:

- Monitor activities of the developer and contractors regularly during the construction phase, ensure that mitigation measures are implemented and keep monitoring records of compliance and non-compliance. Monitoring results must be reported to the developer and the DEDTEA in the form of a Compliance Monitoring Report, which must be submitted monthly during the construction phase. Records of non-compliance must indicate how problems are rectified and must be reported to the developer and the DEDTEA to enable follow-up, if necessary.
- Undertake monthly environmental audits during the construction phase. The monitoring frequency may need to be adjusted depending on the severity of any transgression of this EMP. The results of these audits must be included in EMP Compliance Reports. The DEDTEA also may be involved in monitoring procedures in an advisory capacity.
- Liaise with the DEDTEA when necessary about any new environmental issues which may arise. Any new mitigation measures or amendments to existing ones that address areas of concern raised by the ECO must be carried out by the developer and contractors.
- Maintain open communication channels with IAPs throughout the project. All communications with IAPs received by members of the development team must be referred to the ECO to ensure that these are properly recorded and the appropriate action taken. A record of all correspondence with IAPs should be kept, noting the following details:
    - Date of correspondence or verbal communication, name of the IAP and contact details and issues raised by the IAP.
    - Date and nature of follow-up action taken.
    - Date and nature of notification of the IAP about follow-up action taken.

3.2 EMP COMPLIANCE

This EMP is an extension of the Conditions of Approval of the environmental authorization as determined by the Department of Economic Development, Tourism and Environmental Affairs and is binding for all contractors associated with the development. Non-compliance with, or any deviation from the conditions set out in this EMP, constitutes non-compliance with these conditions. The developer is thus responsible for the actions and impacts caused by all his contractors and agents during the construction phase.

3.3 EMP RESPONSIBILITIES

Parties responsible for complying with this EMP during the construction phase are the developer and contractors appointed by the developer. The Developer however assumes ultimate responsibility for environmental management during the construction phase of the Ezidwadweni Rural Subsidised Housing Project. The individuals responsible for ensuring that the EMP is understood and implemented by the developer and contractors and monitored and audited are the Environmental Control Officer and the Site Engineer, both of whom are appointed by the developer. The KZN Department of Economic Development, Tourism and Environmental Affairs are the provincial environmental authority responsible for monitoring submitted reports and addressing issues of non-compliance which may arise.

A summary of development activities and their environmental management is summarized below.

- The developer **(D)** and contractors **(C)** are responsible for complying with this EMP.
- The Environmental Control Officer **(ECO)** and Site Engineer **(E)** must ensure that the EMP is understood by the developer and contractors and must monitor compliance.
- The Department of Economic Development, Tourism and Environmental Affairs **(DEDTEA)** are responsible for examining submitted reports and dealing with issues of non-compliance.
- Residents/housing beneficiaries **(R)** will be responsible for implementing mitigation measures during the operational phase.
- Nongoma Local Municipality **(N)** should be responsible for organizing the regular collection of domestic waste during the operational phase
- Additional abbreviations: **DOT** – Department of Transport; **DWA** – Department of Water Affairs; **IAPs** – Interested and Affected Parties; **VIPs** – Ventilated Improved Pit latrines.

ITEM	PHASE & PROJECT ACTIVITY	RESPONSIBLE	MONITORING PARTY	MONITORING FREQUENCY	RECORD KEEPING METHOD	AUDIT TECHNIQUE
4	**CONSTRUCTION PHASE**					
4.1	**Contractors' Camp & Construction Site Housekeeping**					
4.1.1	Access to camp site and construction sites					
	Routing and haulage roads	C	E, ECO	Before moving onto site; ongoing	Bi-Monthly reports	Site inspection
	Access to site	D, C	E, ECO	During camp set up	1st monthly report	Site inspection
4.1.2	Contractors camp					
	Location	C	ECO	Before camp & site set up & ongoing	Bi-Monthly reports	Site inspection
	Setting up & layout	C	ECO	During camp & site set up & ongoing	Bi-Monthly reports	Site inspection
	Drainage	C	E	Ongoing	Bi-Monthly reports	Site inspection
	General					
4.1.3	Housekeeping: Contractors camp and construction site					
	Waste disposal	C	ECO, E	During camp & site set up; ongoing	Bi-Monthly reports	Site & waybill inspection
	Areas allocated for eating	C	ECO	During camp & site set up & ongoing	Bi-Monthly reports	Site inspection
	Sanitation & ablutions	C	ECO, E	During camp & site set up; ongoing; toilets: weekly	Bi-Monthly reports	Site inspection
	Security and safety	C	E	During camp & site set up; ongoing; toilets: weekly	Bi-Monthly reports	Site inspection
	Storage areas					
	Establishment & maintenance	C	ECO	During camp & site set up; ongoing	Bi-Monthly reports	Site inspection

ITEM	PHASE & PROJECT ACTIVITY	RESPONSIBLE	MONITORING PARTY	MONITORING FREQUENCY	RECORD KEEPING METHOD	AUDIT TECHNIQUE
	Risks associated with materials on site	C	ECO	During camp & site set up; ongoing	Bi-Monthly reports	Site inspection
	Hazardous substances & materials	C	ECO, E	During camp & site set up; before establishment of area; staff induction; ongoing	Bi-Monthly reports	Site inspection
	Hazardous areas due to construction activities	C	ECO	Ongoing	Bi-Monthly reports	Site inspection
	Vehicle & machinery maintenance	C	ECO, E	Ongoing	Bi-Monthly reports	Site inspection
4.1.4	Materials Management					
	Source of materials	C	ECO, E	On award of contract & receipt of natural materials	Bi-Monthly reports	Site inspection
	Materials & stockpiles	C	ECO, E	Ongoing; monthly	Bi-Monthly reports	Site inspection
	Handling of hazardous materials	C	ECO, E	Before construction phase starts; ongoing	Bi-Monthly reports	Site & hazardous materials inspection
4.1.5	Environmental Education & Awareness					
	General	C	ECO, E	Before start of construction phase; ongoing	Bi-Monthly reports	Training, questioning, observation on site.
	Staff conduct on site	C	ECO	Before construction phase starts; ongoing	Bi-Monthly reports	Training, questioning, observation on site.
	Social environment & IAPs	C, E	E, ECO	Complaints register: monthly; 24 hrs before disruption; ongoing	Bi-Monthly reports	Observation on site; communication with IAPs; check complaints' register
	Cultural heritage	C	E, ECO	Before construction phase starts; ongoing	Bi-Monthly reports	Training; question staff; site inspection
	Project completion and					

ITEM	PHASE & PROJECT ACTIVITY	RESPONSIBLE	MONITORING PARTY	MONITORING FREQUENCY	RECORD KEEPING METHOD	AUDIT TECHNIQUE
	camp closure (see Section 5.9)					
4.2	**Physical and landscape characteristics of the land development area**					
4.2.1	Geology & Soils					
	Geological	C	E	Before construction starts; ongoing	Bi-Monthly reports	Check geotechnical report; site inspection
	Topsoil	C	E, ECO	Before start of & after construction; ongoing	Bi-Monthly reports	Site inspection
	Soil stockpiles	C	E, ECO	Stockpile erection & ongoing	Bi-Monthly reports	Site inspection
	Soil erosion	C	E, ECO	When soil exposed & ongoing; after embankment creation	Bi-Monthly reports	Site inspection
	Construction Site Surface Management	C	E, ECO	Start of & after construction, after earthworks & ongoing	Bi-Monthly reports	Site inspection
	Soil contamination	C	E, ECO	Before construction phase; sighting of hazardous material, after spillage & ongoing	Bi-Monthly reports	Site inspection; test top- & sub-soils; waybill inspection
	Upgrading of access roads to homesteads	C	E, ECO	Before construction phase; before construction starts; during construction	Bi-Monthly reports	Check geotechnical report & DOT specifications; site inspection
4.2.2	Water					
	Storm-water	C	E, ECO	Before & beginning of & after construction; site set up; as directed by E; when necessary; as surfaces are exposed; on completion of activity; at installation; ongoing	Bi-Monthly reports	Site inspection
4.3	**The ecological characteristics of the land development area and its surroundings**					

