in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland." Comment: Although the description is wide it is very evident that seepage or hillslope wetlands do not become inundated but rather are fed by hillslope return flow processes. The main criterion should therefore be the surface and subsurface hydrological linkages expressed as a degree of alteration in terms of the surface, hydropedology and groundwater hydrology.

- "Permanent inundation: Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota." Comment: Mostly not applicable to hillslope seepage wetlands.

Water Quality Criteria

- "Water quality modification: From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland." Comment: Water quality in this context applies generally but cognisance should be taken of seepage water quality that can be natural but significantly different to exposed water bodies. The main reason for this being the highly complex nature of many redox processes within the hillslope.
- "Sediment load modification: Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats." Comment: This is a very relevant concept but on hillslopes should be linked to erosivity of the soils as well as the specific land use influences.

Hydraulic / Geomorphic Criteria

- "Canalisation: Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage." Comment: Again this is a very relevant concept but on hillslopes should be linked to erosivity of the soils as well as the specific land use influences. This concept does however not address the influences on the hydropedology of the hillslope. These aspects shoud be elucidated and contextualised.
- "Topographic Alteration: Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railwaylines and other substrate disruptive activities which reduces or changes wetland habitat directly or through changes in inundation patterns." Comment: Again this is a very relevant concept but on hillslopes should be linked to erosivity of the soils as well as the specific land use influences. This concept does however not address the influences on the hydropedology of the hillslope. These aspects shoud be elucidated and contextualised.

Biological Criteria

- "Terrestrial encroachment: Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions." Comment: Again this is a very relevant concept but on hillslopes should be linked to erosivity of the soils as well as the specific land use influences. This concept does however not address the influences on the hydropedology of the hillslope. These aspects shoud be elucidated and contextualised.

- "Indigenous vegetation removal: Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion."
- "Invasive plant encroachment: Affect habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading)."
- "Alien fauna: Presence of alien fauna affecting faunal community structure."
- "Overutilisation of biota: Overgrazing, Over-fishing, etc."

Scoring Guidelines
Scoring guidelines per attribute:
Natural, unmodified = 5
Largely natural = 4
Moderately modified = 3
Largely modified = 2
Seriously modified = 1
Critically modified = 0

Relative confidence of score:
Very high confidence = 4
High confidence = 3
Moderate confidence = 2
Marginal/low confidence = 1

4.4.5 The Resource Directed Measures for Protection of Water Resources: Appendix W5 IER (Floodplain Wetlands) Determining the Ecological Importance and Sensitivity (EIS) and the Ecological Management Class (EMC)

In Appendix W5 the methodology is provided for the determination of the ecological importance and sensitivity (EIS) and ecological management class (EMC) of floodplain wetlands.

"Ecological importance" of a water resource is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. "Ecological sensitivity" refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. The Ecological Importance and sensitivity (EIS) provides a guideline for determination of the Ecological Management Class (EMC)." Please refer to the specific document for more detailed information.

The following primary determinants are listed as determining the EIS:

1. Rare and endangered species
2. Populations of unique species
3. Species / taxon richness
4. Diversity of habitat types or features
5. Migration route / breeding and feeding site for wetland species

6. Sensitivity to changes in the natural hydrological regime
7. Sensitivity to water quality changes
8. Flood storage, energy dissipation and particulate / element removal

The following modifying determinants are listed as determining the EIS:

1. Protected status
2. Ecological integrity

4.5 Summary and Proposed Approach

When working in environments where the landscape and land use changes are significant (such as urban and mining environments) it is important to answer the following critical questions regarding the assessment and management planning for wetlands:

1. What is the reference condition?
2. What is the difference between the reference condition and the current condition and how big is this difference from a hydrological driver perspective?
3. What are the hydrological drivers (as a function of geology, topography, rainfall and soils) and what are the relative contributions of these drivers to the functioning of the wetland system?
4. What is the intended or planned land use in the wetland as well as terrestrial area and how will these developments impact on the hydrology of the landscape and wetlands?
5. How can the intended land use be plied to secure the best possible hydrological functioning of the landscape in terms of storm water attenuation, erosion mitigation and water quality?

The key to the generation of adequate information lies in the approach that is to be followed. In the next section an explanation about and motivation in favour of will be provided for a hydropedology assessment approach. Due to the detailed nature of the information that can be generated through such an approach it is motivated that all wetland assessments be conducted with the requirements of criminal law in mind. The main reason for this is the fact that many well-meaning administrative exercises often yield not tangible results due to the gap in terms of information that is required should there be a compliance process followed.

To Summarise:

During wetland assessments and delineations it is important to provide a perspective on assessment tools, the original or reference state of the wetland, the assessment process and outcome as well as the intended or possible state of the wetland and site post development. Urban and mining developments are good examples of cases where surrounding developments and land use changes have significant effects on wetland integrity and water quality emanating from the site.

5. CHALLENGES REGARDING WETLAND DELINEATION ON THE HALFWAY HOUSE GRANITE DOME

Disclaimer: The following section represents a discussion that I use as standard in describing the challenges regarding wetland delineation and management in the Halfway House Granite Dome (HHGD) area. This implies that the section is verbatim the same as in other reports provided to clients and the authorities. Copyright is strictly reserved.

In order to discuss the procedures followed and the results of the wetland identification exercise it is necessary at the outset to provide some theoretical background on soil forming processes, soil wetness indicators, water movement in soils and topographical sequences of soil forms (catena).

5.1 PEDOGENESIS

Pedogenesis is the process of soil formation. Soil formation is a function of five (5) factors namely (Jenny, 1941):

- Parent material;
- Climate;
- Topography;
- Living Organisms; and
- Time.

These factors interact to lead to a range of different soil forming processes that ultimately determine the specific soil formed in a specific location. Central to all soil forming processes is water and all the reactions (physical and chemical) associated with it. The physical processes include water movement onto, into, through and out of a soil unit. The movement can be vertically downwards, lateral or vertically upwards through capillary forces and evapotranspiration. The chemical processes are numerous and include dissolution, precipitation (of salts or other elements) and alteration through pH and reduction and oxidation (redox) changes. In many cases the reactions are promoted through the presence of organic material that is broken down through aerobic or anaerobic respiration by microorganisms. Both these processes alter the redox conditions of the soil and influence the oxidation state of elements such as Fe and Mn. Under reducing conditions Fe and Mn are reduced and become more mobile in the soil environment. Oxidizing conditions, in turn, lead to the precipitation of Fe and Mn and therefore lead to their immobilization. The dynamics of Fe and Mn in soil, their zones of depletion through mobilization and accumulation through precipitation, play an important role in the identification of the dominant water regime of a soil and could therefore be used to identify wetlands and wetland conditions.

5.2 WATER MOVEMENT IN THE SOIL PROFILE

In a specific soil profile, water can move upwards (through capillary movement), horizontally (owing to matric suction) and downwards under the influence of gravity.

The following needs to be highlighted in order to discuss water movement in soil:

- Capillary rise refers to the process where water rises from a deeper lying section of the soil profile to the soil surface or to a section closer to the soil surface. Soil pores can be regarded as miniature tubes. Water rises into these tubes owing to the adhesion (adsorption) of water molecules onto solid mineral surfaces and the surface tension of water.

  The height of the rise is inversely proportional to the radius of the soil pore and the density of the liquid (water). It is also directly proportional to the liquid's surface tension and the degree of its adhesive attraction. In a soil-water system the following simplified equation can be used to calculate this rise:

  $$\text{Height} = 0.15/\text{radius}$$

  Usually the eventual height of rise is greater in fine textured soil, but the rate of flow may be slower (Brady and Weil, 1999; Hillel, 1983).

- Matric potential or suction refers to the attraction of water to solid surfaces. Matric potential is operational in unsaturated soil above the water table while pressure potential refers to water in saturated soil or below the water table. Matric potential is always expressed as a negative value and pressure potential as a positive value.

  Matric potential influences soil moisture retention and soil water movement. Differences in the matric potential of adjoining zones of a soil results in the movement of water from the moist zone (high state of energy) to the dry zone (low state of energy) or from large pores to small pores.

  The maximum amount of water that a soil profile can hold before leaching occurs is called the field capacity of the soil. At a point of water saturation, a soil exhibits an energy state of 0 $J.kg^{-1}$. Field capacity usually falls within a range of -15 to -30 $J.kg^{-1}$ with fine textured soils storing larger amounts of water (Brady and Weil, 1999; Hillel, 1983).

- Gravity acts on water in the soil profile in the same way as it acts on any other body; it attracts towards earth's centre. The gravitational potential of soil water can be expressed as:

  $$\text{Gravitational potential} = \text{Gravity} \times \text{Height}$$

  Following heavy rainfall, gravity plays an important part in the removal of excess water from the upper horizons of the soil profile and recharging groundwater sources below.

  Excess water, or water subject to leaching, is the amount of water that falls between soil saturation (0 $J.kg^{-1}$) or oversaturation (> 0 $J.kg^{-1}$), in the case of heavy rainfall resulting in a pressure potential, and field capacity (-15 to -30 $J.kg^{-1}$). This amount of water differs according to soil type, structure and texture (Brady and Weil, 1999; Hillel, 1983).

- Under some conditions, at least part of the soil profile may be saturated with water, resulting in so-called saturated flow of water. The lower portions of poorly drained soils are

often saturated, as are well-drained soils above stratified (layers differing in soil texture) or impermeable layers after rainfall.

The quantity of water that flows through a saturated column of soil can be calculated using Darcy's law:

$$Q = Ksat.A.\Delta P/L$$

Where Q represents the quantity of water per unit time, Ksat is the saturated hydraulic conductivity, A is the cross sectional area of the column through which the water flows, ΔP is the hydrostatic pressure difference from the top to the bottom of the column, and L is the length of the column.

Saturated flow of water does not only occur downwards, but also horizontally and upwards. Horizontal and upward flows are not quite as rapid as downward flow. The latter is aided by gravity (Brady and Weil, 1999; Hillel, 1983).

- Mostly, water movement in soil is ascribed to the unsaturated flow of water. This is a much more complex scenario than water flow under saturated conditions. Under unsaturated conditions only the fine micropores are filled with water whereas the macropores are filled with air. The water content, and the force with which water molecules are held by soil surfaces, can also vary considerably. The latter makes it difficult to assess the rate and direction of water flow. The driving force behind unsaturated water flow is matric potential. Water movement will be from a moist to a drier zone (Brady and Weil, 1999; Hillel, 1983).

The following processes influence the amount of water to be leached from a soil profile:

- Infiltration is the process by which water enters the soil pores and becomes soil water. The rate at which water can enter the soil is termed infiltration tempo and is calculated as follows:

$$I = Q/A.t$$

Where I represents infiltration tempo ($m.s^{-1}$), Q is the volume quantity of infiltrating water (m^3), A is the area of the soil surface exposed to infiltration (m^2), and t is time (s).

If the soil is quite dry when exposed to water, the macropores will be open to conduct water into the soil profile. Soils that exhibit a high 2:1 clay content (swelling-shrinking clays) will exhibit a high rate of infiltration initially. However, as infiltration proceeds, the macropores will become saturated and cracks, caused by dried out 2:1 clay, will swell and close, thus leading to a decline in infiltration (Brady and Weil, 1999; Hillel, 1983).

- Percolation is the process by which water moves downward in the soil profile. Saturated and unsaturated water flow is involved in the process of percolation, while the rate of percolation is determined by the hydraulic conductivity of the soil.

During a rain storm, especially the down pouring of heavy rain, water movement near the soil surface mainly occurs in the form of saturated flow in response to gravity. A sharp boundary, referred to as the wetting front, usually appears between the wet soil and the underlying dry soil. At the wetting front, water is moving into the underlying soil in response

to both matric and gravitational potential. During light rain, water movement at the soil surface may be ascribed to unsaturated flow (Brady and Weil, 1999; Hillel, 1983).

The fact that water percolates through the soil profile by unsaturated flow has certain ramifications when an abrupt change in soil texture occurs (Brady and Weil, 1999; Hillel, 1983). A layer of course sand, underlying a fine textured soil, will impede downward movement of water. The macropores of the coarse textured sand offer less attraction to the water molecules than the macropores of the fine textured soil. When the unsaturated wetting front reaches the coarse sand, the matric potential is lower in the sand than in the overlying material. Water always moves from a higher to a lower state of energy. The water can, therefore, not move into the coarse textured sand. Eventually, the downward moving water will accumulate above the sand layer and nearly saturate the fine textured soil. Once this occurs, the water will be held so loosely that gravitational forces will be able to drag the water into the sand layer (Brady and Weil, 1999; Hillel, 1983).

A coarse layer of sand in an otherwise fine textured soil profile will also inhibit the rise of water by capillary movement (Brady and Weil, 1999; Hillel, 1983).

Field observations and laboratory-based analysis can aid in assessing the soil-water relations of an area. The South African soil classification system (Soil Classification Working Group, 1991.) comments on certain field observable characteristics that shed light on water movement in soil. The more important of these are:

- Soil horizons that show clear signs of leaching such as the E-horizon – an horizon where predominantly lateral water movement has led to the mobilisation and transport of sesquioxide minerals and the removal of clay material;
- Soil horizons that show clear signs of a fluctuating water table where Fe and Mn mottles, amongst other characteristics, indicate alternating conditions of reduction and oxidation (soft plinthic B-horizon);
- Soil horizons where grey colouration (Fe reduction and redox depletion), in an otherwise yellowish or reddish matrix, indicate saturated (or close to saturated) water flow for at least three months of the year (Unconsolidated/Unspecified material with signs of wetness);
- Soil horizons that are uniform in colouration and indicative of well-drained and aerated (oxidising) conditions (e.g. yellow brown apedal B-horizon).

