

7. ENVIRONMENTAL IMPACT DESCRIPTION AND EVALUATION

7.1 Introduction

This section of the report describes and evaluates the potential impact of the proposed development on the environment. The impact of the development has to be assessed in terms of the following development phases:

- **Planning and design phase**
- **Construction phase**
- **Operational phase**
- **Decommissioning phase**

7.2 Evaluation of impacts

The evaluation of impacts is conducted in terms of the following criteria:

- **Nature of impact**
- **Extent of impact**

Site	Effect limited to the site and its immediate surroundings
Local	Effect limited to within 3-5 km of the site
Regional	Effect will have an impact on a regional scale

- **Duration of impact**

Short	Effect lasts for a period 0 to 5 years
Medium	Effect continues for a period between 5 and 10 years
Long	Effect will cease after the operational life of the activity either because of natural process or by human intervention
Permanent	Where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient

- **Probability**

Improbable	Less than 33% chance of occurrence
Probable	Between 33 and 66% chance of occurrence
Highly probable	Greater than 66% chance of occurrence
Definite	Will occur regardless of any prevention measures

- **Significance of impact**

Low	Where the impact will have a relatively small effect on the environment and will not have an influence on the decision
Medium	Where the impact can have an influence on the environment and the decision and should be mitigated
High	Where the impact definitely has an impact on the environment and the decision regardless of any possible mitigation

- **Status**

Positive	Impact will be beneficial to the environment
Negative	Impact will not be beneficial to the environment
Neutral	Positive and negative impact

It must be noted that many of the potential negative consequences can be mitigated successfully. It is however, necessary to make a thorough assessment of all possible impacts in order to ensure that environmental considerations are taken into account, in a balanced way, as far as possible, supporting the aim of creating a healthy and pleasant environment.

7.3 Planning and design phase

The planning and design phase involved office work and site surveys with regards to the development of the proposed Middelburg x44 residential area and the Basic Assessment Report. It also involves obtaining the necessary authorisations for the said development.

Apart from the existing activities on site, no actual construction work took place regarding the proposed Middelburg x44 residential area.

7.4 Construction phase

The impact assessment will be based on Layout Plan no. 4 (Figure 6.3), the preferred layout plan, as indicated in Section 6.2.4.

According to Afri-Infra (2015) the proposed development will be divided into the following three (3) phases as indicated in Table 2.9:

- Phase 1 (area = approximately 6 ha) will consist of the Towers Development (an old hotel and landmark in the area) as well as various complexes providing contractors' accommodation to seasonal and contract workers in the area. Additional buildings/structures could be built on the proposed Business stand and the three Residential 3 stands. Services (water, sewer, electricity) will be installed and the proposed internal roads will be constructed.
- Phase 2 (area = approximately 17 ha) will consist of residential stands that will be serviced and sold to private owners. This would involve the construction of buildings on the Residential 1 stands as well as the 5 Residential 3 stands and the 1 Business stand. The existing church stand will be rezoned to Institutional in order to ensure the continuation of the said activity. Three (3) Public Open Spaces will also be provided. Services (water, sewer, electricity) will be installed and the proposed internal roads will be constructed.
- Phase 3 (area = approximately 17 ha) will consist of residential stands that will be serviced and sold to private owners. This would involve the construction of buildings on the Residential 1 stands, the construction of churches (2 Institutional stands), the community facility (1 Institutional stand) and the combined school (1 Institutional stand). Services (water, sewer, electricity) will be installed and the proposed internal road will be constructed. Two (2) Public Open Spaces will be provided.

Figure 7.1 provides a schematic representation of the above-mentioned phasing of the development.

In terms of the phasing of the development, the following should be noted in terms of the provision of services as indicated in Section 6.3:

- The use of the 2 onsite boreholes might continue once the overall development is connected to the municipal bulk water supply pipeline.

- The existing onsite septic/conservancy tanks will be decommissioned and connected to the proposed waterborne sewer network. The said septic tanks will however remain in use during the development of Phase 1.

For each of the above-mentioned phases, the construction phase would involve the pegging of the stands, installation of services and construction of the buildings and associated infrastructure. This would involve the following:

- ❖ Clearing of vegetation;
- ❖ Levelling of the site;
- ❖ Excavation of trenches;
- ❖ Installation and connection of services;
- ❖ Construction of access road and parking area;
- ❖ Laying of the required foundations;
- ❖ Building of the outer structure;
- ❖ Installation of the required internal fittings;
- ❖ Rehabilitation of the disturbed areas (i.e. landscaping).

Section 7.7 provides further details with regards to potential impacts identified.

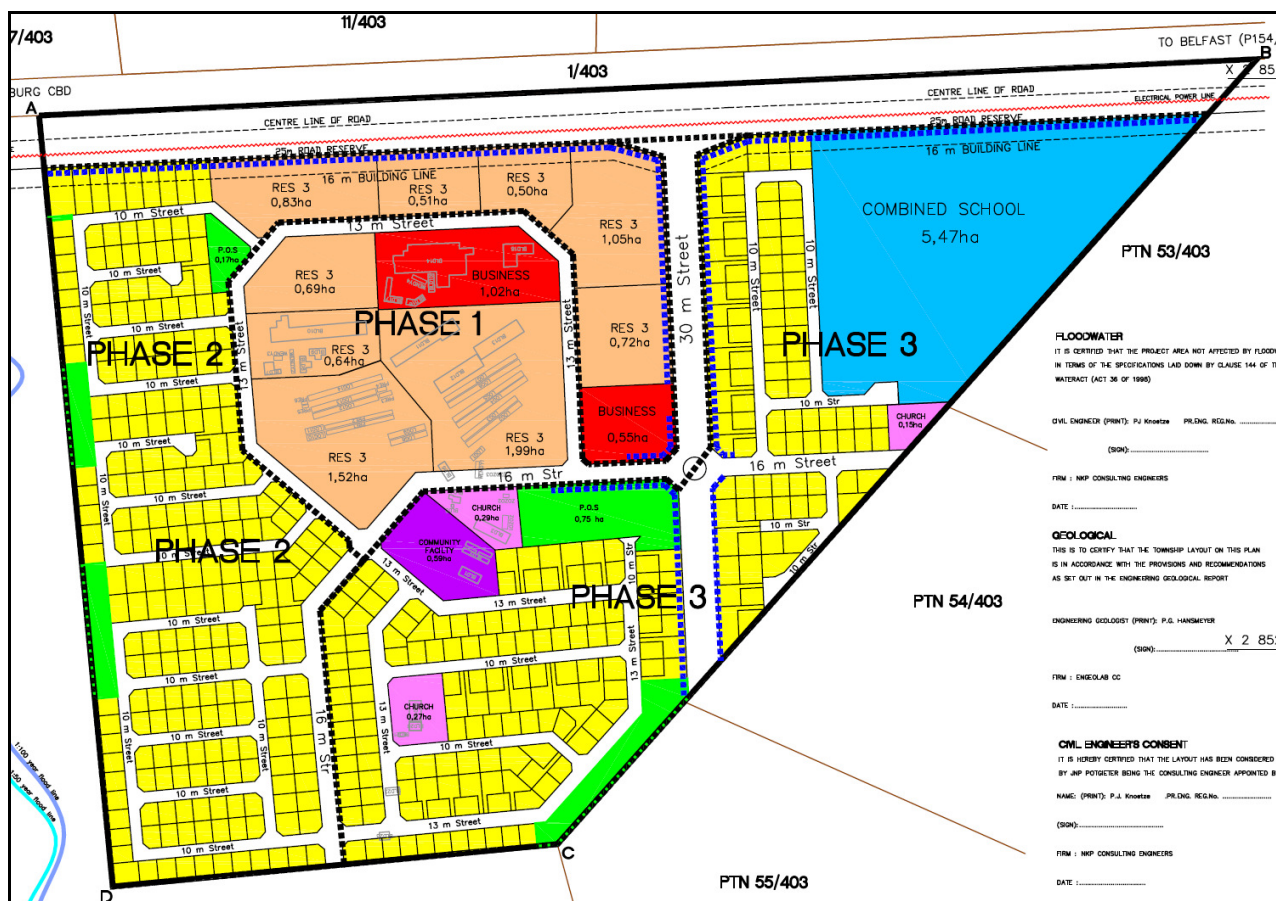


Figure 7.1: Phasing of the proposed development (designed by Urban Dynamics)

7.5 Operational phase

The operational phase would involve the utilisation of the various buildings and facilities associated with the Middelburg x44 residential area.