ITEM	PHASE & PROJECT ACTIVITY	RESPONSIBLE	MONITORING PARTY	MONITORING FREQUENCY	RECORD KEEPING METHOD	AUDIT TECHNIQUE
4.3.1	Flora, Fauna, Habitats & Natural Ecology					
	Damage to flora, fauna, habitats & the natural ecology	C	ECO, E	Before construction starts; at camp & site set up; before & after vegetation stripping; when necessary; ongoing	Bi-Monthly reports	Site inspection; observation on site
	Exotic invasive plant control	D, C	ECO	Start of construction phase; ongoing	Bi-Monthly reports	Site inspection; observation on site
	Plant collecting, hunting & trapping of animals	C	ECO	Ongoing	Bi-Monthly reports	Site inspection; observation on site
4.4	**The impact of the development on current land use of the area and its surroundings**					
4.4.1	Land use impact	E	ECO, E	Before construction starts; at camp & site set up.	Bi-Monthly reports	Site inspection; observation on site
5.5	**Existing significant Archaeological, historical and cultural heritage**					
4.5.1	Conservation of Cultural Heritage					
	Archaeological, palaeontological & historical remains	D	ECO, E	Before construction phase starts; ongoing	Bi-Monthly reports	Liaise with D; site inspections
4.6	**Existing infrastructure and/or services**					
4.6.1	Waste management					
	On-site waste management	C	ECO, E	At camp & site set up; after waste disposal; ongoing	Bi-Monthly reports	Site inspection; observation on site; check waybills
	Hazardous waste	C	E, ECO	After waste disposal; ongoing	Bi-Monthly reports	Site inspection; observation on site; check waybills
4.7	**The social and economic impact on surrounding**					

ITEM	PHASE & PROJECT ACTIVITY	RESPONSIBLE	MONITORING PARTY	MONITORING FREQUENCY	RECORD KEEPING METHOD	AUDIT TECHNIQUE
	communities					
4.7.1	Social and economic impact					
	Socio-economic characteristics	D, C	E, ECO	Before construction phase starts; ongoing	Bi-Monthly reports	▪ Check with D and C ▪ Interviews with local communities
	General	C	ECO, E	Before start of construction phase; ongoing	Bi-Monthly reports	Training, questioning, observation on site.
4.8	**Possible pollution sources**					
	Pollution/water quality	C	E, ECO	Before construction phase starts; site set up; before & after mixing; after spill; before & after vehicle washing; before discharge of polluted runoff; ongoing	Bi-Monthly reports	Site inspection; check waybills
	Pollution from dust	C	ECO, E	At site set up; construction phase; as needed; after earthworks; ongoing	Bi-Monthly reports	Site inspection; observation on site
	Noise pollution	C	ECO, E	Before moving on to site; at camp set up; 24 hrs before noisy activities; ongoing	Bi-Monthly reports	Site inspection; observation on site
	Visual Impacts	C	E, ECO	At camp & site set up; ongoing	Bi-Monthly reports	Site inspection; observation on site
4.9	**Project Completion**					
4.9.1	Post construction activities					
	Closure of contractors' camp & construction sites	C	E, ECO	End of construction phase	Final report	Site inspection; check waybills
	Vegetation	C	E, ECO	End of construction phase	Final report	Site inspection; check waybills
	Land Rehabilitation	C	E, ECO	End of construction phase	Final report	Site inspection; check waybills
	General	C	E, ECO	End of construction phase	Final report	Site inspection;

ITEM	PHASE & PROJECT ACTIVITY	RESPONSIBLE	MONITORING PARTY	MONITORING FREQUENCY	RECORD KEEPING METHOD	AUDIT TECHNIQUE
						check waybills
4.10	**Cumulative & Synergistic Impacts**	C	ECO, E	Ongoing during construction phase	Bi-Monthly reports	Site inspection; observation on site
5	**OPERATIONAL PHASE**					
5.1	**Storm-Water & Soil Erosion**					
	Soil Erosion	R	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
	Upgrading of Access roads to homesteads	N, R	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
5.2	**The ecological characteristics of the land development area and its surroundings**					
	Indigenous Flora	R	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
	Exotic Invasive vegetation	R	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
	Indigenous Fauna	R	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
	Damage to Flora, Fauna, Habitats and the natural ecology.	R	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
5.3	**Existing significant Archaeological, historical and cultural heritage**					
	Conservation of cultural heritage	N, R	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
5.4	**Existing infrastructure and services**					
	Waste management	N	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents

ITEM	PHASE & PROJECT ACTIVITY	RESPONSIBLE	MONITORING PARTY	MONITORING FREQUENCY	RECORD KEEPING METHOD	AUDIT TECHNIQUE
5.5	**Social and Economic Impact on surrounding communities**					
	General	N	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
5.6	**Possible pollution**					
	Pollution	DWA, DEDTEA, N	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents
5.7	**Cumulative & Synergistic Impacts**	R	ECO	After completion of construction at each site	Bi-Monthly reports	Site inspection; advise residents

4 PHASE 1: CONSTRUCTION PHASE

4.1 CONTRACTOR'S CAMP AND CONSTRUCTION SITE HOUSEKEEPING

4.1.1 Access to camp site and construction sites

ACCESS TO CAMP SITE & CONSTRUCTION SITES	**Potential impact**	**Mitigation:**
	Biophysical impacts due to development and use of environmentally unsound access roads.	Use existing access tracks and turning areas, provided they do not occur in sensitive areas or environmentally unsound areas.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Access & Haulage Roads	• No access roads should be constructed on sensitive areas, and access roads in proximity of these areas must be prevented.	ECO	Ongoing
	• Routing and haulage roads will be the same as the existing access track to each homestead unless tracks are impassable due to physical characteristics or unless they pass through or close to sensitive areas.	E/ECO	During construction
	• All IAP's should be notified in advance of any known potential risk associated with the transport of material, and/or an increase in traffic volumes along haulage roads.	ECO	Prior to site occupation.
	• If there is more than one access road to a particular site, choice of routes should be taken into account minimum disturbance to residents neighbouring the site.	E	According to site plan – ongoing.
	• All roads for construction access must be planned and approved by the engineer prior to construction activities if they differ from the existing roads.	E	Prior to moving onto site.
	• Access roads must be stabilized where steep faces remain after cuttings are made. Steep areas must be re-vegetated or physically stabilized.	ECO/E	Ongoing
	• Unnecessary compaction of soils by heavy vehicles must be avoided; construction vehicles must be restricted to	E	Prior to moving on site

	demarcated access, haulage routes and turning areas. • Roads must follow natural contours to reduce storm water erosion. • Agreed turning areas for haulage vehicles are to be formalised and used by contractors. No turning maneuvers other than at the designated places must be permitted. • Machine/vehicle operators should receive clear instructions to remain within demarcated access routes and operations/construction areas.	E ECO/E E	During construction Ongoing Prior to moving on site
Access to site	▪ Contractors should ensure that the access roads are maintained in good condition by attending to potholes, storm water damage and other aspects as soon as these develop. ▪ Unnecessary compaction of soils by heavy vehicles must be avoided and construction vehicles must be restricted to demarcated areas. ▪ Cognizance of vehicle weight / dimensions of trucks must be taken into consideration when using access ways constructed of certain materials e.g. clayey roads	E ECO E	Weekly and after heavy rains. Ongoing Ongoing

4.1.2 Contractors camp establishment

CONTRACTORS' CAMP	Potential impact	Mitigation:
	Impacts due to establishment of contractors' camp.	• Contractors camp must be set up on a specific designated location. • Establish camp away from sensitive ecological areas. • Rehabilitate any damaged areas on closure of the camp.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Setting Up & Layout	▪ The size of the contractors' camp should be minimised and the clearance of natural vegetation including grassland should be avoided.	E/ECO	During camp setup
	▪ Cut and fill must be avoided during the establishment of the contractors' camp.	E	During camp setup
	▪ Adequate parking must be provided for site staff and visitors.	E	During camp setup
Drainage	▪ Contractors must monitor and manage drainage of the camp and construction sites to avoid standing water and soil erosion.	E	During camp setup
	▪ Run-off from the camp and construction sites must not discharge into neighboring properties.	ECO	Ongoing
General	▪ The construction site must be fenced off and the fence maintained to manage access control.	E	During camp setup
	▪ Access to the site should be restricted to employees of the contractor only	E	Ongoing