5.3 WATER MOVEMENT IN THE LANDSCAPE

Water movement in a landscape is a combination of the different flow paths in the soils and geological materials. The movement of water in these materials is dominantly subject to gravity and as such it will follow the path of least resistance towards the lowest point. In the landscape there are a number of factors determining the paths along which this water moves. **Figure 6** provides a simplified schematic representation of an idealised landscape (in "profile curvature". The total precipitation (rainfall) on the landscape from the crest to the lowest part or valley bottom is taken as 100 %. Most geohydrologists agree that total recharge, the water that seeps into the underlying geological strata, is less than 4 % of total precipitation for most geological settings. Surface runoff varies considerably according to rainfall intensity and distribution, plant cover and soil characteristics but is taken as a realistic 6 % of total precipitation for our idealised landscape.

The total for surface runoff and recharge is therefore calculated as 10 % of total precipitation. If evapotranspiration (from plants as well as the soil surface) is taken as a very high 30 % of total precipitation it leaves 60 % of the total that has to move through the soil and/or geological strata from higher lying to lower lying areas. In the event of an average rainfall of 750 mm per year it results in 450 mm per year having to move laterally through the soil and geological strata. In a landscape there is an accumulation of water down the slope as water from higher lying areas flow to lower lying areas.

To illustrate: If the assumption is made that the area of interest is 100 m wide it follows that the first 100 m from the crest downwards has 4 500 m^3 (or 4 500 000 litres) of water moving laterally through the soil (100 m X 100 m X 0.45 m) per rain season. The next section of 100 m down the slope has its own 4 500 m^3 of water as well as the added 4 500 m^3 from the upslope section to contend with, therefore 9 000 m^3. The next section has 13 500 m^3 to contend with and the following one 18 000 m^3. It is therefore clear that, the longer the slope, the larger the volume of water that will move laterally through the soil profile.

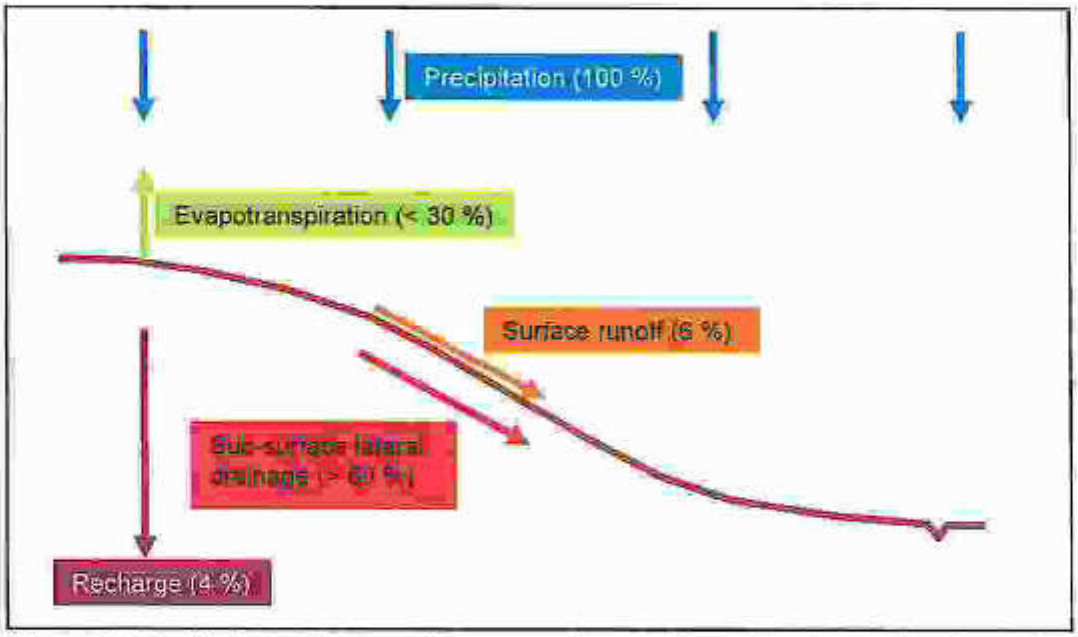

Figure 6 Idealised landscape with assumed quantities of water moving through the landscape expressed as a percentage of total precipitation (100 %).

Flow paths through soil and geological strata, referred to as "interflow" or "hillslope water", are very varied and often complex due to difficulty in measurement and identification. The difficulty in identification stems more from the challenges related to the physical determination of these in soil profile pits, soil auger samples and core drilling samples for geological strata. The identification of the morphological signs of water movement in permeable materials or along planes of weakness (cracks and seams) is a well-established science and the expression is mostly referred to as "redox morphology". In terms of the flow paths of water large variation exists but these can be grouped into a few simple categories. **Figure 7** provides a schematic representation of the different flow regimes that are usually encountered. The main types of water flow can be grouped as 1) recharge (vertically downwards) of groundwater; 2) lateral flow of water through the landscape

along the hillslope (interflow or hillslope water); 3) return flow water that intercepts the soil/landscape surface; and 4) surface runoff. Significant variation exists with these flow paths and numerous combinations are often found. The main wetland types associated with the flow paths are: a) valley bottom wetlands (fed by groundwater, hillslope processes, surface runoff, and/or in-stream water); b) hillslope seepage wetlands (fed by interflow water and/or return flow water); and wetlands associated with surface runoff, ponding and surface ingress of water anywhere in the landscape.

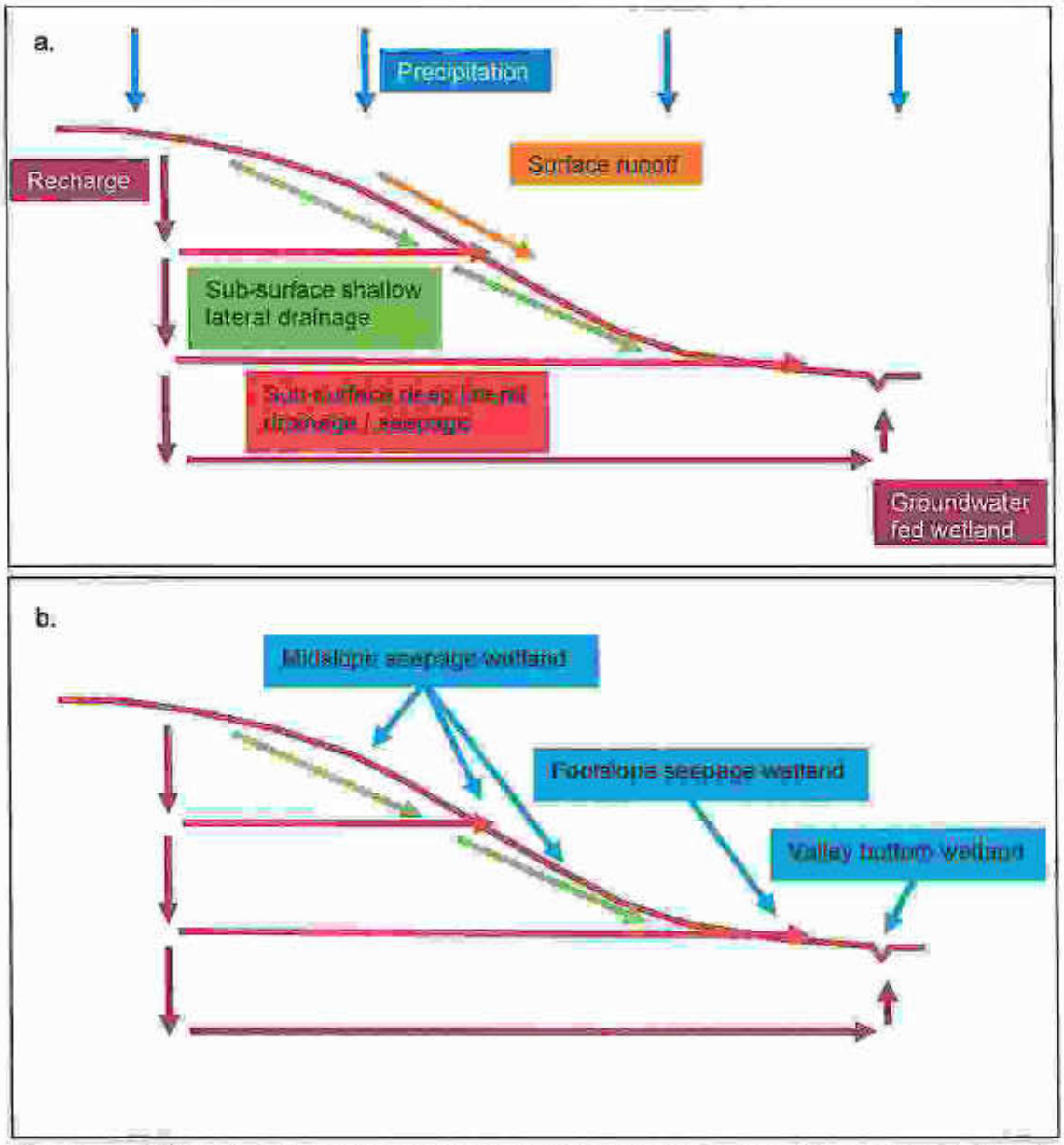

Figure 7 Different flow paths of water through a landscape (a) and typical wetland types associated with the water regime (b)

Amongst other factors, the thickness of the soil profile at a specific point will influence the intensity of the physical and chemical reactions taking place in that soil. **Figure 8** illustrates the difference between a dominantly thick and a dominantly thin soil profile. If all factors are kept the same except

for the soil profile thickness it can be assumed with confidence that the chemical and physical reactions associated with water in the landscape will be much more intense for the thin soil profile than for the thick soil profile. Stated differently: The volume of water moving through the soil per surface area of an imaginary plane perpendicular to the direction of water flow is much higher for the thin soil profile than for the thick soil profile. This aspect has a significant influence on the expression of redox morphology in different landscapes of varying soil/geology/climate composition.

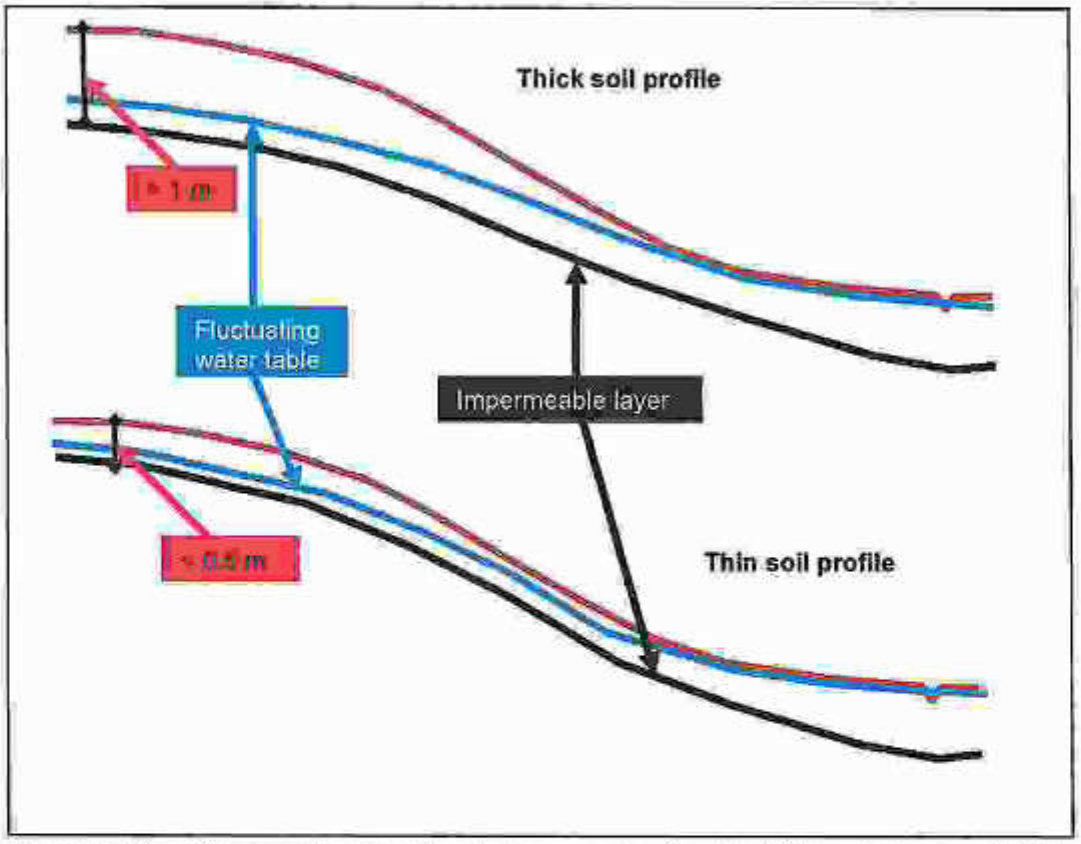

Figure 8 The difference in water flow between a dominantly thick and dominantly thin soil profile.

5.4 THE CATENA CONCEPT

Here it is important to take note of the "catena" concept. This concept is one of a topographic sequence of soils in a homogenous geological setting where the water movement and presence in the soils determine the specific characteristics of the soils from the top to the bottom of the topography. **Figure 9** illustrates an idealised topographical sequence of soils in a catena for a quartz rich parent material. Soils at the top of the topographical sequence are typically red in colour (Hutton and Bainsvlei soil forms) and systematically grade to yellow further down the slope (Avalon soil form). As the volume of water that moves through the soil increases, typically in midslope areas, periodic saturated conditions are experienced and consequently Fe is reduced and removed in the laterally flowing water. In the event that the soils in the midslope positions are relatively sandy the resultant soil colour will be bleached or white due to the colour dominance of the sand quartz particles. The soils in these positions are typically of the Longlands and Kroonstad forms. Further down the slope there is an accumulation of clays and leaching products from higher lying

soils and this leads to typical illuvial and clay rich horizons. Due to the regular presence of water the dominant conditions are anaerobic and reducing and the soils exhibit grey colours often with bright yellow and grey mottles (Katspruit soil form). In the event that there is a large depositional environment with prolonged saturation soils of the Champagne form may develop (typical peat land). Variations on this sequence (as is often found on the Mpumalanga Highveld) may include the presence of hard plinthic materials instead of soft plinthite with a consequent increase in the occurrence of bleached soil profiles. Extreme examples of such landscapes are discussed below.