Section 7.7 provides further details with regards to potential impacts identified.

7.6 Decommissioning phase

If required, this phase would involve the decommissioning of the buildings and facilities constructed as part of this project (see Section 7.4).

The decommissioning phase will not be discussed in detail. It is recommended that at the time of decommissioning, a specific Environmental Management Plan (EMP) be compiled which specifically addresses this phase. This EMP would have to address issues such as the removal of building rubble and the rehabilitation of the site. Soil conservation measures would also have to be implemented.

7.7 Identification of potential impacts

The following tables provide an indication of the environmental features that will be impacted (directly and indirectly) during the construction, operational and decommissioning phases of the proposed project as indicated above.

7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)																				
ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)		
TOPOGRAPHY	Phase 1 (Installation of services, roads and buildings): The topography of the Phase 1 area (Figure 7.1) has already been impacted (an area of approximately 6 ha) in terms of the presence of the existing buildings, infrastructure and roads on site. The construction of any additional buildings/infrastructure on the Residential 3 stands as well as the Business stand would thus have a minimal impact on the general topography and runoff patterns of the area. Due to the flat nature of the site the risk of soil erosion is low.	SITE	LONG	DEFINITE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): During the operational phase, the direct impact on topography (48 ha) will continue in terms of slope, changed runoff patterns and an increased risk of soil erosion. Due to the flat nature of the site the risk of soil erosion is low.	SITE	LONG	PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): During decommissioning, the buildings and associated infrastructure will be demolished and removed from site. The site will be top soiled and shaped to conform to the original slope of the area, which will have a positive impact on the runoff from the site.	SITE	LONG	DEFINITE	LOW POSITIVE	MEDIUM POSITIVE		
	Phase 2 (Installation of services, roads and buildings): The development of the Residential 1 stands, Residential 3 stands and the one Business stand would directly impact on the topography of an area of approximately 17 ha. The construction activities (e.g. removal of vegetation, sloping of the site, paving of the area, construction of buildings, surfacing of roads/parking area, etc.) would result in changed runoff patterns and an increased risk of soil erosion if mitigation measures are not implemented. The risk is however, low due to the relatively flat nature of the site.	SITE	LONG	DEFINITE	LOW NEGATIVE	LOW NEGATIVE														
	Phase 3 (Installation of services, roads and buildings): The topography of the Phase 3 area (Figure 7.1) has already been impacted in terms of the presence of the existing houses, infrastructure (race track), truck parking area and roads on site. The development of the Residential 1 stands, 4 Institutional stands (including the combined school) would directly impact on the topography of an area of approximately 17 ha. The construction activities (e.g. removal of vegetation, sloping of the site, paving of the area, construction of buildings, surfacing of roads/parking area, etc.) would result in changed runoff patterns and an increased risk of soil erosion if mitigation measures are not implemented. The risk is however, low due to the relatively flat nature of the site.	SITE	LONG	DEFINITE	LOW NEGATIVE	LOW NEGATIVE														
GEOLOGY	Phase 1 (Installation of services, roads and buildings): The geology of the Phase 1 area (Figure 7.1) has already been impacted (an area of approximately 6 ha) in terms of the construction of the existing buildings, infrastructure and roads on site. The construction of any additional buildings/infrastructure on the Residential 3 stands as well as the Business stand would impact on the underlying intrusive diabase. The direct impact on geology will depend on the depth of the excavations required for the construction of the buildings and installation of infrastructure. The possible impact on the underlying geology cannot be mitigated.	SITE	PERMANENT	HIGHLY PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phase 1 (Utilization of services, roads and buildings): NONE. No further impact since no further construction would take place.						Phase 1 (Decommissioning of the services, roads and buildings): NONE. No further impact since no further construction would take place.							

7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)																		
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GEOLOGY	Phase 2 (Installation of services, roads and buildings): The development of the Residential 1 stands, Residential 3 stands and the one Business stand would impact on the geology of an area of approximately 17 ha. The construction activities would impact on intrusive diabase, shale of the Loskop Formation and tillite of the Dwyka Formation. Well cemented hardpan ferricrete was recorded along the central southern section of the western boundary and would also be impacted by construction activities. The direct impact on geology will depend on the depth of the excavations required for the construction of the buildings and installation of infrastructure. The possible impact on the underlying geology cannot be mitigated.	SITE	PERMANENT	HIGHLY PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phase 2 (Utilization of services, roads and buildings): NONE. No further impact since no further construction would take place.						Phase 2 (Decommissioning of the services, roads and buildings): NONE. No further impact since no further construction would take place.					
	Phase 3 (Installation of services, roads and buildings): The geology of the Phase 3 area (Figure 7.1) has already been impacted in terms of the construction of the existing houses, infrastructure (race track), truck parking area and roads on site. The construction activities of the Residential 1 stands, 4 Institutional stands (including the combined school) would impact on intrusive diabase, shale of the Loskop Formation and tillite of the Dwyka Formation covering an area of 17 ha. The direct impact on geology will depend on the depth of the excavations required for the construction of the buildings and installation of infrastructure. The possible impact on the underlying geology cannot be mitigated.	SITE	PERMANENT	HIGHLY PROBABLE	LOW NEGATIVE	LOW NEGATIVE	(Phase 3) Utilization of services, roads and buildings: NONE. No further impact since no further construction would take place.						Phase 3 (Decommissioning of the services, roads and buildings): NONE. No further impact since no further construction would take place.					
SOIL	Phase 1 (Installation of services, roads and buildings): The soil of the Phase 1 area (Figure 7.1) has already been impacted (an area of approximately 6 ha) in terms of the presence of the existing buildings, infrastructure and roads on site. The construction of any additional buildings/infrastructure on the Residential 3 stands as well as the Business stand as well as the stockpiling of topsoil, subsoil, overburden and rocks would directly impact on the soil of the area in terms of soil structure, nutritional and chemical values when the vegetation and topsoil are removed, the site sloped and the infrastructure constructed. It could also result in changed runoff patterns and an increased risk of soil erosion if mitigation measures are not implemented. The risk is however low due to the relatively flat nature of the site.	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	Phase 1 (Utilization of services, roads and buildings): Direct impact on soil will continue (48 ha) i.t.o. soil structure, nutritional and chemical values and soil compaction as a result of the presence of the infrastructure.	SITE	LONG	DEFINITE	LOW NEGATIVE	LOW NEGATIVE	Phase 1 (Decommissioning of the services, roads and buildings): In general, the decommissioning and rehabilitation of the site would have a positive impact on the soil of the site since the infrastructure will be removed and the site will be topsoiled and shaped to conform to the original slope of the area. The revegetation of the site would lead to a decrease in surface water runoff velocity and a smaller risk of erosion and sedimentation of the nearby surface water environments.	SITE	LONG	HIGHLY PROBABLE	LOW POSITIVE	MEDIUM POSITIVE
	Soil pollution has already taken place at various points within the Phase 1 area as a result of sewage overflowing. Phase 1 construction activities could lead to further soil pollution if: <ul style="list-style-type: none"> sewage is allowed to continue overflowing; the construction vehicles are not maintained/repared resulting in oil leaks and fuel spills; waste management measures are not implemented, proper ablution and sanitation facilities are not provided for the site workers to use on site. 	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Soil pollution could take place if: <ul style="list-style-type: none"> sewage is allowed to continue overflowing; waste management measures are not implemented for the overall development. 	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Soil pollution may occur if: <ul style="list-style-type: none"> The vehicles are not maintained/ repaired resulting in oil leaks and fuel spills; Waste management measures are not implemented; Proper sanitation and ablution facilities are not provided for use by site workers. The removal of any polluted soil and proper rehabilitation of the site after decommissioning will however, have a positive impact on the soil.	SITE	SHORT	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE

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SOIL	<p>Phase 2 (Installation of services, roads and buildings): The development of the Residential 1 stands, Residential 3 stands and the one Business stand would directly impact on the soil of an area of approximately 17 ha. The construction activities (e.g. removal of vegetation, sloping of the site, paving of the area, construction of buildings, surfacing of roads, etc.) as well as the stockpiling of topsoil, subsoil, overburden and rocks would directly impact on the soil of the area in terms of soil structure, nutritional and chemical values when the vegetation and topsoil are removed, the site sloped and the infrastructure constructed. It could also result in changed runoff patterns and an increased risk of soil erosion if mitigation measures are not implemented. The risk is however, low due to the relatively flat nature of the site.</p>	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phase 2 (Utilization of services, roads and buildings): Direct impact on soil will continue (48 ha) i.t.o. soil structure, nutritional and chemical values and soil compaction as a result of the presence of the infrastructure.</p>	SITE	LONG	DEFINITE	LOW NEGATIVE	LOW NEGATIVE	<p>Phase 2 (Decommissioning of the services, roads and buildings): In general, the decommissioning and rehabilitation of the site would have a positive impact on the soil of the site since the infrastructure will be removed and the site will be topsoiled and shaped to conform to the original slope of the area. The revegetation of the site would lead to a decrease in surface water runoff velocity and a smaller risk of erosion and sedimentation of the nearby surface water environments.</p>	SITE	LONG	HIGHLY PROBABLE	LOW POSITIVE	MEDIUM POSITIVE
	<p>Soil pollution has already taken place at various points within the Phase 2 area as a result of sewage overflowing. Phase 2 construction activities could lead to further soil pollution if:</p> <ul style="list-style-type: none"> sewage is allowed to continue overflowing; the construction vehicles are not maintained/repared resulting in oil leaks and fuel spills; waste management measures are not implemented, proper ablution and sanitation facilities are not provided for the site workers to use on site. 	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Soil pollution could take place if:</p> <ul style="list-style-type: none"> sewage is allowed to continue overflowing; waste management measures are not implemented for the overall development. 	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Soil pollution may occur if:</p> <ul style="list-style-type: none"> The vehicles are not maintained/ repaired resulting in oil leaks and fuel spills; Waste management measures are not implemented; Proper sanitation and ablution facilities are not provided for use by site workers. <p>The removal of any polluted soil and proper rehabilitation of the site after decommissioning will however, have a positive impact on the soil.</p>	SITE	SHORT	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE
	<p>Phase 3 (Installation of services, roads and buildings): The soil of the Phase 3 area (Figure 7.1) has already been impacted in terms of the presence of the existing houses, infrastructure (race track), truck parking area and roads on site. The development of the Residential 1 stands, 4 Institutional stands (including the combined school) would directly impact on the soil of an area of approximately 17 ha. The construction activities (e.g. removal of vegetation, sloping of the site, paving of the area, construction of buildings, surfacing of roads, etc.) as well as the stockpiling of topsoil, subsoil, overburden and rocks would directly impact on the soil of the area in terms of soil structure, nutritional and chemical values when the vegetation and topsoil are removed, the site sloped and the infrastructure constructed. It could also result in changed runoff patterns and an increased risk of soil erosion if mitigation measures are not implemented. The risk is however, low due to the relatively flat nature of the site.</p>	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phase 3 (Utilization of services, roads and buildings): Direct impact on soil will continue (48 ha) i.t.o. soil structure, nutritional and chemical values and soil compaction as a result of the presence of the infrastructure.</p>	SITE	LONG	DEFINITE	LOW NEGATIVE	LOW NEGATIVE	<p>Phase 3 (Decommissioning of the services, roads and buildings): In general, the decommissioning and rehabilitation of the site would have a positive impact on the soil of the site since the infrastructure will be removed and the site will be topsoiled and shaped to conform to the original slope of the area. The revegetation of the site would lead to a decrease in surface water runoff velocity and a smaller risk of erosion and sedimentation of the nearby surface water environments.</p>	SITE	LONG	HIGHLY PROBABLE	LOW POSITIVE	MEDIUM POSITIVE

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SOIL	The soil of the site has already been polluted as a result of the trucking operation. Phase 3 construction activities could lead to further soil pollution if: <ul style="list-style-type: none"> • Polluted soil from the trucking area is not removed and disposed of properly; • Dumped waste is not collected and disposed of properly; • Construction vehicles are not maintained/repared resulting in oil leaks and fuel spills; • Waste management measures are not implemented, • Proper ablution and sanitation facilities are not provided for the site workers to use on site. 	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Soil pollution could take place if: <ul style="list-style-type: none"> • sewage is allowed to overflow; • waste management measures are not implemented for the overall development. 	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Soil pollution may occur if: <ul style="list-style-type: none"> • The vehicles are not maintained/ repaired resulting in oil leaks and fuel spills; • Waste management measures are not implemented; • Proper sanitation and ablution facilities are not provided for use by site workers. The removal of any polluted soil and proper rehabilitation of the site after decommissioning will however, have a positive impact on the soil.	SITE	SHORT	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	
GEOTECHNICAL ASPECTS	Phase 1 (Installation of services, roads and buildings): The construction of any additional buildings/infrastructure on the Residential 3 stands as well as the Business stand within the Phase 1 area would impact on the Zone 2B geotechnical zone which is characterised by consolidation and collapse settlement and occasional boulder excavation. Limited subsurface seepage is also associated with this zone. The structures could be impacted if the geotechnical mitigation measures (modified normal construction methods, provision of subsurface drainage) with regards to the above-mentioned are not implemented as part of the construction phase.	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phase 1 (Utilization of services, roads and buildings): The structures will continue to be impacted upon through the operational phase if the geotechnical mitigation measures were not implemented.	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phase 1 (Decommissioning of the services, roads and buildings): NONE. No further impact since no further construction would take place.						
	Phases 2 and 3 (Installation of services, roads and buildings): The development of Phases 1 and 2 would impact on a number of geotechnical zones namely: <ul style="list-style-type: none"> • Zone 2 B (northern portion of area) which is characterised by consolidation and collapse settlement and occasional boulder excavation. Limited subsurface seepage is also associated with this zone. The structures could be impacted if the geotechnical mitigation measures (modified normal construction methods, provision of subsurface drainage) with regards to the above-mentioned are not implemented as part of the construction phase. • Zone 2A (central portion of area) is characterised by medium active clays overlaying shallow (> 0.8 > 1.5m) intermediate excavatable shale and rock. Limited subsurface seepage is also associated with this zone. The structures could be impacted if the geotechnical mitigation measures are not implemented as part of the construction phase. • Zone 1 (southern portion of area) is characterised by occasional boulder excavation, hardpan ferricrete in vicinity of TP5, and localised intermediate excavation. The structures could be impacted if the geotechnical mitigation measures are not implemented as part of the construction phase. • Zone 3 (southern portion of site) is characterised by excavations subject to ponding during rainy season. Hansmeyer (2009) indicated no development for this area unless the said area is correctly rehabilitated. 	SITE	LONG	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phase 2 (Utilization of services, roads and buildings): The structures will continue to be impacted upon through the operational phase if the geotechnical mitigation measures were not implemented.	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phase 2 (Decommissioning of the services, roads and buildings): NONE. No further impact since no further construction would take place.						

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ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)
LAND USE/ AGRICULTURAL POTENTIAL/SENSE OF PLACE	<p>Phases 1 to 3 (Installation of services, roads and buildings): In terms of land capability, the proposed site is indicated as moderate potential arable land and the grazing potential as approximately 3 hectares per large stock unit. If cultivated, the area could produce 4-5 tons of maize per hectare. The said site is however, indicated as Transformed Rangeland and has a low to moderate agricultural potential due to the degree of disturbance/human impacts on site (e.g. buildings, roads, race-track, waste, etc.). The site has however not been used for agricultural purposes but for accommodation purposes for many years. The change of land use from 'Agricultural' to mainly 'Residential' will therefore not impact directly on agriculture. It would legalise the existing accommodation activities taking place on the said site as well as provide much needed accommodation for contractors and residents of Middelburg.</p>	SITE	LONG	DEFINITE	MEDIUM POSITIVE	MEDIUM POSITIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): In terms of land capability, the proposed site is indicated as moderate potential arable land and the grazing potential as approximately 3 hectares per large stock unit. If cultivated, the area could produce 4-5 tons of maize per hectare. The said site is however, indicated as Transformed Rangeland and has a low to moderate agricultural potential due to the degree of disturbance/human impacts on site (e.g. buildings, roads, race-track, waste, etc.). The site has however not been used for agricultural purposes but for accommodation purposes for many years. The change of land use from 'Agricultural' to mainly 'Residential' will therefore not impact directly on agriculture. It would legalise the existing accommodation activities taking place on the said site as well as provide much needed accommodation for contractors and residents of Middelburg.</p>	SITE	LONG	DEFINITE	MEDIUM POSITIVE	MEDIUM POSITIVE	<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): The decommissioning of the buildings and associated infrastructure and rehabilitation of the site would allow for a different land use on site. The impact will depend on the existing land use in the area.</p>	SITE	LONG	HIGHLY PROBABLE	MEDIUM NEUTRAL	MEDIUM NEUTRAL
	<p>Phases 1 to 3 (Installation of services, roads and buildings): According to Urban Dynamics Inc. (2009), the future direction of development would be to the northern, north eastern and eastern side of Middelburg. This area was also indicated in the Spatial Development Framework (2004) as the hinterland of the town, indicating the direction of growth. In the Steve Tshwete SDF (2010), the proposed site is indicated as hotel (in terms of the original Copper Towers establishment). It is also indicated as Middelburg x44, indicating that residential development is proposed for the said site. Although the site is currently located in a predominantly rural area, the proposed development can be viewed as a natural extension to the existing and proposed residential areas, Middelburg X22 and Middelburg X34 – 36. The development of the said site would therefore not impact on the sense of place and immediate surroundings. It might improve the current situation on site in terms of legalising existing activities and ensuring that the said site is properly managed according to the STLM bylaws.</p>	SITE	LONG	DEFINITE	MEDIUM POSITIVE	MEDIUM POSITIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): According to Urban Dynamics Inc. (2009), the future direction of development would be to the northern, north eastern and eastern side of Middelburg. This area was also indicated in the Spatial Development Framework (2004) as the hinterland of the town, indicating the direction of growth. In the Steve Tshwete SDF (2010), the proposed site is indicated as hotel (in terms of the original Copper Towers establishment). It is also indicated as Middelburg x44, indicating that residential development is proposed for the said site. Although the site is currently located in a predominantly rural area, the proposed development can be viewed as a natural extension to the existing and proposed residential areas, Middelburg X22 and Middelburg X34 – 36. The development of the said site would therefore not impact on the sense of place and immediate surroundings. It might improve the current situation on site in terms of legalising existing activities and ensuring that the said site is properly managed according to the STLM bylaws.</p>	SITE	LONG	DEFINITE	MEDIUM POSITIVE	MEDIUM POSITIVE						