4.1.3 Housekeeping: Contractor's Camp & Construction Site

CONTRACTORS' CAMP & CONSTRUCTION SITE HOUSEKEEPING	**Potential impact: Negative**	**Mitigation:**
	Impacts due to activities at contractors' camp and construction site.	• Prevent negative impacts of human and vehicle activities, vehicle maintenance, and storage of materials. • Ensure the provision of adequate waste disposal, ablution and sanitation facilities.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Areas allocated for eating	▪ Food preparation areas must be provided with adequate washing facilities.	ECO	During camp and site setup.
	▪ Eating areas should be serviced and cleaned regularly and maintained to a high standard of hygiene.	ECO	Ongoing monitoring
	▪ Food refuse must be stored in sealed refuse bins and removed from site on a weekly basis.	ECO	Ongoing monitoring
Sanitation & Ablutions	▪ Adequate sanitation and ablution facilities must be provided for construction workers to avoid use of open space and watercourses as toilets or washing facilities.	ECO	At camp setup
	▪ Chemical toilets must be provided by a company that has been approved by the engineer. Such toilets must be available for all site staff, both at the camp site and the construction sites as agreed by the engineer.	E	At camp and site setup
	▪ Toilets should not be within a distance of 100 m from any natural water bodies.	ECO	At camp and site setup
	▪ Toilets are to be maintained in a clean state.	E/ECO	Weekly inspection Ongoing monitoring
	▪ A registered chemical waste company is to be used to remove waste from chemical toilets on site.	ECO	Ongoing monitoring Ongoing monitoring
	▪ The construction of pit toilets is not allowed and open areas or the surrounding bush may not be used as a toilet facility.	ECO	At camp setup
	▪ Toilets must be set up on level surfaces and any excavations surrounding the toilets must be stabilized.	E	During camp setup
Security and Safety	▪ Secure the site to reduce the opportunity for criminal activity in the locality of the construction site.	E	During camp and site setup

	▪ Potentially hazardous areas such as trenches are to be demarcated and clearly marked.	E	During camp and site setup
Establishment and Maintenance of storage areas	▪ Storage areas must be designated, demarcated and fenced if necessary.	ECO	During camp and site setup
	▪ Location of storage areas must take into account prevailing winds, distance to water bodies, boreholes and on-site topography.	ECO	During camp and site setup
	▪ Contractors must ensure that potentially harmful materials are stored properly in a dry, secure location with concrete or sealed flooring and secured entry	ECO	During camp and site setup
	▪ Storage areas should be secure and be safe from access by children and animals.	ECO	During camp and site setup
	▪ Fire prevention facilities must be present at all storage facilities.	ECO	Ongoing
	▪ Storage facilities (including any tanks) should be stored on an impermeable surface, surrounded by a bund wall in order to ensure that accidental spillage does not pollute local soil or water resources.	ECO	During camp and site setup
	▪ Contractors must ensure that storage facilities are cleaned and maintained regularly and that leaking containers are disposed of without spillage onto the soil.	ECO	Ongoing
Risks associated with materials on site	▪ Material stockpiles or stacks, such as pipes and bricks, must be stable and well secured to avoid collapse and possible injury to site workers/local residents.	E/ECO	Daily
	▪ Obstruction to drivers' line of sight due to stockpiles and stacked materials must be avoided, especially at intersections and sharp corners.	ECO	Ongoing
	▪ No materials are to be stored in unstable or high-risk areas such as in floodplains or on steep slopes.	ECO	Ongoing
Hazardous Substances & Materials (*Those hazardous substances and materials which are potentially poisonous, flammable, carcinogenic or toxic. These could include:*	▪ Material Safety Data Sheets (MSDSs) must be readily available for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs should include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.	E/ ECO	Ongoing
▪ *Diesel, petroleum, oil, bituminous products.*	▪ The proximity of schools, community facilities, etc, must be taken into account when deciding on storage	E/ECO	During preliminary investigations and

▪ *Cement.* ▪ *Solvent based paints.* ▪ *Lubricants.* ▪ *Explosives.* ▪ *Drilling fluids.* ▪ *Pesticides, herbicides.* ▪ *Liquid petroleum gas.*	areas for hazardous substances. ▪ Hazardous storage and refueling areas must be underlain with an impermeable liner to protect groundwater quality. ▪ Contractors must submit a method statement and plans for the storage of hazardous materials and emergency procedures to the engineer for approval. ▪ Fuel tanks must meet relevant specifications and must be elevated so that leaks may be detected easily. Storage areas containing hazardous substances and materials must be clearly signed. ▪ Residents living adjacent to the camp site must be notified of the existence of the hazardous storage area. ▪ Staff dealing with these materials and substances must be aware of their potential impacts and follow the appropriate safety measures. ▪ Handling, storage and disposal of potential hazardous materials, residues or their containers must be in accordance with DWA's requirements and specifications. Scheduled hazardous waste such as bitumen, tar, oils, etc., must be disposed of at DWA-approved facilities.	 E E ECO ECO ECO/E	camp setup On award of contract During site setup During site setup When moving onto site or as the relevant materials arrive on site. During staff induction and ongoing as necessary. Ongoing
Hazardous Areas due to Construction Activities	▪ Potentially hazardous areas such as trenches are to be demarcated and clearly marked so that warning about these areas is visible during the day and night.	ECO	Ongoing during construction period.
Vehicle & Machinery Maintenance	▪ Washing of construction vehicle wheels is permitted without detergents or other chemicals, but no other washing of vehicles or equipment is allowed, unless this occurs on a lined and bunted area. ▪ Maintenance of machinery must be undertaken on a lined area to prevent oil and fuel leaks during construction activities	ECO ECO	Ongoing during construction phase. Monitored on an ongoing basis.

4.1.4 Material Management

MATERIALS MANAGEMENT	**Potential impact**	**Mitigation:**
	Impacts due to materials for camp and construction site activities.	• Prevent negative impacts of materials procurement, use, storage and disposal. • Obtain any necessary imported earthworks material from an authorized environmentally sound source. • Dispose of any excess earthworks or other material in an environmentally sound way.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	**RECOMMENDATIONS**	**RESPONSIBILITY**	**FREQUENCY**
Materials & Stockpiles ***(****Polluting materials and operations include:* • *Batching,* • *storing of cement, concrete and mortar.* • *Petrol,* • *oil,* • *chemical storage and transfer.* • *Washing, ablution and toilet facilities.* • *Plant storage and refuelling.)*	• Stockpiles should not be located in areas where they obstruct natural water pathways.	ECO	Ongoing
	• Stockpiles should not exceed 2 m in height unless otherwise permitted by the engineer.	E/ECO	Ongoing
	• If stockpiles are exposed to windy conditions or heavy rain, they should be covered by suitable material, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.	E/ECO	When necessary.
	• Stockpiles should be kept clear of weeds and exotic vegetation growth by regular weed eradication.	ECO	Ongoing.
	• Contractors must maintain storage of all polluting materials and conduct potentially polluting operations away from indigenous vegetation, top- or subsoil stockpiles, boreholes and sensitive ecological areas.	ECO	Ongoing Monitoring
	• All unopened oils and lubricants must be stored in a safe and secure location on site. Used oils and lubricants must be kept in drums and recycled. Contractors must ensure that these chemicals are not disposed of on open ground, down drains, in watercourses, wetlands or other sensitive ecological areas and must understand the liability under which they operate.	ECO	Ongoing monitoring
Handling of Hazardous Materials	▪ No vehicles transporting, placing or compacting asphalt or any other bituminous product may be washed on site.	ECO	Ongoing monitoring
	▪ Powders, e.g. lime, must not be mixed during excessively windy conditions.	ECO	Ongoing monitoring
	▪ All concrete mixing must take place on a designated, impermeable surface.	ECO	Ongoing monitoring