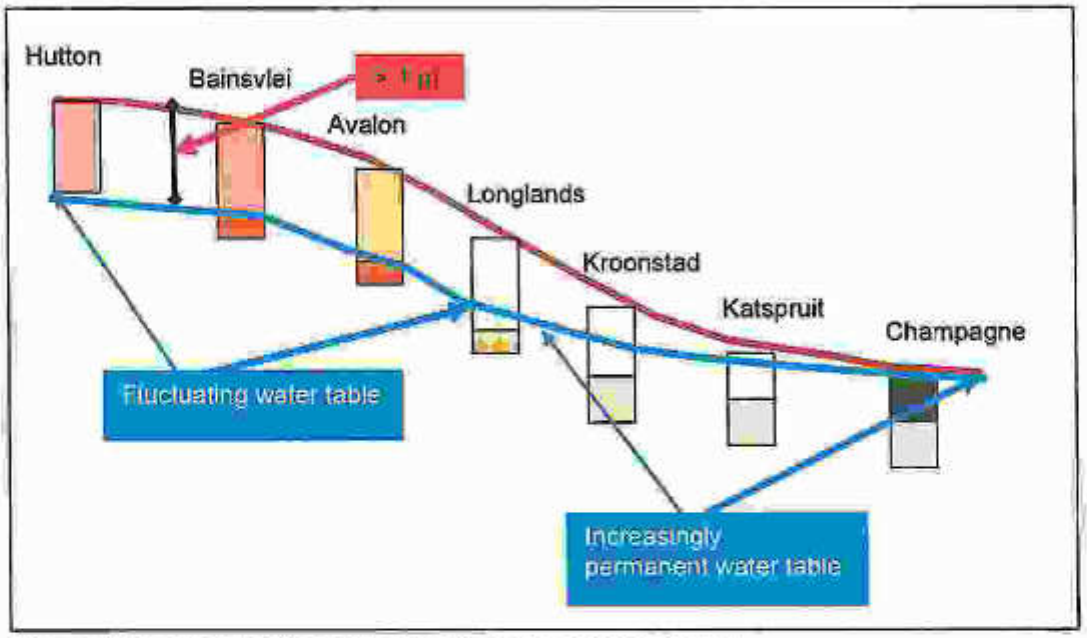

Figure 9 Idealised catena on a quartz rich parent material.

5.5 THE HALFWAY HOUSE GRANITE DOME CATENA

The Halfway House Granite Catena is a well-studied example of a quartz dominated Bb catena. As a result of the elucidation of the wetland delineation parameters and challenges in the specialist testimony in the matter between The State versus 1. Stefan Frylinck and 2. Mpofu Environmental Solutions CC (Case Number 14/1740/2010) it will be discussed in further detail here.

The typical catena that forms on the Halfway House granite differs from the idealised one discussed above in that the landscape is an old stable one, often with extensive subsoil ferricrete (or hard plinthic) layers where perched water tables occur. The parent material is relatively hard and the ferricrete layer is especially resistant to weathering. The quartz rich parent materials have a very low Fe content/"reserve", and together with the age of the material leads to the dominance of bleached sandy soils. The implication is that the whole catena is dominated by bleached sandy soils with a distinct and shallow zone of water fluctuation. This zone is often comprised of a high frequency of Fe/Mn concretions and sometimes exhibits feint mottles. In lower lying areas the soils tend to be deeper due to colluvial accumulation of sandy soil material but then exhibit more distinct signs of wetness (and pedogenesis). **Figure 10** provides a schematic representation of the catena.

The essence of this catena is that the soils are predominantly less than 50 cm thick and as such have a fluctuating water table (mimicking rainfall events) within 50 cm of the soil surface. One of the main criteria used during wetland delineation exercises as stipulated by the guidelines (DWAF, 2005) is the presence of mottles within 50 cm of the soil surface (temporary and seasonal wetland zones). Even from a theoretical point of view the guidelines cannot be applied to the above-described catena as soils at the crest of the landscape would already qualify as temporary wetland zone soils (upon request many such examples can be supplied). The practical implication of this statement as well as practical examples will be discussed in the next section.

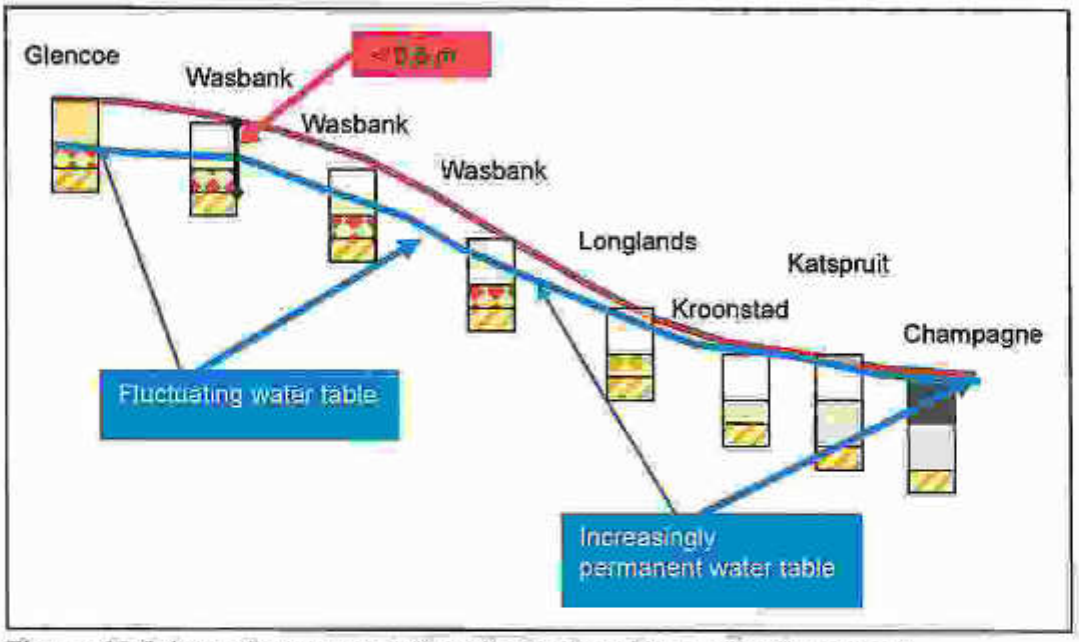

Figure 10 Schematic representation of a Halfway House Granite catena.

5.6 CONVEX VERSUS CONCAVE LANDSCAPES IN THE HALFWAY HOUSE GRANITE CATENA

An additional factor of variation in all landscapes is the shape of the landscape along contours (referred to a "plan curvature"). Landscapes can be either concave or convex, or flat. The main difference between these landscapes lies in the fact that a convex landscape is essentially a watershed with water flowing in diverging directions with a subsequent occurrence of "dryer" soil conditions. In a concave landscape water flows in converging directions and soils often exhibit the wetter conditions of "signs of wetness" such as grey colours, organic matter and subsurface clay accumulation. **Figure 11** presents the difference between these landscapes in terms of typical soil forms encountered on the Halfway House granites. In the convex landscape the subsurface flow of water removes clays and other weathering products (including Fe) in such a way that the midslope position soils exhibit an increasing degree of bleaching and relative accumulation of quartz (E-horizons). In the concave landscapes clays and weathering products are transported through the soils into a zone of accumulation where soils start exhibiting properties of clay and Fe accumulation. In addition, coarse sandy soils in convex environments tend to be thinner due to the removal of sand particles through erosion and soils in concave environments tend to be thicker due to colluvial accumulation of material transported from upslope positions. Similar patterns are

observed for other geological areas with the variation being consistent with the soil variation in the catena.

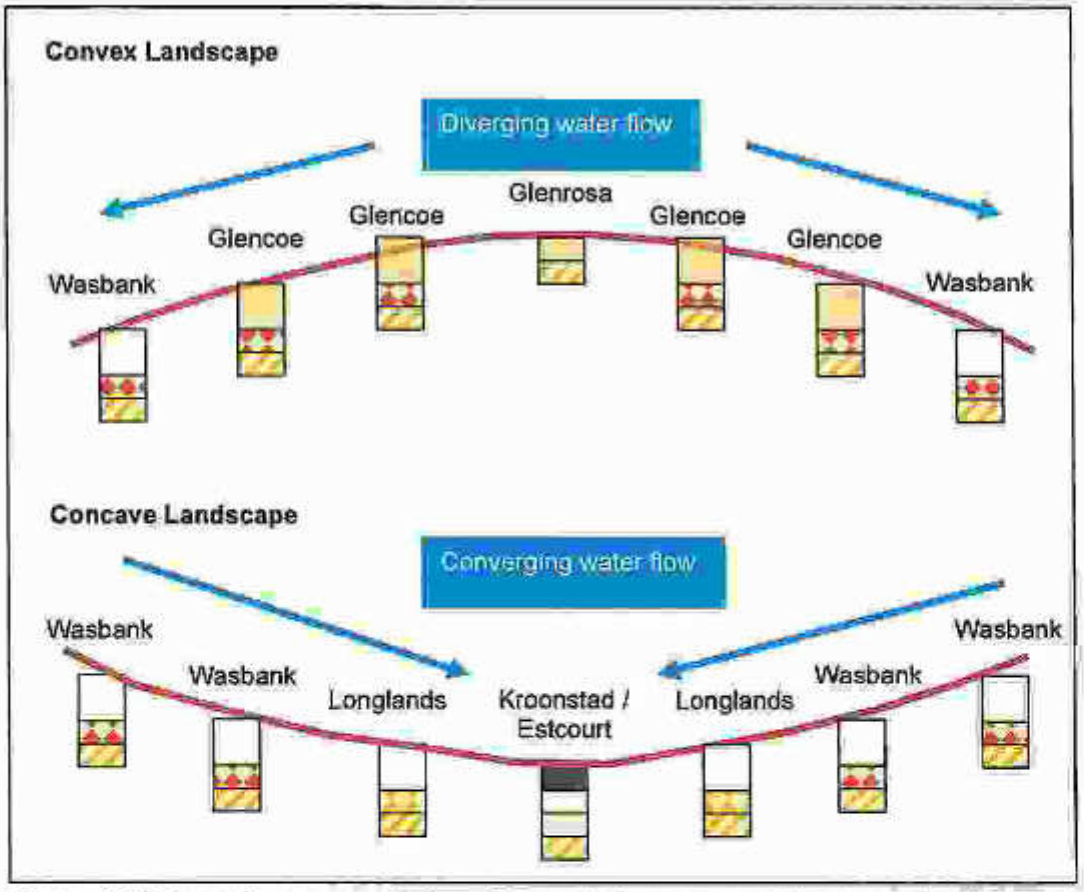

Figure 11 Schematic representation of the soils in convex and concave landscapes in the Halfway House Granite catena.

Often these concave and convex topographical environments occur in close proximity or in one topographical sequence of soils. This is often found where a convex upslope area changes into a concave environment as a drainage depression is reached (**Figure 12**). The processes in this landscape are the same as those described for the convex and concave landscapes above.

5.7 Implications for Wetland Delineation and Application of the Guidelines

When the 50 cm criterion is used to delineate wetlands in the HHGD environment, the soils in convex positions often "qualify" as temporary wetland soils due to their relatively thin profile and the presence of concretions (often weathering to yield "mottles") within this zone. In conjunction with a low Fe content in the soils and subsequent bleached colours (as defined for E-horizons) in the matrix a very large proportion of the landscape "qualifies" as temporary wetland zones. On the other hand, the soils in the concave environments, especially in the centre of the drainage depression, tend to be thicker and the 50 cm criterion sometimes does not flag these soils as being wetland soils due to the depth of the signs of wetness (mottles) often occurring only at depths greater than 80 cm. Invariably these areas are always included in wetland delineations due to the terrain unit indicator flagging it as a wetland area and drainage feature.

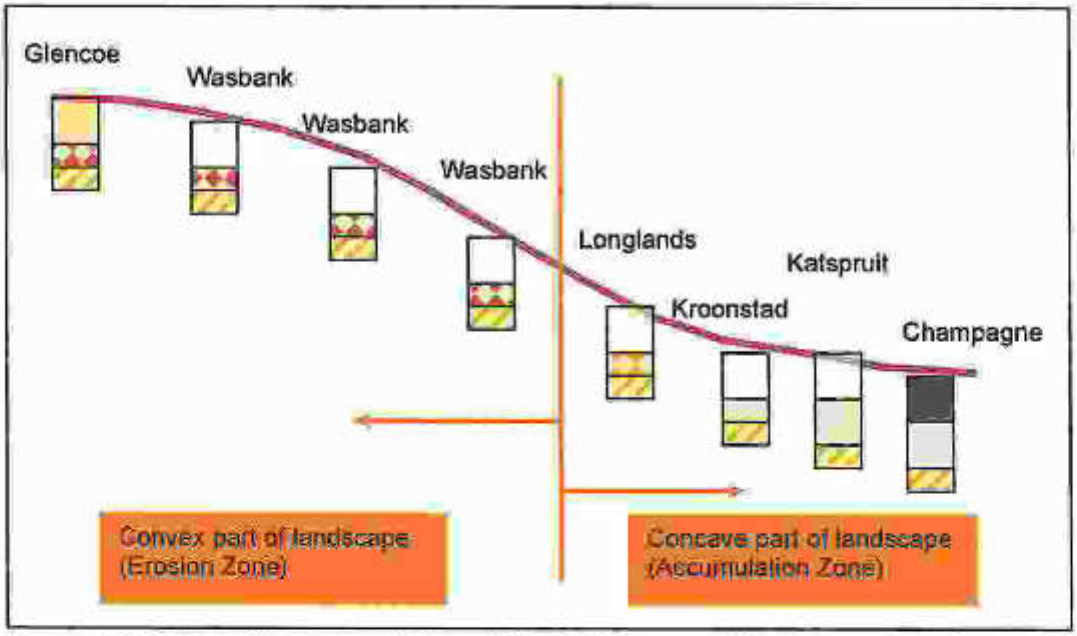

Figure 12 Schematic representation of the soils in a combined convex and concave landscape in the Halfway House Granite catena.