7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)																		
ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)
NATURAL VEGETATION/ ANIMAL LIFE	<p>Phase 1, Phase 2, Phase 3 (Installation of services, roads and buildings): The site is located in the Rand Highveld Grassland, which has been classified as Endangered in Mucina et. al. (2006) and Vulnerable in the National List of Ecosystems that are threatened and in need of protection (GN 1002 of 2011). According to the Mpumalanga Biodiversity Sector Plan (MBSP, 2013), the majority of the site falls within the category – Moderately modified (old lands) and Heavily modified. A portion of the southern area is indicated as Other Natural Areas that links up with the nearby stream area. A small narrow strip along the northern boundary is indicated as CBA (Critical Biodiversity Area) Irreplaceable. The vegetation on site comprises of natural grassland, which has been impacted upon by past agricultural activities, grazing, the construction of the infrastructure as indicated in Section 5.6.4 of this report and the human activities taking place on site. Large areas have been totally cleared of vegetation. Only a small portion of natural grassland is present in the eastern and western portions of the site. The development of Phase 1, Phase 2 and Phase 3 would thus impact on disturbed Rand Highveld vegetation.</p>	SITE	PERMANENT	DEFINITE	LOW NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): No further direct impact on vegetation or animal life since no further construction activities will take place. However, the vegetation and animal life associated with the nearby Klein Olifants River could be indirectly impacted upon during the operational phase in terms of surface/storm water runoff, sediment transport or soil erosion if proper erosion control measures are not implemented. In addition, alien plants could be introduced into areas disturbed by construction, which are not rehabilitated. If alien plants are utilized in the gardens, they could spread and impact on the surrounding vegetation.</p>	SITE	LONG	HIGHLY PROBABLE	LOW NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): During the decommissioning phase, building rubble and any polluted soil will be removed from the site and disposed of accordingly. The said area will then be rehabilitated in order to establish a vegetation cover and prevent soil erosion. This could result in the creation of artificial habitats for animal life within the rehabilitated area. Alien plants could be introduced into areas rehabilitated as part of the decommissioning phase. This could impact on the vegetation of the surrounding area and especially the nearby Klein Olifants River.</p>	SITE	LONG	PROBABLE	MEDIUM POSITIVE	MEDIUM POSITIVE
	<p>Phase 1 (Installation of services, roads and buildings): The construction of any additional buildings/infrastructure on the Residential 3 stands as well as the Business stand within the Phase 1 area would impact on many ornamental plants (indigenous and exotic) that have been planted in the garden, along the access road and amongst the rows of rooms/flats.</p>	SITE	PERMANENT	HIGHLY PROBABLE	LOW NEUTRAL	LOW NEUTRAL		LOCAL	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE						
	<p>Phase 2 (Installation of services, roads and buildings): The development the Residential 1 stands, Residential 3 stands and the one Business stand would directly impact on the remaining natural vegetation of an area of approximately 17 ha. In the northern portion of the site, Phase 2 activities would impact on the remaining natural vegetation (dominated by Common Thatching Grass - <i>Hyparrhenia hirta</i>) that is slashed on a regular basis and the area used as a soccer field. Some natural grassland also occurs in the western portion of the site and would be impacted by the Phase 2 construction activities. The construction activities would also lead to the removal of alien vegetation (e.g. Blue Gum trees, Kikuyu Grass, etc.) and other exotic trees, which would have a positive impact in terms of vegetation.</p>	SITE	PERMANENT	DEFINITE	LOW NEUTRAL	LOW NEUTRAL												
	<p>Phase 3 (Installation of services, roads and buildings): The development of the Residential 1 stands, 4 Institutional stands (including the combined school) would directly impact on some natural grassland that occurs in the eastern portion of the site which has been impacted upon by the construction of the race track and associated infrastructure, a large excavation, gravel roads and past agricultural activities. Khaki weed, Kikuyu grass and Scottish thistle were noted in and adjacent to the excavation.</p>	SITE	PERMANENT	DEFINITE	LOW NEUTRAL	LOW NEUTRAL												

7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)																		
ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)
NATURAL VEGETATION/ ANIMAL LIFE	Phase 3 construction activities could impact on a number of bulbous plants (<i>Boophone disticha</i> - <i>Poison Bulb</i>) noted south of the excavation near the eastern boundary of the site. Although not on the endangered list, this plant species has to be protected according to Provincial Ordinances.	SITE	PERMANENT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): No further direct impact on vegetation or animal life since no further construction activities will take place. However, the vegetation and animal life associated with the nearby Klein Olifants River could be indirectly impacted upon during the operational phase in terms of surface/storm water runoff, sediment transport or soil erosion if proper erosion control measures are not implemented. In addition, alien plants could be introduced into areas disturbed by construction, which are not rehabilitated. If alien plants are utilized in the gardens, they could spread and impact on the surrounding vegetation.	SITE	LONG	HIGHLY PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): During the decommissioning phase, building rubble and any polluted soil will be removed from the site and disposed of accordingly. The said area will then be rehabilitated in order to establish a vegetation cover and prevent soil erosion. This could result in the creation of artificial habitats for animal life within the rehabilitated area. Alien plants could be introduced into areas rehabilitated as part of the decommissioning phase. This could impact on the vegetation of the surrounding area and especially the nearby Klein Olifants River.	SITE	LONG	PROBABLE	MEDIUM POSITIVE	MEDIUM POSITIVE
	Phase 1, Phase 2, Phase 3 (Installation of services, roads and buildings): It is not anticipated that the development will have a significant impact on animal life. As indicated in Section 5.7 of this report, the site has been impacted upon by human activity (e.g. buildings, roads, infrastructure, waste, sewage, etc.), which resulted in the disturbance of the vegetation and therefore animal life and animal habitats on site. In addition, the constant human movement on site and in the surrounding area as well as the close proximity of domestic animals such as dogs and cats would deter especially larger animals from inhabiting the site. However, it is expected that smaller animal species (e.g. rodents), birds, reptiles and amphibian species would be found on site, especially in the areas where natural grassland is still present. The surrounding area could provide habitat for animal species however, the vegetation on the adjacent properties have also been heavily impacted upon. Businesses are operated from at least two of the properties. The properties further east of the site and closer to the Middelburg dam are more likely to provide suitable habitat for various species. Although no endangered or rare species were noted on site, it does not exclude the possibility that Red Data fauna species may occur on site. This is however, highly unlikely.	SITE	LONG	PROBABLE	LOW NEGATIVE	LOW NEGATIVE		LOCAL	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE						
SURFACE WATER/ SENSITIVE LANDSCAPES	Phase 1, Phase 2, Phase 3 (Installation of services, roads and buildings): Construction activities associated with Phase 1, Phase 2 and Phase 3 will not impact directly on any surface water environments (e.g. rivers, streams, dams, etc.) located on site. Construction activities will also not directly impact on the following identified wetlands located within 500m of the development site: <ul style="list-style-type: none"> the channelled valley bottom wetland (PES = Class C; EIS = Class B/c) associated with a non-perennial tributary of the Klein Olifants River (located ±100m to the west) - this drainage line/tributary is indicated as an Ecological Support Area (ESA) in terms of the wetlands associated with it. the unchanneled valley bottom wetland (PES = Class C; EIS = Class B/C) associated with a drainage area of the Klein Olifants River (located ±200m to the east). Grobler (2015) concluded that no wetland area or other watercourse type (as defined by the National Water Act (Act 36 of 1998) overlaps with the development site. The proposed development of the site thus has a low-negligible risk of impacting on wetlands and other watercourses and therefore sensitive landscapes.						Phases 1 to 3 (Utilization of services, roads and buildings): NONE.						Phases 1 to 3 (Decommissioning of the services, roads and buildings): NONE.					