	▪ No vehicles transporting concrete to construction sites may be washed on site.	ECO	Ongoing monitoring
	▪ All substances required for vehicle maintenance and repair must be stored in sealed containers until they can be disposed of or removed from the site.	ECO	Ongoing monitoring
	▪ Hazardous substances and materials are to be transported in sealed containers or bags.	ECO	Ongoing monitoring
	▪ Spraying of herbicides or pesticides should not take place under windy conditions and must comply with the Occupational Health and Safety Act specifications and other chemical handling laws. Laborers must be trained and fully aware of safety precautions and possible risks.	ECO	Ongoing monitoring
	▪ Emergency numbers should be on hand and consulted should any accidents or spillages of hazardous substances and/or materials take place.	ECO	Before construction starts.
	▪ Contractors are to outline a method statement for dealing with accidents or spillages of hazardous materials. This statement must be handed to the engineer as well as to DWA should the incident occur near a water body.	E/ECO	Before construction starts

4.1.5 Environmental Education & Awareness

ENVIRONMENTAL EDUCATION & AWARENESS	Potential impact	Mitigation:
	Various biophysical and sociological impacts due to poor staff conduct.	• Provide suitable environmental education and awareness including advice about non-permissible conduct. • Maintain good communication with IAPs including a complaints' register.
	Loss of significant archaeological or palaeontological remains.	• Advise contractors on what to look out for in terms of archaeology and palaeontology during the construction process. • The contractor should stop all work immediately and notify Amafa-aKwaZulu-Natali should any heritage resources as defined in the act be discovered during the course of development activities.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Staff Conduct on Site Social Environment & Interested & Affected Parties (IAPs)	▪ The contractor should ensure proper supervision of employees at all times.	E/ECO	Ongoing monitoring
	▪ Staff needs to be made aware of the following general rules which must be followed at all times. o No alcohol or drugs are to be present on site. o No firearms are allowed on site or in vehicles transporting staff to/from site, unless used by security personnel. o Prevent excessive noise. o No harvesting of firewood from the site or from the areas adjacent to it. o Trespassing on private/commercial properties adjoining the site is forbidden. o Driving under the influence of alcohol is prohibited. o No pets are allowed on site	ECO	Ongoing monitoring.
Staff Conduct on Site Social Environment & Interested & Affected Parties (IAPs)	▪ The engineer and contractors are responsible for ongoing communication with those people who are interested in and affected by the rural housing project.	E/ECO	Ongoing
	▪ Should the construction staff be approached by members of the public or IAPs, they should assist them in locating the engineer or contractor, or provide contact telephone or cell numbers.	E/ECO	Ongoing monitoring
	▪ A complaints' register should be housed at the site office. This should be in carbon copy format with numbered pages. Any missing pages must be accounted for by the contractors.	ECO	Monthly

	▪ Queries and complaints are to be handled in the following way: o Document details of such communications. o Submit these for inclusion in the complaints register. o Bring issues to the engineer's attention immediately. o Take remedial action according to the engineer's instruction.	ECO	Ongoing monitoring
	▪ Disruption of access for local residents must be minimised and must have the engineer's permission.	E	Ongoing monitoring
	▪ Contractors are to inform residents in writing of disruptive activities at least 24 hours beforehand giving the engineer's and contractors' contact details.	E/ECO	Ongoing monitoring
Cultural Heritage	▪ Before construction starts, all staff must be informed what possible archaeological, historical or palaeontological objects (e.g. tools, human remains, fossils, etc) of value look like, and must notify the engineer or contractors should such an item be uncovered	ECO	Before construction phase starts and ongoing monitoring.
	▪ All work should cease immediately if any archaeological, historical or palaeontological remains are discovered during development and Amafa aKwaZulu-Natali be notified at Tel: 033 – 394 6543.	E/ECO	When necessary

4.2 PHYSICAL AND LANDSCAPE CHARACTERISTICS OF THE LAND DEVELOPMENT AREA

4.2.1 Geology and Soils

GEOLOGY AND SOILS	**Potential impact** The soil potential of soils present across the site may be impacted upon as a result of development (especially in instances where soils with a good/high potential exist).	**Mitigation:** The development of new housing structures should be limited and where possible avoided in areas of existing agricultural land in the homestead areas
	Should any colluviums and/or residual clayey soils exist in the project area; the clayey nature thereof will be moisture sensitive and difficult to compact when wet. These clays will soften significantly when saturated and could lead to excessive settlement of any supporting structure or paving	Cuts and fills should be restricted in extent to promote stability
	Loss of top soil from excavated areas.	Conserve topsoil and keep separate from any excavated deeper soils and protect from wind and rain.
	Loss of excavated or exposed soil.	Prevent soil erosion, protect topsoil and subsoil stockpiles.
	Contamination of topsoil and subsoil.	Administer proper site management to prevent contamination. Should contamination occur, expedite immediate corrective action.
	Ineffective disposal of stormwater and uncontrolled run-off can cause damage to property and may erode and destabilize soil banks	Plan and install appropriate stormwater control measures around all new housing structures to be developed

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Geology	▪ Cut and fills should be restricted in extent to promote stability of development area	E/ECO	During construction
	▪ Two founding options should be considered to address the anticipated sub soil variability on the development site: o Re-enforced concrete strip footings and ground beams on mass concrete slabs o Re-enforced concrete raft foundations	E/ECO	Start of construction and ongoing
	▪ All earthworks should be carried out in accordance with SABS 1200. The design of platforms should take account of the varying slopes, which would suit the development of either: o Cut platforms on the limited shallow	E/ECO	Ongoing during construction

	slopes (<1:8 grade) present in the central northeastern and western areas or o Cut to fill platforms on moderate slopes (average grade of between 1:8 and 1:5) or o Cut to fill platforms with retaining walls on locally steep slopes (slope grades >1:5) and on wet Sites		
	▪ Where poor road sub grade is exposed during the construction of gravel roads, undercutting into the unsuitable materials (depending on the road formation level) by typically 300mm is recommended to accommodate a select layer comprising material of at least G7 quality. Where bedrock of G9 quality (or better) is encountered, the materials should be ripped to a level of 400mm below road formation level and compacted to 93% Modified A.A.S.H.T.O. maximum dry density.	E/ECO	Ongoing during construction
Topsoil	▪ The stripping of vegetation during preliminary activities on site greatly increases the risk of erosion and permanent loss of topsoil. The removal of vegetation must be limited to demarcated areas under strict supervision of the ECO.	E/ECO	Start of construction and ongoing monitoring.
	▪ The time that stripped areas are exposed must be minimized.	E/ECO	Before construction and ongoing monitoring.
	▪ Where earthworks are necessary and prior to their commencement, the contractor must determine the average depth of topsoil, commonly up to 300 mm and following approval of the ECO, strip the full depth of topsoil from areas affected by construction and related activities; this also applies to access routes and working, storage and camp areas. No unnecessary soil stripping must occur in the development area.	E/ECO	Start of construction and ongoing monitoring.
	▪ Topsoil and subsoil should not be mixed during excavation.	E/ECO	Ongoing monitoring.
	▪ Use topsoil in the rehabilitation of any disturbed areas at specific destabilized sites and preferably in their immediate surroundings.	E/ECO	On completion of each activity.
	▪ Application of topsoil and re-vegetation must commence immediately after the completion of development activities. Re-vegetation should only commence in the rainy season.		