The strict application of the wetland delineation guidelines in the Halfway House Granite area often leads to the identification of 70 % or more of a landscape as being part of a wetland. For this reason a more pragmatic approach is often followed in that the 50 cm criterion is not applied religiously. Rather, distinctly wet horizons and zones of clay accumulation within drainage depressions are identified as distinct wetland soils. The areas surrounding these are assigned to extensive seepage areas that are difficult to delineate and on which it is difficult to assign a realistic buffer area. The probable best practice is to assign a large buffer zone in which subsurface water flow is encouraged and conserved to lead to a steady but slow recharge of the wetland area, especially following rainfall events. In the case where development is to take place within this large buffer area it is preferred that a "functional buffer" approach be followed. This implies that development can take place within the buffer area but then only within strict guidelines regarding storm water management and mitigation as well as erosion prevention in order to minimise sediment transport into stream and drainage channels and depressions.

5.8 Implications for Wetland Conservation in Urban Environments

Whether an area is designated a wetland or not loses some of its relevance once drastic influences on landscape hydrology are considered. If wetlands are merely the expression of water in a landscape due to proximity to the land surface (viz. the 50 cm mottle criterion in the delineation guidelines) it follows that potentially large proportions of the water moving in the landscape could fall outside of this sphere – as discussed in detail above. **Figures 13** and **14** provide schematic representations (as contrasted with **Figure 7**) of water dynamics in urban environments with distinct excavations and surface sealing activities respectively.

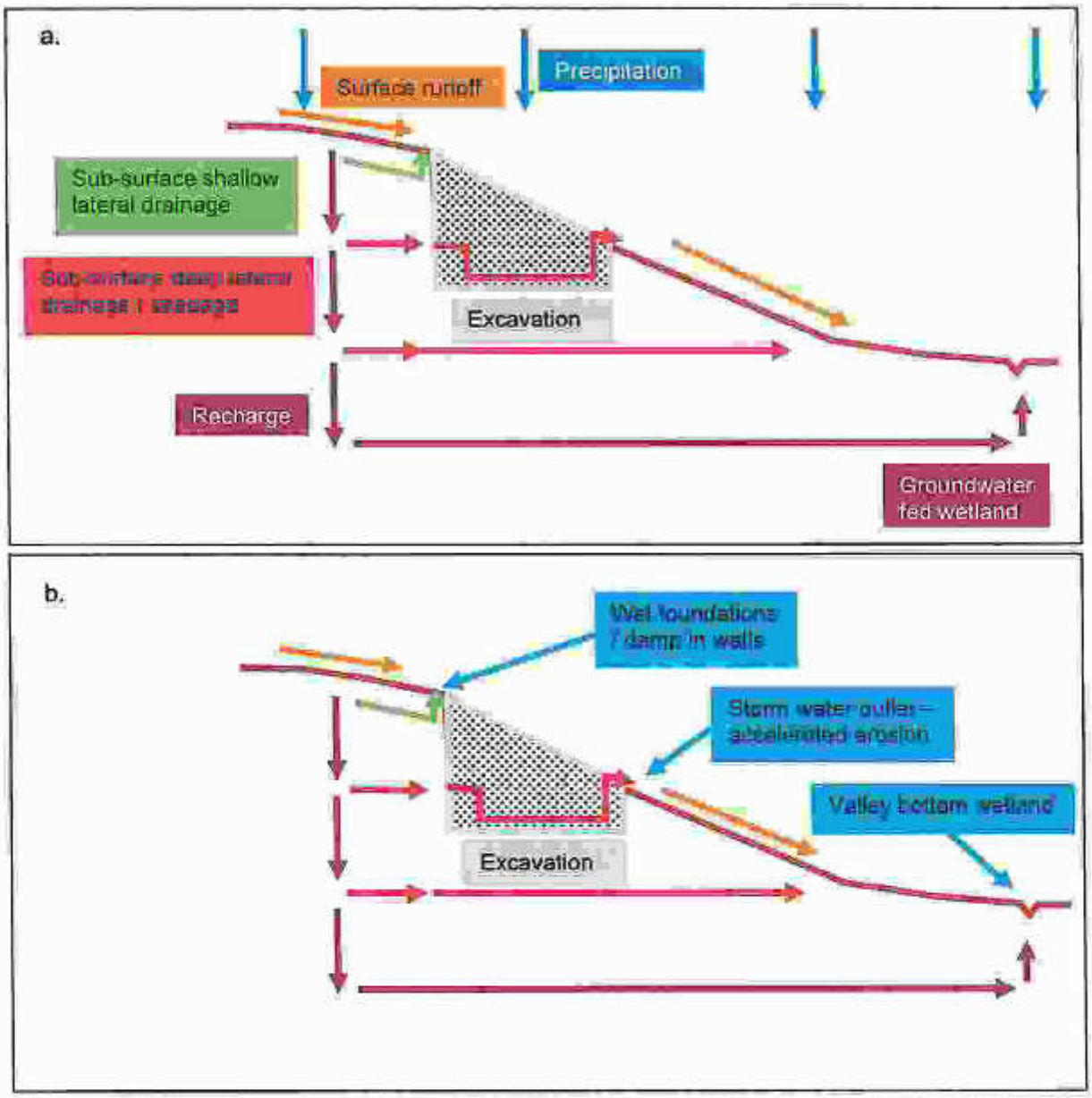

Figure 13 Different flow paths of water through a landscape with an excavated foundation (a) and typical wetland types associated with the altered water regime (b)

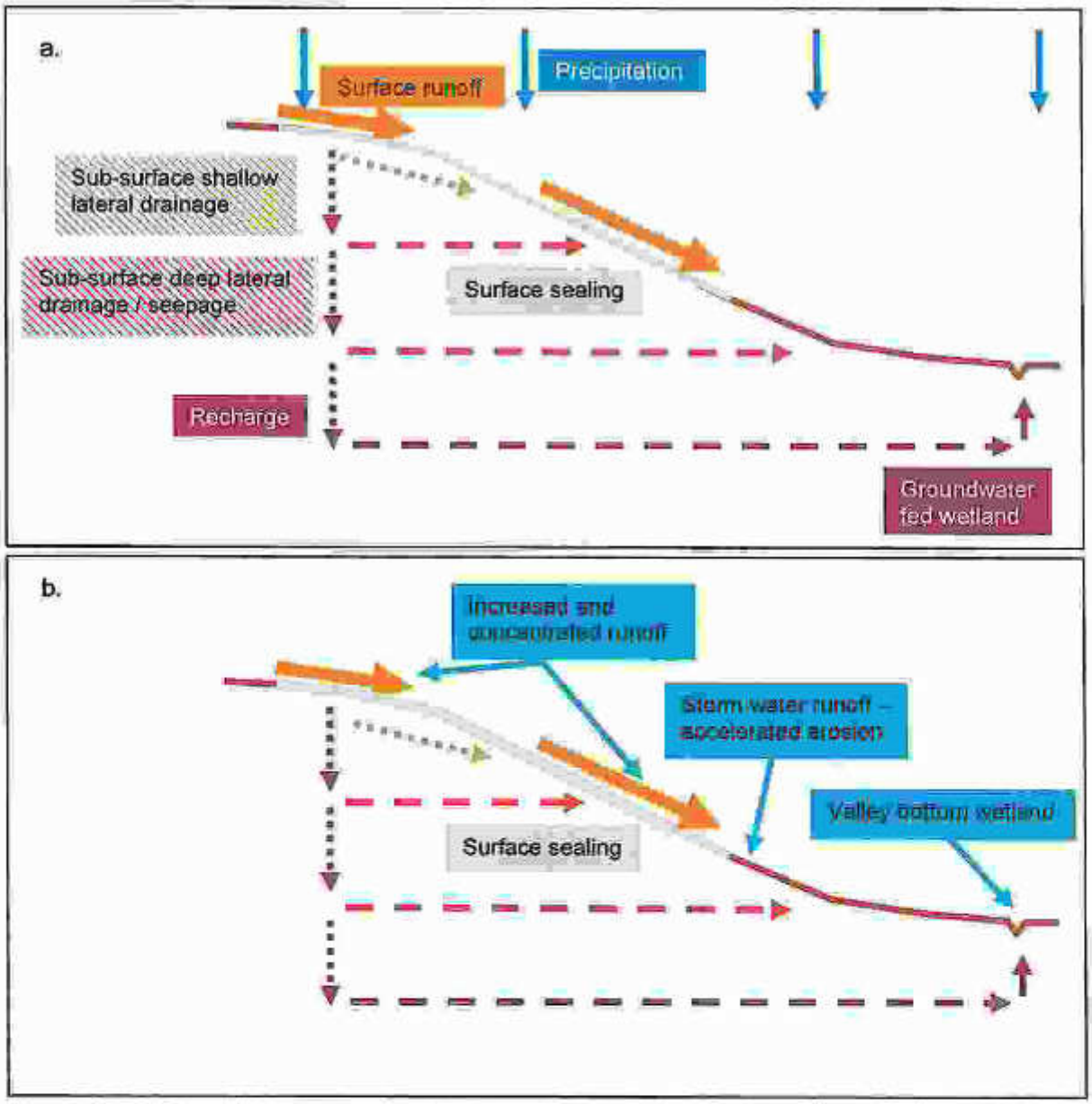

Figure 14 Different flow paths of water through a landscape with surface sealing (buildings and paving) (a) and typical wetland types associated with the altered water regime (b)

Through the excavation of pits (**Figure 13**) for the construction of foundations for infrastructure or basements for buildings the shallow lateral flow paths in the landscape are severed. As discussed above these flow paths can account for up to 60 % of the volume of water entering the landscape in the form of precipitation. These severed flow paths often lead to the ponding of water upslope from the structure with a subsequent damp problem developing in buildings. Euphemistically we have coined the term "wet basement syndrome" (WBS) to describe the type of problem experienced extensively on the HHGD. A different impact is experienced once the surface of the land is sealed through paving (roads and parking areas) and the construction of buildings (in this case the roof provides the seal) (**Figure 14**). In this case the recharge of water into the soil and weathered rock experienced naturally is altered to an accumulation and concentration of water on the surface with a subsequent rapid flowing downslope. The current approach is to channel this

water into storm water structures and to release it in the nearest low-lying position in the landscape. These positions invariable correlate with drainage features and the result is accelerated erosion of such features due to a drastically altered peak flow regime.

The result of the above changes in landscape hydrology is the drastic alteration of flow dynamics and water volume spikes through wetlands. This leads to wetlands that become wetter and that experience vastly increased erosion pressures. The next section provides a perspective on the erodibility of the soils of the HHGD. It is important to note the correlation between increasing wetness, perching of water and erodibility.

5.9 Soil Erosion on the Halfway House Granite Dome

Infiltration of water into a soil profile and the percolation rate of water in the soil are dependent on a number of factors with the dominant one being the soil's texture (**Table 2**). Permeability and the percolation of water through the soil profile are governed by the least permeable layer in the soil profile. The implication of this is that soil horizons that overlie horizons of low permeability (i.e. hard rock, hard plinthite, G-horizon) are likely to become saturated with water relatively quickly - particularly if the soil profile is shallow and a large amount of water is added. Another impermeable layer is one that is saturated with water and such a layer acts the same way as the ones mentioned earlier. In cases where internal drainage is hampered by an impermeable layer such as hard rock (the Dresden or Wasbank soil forms) evaporation and lateral water movement are the only processes that will drain the soil profile of water.

Table 2 Infiltration/permeability rates for soil textural classes (Wischmeier, Johnson & Cross 1971)

Texture class	Texture	Permeability Rate (mm/hour)	Permeability Class
Coarse	Gravel, coarse sand	>508	Very rapid
	Sand, loamy sand	152 – 508	Rapid
Moderately coarse	Coarse sandy loam	51 - 152	Moderately rapid
	Sandy loam		
	Fine sandy loam		
Medium	Very fine sandy loam	15 – 51	Moderate
	Loam		
	Silt loam		
	Silt		
Moderately fine	Clay loam	5.1 – 15.2	Moderately slow
	Sandy clay loam		
	Silty clay loam		
Fine	Sandy clay	1.5 – 5.1	Slow
	Silty clay		
	Clay (>60%)		
Very fine	Clay (>60%)	< 1.5	Very slow
	Clay pan		

Infiltration of water into a soil profile is dependent on the factors leading to the downward movement of water. In cases where impermeable layers exist water will infiltrate into the profile until it is saturated. Once this point is reached water infiltration will cease and surface runoff will become the dominant water flow mechanism. A similar situation will develop if a soil has a slow infiltration rate of water due to fine texture, hardened or compacted layers and low hydraulic conductivity. When these soils are subjected to large volumes and rates of rainfall the rate of infiltration will be exceeded and excess water will flow downslope on the soil surface.

The texture, permeability and presence of impeding layers are some of the main determinants of soil erosion. Wischmeier, Johnson and Cross (1971) compiled a soil erodibility nomograph from soil analytical data (**Figure 15**). The nomograph uses the following parameters that are regarded as having a major effect on soil erodibility:

- The mass percentage of the fraction between 0.1 and 0.002 mm (very fine sand plus silt) of the topsoil.
- The mass percentage of the fraction between 0.1 and 2.0 mm diameter of the topsoil.
- Organic matter content of the topsoil. This "content" is obtained by multiplying the organic carbon content (in g/100 g soil – Walkley Black method) by a factor of 1.724.
- A numerical index of soil structure.
- A numerical index of the soil permeability of the soil profile. The least permeable horizon is regarded as horizon that governs permeability.

Box 1 describes the procedure to use the nomograph.