7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)

ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA					PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha					PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha																			
	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)															
SURFACE WATER/ SENSITIVE LANDSCAPES	Phase 1, Phase 2, Phase 3 (Installation of services, roads and buildings): Construction activities associated with Phase 1, Phase 2 and Phase 3 will not have a direct impact on the 1:100 year floodline associated with a non-perennial tributary (located ±100m to the west) and a drainage area (located ±200m to the east) of the Klein Olifants River.					Phases 1 to 3 (Utilization of services, roads and buildings): NONE. The development will be located outside of the 1:100 year floodlines.					Phases 1 to 3 (Decommissioning of the services, roads and buildings): NONE. The development will be located outside of the 1: 100 year floodline.																			
	Phase 1 (Installation of services, roads and buildings): The removal of vegetation, earthworks and stockpiling activities (required as part of the construction of any additional buildings/infrastructure on the Residential 3 stands as well as the Business stand) would have minimal impact on the runoff patterns of the area due to the flat nature of the site. It is not anticipated that this would impact (in terms of water quantity and quality) on a non-perennial tributary and associated channelled valley bottom wetland of the Klein Olifants River (located ±100m west of the development site).					SITE	SHORT	IMPROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): During the operational phase, increased yields could be expected due to increased paved areas and buildings, which would facilitate increased run-off quantities due to quicker run-off and less infiltration into the soil. This could lead to soil erosion if proper storm water control measures are not implemented.					LOCAL	LONG	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): During the decommissioning phase, building rubble and any polluted soil will be removed from the site and disposed of accordingly. The said area will then be rehabilitated in order to establish a vegetation cover and prevent soil erosion. This would result in clean runoff from the site entering the non-perennial tributary located 100m towards the west and the drainage area located 200m towards the east.					LOCAL	LONG	HIGHLY PROBABLE	MEDIUM POSITIVE	MEDIUM POSITIVE
	Phase 2 (Installation of services, roads and buildings): The removal of vegetation (17 ha area), earthworks and stockpiling activities (required as part of the Phase 2 construction activities) could result in changed runoff patterns, sediment transport and soil erosion that could indirectly impact (in terms of water quantity and quality) on a non-perennial tributary and associated channelled valley bottom wetland of the Klein Olifants River (located ±100m west of the development site) if proper storm water control measures are not implemented. The adjacent private property, located between the development site and the said stream, could also be impacted upon.					SITE	SHORT	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	In view of the north-north-east trending watershed located in approximately the centre of the site the resultant surface water runoff could either impact (in terms of quantity and quality) on: • a non-perennial tributary and associated channelled valley bottom wetland of the Klein Olifants River (located ±100m west of the development site). It could also impact on a private property located between the development site and the said stream or • a drainage area and associated unchanneled valley bottom wetland of the Klein Olifants River (located ±200m east of the site) if proper storm water control measures are not implemented. The adjacent gravel road and adjacent private properties could also be impacted. The storm water management plan for the site must take this into account.					LOCAL	LONG	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE										
	Phases 1 and 2 (Installation of services, roads and buildings): Soil pollution has already taken place at various points within the proposed Phase 2 area as a result of sewage overflowing. Construction activities could lead to further soil pollution if: • sewage is allowed to continue overflowing; • old septic tanks are removed whilst still containing sewage; • the construction vehicles are not maintained/repared resulting in oil leaks and fuel spills; • waste management measures are not implemented, • proper ablation and sanitation facilities are not provided for the site workers to use on site. This could impact on the quality of the surface water runoff flowing into a non-perennial tributary and associated channelled valley bottom wetland of the Klein Olifants River (located ±100m west of the development site). It could also impact on a private property located between the development site and the said stream.					SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	The above-mentioned drainage areas could also be indirectly impacted in terms of surface water runoff if the sewage system does not have sufficient capacity, is not maintained on a regular basis and proper waste management measures (littering takes place) are not implemented on site.					LOCAL	LONG	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE										



7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)																		
ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)
SURFACE WATER/ SENSITIVE LANDSCAPES	<p>Phase 3 (Installation of services, roads and buildings): The removal of vegetation (17 ha area), earthworks and stockpiling activities (required as part of the Phase 3 construction activities) could result in changed runoff patterns, sediment transport and soil erosion that could indirectly impact (in terms of water quantity and quality) on a drainage area and associated unchanneled valley bottom wetland of the Klein Olifants River (located ±200m east of the site) if proper storm water control measures are not implemented. The adjacent gravel road and adjacent private properties could also be impacted.</p>	SITE	SHORT	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): During the operational phase, increased yields could be expected due to increased paved areas and buildings, which would facilitate increased run-off quantities due to quicker run-off and less infiltration into the soil. This could lead to soil erosion if proper storm water control measures are not implemented.</p>	LOCAL	LONG	HIGHLY PROBABLE	MEDIUM	LOW NEGATIVE	<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): During the decommissioning phase, building rubble and any polluted soil will be removed from the site and disposed of accordingly. The said area will then be rehabilitated in order to establish a vegetation cover and prevent soil erosion. This would result in clean runoff from the site entering the non-perennial tributary located 100m towards the west and the drainage area located 200m towards the east.</p>	LOCAL	LONG	HIGHLY PROBABLE	MEDIUM POSITIVE	MEDIUM POSITIVE
	<p>The soil of the site has already been polluted as a result of the trucking operation. Phase 3 construction activities could lead to further soil pollution if:</p> <ul style="list-style-type: none"> • Polluted soil from trucking area is not removed and disposed of properly; • Dumped waste is not collected and disposed of properly; • Construction vehicles are not maintained/repared resulting in oil leaks and fuel spills; • Waste management measures are not implemented, • Proper ablation and sanitation facilities are not provided for the site workers to use on site. <p>This could indirectly impact on the quality of the surface water runoff flowing into a drainage area and associated unchanneled valley bottom wetland of the Klein Olifants River (located ±200m east of the site). The adjacent gravel road and adjacent private properties could also be impacted.</p>	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE		<p>In view of the north-north-east trending watershed located in approximately the centre of the site the resultant surface water runoff could either impact (in terms of quantity and quality) on:</p> <ul style="list-style-type: none"> • a non-perennial tributary and associated channelled valley bottom wetland of the Klein Olifants River (located ±100m west of the development site). It could also impact on a private property located between the development site and the said stream or • a drainage area and associated unchanneled valley bottom wetland of the Klein Olifants River (located ±200m east of the site) if proper storm water control measures are not implemented. The adjacent gravel road and adjacent private properties could also be impacted. <p>The storm water management plan for the site must take this into account.</p> <p>The above-mentioned drainage areas could also be indirectly impact in terms of surface water runoff if the sewage system does not have sufficient capacity, is not maintained on a regular basis and proper waste management measures (littering takes place) are not implemented on site.</p>	LOCAL	LONG	HIGHLY PROBABLE	MEDIUM		LOW NEGATIVE	<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): NONE.</p>	LOCAL	LONG	HIGHLY PROBABLE
GROUNDWATER	<p>Phase 1, Phase 2, Phase 3 (Installation of services, roads and buildings): The presence of ferricrete on site indicates a possible perched water table. Ferricrete is usually also associated with the presence of wetlands. Grobler (2015) concluded that no wetland area or other watercourse type (as defined by the National Water Act (Act 36 of 1998) overlaps with the development site. The proposed development of the site thus has a low-negligible risk of impacting on wetlands and other watercourses. Construction activities associated with Phase 1, Phase 2 and Phase 3 will therefore not impact on a perched water table associated with wetlands.</p>						<p>Phases 1 to 3 (Utilization of services, roads and buildings): NONE.</p>						<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): NONE.</p>					