Soil Stockpiles	• Topsoil stockpiles must be kept separate, must not be compacted and must not exceed two meters in height.	E/ECO	Once stockpiles are placed,
	• Any exotic invasive plant growth on stockpiles must be controlled before flowering occurs. Triffid weed, *Chromolaena odorata,* must be severely dealt with (chemically).	ECO	Ongoing monitoring.
	• Stockpiles not used within three months of initial stripping or prior to the seasonal rains must be seeded with grass seed mixes native to the area (recommended by an ecologist) to avoid further possible erosion. The grass species *Eragrostis tef* (1kg/ha) can be applied as a temporary soil stabilizer.	E/ECO	Ongoing monitoring.
	• Soil stockpiles must be kept free of any contaminants, including paints, building rubble, cement, chemicals, oil, etc.	E/ECO	Ongoing monitoring.
	• Soil stockpiles should be located away from drainage lines and areas of temporary inundation.	E	Ongoing monitoring.
Soil Erosion	▪ Storm-water control and wind screening should be undertaken to prevent soil loss from development site.	E/ECO	Ongoing monitoring
	▪ Prevent any concentrated water flow over exposed soil into drainage lines and wetlands using berms, silt traps, detention ponds and temporary measures to spread flow over the soil surface into vegetation.	E/ECO	Once soil is exposed Ongoing monitoring
	▪ Battering of all banks must be such that cut and fill embankments are no steeper than previous natural slopes unless otherwise permitted by the engineer. Cut and fill embankments steeper than previous ground levels must be re-vegetated immediately on completion of trimming or must be protected against erosion using bio-engineered minimization measures.	E/ECO	Ongoing monitoring
	▪ A cut-off drain, unless otherwise directed by the engineer, must protect all embankments. This will prevent water from cascading down the face of the embankment and causing erosion.	E/ECO	Immediately after the creation of the embankment or stripping of vegetation.

Construction Site Surface Management	▪ The smallest possible area should be disturbed.	E/ECO	Start of construction and ongoing monitoring.
	▪ Vegetation must not be removed until immediately before construction and must not be stripped on steep slopes.	E/ECO	Start of construction and ongoing monitoring
	▪ Soils must be rehabilitated immediately after construction. Rehabilitation includes planting or hydro-seeding of grasses native to the area.	ECO	After completion of construction. Ongoing monitoring.
	▪ The following site specific grass species mix (10 kg/ha) can be applied for re-vegetation: o *Eragrostis curvula* 3 kg/ha o *Eragrostis tef* 1 kg/ha o *Digitaria eriantha* 2 kg/ha o *Chloris gayana* 2 kg/ha o *Cynodon dactylon* 2 kg/ha	E/ECO	After seeding (rainy season). Seasonal assessments.
	▪ Soils compacted by construction activity must be ripped deeply to loosen compacted layers and re-graded to even levels. Topsoil must be re-spread over rehabilitated areas.	E/ECO	After completion of construction. Ongoing monitoring.
	▪ Excess earthworks material must be disposed of in an environmentally sound way. Locations in the area for this spoil should be investigated. No spoil material may be dumped in any river or wetland.	ECO	After earthworks activity. Ongoing monitoring.
	▪ Vehicles must use existing tracks or pre-planned access routes, and construction vehicle speeds should be kept below 20 km/h.	ECO	Ongoing monitoring.
Soil Contamination	▪ Potential soil contaminants, e.g., fuel, oil and cement, must be managed carefully with adequate containment measures.	E/ECO	Ongoing monitoring.
	▪ If it is suspected that top- and/or sub-soils have become contaminated due to site operations, top-/subsoil tests must be conducted.	ECO	After spillage, ongoing monitoring

	▪ If tests are positive the contractor must remove the polluted soil to the full depth of pollution from the site and provide an equal replacement of approved topsoil in terms of quality and quantity.	ECO	After spillage, ongoing monitoring
	▪ Imported topsoil must be obtained from the site of other construction works and not from an undisturbed area.	E/ECO	After spillage, ongoing monitoring.
	▪ Contaminated soil must be transported to a DWA-approved facility. Waybills for all such disposals are to be kept by contractors for review by the engineer and the ECO.	E/ECO	After spillage, ongoing monitoring
Upgrading of Access Roads to Homesteads	▪ When poor road sub grade as described in geotechnical report is exposed, undercutting into unsuitable materials by typically 300mm is specified to accommodate a select layer comprising material of at least G7 quality.	E	During construction
	▪ Roads must follow natural contours to reduce storm-water erosion and must allow for natural flow of water.	E/ECO	Before and during construction
	▪ Roads must follow the existing profile to minimize disturbance to the soil and vegetation.	E/ECO	Before and during construction
	▪ No trees, shrubs or groundcover may be removed or vegetation stripped without the prior permission of an ecological specialist.	E/ECO	Before and during construction
	▪ Roads must have as little cut and fill as possible.	E	During construction
	▪ Roads must be properly reinforced around the shoulder areas to reduce erosion potential.	E	During construction

4.2.2 Water

WATER	Potential impact	Mitigation:
	Soil erosion.	Manage storm-water.
	Pollution of surface water and ground water or reduced water quality.	Prevent soil erosion, incorrect handling and disposal of substances and materials, leakage of toxic chemicals, mismanagement of polluted run-off and wind dispersal of dry materials into rivers, watercourses and wetlands.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBLITY	FREQUENCY
Storm-water	▪ Plan and install appropriate stormwater control measures around all new housing structures to be developed	E/ECO	Prior to construction and ongoing during construction
	▪ Increase in storm water run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to the engineer for approval.	E	Before construction commences.
	▪ If vegetation is to be removed, it must be done in phases to ensure that a minimum area of soil is exposed to potential erosion at any one time.	E/ECO	At beginning of construction
	▪ Temporary cut off drains, grassed or rock-pitched diversion ditches and berms may be required to capture storm-water and promote infiltration or to divert run-off away from exposed soil or construction areas.	E/ECO	During site setup.
	▪ Contractors must not in any way modify nor damage the banks or beds of streams or rivers, wetlands, other open water bodies and drainage lines adjacent to or within the designated area.	ECO	Ongoing monitoring
	▪ Earth, stone and rubble is to be properly disposed of to prevent obstruction of natural water pathways over the site. These materials must not be placed in storm-water channels, drainage lines or rivers.	E/ECO	Monitoring throughout construction phase
	▪ Storm-water outfalls should be designed to reduce flow velocity and avoid stream bank and soil erosion.	E/ECO	When necessary

	▪ During construction, un-channeled flow must be controlled to avoid soil erosion. Where large areas of soil are left exposed, rows of straw/hay or bundles of cut vegetation should be dug into the soil in contours to slow surface wash and capture eroded soil. The spacing between rows will be dependent on slope.	E/ECO	During construction, as surface becomes exposed Ongoing monitoring.
	▪ Brush packing of plant material should be used to guard against loss of topsoil during heavy rains.	E/ECO	As surfaces becomes exposed.
	▪ Disturbed surfaces must be re-vegetated immediately after completion of construction activities in each area.	ECO	After construction activities
	▪ Rehabilitated areas of vegetation and the effectiveness of brush packing and other anti-erosion measures must be monitored until vegetation has covered all areas of exposed soil. Remedial action must be taken in areas where erosion is occurring.	ECO	After construction activities
	▪ Separate storm-water collection areas and interceptors at fuel storage sites, batching plants and other potential polluting activities must be constructed and maintained.	E/ECO	At site setup
	▪ The installation of a water tank and roof guttering, with each house could be considered to control storm-water drainage from the roof and potential erosion in homestead areas.	E	At installation

4.3 THE ECOLOGICAL CHARACTERISTICS OF THE LAND DEVELOPMENT AREA AND ITS SURROUNDINGS

FLORA, FAUNA, HABITATS AND NATURAL ECOLOGY	Potential impact	Mitigation:
	• Impact on indigenous flora, fauna, and habitats resulting from development • Spreading of alien invasive plants form district areas.	• Protect indigenous flora, fauna, habitats and natural ecology. • Eradicate alien invasive plants • Prevent plant and fire wood collecting and the collecting, hunting or trapping of animals.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILTY	FREQUENCY
Potential impact on Flora, Fauna and Habitats	▪ No vegetation may be cleared without prior permission from the engineer, ECO, or ecological specialists if required.	ECO	During camp setup, Ongoing
	▪ No trees are to be cleared unless they are exotic invaders which must be verified by the ECO.	ECO	During construction
	▪ The ECO must draw up an indigenous vegetation protection plan which must include the conservation of removed indigenous vegetation in a nursery, and replacement thereof during the rehabilitation process. Disturbance of indigenous fauna and flora, and the natural ecology in the surrounding areas must be avoided where possible.	ECO	Before construction commences
	▪ Gathering of firewood, fruit, medicinal plants, crops or any other natural material or the collecting of animals on site or in areas adjacent to the site is not allowed.	ECO	Ongoing monitoring
	▪ Disturbance of mammals, birds, reptiles, other animals and their habitats must be prevented.	ECO	Ongoing monitoring
	▪ If subterranean mammals are found in a construction area, construction must stop and the ECO must arrange for their capture and translocation to a safe area.	ECO	When necessary
	▪ Contractors must rehabilitate any disturbed or damaged area to the satisfaction of an ecological expert and must be managed by the ECO	ECO	After construction
	▪ Immediate re-vegetation of stripped areas and removal of alien species by weeding must take place on an ongoing basis. This will significantly reduce the amount of time and money that need to be spent on alien plant management during rehabilitation.	E/ECO	Ongoing
Exotic Invasive Plant Control	▪ Avoid the introduction of exotic plant species to the	ECO	Ongoing