As part of a different study 45 soil samples were collected from 19 points on the HHGD. The samples were described in terms of soil form and analysed with respect to texture (6 fractions) and organic carbon content of the A-horizons (data not presented here but available upon request). The erodibility index and maximum stable slope were calculated for each horizon (according to the method discussed above) in both an unsaturated and saturated soil matrix (data not presented here but available upon request).

The erosion risk is based on the product of the slope (in percentage) and the K-value of erodibility (determined from the Wischmeier, Johnson and Cross (1971) nomograph). This product should not exceed a value of 2.0 in which case soil erosion becomes a major concern. The K-value allows for a "hard" rainfall event but is actually based on scheduled irrigation that allows for infiltration and percolation rates and so-called "normal" rainfall intensity. Soil erosion potential increases with an increase in the very fine sand plus silt fraction, a decrease in the organic matter content, an increase in the structure index and a decrease in permeability. Water quality is assumed not to be a problem for the purposes of the erosion hazard calculations.

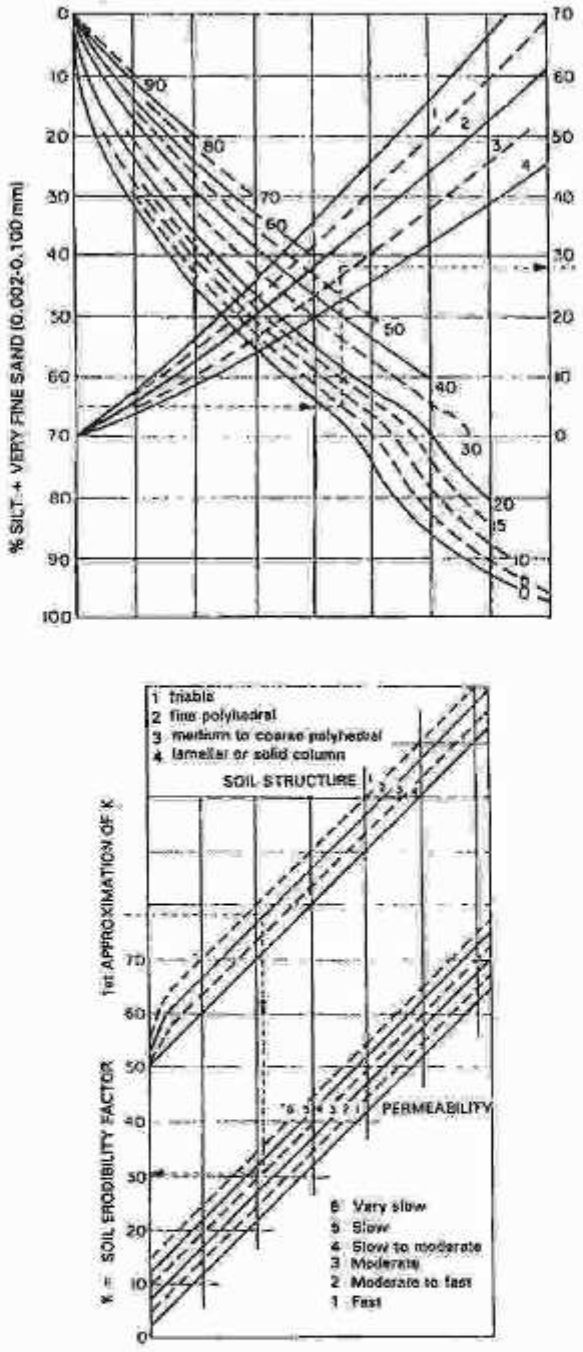

Figure 15 The nomograph by Wischmeier, Johnson and Cross (1971) that allows a quick assessment of the K factor of soil erodibility

Box 1: Using the nomograph by Wischmeier, Johnson and Cross (1971)

In examining the analysis of appropriate surface samples, enter on the left of the graph and plot the percentage of silt (0.002 to 0.1 mm), then of sand (0.10 to 2 mm), then of organic matter, structure and permeability in the direction indicated by the arrows. Interpolate between the drawn curves if necessary. The broken arrowed line indicates the procedure for a sample having 65% silt + very fine sand, 5% sand, 2.8% organic matter, 2 of structure and 4 of permeability. Erodibility factor K = 0,31.

Note: The erodibility factor increase due to saturation was also calculated. These results indicated an increase in erodibility of a factor predominantly between 3 and 4 for saturated soil conditions.

5.10 Detailed Soil Characteristics – Summarising Conclusions

The following general conclusions can be made regarding the soil characteristics of the HHGD (and the catchment):

1. The site (and catchment) is dominated by shallow to moderately deep sandy soils with deep soils occurring in the drainage features only;
2. The soils are dominantly coarse sandy in texture;
3. On the bulk of the site the soils are underlain by a hard plinthic layer (ferricrete) that acts as an aquaclude under natural conditions;
4. The bulk of the water movement on the site occurs within 50 cm of the soil surface on top of the ferricrete layer in the absence of human impacts;
5. Wetland delineation is a challenging exercise on the HHGD; and
6. The soils of the HHGD, as those of the site, are highly erodible, especially when saturated with water.

5.11 Recommended Assessment Approach – Hydropedology Investigation

5.11.1 Hydropedology Background

The identification and delineation of wetlands rest on several parameters that include topographic, vegetation and soil indicators. Apart from the inherent flaws in the wetland delineation process, as discussed earlier in this report, the concept of wetland delineation implies an emphasis on the wetlands themselves and very little consideration of the processes driving the functioning and presence of the wetlands. One discipline that encompasses a number of tools to elucidate landscape hydrological processes is "hydropedology" (Lin, 2012). The crux of the understanding of hydropedology lies in the fact that pedology is the description and classification of soil on the basis of morphology that is the result of soil and landscape hydrological, physical and chemical processes. But, the soils of which the morphology are described, also take part in and intimately influence the hydrology of the landscape. Soil is therefore both an indicator as well as a participator in the processes that require elucidation.

Wetlands are merely those areas in a landscape where the morphological indicators point to prolonged or intensive saturation near the surface to influence the distribution of wetland vegetation. Wetlands therefore form part of a larger hydrological entity that they cannot be separated from.

5.11.2 Hydropedology – Proposed Approach

In order to provide detailed pedohydrological information both detailed soil surveys and hydrological investigations are needed. In practice these intensive surveys are expensive and very seldom conducted. However, with the understanding of soil morphology, pedology and basic soil physics parameters as well as the collection and interpretation of existing soil survey information,

assessments at different levels of detail and confidence can be conducted. In this sense four levels of investigation are proposed namely:

1. Level 1 Assessment: This level includes the collection and generation of all applicable remote sensing, topographic and land type parameters to provide a "desktop" product. This level of investigation rests on adequate experience in conducting such information collection and interpretation exercises and will provide a broad overview of dominant hydropedological parameters of a site. Within this context the presence, distribution and functioning of wetlands will be better understood than without such information.
2. Level 2 Assessment: This level of assessment will make use of the data generated during the Level 1 assessment and will include a reconnaissance soil and site survey to verify the information as well as elucidate many of the unknowns identified during the Level 1 assessment.
3. Level 3 Assessment: This level of assessment will build on the Level 1 and 2 assessments and will consist of a detailed soil survey with sampling and analysis of representative soils. The parameters to be analysed include soil physical, chemical and mineralogical parameters that elucidate and confirm the morphological parameters identified during the field survey.
4. Level 4 Assessment: This level of assessment will make use of the data generated during the previous three levels and will include the installation of adequate monitoring equipment and measurement of soil and landscape hydrological parameters for an adequate time period. The data generated can be used for the building of detailed hydrological models (in conjunction with groundwater and surface hydrologists) for the detailed water management on specific sites.

For most wetland delineation exercises a Level 2 or Level 3 assessment should be adequate. For this investigation a Level 2 assessment was conducted with a reconnaissance soils survey and field work. Analysis of soils was not conducted but data from other sites with highly similar soils was also used to illustrate the challenges faced on the site and in the broader area.

The process of the hydropedology assessment entails the aspects listed in the methodology description below. These items also correspond with the proposed PES assessment methodology discussed in section 4.4.4. The results of the assessment will therefore be structured under the headings as provided below.

6. METHOD OF SITE INVESTIGATION

6.1 WETLAND CONTEXT DETERMINATION

For the purposes of the wetland buffer assessment the context of the specific wetland was determined. This was done through the thorough consideration of the geological, topographical, climatic, hydropedological and catchment context of the site. In this sense the relative contribution of water flow from the catchment upstream was compared to the contribution from the slopes on

the specific site. The motivation being that the larger the contribution of the catchment upstream the smaller the impacts of the proposed developments on the site would be in terms of modification of the wetland. The elements of context are described in more detail below.

6.2. Aerial Photograph Interpretation

An aerial photograph interpretation exercise was conducted through the use of Google Earth Images and historical aerial photographs of the site. This data was used to obtain an indication of the extent of the wetlands on the site as well as to provide an indication of the artificial modifiers evident on the site and in the catchment.

6.3 Terrain Unit Indicator

Detailed contours of the site (filtered to 5 m intervals for the purpose of map production) were used to provide an indication of drainage depressions and drainage lines. From this data the terrain unit indicator was deduced.

6.4 Soil Form and Soil Wetness Indicators

The soil form and wetness indicators were assessed on the site through a dedicated soil survey within the context of the description of the HHGD as provided in sections 5.5 to 5.7. During the soil survey areas of significance were identified and soil auger profile description activities conducted for the specific areas.

Historical impacts were identified as the impacts on the soils are very distinct. Soil characteristics could therefore be used to provide a good indication of the historical impacts on the grounds of a forensic approach. In areas where soil impacts are limited the standard approach in terms of identification of soil form and soil wetness indicators was used.

6.5 Vegetation Indicator

Due to the extent of the historical impacts as well as the timing of the investigation a dedicated vegetation survey for the purpose of wetland delineation was not conducted. Relevant vegetation parameters were noted and these are addressed in the report where applicable.

6.6 Artificial Modifiers

Artificial modifiers of the landscape and wetland area were identified during the different components of the investigation and are addressed in the context of the wetland management plan.

7. SITE SURVEY RESULTS AND DISCUSSION

7.1 WETLAND CONTEXT

The land type, topography and geological setting of the site have been elucidated in section 2 of this document. The main wetland feature on the site is limited to a drainage channel and associated wetland area that runs from north to south parallel to the Ben Schoeman (N1) highway. The original wetland area is also crossed by Allandale road and its associated on- and off-ramps from the N1. The headwater area of the wetland has been developed extensively and is for all intents and purposes entirely sealed with hard surfaces. The original catchment is indicated on the DEM in **Figure 15** and on the recent satellite image with contours in **Figure 16**.