7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)

ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)
GROUNDWATER	Phases 1 to 3 (Installation of services, roads and buildings): The geotechnical study identified limited subsurface drainage associated with a portion of the Phase 1, the Phase 2 and the Phase 3 areas. The structures could be impacted if the geotechnical mitigation measures (modified normal construction methods, provision of subsurface drainage) with regards to the above-mentioned are not implemented as part of the construction phase.	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): The structures will continue to be impacted upon through the operational phase if the geotechnical mitigation measures were not implemented.	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): • NONE. No further impact since no further construction would take place.					
	Phases 1 to 3 (Installation of services, roads and buildings): Groundwater (quality) could be indirectly impacted upon if proper sanitation facilities and waste management measures are not put in place and maintained during the construction phase.	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): Groundwater (quality) could be indirectly impacted upon if proper sanitation facilities and waste management measures are not put in place and maintained during the operational phase. This would impact on the residents using the said water for drinking purposes.	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): NONE. No further impact since the groundwater will no longer be used for drinking purposes.					
	Phase 1 (Installation of services, roads and buildings): Phase 1 construction activities should not directly impact on the 2 boreholes (BH1/RDBM1 and BH2/RDBM2) present on site.						Phases 1 to 3 (Utilization of services, roads and buildings): During the operational phase, the development will obtain water from the Steve Tshwete Local Municipality by connecting with a water pipeline from Rockdale Reservoir. Groundwater will no longer be abstracted for use by the overall development.											
	Phase 2 (Installation of services, roads and buildings): Phase 2 construction activities could impact on borehole BH1/RDBM1 if the said borehole is not clearly demarcated and protected from construction activities. This would impact on the site's water supply source and therefore the residents.	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	It is possible that the 2 existing boreholes will be used during the operational phase for limited groundwater abstraction. The development could thus directly impact on the groundwater levels of the area (and downstream users) if water is not abstracted sustainably as recommended in the groundwater report (Gouws, 2015).	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE						
	Phase 3 (Installation of services, roads and buildings): Phase 3 construction activities could impact on borehole BH2/RDBM2 if the said borehole is not clearly demarcated and protected from construction activities. This would impact on the site's water supply source and therefore the residents.	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE												
Phases 1 to 3 (Installation of services, roads and buildings): The 2 existing boreholes (BH1/RDBM1 and BH2/RDBM2) will be used during the construction phase for groundwater abstraction. This could impact on the groundwater levels of the area (and downstream users) if water is not abstracted sustainably as recommended in the groundwater report (Gouws, 2015).	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE													
SITES OF ARCHAEOLOGICAL /CULTURAL INTEREST	Phase 1 (Installation of services, roads and buildings): The construction of any additional buildings/infrastructure on the Business stand within the Phase 1 area could impact on identified Site 3 (Tower Hotel) which consists of a number of different buildings from different ages. The site is regarded as having a Low cultural significance with a field rating of General Protection Grade C (IVC). According to van Vollenhoven (2015), the site may be demolished. No further action is required.	SITE	SHORT	PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): NONE. No further construction will take place.						Phases 1 to 3 (Decommissioning of the services, roads and buildings): NONE. No further construction will take place.					



7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)

ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)			
SITES OF ARCHAEOLOGICAL /CULTURAL INTEREST	Phase 2 (Installation of services, roads and buildings): The development of the Residential 1 stands could impact on identified Site 1 (building ruins) that consists of the remains of different buildings located close to the blue gum bush. The site is regarded as having a Low cultural significance with a field rating of General Protection. Grade C (IVC). According to van Vollenhoven (2015), the site may be demolished. No further action is required.	SITE	SHORT	PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): NONE. No further construction will take place.						Phases 1 to 3 (Decommissioning of the services, roads and buildings): NONE. No further construction will take place.								
	Phase 3 (Installation of services, roads and buildings): The development of the Residential 1 stands and Institutional stands could impact on identified Site 2 (farm house and outbuildings) The site is regarded as having a Low cultural significance with a field rating of General Protection. Grade C (IVC). According to van Vollenhoven (2015), the site may be demolished. No further action is required.	SITE	SHORT	PROBABLE	LOW NEGATIVE	LOW NEGATIVE															
	Phase 1, Phase 2, Phase 3 (Installation of services, roads and buildings): No graves were noted on the said site (Van Vollenhoven, 2015). In the scoping report mention was made of a small informal grave site (with possibly three (3) un-marked graves) located on the southern boundary of the site on Portion 56 (i.e. not on the proposed development site). Hansmeyer (2009) also indicated the presence of graves on the said site. Van Vollenhoven (2015) identified no graves were identified within the said area. However, it was indicated that the remains of many old houses were visible that could have been mistaken for graves.																				
	Phase 1 (Installation of services, roads and buildings): The construction activities would impact on the underlying intrusive diabase. Phase 2 (Installation of services, roads and buildings): The construction activities would impact on intrusive diabase, shale of the Loskop Formation and tillite of the Dwyka Formation. Phase 3 (Installation of services, roads and buildings): The construction activities would impact on intrusive diabase, shale of the Loskop Formation and tillite of the Dwyka Formation. Fourie (2015) indicated no objection to the proposed development of the said site. According to Fourie (2015), the impact of the development on fossil heritage is Moderate (Loskop Formation) and Low (Dwyka and Rooiberg Formation) as indicated above and therefore mitigation or conservation measures are not necessary for this development.	SITE	SHORT	IMPROBABLE	LOW NEGATIVE	LOW NEGATIVE															

7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)																		
ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)
AIR QUALITY	<p>Phase 1 (Installation of services, roads and buildings): The construction of any additional buildings/infrastructure on the Residential 3 stands and Business stand within the Phase 1 area could impact on the site workers and current residents residing in the onsite accommodation facility as well as the various houses on site in terms of dust generation and vehicle emissions (use of heavy machinery). In addition, the air quality of the site could be impacted if the onsite sanitation system does not have sufficient capacity and is allowed to overflow on a continuous basis. The extent of the impact would depend on the time of year, wind direction and velocity and portion of the property being developed. Mitigation measures would have to be implemented.</p>	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): During the operational phase, no direct impact on the air quality is anticipated due to the development being supplied with electricity. In addition, no noxious (scheduled processes) industries would be permitted on the business stands.</p> <p>The air quality of the site and surroundings could be impacted in terms of odours if:</p> <ul style="list-style-type: none"> • The sewer system does not have capacity and is not maintained; • Proper waste management measures are not implemented. 	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): Dust generation and vehicle emissions due to decommissioning activities and use of heavy machinery could impact on site workers and the residents of the surrounding area. The extent of the impact would depend on the time of year, wind direction, wind velocity and portion of property.</p> <p>Once rehabilitated, the impact on air quality is expected to be positive in terms of reduced dust generation as the area will then be revegetated.</p>	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE
	<p>Phase 2 (Installation of services, roads and buildings): The development of the Residential 1 stands, Residential 3 stands and the one Business stand would result in an area of approximately 17 ha being cleared. This would result in dust generation and vehicle emissions (use of heavy machinery) which could impact on the site workers, current residents residing in the existing onsite accommodation facility and newly constructed Phase 1 units, the various houses on site and the adjacent land owners/users to the south and west of the site. In addition, the air quality of the site could be impacted if the onsite sanitation system does not have sufficient capacity and is allowed to overflow on a continuous basis. The extent of the impact would depend on the time of year, wind direction and velocity and portion of the property being developed. Mitigation measures would have to be implemented.</p>	SITE	SHORT	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE		SITE	LONG	DEFINITE	HIGHLY PROBABLE	MEDIUM POSITIVE		MEDIUM POSITIVE				
	<p>Phase 3 (Installation of services, roads and buildings): The development of the Residential 1 stands, 4 Institutional stands (including the combined school) would result in an area of approximately 17 ha being cleared. This would result in dust generation and vehicle emissions (use of heavy machinery) which could impact on the site workers, current residents residing in the existing onsite accommodation facility and newly constructed Phase 1 and 2 residential units, the various houses on site and the adjacent land owners/users to the south and east of the site. In addition, the air quality of the site could be impacted if the onsite sanitation system does not have sufficient capacity and is allowed to overflow on a continuous basis. The extent of the impact would depend on the time of year, wind direction and velocity and portion of the property being developed. Mitigation measures would have to be implemented.</p>	SITE	SHORT	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE		SITE	LONG	DEFINITE	HIGHLY PROBABLE	MEDIUM POSITIVE		MEDIUM POSITIVE				