	development sites and surrounding areas through the use of imported material.		monitoring
	▪ Plant invader species favour disturbed soil (i.e. areas with low competition) and pose the biggest threat to indigenous vegetation in and adjacent to development sites. These species must be eradicated before they can spread.	ECO	Ongoing monitoring
	▪ The spread of any exotic plant species in and from development sites or the site camp must be controlled. Exotic vegetation encroachment onto the sites as a result of gardening activities must be controlled during construction.	ECO	Ongoing monitoring
Plant Collecting, Hunting & Trapping of Animals	▪ The hunting of any animals and the laying of snares and other traps is strictly forbidden.	ECO	Ongoing monitoring

4.4 THE IMPACT OF THE DEVELOPMENT ON CURRENT LAND USE OF THE AREA AND ITS SURROUNDINGS

SOCIAL AND ECONOMIC IMPACT	Potential impact	Mitigation:
	Potential impact on land use of areas outside the planned demarcated construction area and development areas	Construction activities must be confined to the demarcated areas as indicated on the settlement plan.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Planning	▪ Clear settlement plan must be available of the planned development prior to commencement of construction	E	Before construction starts, ongoing.
	▪ Areas must be demarcated accurately and no additional land must be impacted upon by the development.	E/ECO	During construction. Ongoing monitoring
	▪ Existing land uses in the area around development sites must not be negatively impacted upon through any unauthorized activity during the construction process.	E	During construction. Ongoing monitoring

4.5 EXISTING SIGNIFICANT ARCHAEOLOGICAL, HISTORICAL AND CULTURAL SITES IN THE LAND DEVELOPMENT AREA

CONSERVATION OF CULTURAL HERITAGE	Potential impact	Mitigation:
	• Loss of archaeological, historical or palaeontological remains due to construction activities. • Alteration of landscape by construction of houses from modern materials	Although the Heritage Impact Assessment did not identify any archaeological, historical or paleantological aspects that will affect the proposed development, the developer will cease all work immediately and notify Amafa-aKwaZulu Natali should any heritage resources as defined in the act be discovered during the course of development activities

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Archaeological, historical or palaeontological objects	▪ All relevant staff should be sensitized prior to commencement of construction to be able to recognize possible archaeological, historical or palaeontological objects of value. Advise should be obtained from an archaeologist to advise construction staff if necessary.	ECO	Before construction starts.
	▪ Staff must be informed to notify the engineer or contractors immediately should such an item be uncovered during construction activities.	E/ECO	Ongoing monitoring
	▪ If any archaeological, historical or palaenontological objects be found during construction, all development activity at the site should cease immediately and Amafa aKwaZulu Natali be informed.	E/ECO	When required

4.6 WASTE MANAGEMENT IN AND AROUND THE LAND DEVELOPMENT

WASTE MANAGEMENT	**Potential impact** No formalized waste collection and management services in project area	**Mitigation:** Encourage local waste management and recycling practices
	Incorrect management of hazardous and non-hazardous waste.	Manage waste properly and according to relevant legislation

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
On-Site Waste Management ***(****Waste includes all construction waste such as rubble, asphalt millings, cement bags, waste cement, timber, cans, other containers, wire and nails.****)***	▪ The excavation and use of rubbish pits on site or the burning of waste at the construction camp is forbidden.	ECO	Ongoing monitoring
	▪ Refuse must be placed in designated skips or bins in the camp area and at construction sites. These should remain within demarcated waste areas and should be covered to prevent refuse from being blown out by wind and attraction of vermin.	ECO	At camp and site setup and ongoing monitoring.
	▪ Recycling is to be encouraged by providing separate bins for different types of waste and making sure that staff is aware of their uses.	ECO	At camp and site setup and ongoing monitoring.
	▪ Littering in the camp area or on site is forbidden and the site must be cleared of litter at the end of each working day.	ECO	Ongoing monitoring
	▪ Skips and bins must be emptied regularly (at least two-weekly), removed from the camp site and construction sites and transported to a DWA-registered recycling and waste facility.	E/ECO	After disposal and ongoing monitoring.
	▪ Waste from chemical toilets should be disposed of regularly at a certified waste facility by a registered waste contractor. Care must be taken to avoid contamination of soils and water and pollution of construction sites and adjoining areas.	ECO	Regular ongoing monitoring
Hazardous Waste	▪ Hazardous waste disposal (if applicable) must be carried out by an approved waste contractor at DWA-certified waste disposal facilities. Waybills must be provided by the contractor.	E/ECO	After disposal and ongoing monitoring
	▪ An earth sump must be created for concrete waste. This is to be de-sludged regularly and the cement waste is to be removed to a DWA-registered site. Waybills must be provided by the contractor.	**E/ECO**	After disposal and ongoing monitoring

THE SOCIO-ECONOMIC IMPACT ON COMMUNITIES IN THE LAND DEVELOPMENT AREA AND ITS SURROUNDINGS

4.6.1 Social and Economic Impact

SOCIAL AND ECONOMIC IMPACT	Potential impact:	Mitigation
	The majority of the Ezidwadweni project areas population are younger than 20 years of age	Sufficient and appropriate education facilities according to accepted national norms and standards will have to be provided
	The study area is characterized by very low levels of literacy with a significant proportion of the population of the study area older than 20 years of age not having received any form of schooling	In terms of the overall project development and management it is important to ensure that all beneficiaries fully understand and grasp the implications and technical aspects relating to this housing initiative.
	Affordability levels in the study area are very low with the vast majority of all households earning less than R1600 per household per month.	Local employment creation opportunities would thus be optimized during the implementation stages to contribute towards longer term economic sustainability in the project area
	The low affordability levels in the study area are clearly the result of the high unemployment rate in the study area	Local employment creation opportunities would thus be optimized during the implementation stages to contribute towards longer term economic sustainability in the project area
	Skills transfer and enhancement.	NA
	Improved standard of living	NA

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Socio-economic characteristics	▪ Sufficient and appropriate education facilities according to accepted national norms and standards will have to be provided	E	Project planning
	▪ In terms of the overall project development and management it is important to ensure that all beneficiaries fully understand and grasp the implications and technical aspects relating to this housing initiative.	E	Before and during construction
	▪ Local employment creation opportunities must be optimized during the implementation stages to contribute towards longer term economic sustainability in the project area. Anticipated benefits also include skills transfer and enhancement.	E	Before construction and ongoing
	▪ Various ad hoc work may arise during the construction phase and a plan should be developed for obtaining the	E	Before construction starts, ongoing.

	services of local unemployed people.		
General	▪ The project will also result in the improvement of living standards in the project area and will be contributed to the development of the larger community of Ezidwadweni.		