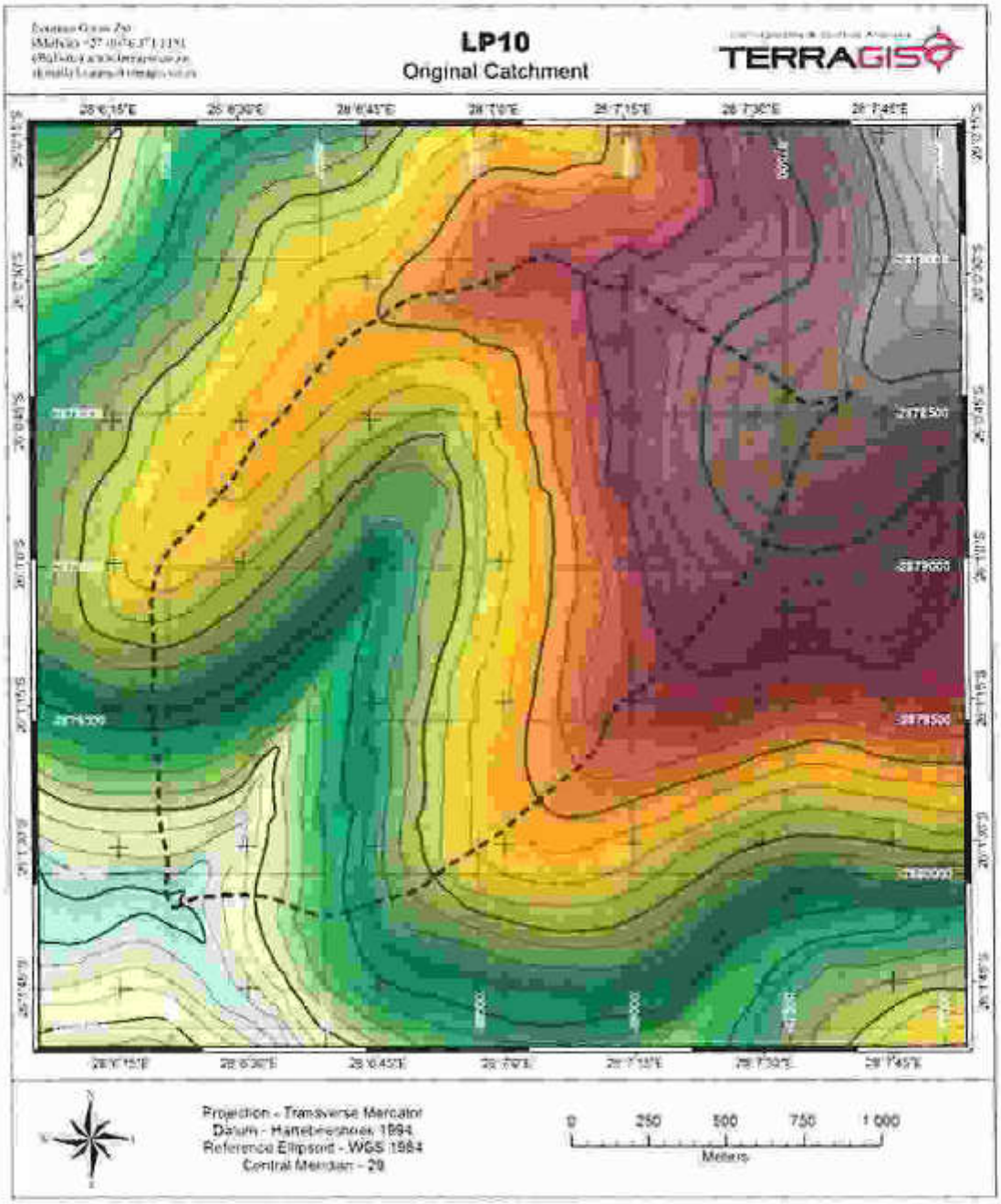

Figure 15 DEM of the wetland/watercourse catchment

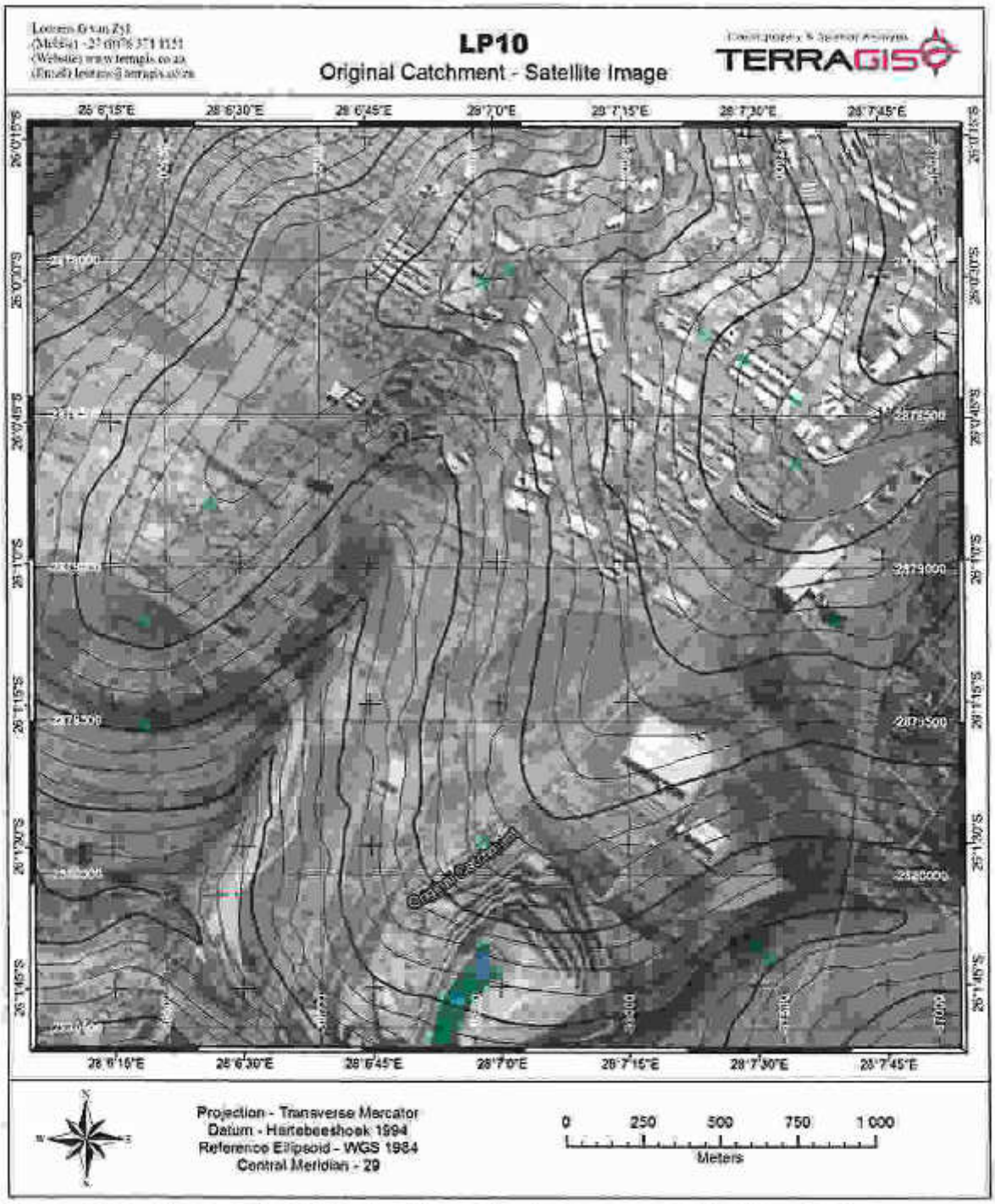

Figure 16 Contours and catchment of the wetland/watercourse under investigation

7.2 AERIAL PHOTOGRAPH INTERPRETATION

The aerial photograph interpretation was conducted in two stages namely 1) the interpretation of historical aerial photographs indicating the specific wetland conditions and changes and 2) the Google Earth images indicating specific activities and changes on the site.

7.2.1 Historical Aerial Photographs

The historical data collected for the site include aerial photographs of 1938, 1952, 1968, 1976, 1985 and 1991. **Figure 17** indicates the land status in 1938 with clear signs of crop production and other land uses within the headwaters of the wetland/watercourse. **Figure 18** indicates the changes from 1952 to 1968 with the construction of the N1 highway as well as Allandale Road in the late 60s. In **Figure 19** the intensification of urban developments in the headwaters of the wetland/watercourse is evident. None of the images indicate any significant wetland expression in the lower reaches of the watercourse leading to the conclusion that the headwater area constituted the more pronounced wetland area. This is in agreement with the discussion provided earlier on the typical wetland distribution trends found on the HHGD. Significant erosion scars are also not evident in the images.

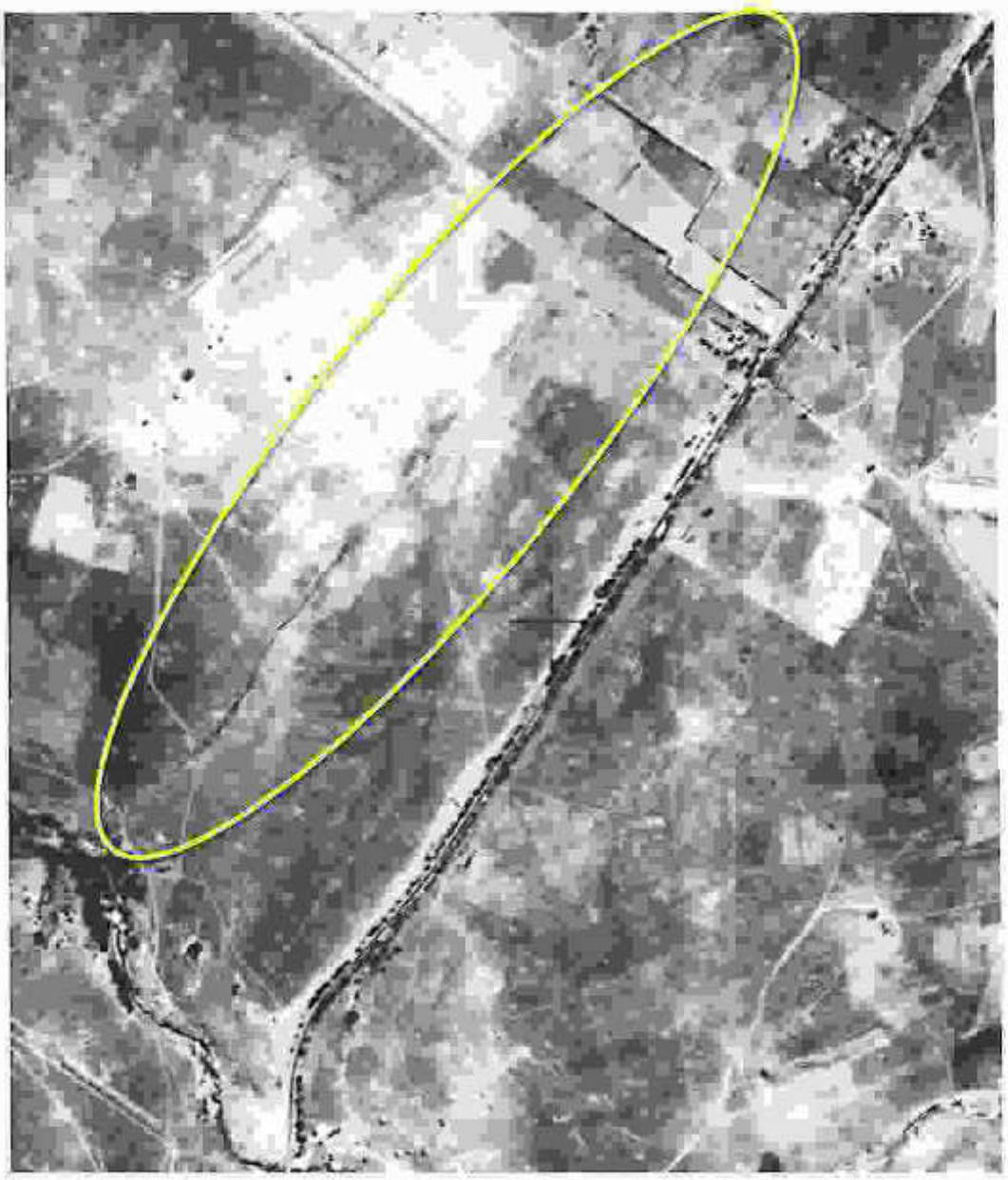

Figure 17 The LP10 wetland and watercourse land characteristics in 1938

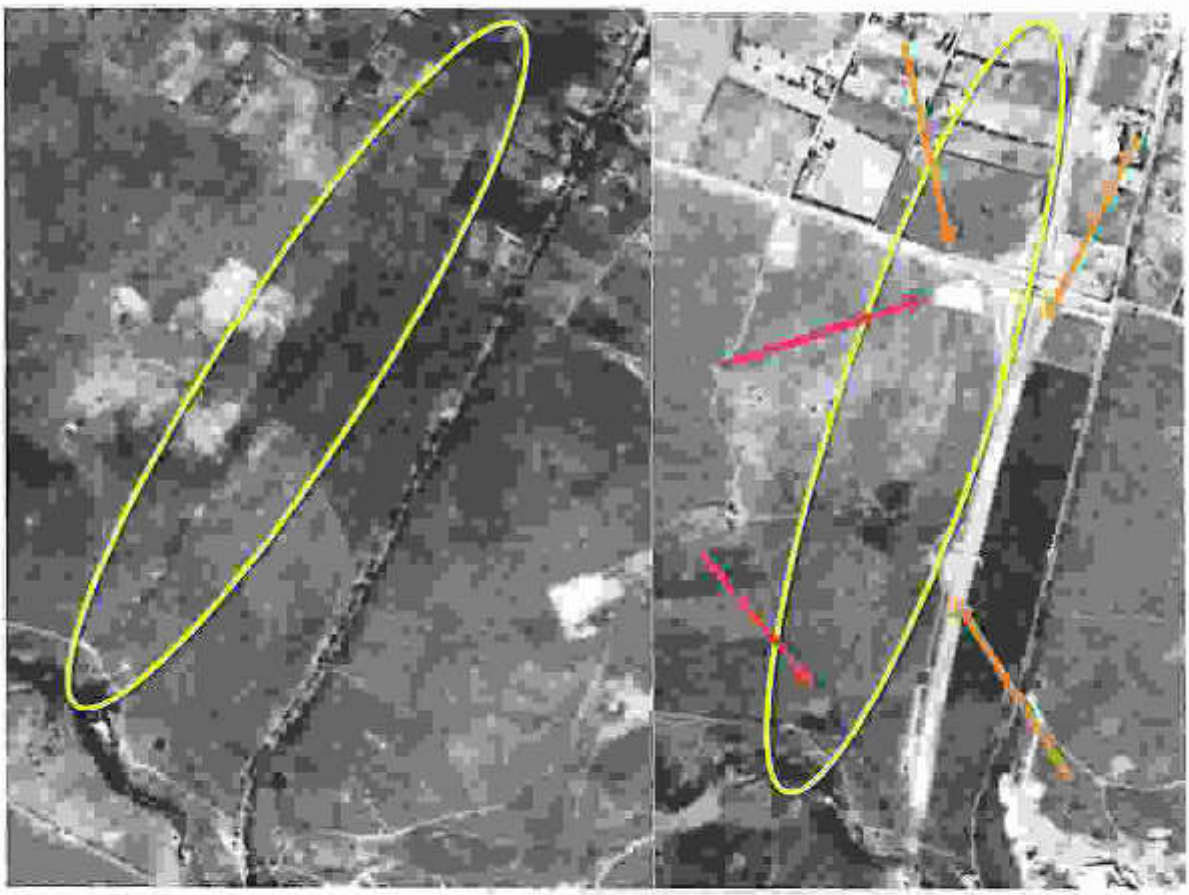

Figure 18 The LP10 wetland and watercourse land characteristics in 1952 (left) and 1968 (right) with dams (red arrows) and construction of the N1 highway and Allandale Road (orange arrows) evident in the latter

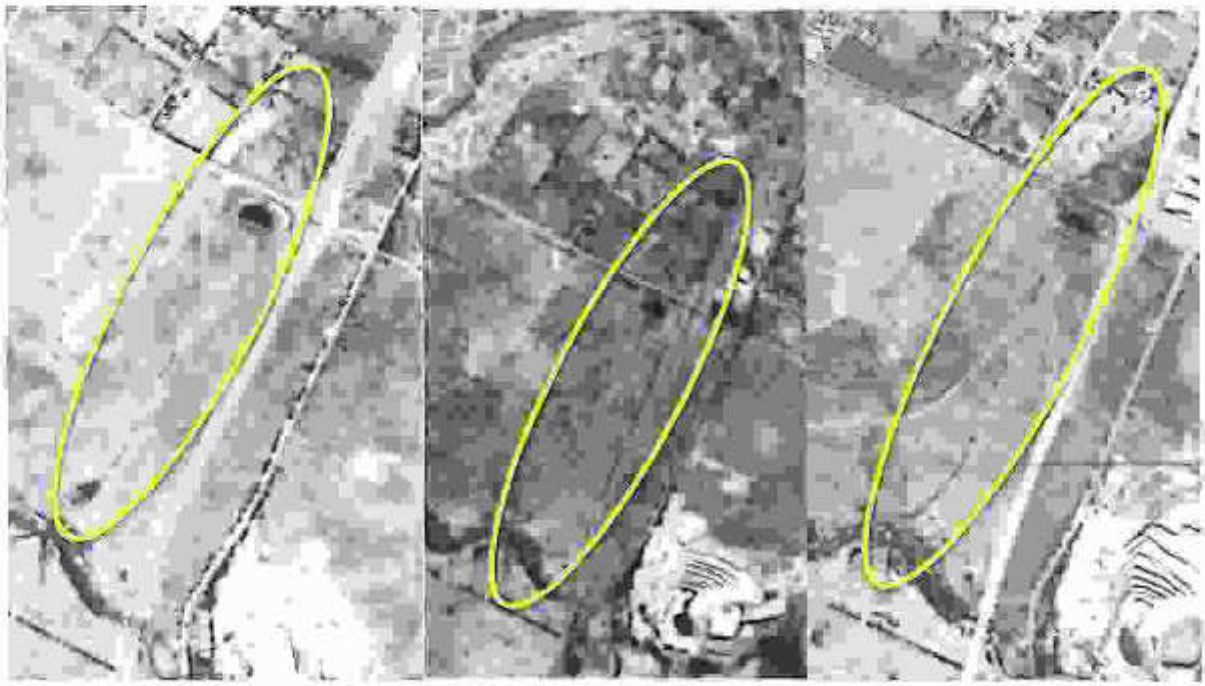

Figure 19 The LP10 site land characteristics during 1976, 1985 and 1991 (left to right) with the urban development intensification visible during the periods

7.2.2 Recent Google Earth Images

The Google Earth images of the site were used to identify specific impacts and their timing in high resolution. **Figures 20** to **24** indicate the rapid intensification of urban development for the entire watercourse since 2001.