7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)																		
ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)
VISUAL	Phase 1 (Installation of services, roads and buildings): The construction of any additional buildings/infrastructure on the Residential 3 stands and Business stand within the Phase 1 area would be visible from the existing onsite accommodation facility and houses. A row of Pine trees screens the site from the traffic utilizing the R104 provincial road. The construction site would have to be kept neat and tidy at all times.	SITE	SHORT	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): The residential area will be visible from the adjacent properties located to the south, west, north and east of the site. It will also be visible from the R104 provincial road and the gravel road along the eastern boundary. It would thus be very important to keep the development neat and tidy at all times and ensure that the site (including buildings) is well maintained.	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): During the decommissioning phase, building rubble and any polluted soil will be removed from the site and disposed of accordingly. The said area will then be topsoiled, shaped to conform to the original slope of the area and revegetated with indigenous grass species. Over time, the vegetation should revert back to natural grassland if continuous monitoring and rehabilitation takes place. If the site is rehabilitated properly it could have a positive impact in terms of visual aspects.	SITE	LONG	PROBABLE	LOW POSITIVE	MEDIUM POSITIVE
VISUAL	Phase 2 (Installation of services, roads and buildings): The development of the Residential 1 stands, Residential 3 stands and the one Business stand would be visible to the current residents residing in the existing onsite accommodation facility and newly constructed Phase 1 units, the various houses on site and the adjacent land owners/users to the south and west of the site. The construction activities might also be visible from the property on the opposite side of the stream and Middelburg x22 as well as the R104 provincial road depending on where construction takes place. The construction site would have to be kept neat and tidy at all times. Phase 3 (Installation of services, roads and buildings): The development of the Residential 1 stands, 4 Institutional stands (including the combined school) would be visible to residents residing in the existing onsite accommodation facility and newly constructed Phase 1 and 2 residential units, the various houses on site and to the adjacent land owners/users to the south and east of the site. The construction activities will also be visible from the R104 provincial road and the gravel road along the eastern boundary. The construction site would have to be kept neat and tidy at all times.	SITE	SHORT	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): The residential area will be visible from the adjacent properties located to the south, west, north and east of the site. It will also be visible from the R104 provincial road and the gravel road along the eastern boundary. It would thus be very important to keep the development neat and tidy at all times and ensure that the site (including buildings) is well maintained.	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): During the decommissioning phase, building rubble and any polluted soil will be removed from the site and disposed of accordingly. The said area will then be topsoiled, shaped to conform to the original slope of the area and revegetated with indigenous grass species. Over time, the vegetation should revert back to natural grassland if continuous monitoring and rehabilitation takes place. If the site is rehabilitated properly it could have a positive impact in terms of visual aspects.	SITE	LONG	PROBABLE	LOW POSITIVE	MEDIUM POSITIVE
NOISE	Phase 1 (Installation of services, roads and buildings): Noise generated as a result of the construction (including use of heavy machinery) of any additional buildings/infrastructure on the Residential 3 stands and Business stand within the Phase 1 area would impact on site workers, residents of the onsite accommodation facility and houses as well as the residents of the nearby smallholdings.	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): Noise generation would be due to noise associated with the residential and business activities and increased traffic. This would impact on residents of Middelburg x44 and residents of the surrounding smallholdings.	SITE	LONG	HIGHLY PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): In general, the use of heavy machinery for decommissioning activities would impact on the surrounding area in terms of noise. Once rehabilitated, the impact on the ambient noise level is expected to be positive.	SITE	SHORT	PROBABLE	MEDIUM NEUTRAL	LOW NEUTRAL

7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)																		
ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)
NOISE	Phase 2 (Installation of services, roads and buildings): Noise generated as a result of the construction (including use of heavy machinery) of the Residential 1 stands, Residential 3 stands and the one Business stand would impact on site workers, residents residing in the existing onsite accommodation facility and newly constructed Phase 1 units, the various houses on site and the adjacent land owners/users to the south and west of the site.	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): Noise generation would be due to noise associated with the residential and business activities and increased traffic. This would impact on residents of Middelburg x44 and residents of the surrounding smallholdings.	SITE	LONG	HIGHLY PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): In general, the use of heavy machinery for decommissioning activities would impact on the surrounding area in terms of noise. Once rehabilitated, the impact on the ambient noise level is expected to be positive.	SITE	SHORT	PROBABLE	MEDIUM NEUTRAL	LOW NEUTRAL
	Phase 3 (Installation of services, roads and buildings): Noise generated as a result of the construction (including use of heavy machinery) of the Residential 1 stands, and 4 Institutional stands (including the combined school) would impact on site workers, residents residing in the existing onsite accommodation facility and newly constructed Phase 1 and 2 residential units, the various houses on site and the adjacent land owners/users to the south and east of the site.	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE		SITE	SHORT	PROBABLE	MEDIUM NEUTRAL	LOW NEUTRAL						
TRAFFIC	Phases 1 to 3 (Installation of services, roads and buildings): Access to the proposed development will be obtained from the R104 provincial road at the existing access point located on the northern boundary of the site. In general, the construction activities would not directly impact on the traffic utilizing the R104 provincial road or the nearby gravel road (along the eastern boundary) since all activities will be limited to the said site. The delivery of building material during the construction period could however, lead to a slight increase in traffic on the R104 provincial road as well as the onsite road network. This could impact on the residents of the onsite accommodation facility and houses using the internal road network as well as the road users of the R104 provincial road. The deliveries would however, not occur on a continuous basis.	SITE	SHORT	PROBABLE	LOW NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): Makala and Kotze (2009) indicated that the proposed development would not impact on the N11(49-1)/Tswelopele intersection as this intersection has enough spare capacity to accommodate the additional development traffic generations. No upgrading of this intersection is required.						Phases 1 to 3 (Decommissioning of the services, roads and buildings): In general, the decommissioning of services, roads and buildings would not directly impact on traffic utilising the R104 provincial road or the nearby gravel road as all activities would be limited to the said site. Building rubble and other waste would have to be removed from site. This could lead to a slight increase in traffic on the road network (i.e. on site and the R104 provincial road).	SITE	SHORT	PROBABLE	LOW NEGATIVE	LOW NEGATIVE
	Phases 1 to 3 (Installation of services, roads and buildings): During the construction phase, heavy vehicles will utilise the R104 provincial road and the onsite roads for the delivery of material. Depending on the frequency of deliveries, the heavy vehicles could impact on the condition of the R104 provincial road (already in a poor state) and the onsite roads. This could impact on the residents of the onsite accommodation facility and houses using the internal road network as well as the road users of the R104 provincial road. The deliveries would however, not occur on a continuous basis.	SITE	SHORT	PROBABLE	LOW NEGATIVE	LOW NEGATIVE								Impact on traffic after decommissioning will however, depend on the intended end land use.				
	Phases 1 to 3 (Installation of services, roads and buildings): Makala and Kotze (2009) indicated that during the operational phase, the said development would result in an increase in traffic accessing the R104 provincial road via the current site access point. This would impact on the road users of the R104 provincial road and upgrading of this site access as recommended by Makala and Kotze (2009) would be required. The construction of the upgraded site access road could impact on the road users of the provincial R104 road as well as the residents of the onsite accommodation facility and houses.	SITE	SHORT	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE		Phases 1 to 3 (Utilization of services, roads and buildings): Makala and Kotze (2009) indicated that during the operational phase, the said development would result in an increase in traffic accessing the R104 provincial road via the current site access point. This would impact on the road users of the R104 provincial road and upgrading of this site access as recommended by Makala and Kotze (2009) would be required	SITE	LONG	DEFINITE	MEDIUM NEGATIVE		MEDIUM NEGATIVE				

7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES (LAYOUT PLAN NO.4; FIGURE 6.3)

ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	
TRAFFIC	<p>Phases 1 to 3 (Installation of services, roads and buildings): During the construction phase there will be an increase in pedestrians along the R104 provincial road as the public transport facility is located about 2 km from the site access along the R104 provincial road (which is a bit far for the pedestrians). This could result in accidents involving pedestrians walking along this road as no proper sidewalk is present adjacent to the said road. Recommendations by Makala and Kotze (2009) with regards to public transport facilities (bus and taxi lay-byes) and a sidewalk must be implemented.</p>	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): The proposed development will result in an increase in traffic at the Cowen Ntuli/N11 intersection. This would impact on the road users if the intersection is not upgraded as recommended by Makala and Kotze (2009).</p>	SITE	LONG	DEFINITE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): In general, the decommissioning of services, roads and buildings would not directly impact on traffic utilising the R104 provincial road or the nearby gravel road as all activities would be limited to the said site.</p>	SITE	SHORT	PROBABLE	LOW NEGATIVE	LOW NEGATIVE	
	<p>Phases 1 to 3 (Installation of services, roads and buildings): During the operational phase there will be an increase in pedestrians along the R104 provincial road as the public transport facility is located about 2 km from the site access along the R104 provincial road (which is a bit far for the pedestrians). This could result in accidents involving pedestrians walking along this road as no proper sidewalk is present adjacent to the said road. Recommendations by Makala and Kotze (2009) with regards to public transport facilities (bus and taxi lay-byes) and a sidewalk must be implemented.</p>	SITE	LONG	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): Building rubble and other waste would have to be removed from site. This could lead to a slight increase in traffic on the road network (i.e. on site and the R104 provincial road).</p> <p>Impact on traffic after decommissioning will however, depend on the intended end land use.</p>	SITE	LONG	PROBABLE	LOW NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): The impact of the decommissioning of the development in terms of interested and affected parties will depend on the character of the area at that time as well as the intended end land use.</p>	SITE	LONG	PROBABLE	LOW NEGATIVE	LOW NEGATIVE	
INTERESTED AND AFFECTED PARTIES	<p>Phases 1 to 3 (Installation of services, roads and buildings): Possible impacts (e.g. dust, noise, groundwater, etc.) on the surrounding landowners/users as well as road users are indicated above.</p>						<p>Phases 1 to 3 (Utilization of services, roads and buildings): Possible impacts (e.g. dust, noise, groundwater, etc.) on the surrounding landowners/users as well as road users are indicated above.</p>						<p>Phases 1 to 3 (Decommissioning of the services, roads and buildings): The impact of the decommissioning of the development in terms of interested and affected parties will depend on the character of the area at that time as well as the intended end land use.</p>						
	<p>Phases 1 to 3 (Installation of services, roads and buildings): The connection of the services (water, electricity, sewage) to the municipal infrastructure could impact on the residents of Middelburg x22 in terms of service interruptions. The residents could also be impacted upon if the existing services do not have sufficient capacity for the proposed development.</p>	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): The residents could be impacted upon if the existing services do not have sufficient capacity for the proposed development.</p>	SITE	LONG	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE							
	<p>Phases 1 to 3 (Installation of services, roads and buildings): Contractors working on site could be directly impacted upon if the necessary safety and occupational health measures are not adhered to.</p>	SITE	SHORT	HIGHLY PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): NONE.</p>												
	<p>Phases 1 to 3 (Installation of services, roads and buildings): More people in the area during the construction phase could lead to increased theft and burglaries in the area.</p>	SITE	SHORT	PROBABLE	LOW NEGATIVE	LOW NEGATIVE	<p>Phases 1 to 3 (Utilization of services, roads and buildings): Once fully developed, the site will no longer be open to vagrants, which could have a positive impact in terms of security.</p>	SITE	SHORT	PROBABLE	LOW POSITIVE	LOW POSITIVE							



**7.7 DIRECT AND INDIRECT IMPACTS – DEVELOPMENT OF THE MIDDELBURG X44 RESIDENTIAL AREA CONSISTING OF VARIOUS STANDS AND ASSOCIATED SERVICES
(LAYOUT PLAN NO.4; FIGURE 6.3)**

ENVIRONMENTAL FEATURE(S)	PREDICTED IMPACT CONSTRUCTION PHASE (PHASE 1, 2 & 3) TIME PERIOD: 12 - 24 MONTHS ONWARDS (DEPENDS ON FUNDING) AREA: PHASE 1 = 6 HA; PHASE 2 = 17 HA; PHASE 3 = 17HA	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT OPERATIONAL PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	PREDICTED IMPACT PHASE: DECOMMISSIONING PHASE TIME PERIOD: UNKNOWN AREA: 48 ha	EXTENT	DURATION	PROBABILITY	SIGNIFICANCE (PRE-MITIGATION)	SIGNIFICANCE (POST MITIGATION)	
																			EXTENT
INTERESTED AND AFFECTED PARTIES	Phases 1 to 3 (Installation of services, roads and buildings): Job opportunities would be provided during the construction phase.	SITE	SHORT	DEFINITE	MEDIUM POSITIVE	MEDIUM POSITIVE	Phases 1 to 3 (Utilization of services, roads and buildings): Job opportunities would be provided during the operational phase.	SITE	LONG	DEFINITE	MEDIUM POSITIVE	MEDIUM POSITIVE	Phases 1 to 3 (Decommissioning of the services, roads and buildings): The impact of the decommissioning of the development in terms of interested and affected parties will depend on the character of the area at that time as well as the intended end land use.	SITE	LONG	HIGHLY PROBABLE	LOW NEUTRAL	LOW NEUTRAL	
	Phases 1 to 3 (Installation of services, roads and buildings): Eskom powerlines are located on site. Eskom and its clients could be impacted if the powerlines are damaged in any way by the construction and the stipulated conditions are not adhered to.	LOCAL	SHORT	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): Eskom and its clients could be impacted if the powerlines are damaged in any way during the operational phase and the stipulated conditions are not adhered to.	LOCAL	SHORT	PROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE							
	Phases 1 to 3 (Installation of services, roads and buildings): The people currently residing on site could be impacted upon in terms of a place to stay if they have to vacate the premises and were not given ample notice.	SITE	SHORT	IMPROBABLE	MEDIUM NEGATIVE	LOW NEGATIVE	Phases 1 to 3 (Utilization of services, roads and buildings): NONE. No further construction will take place.												
	Phases 1 to 3 (Installation of services, roads and buildings): NONE.						Phases 1 to 3 (Utilization of services, roads and buildings): The proposed development could have a positive impact on the surrounding landowners/users in terms of providing amenities such as schools, community facilities, etc.	LOCAL	LONG	HIGHLY PROBABLE	MEDIUM POSITIVE	MEDIUM POSITIVE							

7.8 Cumulative impacts

Primarily, the only impacts that could have a cumulative impact on the environment are in terms of:

- loss of untransformed Rand Highveld Grassland;
- surface and groundwater pollution;
- traffic;
- services (water, sewage, electricity);
- socio-economic environment.

A few hectares (± 34 ha - i.e. Phases 1 and 2) of transformed Rand Highveld Grassland will be lost as a result of the development. This will lead to an overall loss of this vegetation type, which has been classified as Vulnerable.

In view of the north-north-east trending watershed located in approximately the centre of the site, the resultant surface water runoff (as a result of construction or operational activities) could either impact (in terms of quantity and quality) on:

- a non-perennial tributary and associated channelled valley bottom wetland of the Klein Olifants River (located ± 100 m west of the development site). It could also impact on a private property located between the development site and the said stream.
- a drainage area and associated unchannelled valley bottom wetland of the Klein Olifants River (located ± 200 m east of the site) if proper storm water control measures are not implemented. The adjacent gravel road and adjacent private properties could also be impacted.

The nearby drainage line/tributary of the Klein Olifants River (located ± 100 m west of the development site) is indicated as an Ecological Support Area and must thus be protected from any impact as a result of the proposed residential development.

The proposed development would add to the cumulative impact of traffic on the existing road network (i.e. R104 provincial road, N11 national road and Cowen Ntuli Street). The site access and the Cowen Ntuli/N11 intersection will need to be upgraded as recommended by the traffic engineers in order to prevent a potential impact on the general road user. Recommendations by Makala and Kotze (2009) with regards to public transport facilities (bus and taxi lay-byes) and a sidewalk must also be implemented.

The proposed development together with all other developments in Middelburg would impact on the services (water and sewage) provided by the local municipality. The Steve Tshwete Local Municipality must ensure that the required services can be provided and that there is sufficient capacity at the sewage works to cater for the additional development.

The proposed site is located within an area already earmarked by the STLM SDF for residential development. Although the site is currently located in a predominantly rural area, the proposed development can be viewed as a natural extension to the existing and proposed residential areas, Middelburg X22 and Middelburg X34 - 36.

Job opportunities will be provided during the construction and operational phase of the development, which would have a beneficial impact in terms of the general economy. In addition, much needed housing would be provided, which would assist in alleviating of the current contractors housing shortage.