4.7 POSSIBLE POLLUTION SOURCES

POLLUTION	Potential impact	Mitigation:
	Water pollution due to construction activities.	Appropriate management of all possible polluting materials with specific reference to appropriate management of existing streams, rivers and open water bodies in development area.
	Air pollution due to construction activities.	▪ Appropriate management of all exposed soil surfaces during construction. ▪ Limiting and managing the impact of construction vehicles with specific reference to creation of dust. ▪ Ensure re-vegetation of disturbed areas immediately after completion of construction.
	Visual pollution due to construction activities.	Minimise visual pollution in the camp site and at construction sites by proper management.
	Noise pollution due to construction activities.	Minimise noise pollution in the camp site and at construction sites by proper management.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Pollution/Water Quality *Water quality could be affected by the incorrect handling and management of substances and materials that includes the following:* ▪ *Pollution due to soil erosion and sediment infiltration.* ▪ *Mismanagement of polluted run-off from vehicle and plant washing.* ▪ *Wind dispersal of dry materials into rivers and watercourses.* ▪ *Incorrect disposal of substances and materials and polluted run-off can have serious negative effects on groundwater quality.*	▪ DWA's groundwater protection protocol must be adhered to with regards to the location, construction and operation of the proposed Ventilated Improved Pit toilets. ▪ Emergency contact telephone numbers should be on hand in order to deal with spillages and contamination of the soil, groundwater or aquatic environments. ▪ Storage areas that contain chemicals and hazardous substances must be bunded with an approved impermeable lining. The containment capacity must equal the capacity of the storage containers. The ECO must approve the location and storage of any chemicals and hazardous substances on site. ▪ Adequate spillage containment measures must be implemented, such as cut-off drains, berms, etc. ▪ Mixing or decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these operations must be disposed of at a suitable DWA-certified waste facility for which a waybill must be shown to the engineer and ECO. ▪ Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after	E, ECO E, ECO E, ECO E, ECO E, ECO ECO	Ongoing monitoring Before construction phase starts During site setup At site set up and ongoing monitoring Before and after mixing; check waybill; ongoing regular monitoring Ongoing regular monitoring and

	detection as possible to minimise pollution risk and reduced bunding capacity.		immediately after spills
	▪ Any spillage residues must be removed from the development area by contractors to DWA-approved waste facilities for which a waybill must be shown to the engineer and ECO.	ECO	After spill; check waybill
	▪ A designated, bunded area is to be set aside for vehicle washing and maintenance. Materials caught in this bunded area must be disposed of at a DWA-certified waste site (waybill to be shown to engineer and ECO) or as directed by the engineer.	E, ECO	Before and after vehicle washing; check waybill; ongoing regular monitoring
	▪ Care must be taken to ensure that run-off from vehicle or plant washing does not enter the groundwater.	ECO	Ongoing regular monitoring
	▪ Provision should be made for all polluted run-off to be treated to the engineer's and ECO's approval before being discharged. This will be required for the duration of the project.	E, ECO	Before discharge of polluted runoff and ongoing monitoring
	▪ Effluent from concrete batch and crusher plants should be treated in a suitable designated sedimentation dam to legally required standards. Designs of such a facility should be submitted to the site engineer for approval.	E, ECO	When necessary
	▪ Site staff is not allowed to use any 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. Another source approved by the engineer should be used instead for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc.	ECO	Regular monitoring

Pollution from dust and odours
 	
The following activities can reduce air quality:
• *Establishment of the camp site and related temporary works at construction sites.*
  ○ *Dust from vehicle movements and stockpiles.*
  ○ *Vehicle emissions and fires.*
	▪ Areas that have been stripped of vegetation, existing exposed soil surfaces and sandy access routes must be dampened regularly to avoid excessive dust, particularly during dry and windy conditions.	ECO	During camp and site set up and ongoing

	▪ The time that stripped areas are left open to exposure should be minimized wherever possible.	E, ECO	Throughout construction phase
	▪ Rehabilitation of exposed soil surfaces must take place immediately after completion of earthworks including grassing of any cut and fill soil slopes.	E, ECO	Straight after earthworks
	▪ Maintenance of existing vegetation helps control dust and prevents soil erosion. The ECO can order areas of vegetation to be fenced off during construction that remain out of bounds.	ECO	Ongoing monitoring

	Clearing of existing vegetation on and adjacent to construction areas requires written approval from the ECO.		
	▪ Construction vehicles must adhere to speed limits to avoid creating excessive dust. A speed limit of 30 km/hr must be adhered to on all dirt roads.	ECO	Ongoing monitoring
	▪ Contractors must provide appropriate arrangements for cooking and/or heating requirements of staff (open fires not allowed)	ECO	Camp set up and ongoing monitoring
Noise pollution	▪ Working hours must be limited to between 7:00 am and 5:00 pm, or as otherwise agreed to with local community	E, ECO	Ongoing monitoring
	▪ Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise pollution.	ECO	Ongoing monitoring
	▪ Construction vehicles are to be fitted with standard silencers prior to the beginning of construction.	ECO	Before moving onto site
	▪ Operation of generators at night, e.g., in the camp site, should not be permitted after 10 pm to avoid disturbing of local residents.	ECO	At camp set up and ongoing monitoring
	▪ Notice of particularly noisy activities (e.g. Jackhammers, Blasting, Drilling) must be given to local residents at least 24 hours before the activity.	E, ECO	At least 24 hours before the start of the activity
Visual impacts	▪ Storage facilities, elevated tanks and other temporary structures on site should be located so that they do not impede the view on nearby roads and compromise traffic safety.	E, ECO	During camp and site set up and ongoing monitoring
	▪ Storage facilities, elevated tanks and other temporary structures on site should be located to have as little as possible visual impact on local residents.	E, ECO	During site set up and ongoing monitoring
	▪ Special attention should be given to the screening of highly reflective materials on site.	ECO	During camp and site setup
	▪ Lighting in the camp site or at construction sites should be pointed downwards and away from oncoming traffic and nearby residents.	ECO	Ongoing monitoring
	▪ The site must be kept clean to minimize the visual impact of the site.	ECO	Ongoing monitoring

4.8 PROJECT COMPLETION

Post construction activities	**Potential impact**	**Mitigation:**
	Various biophysical impacts due to premature departure of contractors.	Ensure that contractors' camp and construction sites are left in an environmentally sound condition.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Closure of Contractors' Camp & Construction Sites	▪ All structures comprising the camp and temporary structures at construction sites are to be removed from site.	E	End of construction phase
	▪ The contractors' camp and construction sites must be checked for spills of substances such as oil, paint, etc., and these should be cleaned up.	E/ECO	End of construction phase
	▪ Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the engineer.	E/ECO	End of construction phase
Vegetation	▪ All areas that have been disturbed by construction activities must be cleared of exotic vegetation.	E/ECO	End of construction phase
	▪ All vegetation that has been cleared during construction is to be removed from site.	E/ECO	End of construction phase
	▪ Contractors are to water and maintain all planted vegetation until the vegetation becomes established.	E/ECO	End of construction phase
Land rehabilitation	▪ Sites are to be cleared of all litter due to construction activities.	E/ECO	End of construction phase
	▪ All rubble and other waste must be removed from sites to a DWA-registered disposal facility. Burying of rubble on site is prohibited. Waybills must be shown to the engineer and ECO.	E/ECO	End of construction phase
	▪ Exposed soil areas are to be re-planted with indigenous vegetation according the following site specific grass species mix (10 kg/ha): o *Eragrostis curvula* 3 kg/ha o *Eragrostis tef* 1 kg/ha o *Digitaria eriantha* 2 kg/ha	E/ECO	End of construction phase

	○ *Chloris gayana* 2 kg/ha ○ *Cynodon dactylon* 2 kg/ha		
	▪ All surfaces compacted or hardened due to construction activities in the contractors' camp or at construction sites must be ripped, all imported materials removed, and the area rehabilitated with topsoil and indigenous vegetation.	E/ECO	End of construction phase
	▪ Borrow pits (if applicable) are to be closed and rehabilitated in accordance with the Department of Minerals and Energy's approved environmental management plan for each borrow pit. Contractors must liaise with the engineer regarding these requirements.	E/ECO	End of construction phase
	▪ All embankments are to be trimmed, stabilized mechanically, shaped and replanted to the satisfaction of the engineer.	E/ECO	End of construction phase
	▪ Contractors are to check that all watercourses are free from building rubble, spoil materials and waste materials.	E/ECO	End of construction phase
	▪ Fences, barriers and demarcations associated with the construction phase are to be removed from sites unless stipulated otherwise by the engineer.	E/ECO	End of construction phase
	• All residual stockpiles and leftover building materials must be removed from sites.	E/ECO	End of construction phase
General	▪ A meeting is to be held on site between the engineer, ECO and contractors to ensure that sites have been restored to a condition approved by the ECO and engineer.	E/ECO	End of construction phase
	▪ Temporary roads must be closed and access across these blocked	E/ECO	End of construction phase
	▪ If any access or haulage roads were built across watercourses these must be rehabilitated by removing temporary bridges and any other materials placed in/or near to watercourses.	E/ECO	End of construction phase
	▪ All areas where temporary services were installed are to be rehabilitated to the satisfaction of the Engineer	E/ECO	End of construction phase

4.9 CUMULATIVE IMPACTS

CUMULATIVE IMPACTS	Potential impact	Mitigation:
	Cumulative and synergistic biophysical and socio-economic impacts	Minimise/eliminate all of the negative construction phase biophysical and socio-economic impacts

MANAGEMENT PLAN RECOMMENDATIONS			
ISSUE	**RECOMMENDATIONS**	**RESPONSIBILITY**	**FREQUENCY**
	▪ By minimizing and mitigating to a reasonable level all negative planning and construction phase biophysical and socio-economic impacts, cumulative and synergistic impacts will be minimized.	ECO/E	Ongoing monitoring during the construction phase.