Figure 20 Google Earth images from 2001/07/20 (top) and 2004/03/26 (bottom)

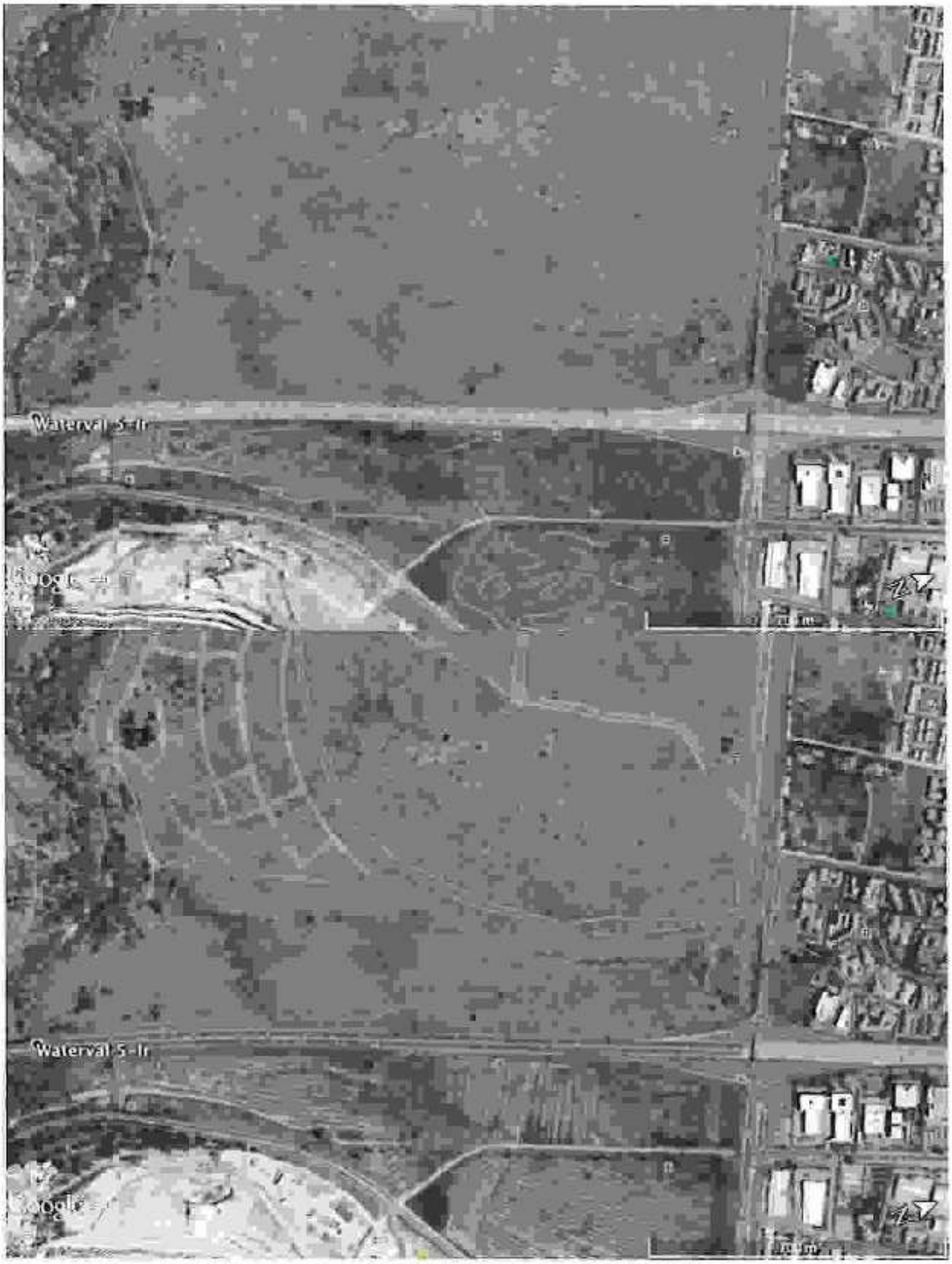

Figure 21 Google Earth images from 2006/08/10 (top) and 2008/09/07 (bottom)

Figure 22 Google Earth images from 2009/04/24 (top) and 2010/10/20 (bottom)

Figure 23 Google Earth images from 2011/07/02 (top) and 2013/07/14 (bottom)

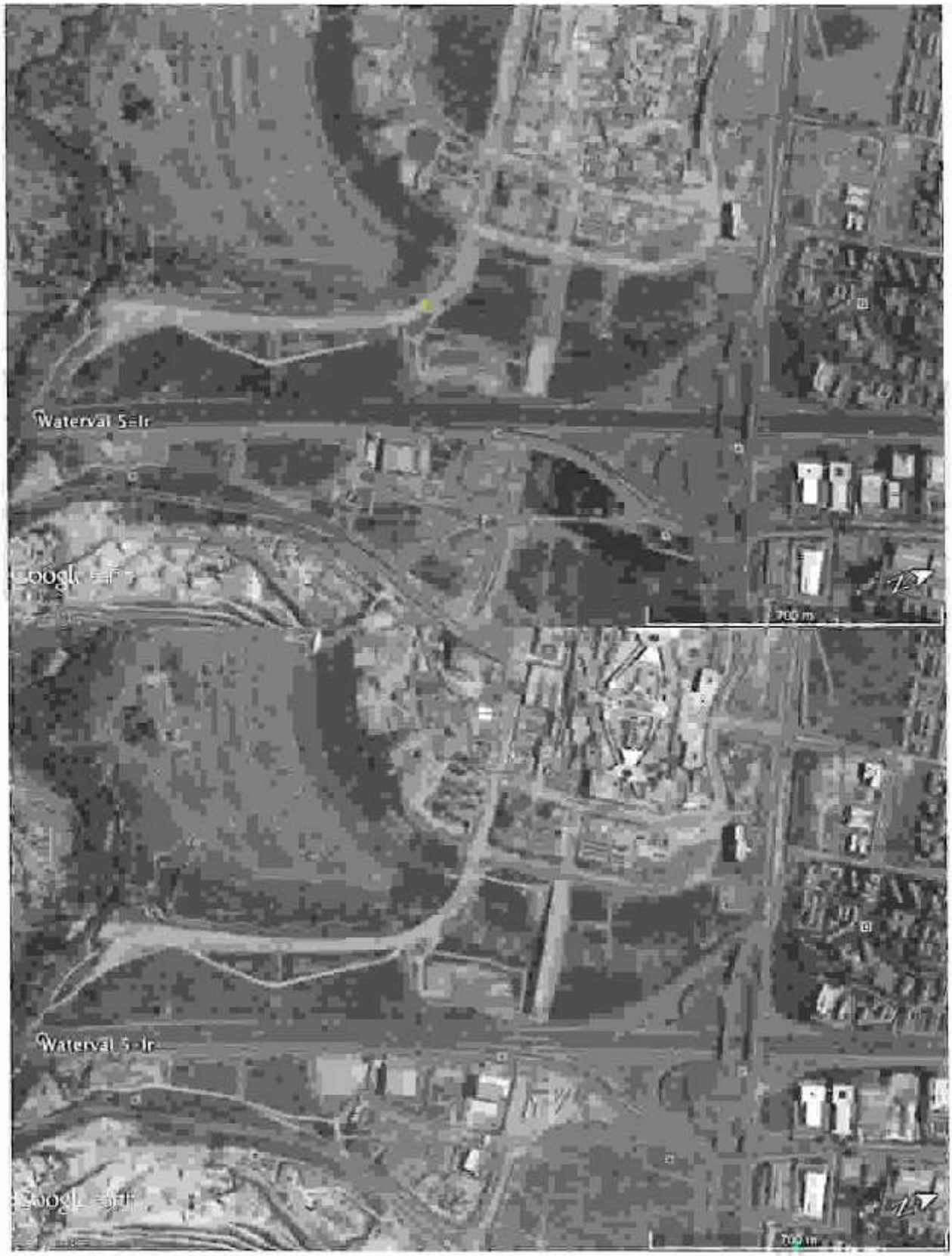

Figure 24 Google Earth images from 2014/08/08 (top) and 2015/06/10 (bottom)

The erosion damage increase to the watercourse, as compounded by increased rapid storm water runoff from paved and sealed areas is evident in images from 2001 to 2014 (**Figures 25** and **26**).

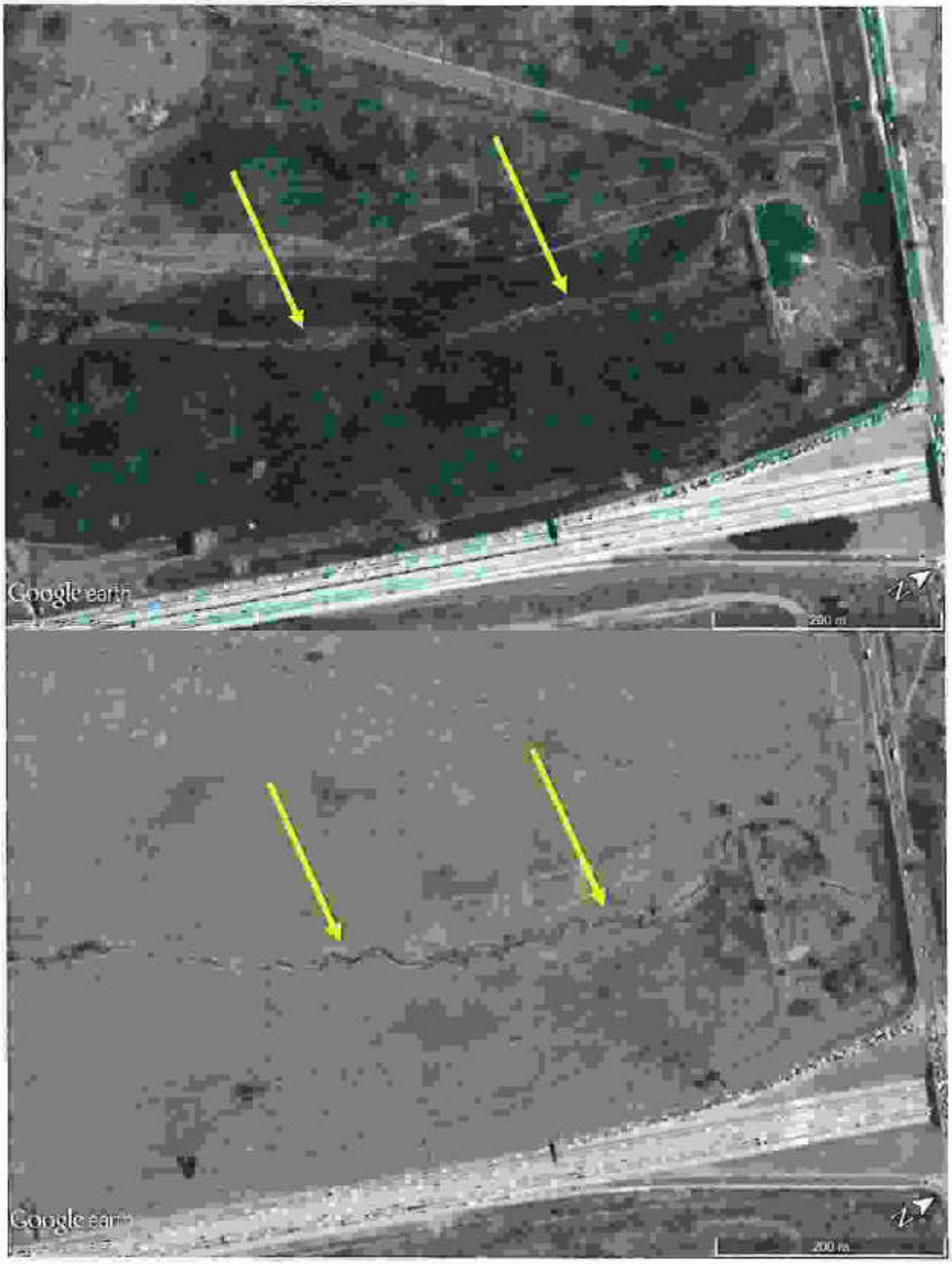

Figure 25 Google Earth images from 2001/07/20 (top) and 2006/08/10 (bottom) indicating erosion