5 PHASE 2: OPERATIONAL PHASE

5.1 PHYSICAL AND LANDSCAPE CHARACTERISTICS OF THE LAND DEVELOPMENT AREA.

STORM WATER AND SOIL EROSION	**Potential Impacts**	**Mitigation:**
	Uncontrolled storm water run-off and associated erosion.	Advise residents about the maintenance of mitigation measures.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
Soil Erosion	▪ Advise residents about the prevention of soil erosion.	ECO	After completion of construction at each site.
	▪ Advise residents about the mitigation measures introduced to control storm-water and soil erosion and about what residents should do to maintain these measures.	ECO	After completion of construction at each site
	▪ Advise residents that they should keep meter drains on access roads clear of any material so that drains can function properly.	ECO	
Upgrading of Access Roads to Homesteads	▪ The municipality should ensure that the access roads are maintained in good condition by attending to potholes and storm water damage as soon as these develop.	LM	After project handover

5.2 THE ECOLOGICAL CHARACTERISTICS OF THE LAND DEVELOPMENT AREA AND ITS SURROUNDINGS

FLORA, FAUNA, HABITATS AND NATURAL ECOLOGY	**Potential impact: Negative**	**Mitigation:**
	Demise of indigenous vegetation in and around homestead areas.	Advise residents to protect indigenous vegetation.
	Development of alien invasive plants in and around homestead areas.	Advise residents to eradicate alien invasive plants.
	Demise of indigenous fauna in and around homestead areas.	Advise residents to protect indigenous fauna.

MANAGEMENT PLAN RECOMMENDATIONS			
ISSUE	**RECOMMENDATIONS**	**RESPONSIBILITY**	**FREQUENCY**
Indigenous flora	▪ Advise residents about the threat of exotic invasive plants in their homestead and surrounding areas and the need to eradicate the plants on an on-going basis. An educational programme can be initiated to contribute to the understanding the impact of exotic vegetation. ▪ Encourage residents to introduce and maintain indigenous vegetation in their gardens.	ECO ECO	After completion of construction at each site After completion of construction of each site.
Exotic vegetation	▪ Advise residents about the need to protect indigenous fauna in their homestead and surrounding areas.	ECO	After completion of construction at each site
Indigenous fauna	▪ Educate the community on the principles of conservation and the prevention of damage to sensitive ecological areas. ▪ No vegetation may be unnecessarily cleared. ▪ No trees are to be cleared unless they are exotic invaders. ▪ Gathering of firewood, fruit, medical plants, crops or any other natural material or the collecting of animals on site or in areas adjacent to the site must be limited. ▪ Disturbance of mammals, birds, reptiles, other animals and their habitats must be prevented.	ECO	After completion of construction at each site

5.3 EXISTING SIGNIFICANT ARCHAEOLOGICAL, HISTORICAL AND CULTURAL SITES IN THE LAND DEVELOPMENT AREA

CONSERVATION OF CULTURAL HERITAGE	**Potential impact**	**Mitigation:**
	Loss of archaeological, historical or palaeontological remains.	Plan for archaeologist to advise local residents if necessary.

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	**RECOMMENDATIONS**	**RESPONSIBLITY**	**FREQUENCY**
Archaeological, historical or palaeontological objects	▪ Advise residents about the need to protect archaeological, historical or palaeontolgical traits of their homestead areas.	ECO	After completion of construction at each site

5.4 EXISTING WASTE MANAGEMENT SERVICES IN AND AROUND THE LAND DEVELOPMENT

WASTE MANAGEMENT	Potential impact	Mitigation:
	Accumulation of waste or disposal of waste in inappropriate areas.	Advise residents about the necessity of appropriate waste disposal

MANAGEMENT PLAN RECOMMENDATIONS

ISSUE	RECOMMENDATIONS	RESPONSIBILITY	FREQUENCY
On-Site Waste Management	▪ Nongoma Local Municipality should implement a waste management programme whereby domestic waste is collected and disposed of at an approved recycling and waste facility	Nongoma LM	Weekly
	▪ Initiate program to implement local waste minimization and recycling initiatives.	Nongoma LM	Ongoing

5.5 THE SOCIO-ECONOMIC IMPACT ON COMMUNITIES IN THE LAND DEVELOPMENT AREA AND ITS SURROUNDINGS

SOCIAL AND ECONOMIC IMPACT	**Potential impact: Positive**	**Mitigation: (Not applicable)**
	Socio-economic up-liftment through provision of improved housing and basic services	NA
MANAGEMENT PLAN RECOMMENDATIONS		
ISSUE	**RECOMMENDATIONS**	
General	▪ The project will also result in and improvement of living standards in the project area and will be contribute to the development of the larger community of Ezidwadeni.	

5.6 THE LEVELS OF POSSIBLE POLLUTION

POLLUTION	Potential impact:	Mitigation:
	Water pollution due to operational activities.	Installation and maintenance of improved sanitation infrastructure (e.g. VIP's)
	Air pollution due to operational activities.	Minimise air pollution by provision of electricity and by lowering the speed limit on local roads.
MANAGEMENT PLAN RECOMMENDATIONS		
ISSUE	**RECOMMENDATIONS**	
Pollution/Water Quality	▪ Pollution pressure on groundwater will be alleviated through the project as improved sanitation facilities will be provided. ▪ Washing of clothes and bathing should be discouraged in the streams of the area, and provision of water at each stand will alleviate this problem.	
Pollution from dust, and smoke.	▪ The provision of electricity will minimize smoke pollution as fewer fires will be used for domestic purposes. ▪ Controlling the speed limit on the roads will minimize dust pollution.	

6 SOURCES

1. **Department of Environmental Affairs & Tourism (DEAT)**, 1992. *Integrated Environmental Management Guideline Series: No. 3. Guidelines for Report Requirements.* Department of Environmental Affairs and Tourism, Pretoria, South Africa.

2. **Department of Environmental Affairs & Tourism (DEAT)**, 1998. *A National Strategy for Integrated Environmental Management in South Africa*. Department of Environmental Affairs and Tourism, Pretoria, South Africa.

3. **Department of Water Affairs & Forestry (DWAF)**, 2003. *A Protocol to Manage the Potential of Groundwater Contamination from On Site Sanitation*. 2nd edition. 35 pp. Department of Water Affairs and Forestry, Pretoria, South Africa.

Appendix A:

Complaints Register

This a register for recording all complaints received from neighbours i.e. Complaints about noise, odours, dust etc.

Date of complaint	Complainant's name	Contact Details (phone)	Nature of complaint	Corrective action taken	Date action completed

Appendix B:

Non-compliance Record

This is record of non-compliances with the EMP i.e. any action taken that is in violation of the EMP must be recorded e.g. mixing concrete directly on soil, site staff using neighboring properties as toilet facilities, dumping of material over fence etc.

Date of non conformance	Details of non-conformance	Party / ies responsible	Corrective action taken	Date action completed

Appendix C:

Incident Record

This is record of incidents as defined in NEMA and the NWA. Incidents should be recorded and reported to the applicable authorities.

Date of incident	Details of incident	Party / ies responsible	Corrective action taken	Date action completed

Appendix D:

Training Record

This is record of training carried out on site.

Date of Training	Name of Attendee	Signature	Details of Training course	Training provided by (name)