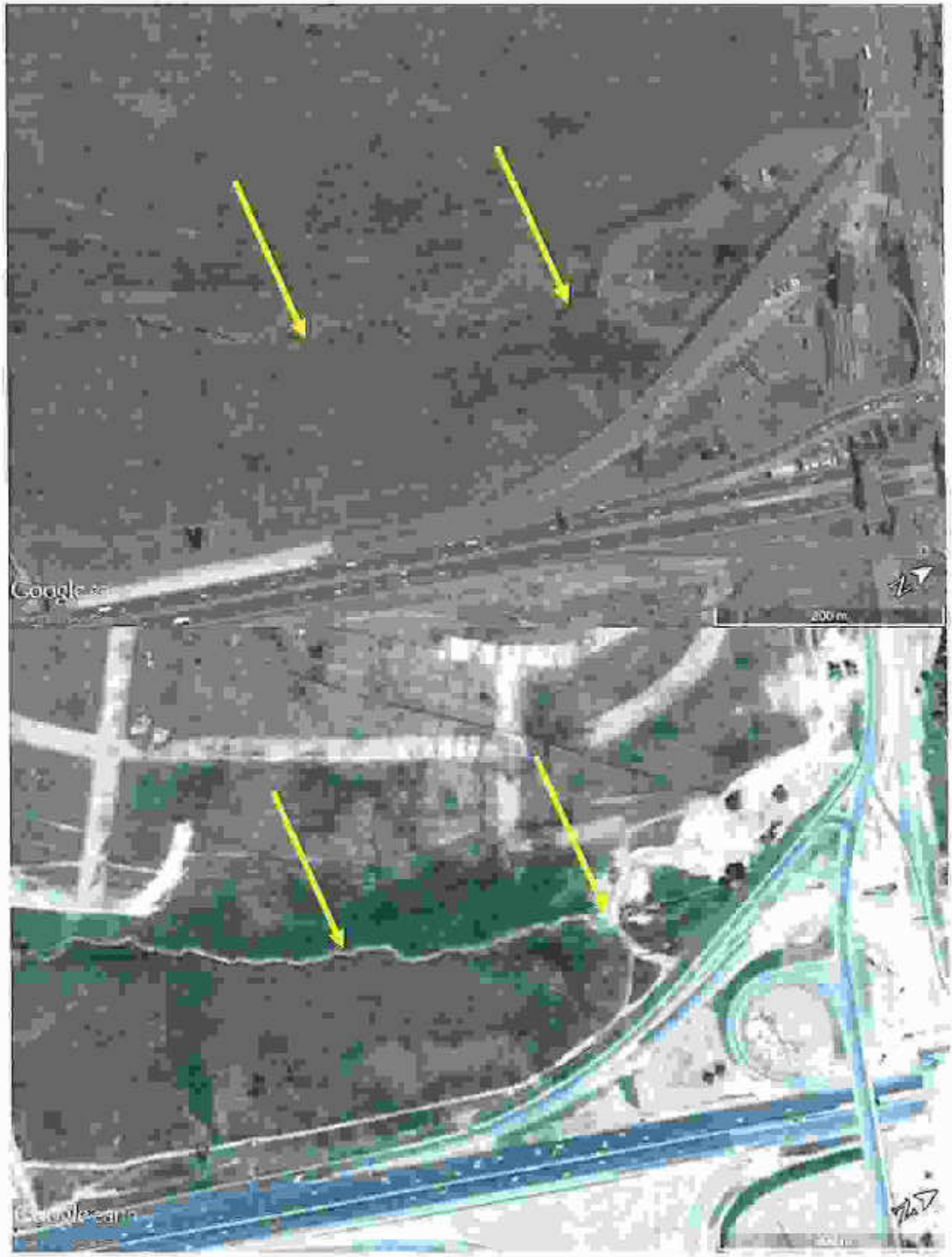

Figure 26 Google Earth images from 2009/05/07 (top) and 2010/12/15 (bottom) indicating erosion

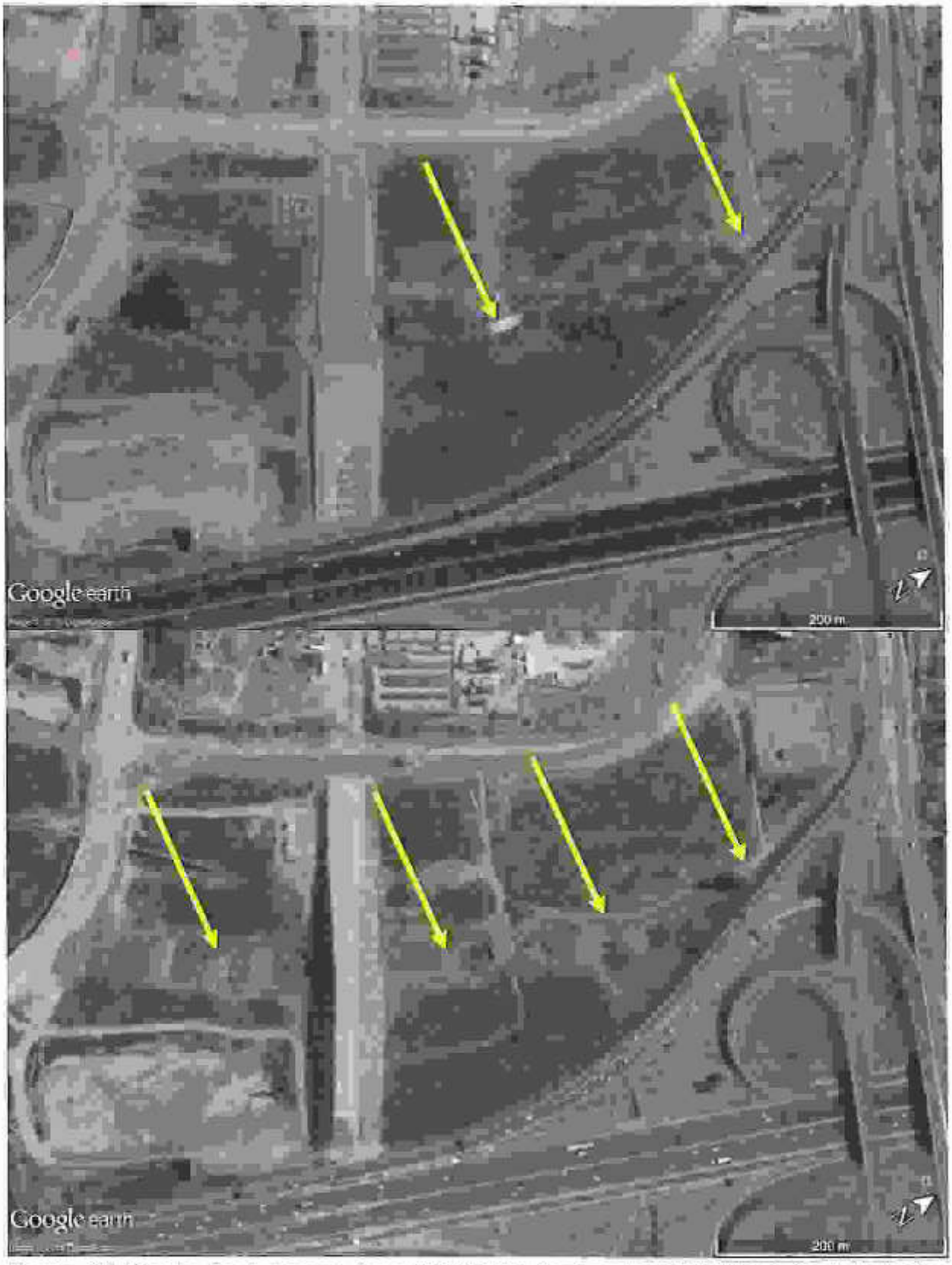

Figure 27 Google Earth images from 2014/08/10 (top) and 2015/06/10 (bottom) indicating rehabilitation and stabilisation work within the watercourse

7.3 TERRAIN UNIT INDICATOR

From the contour data a topographic wetness index (TWI) (**Figure 28**) was generated for the site.

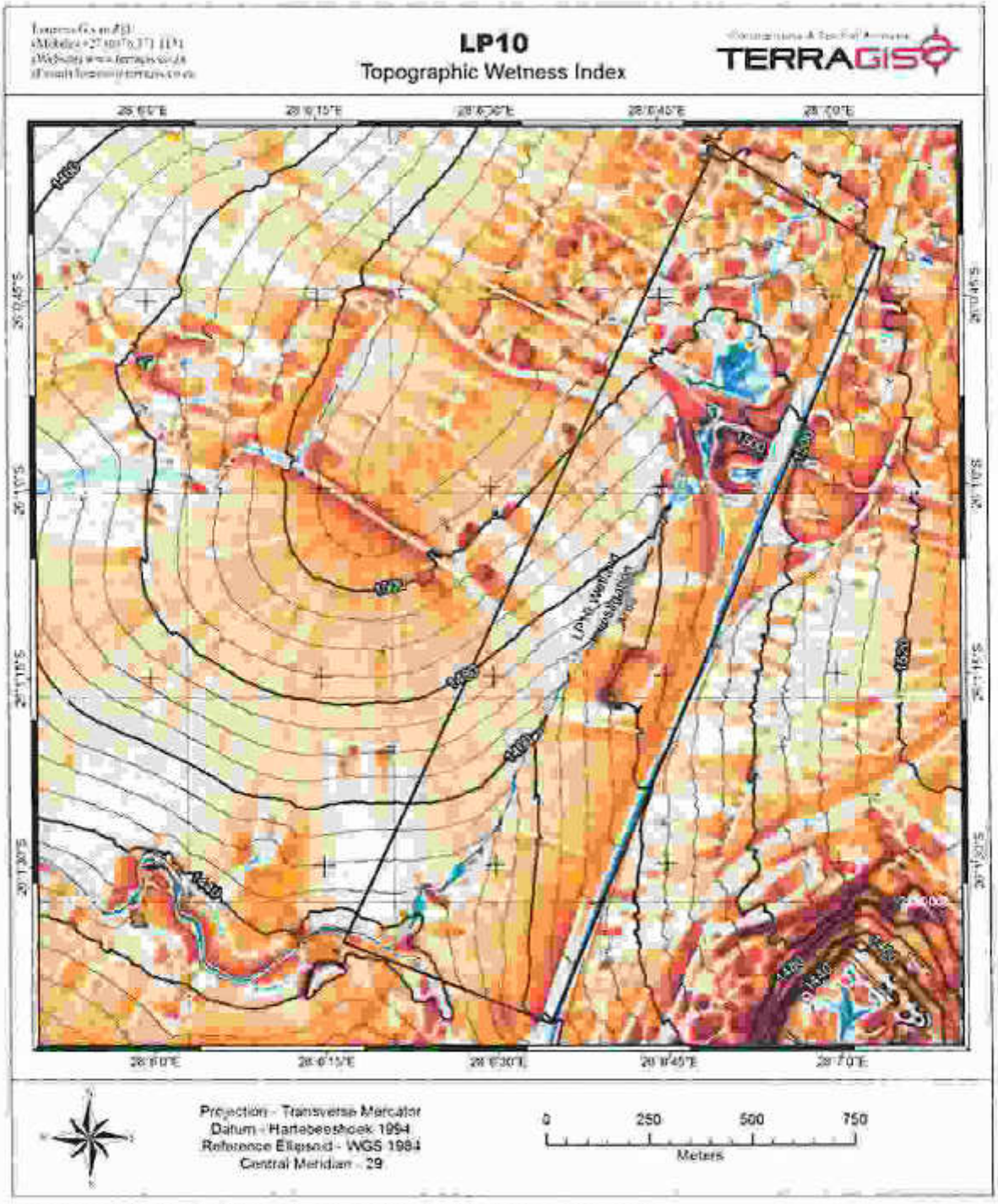

Figure 28 Topographic wetness index (TWI) of the survey site

From extensive experience on the field of hydropedology it is evident that the TWI provides a very accurate indication of water flow paths and areas of water accumulation that are often correlated with wetlands. This is a function of the topography of the site and ties in with the dominant water flow regime in the soils and the landscape (refer to previous section where the concept of these flows was elucidated). Areas in blue indicate concentration of water in flow paths with lighter shades of blue indicating areas of regular water flows in the soils and on the surface of the wetland / terrestrial zone interface.

The image indicates significant alteration in the catchment of the watercourse in the form of varied flow and water accumulation areas (north of Allandale Road). Under undisturbed conditions the flow paths are smoother due to diffuse water flows. Significant alteration of the watercourse is also evident but the data's age conceals the more recent drastic alterations on the site as observed in the more recent satellite images.

7.4 Soil Form and Soil Wetness Indicators (and Vegetation)

A dedicated field verification exercise was conducted through the auguring of the soils within the wetland feature. The soils found on the site conform largely to the description provided in section 5.5 to 5.7. The soils within the drainage feature are predominantly high clay content swelling soils with vertic properties. Vertic soils are highly erodible once disturbed and this observation accounts for the rapid degradation of the watercourse once storm water volumes increased following surface sealing in the catchment.

7.5 Artificial Modifiers

Most of the physical historical artificial modifiers on the site were addressed in the sections above. The driver of most of the modifications is the altered hydrology of and runoff from the urban structures in the catchment area. Additional impacts are the concentrated and increased storm water runoff from the extensive road network in the area (**Figure 29**). These impacts are expected to increase with increased sealing of the site's and catchment's open land areas.

8. WETLAND ASSESSMENT

8.1 Proposed Delineation and Buffer

Due to the highly impacted nature of the wetland on the site, taking into account all the historical modifiers as well as future authorised impacts, a delineation exercise would not yield any information of value and is therefore not provided. Similarly, due to the significant impacts a buffer is a meaningless property if it does not inform and guide dedicated storm water management and soil stabilisation interventions. The main aspects that have to be addressed are sediment generation and erosion.

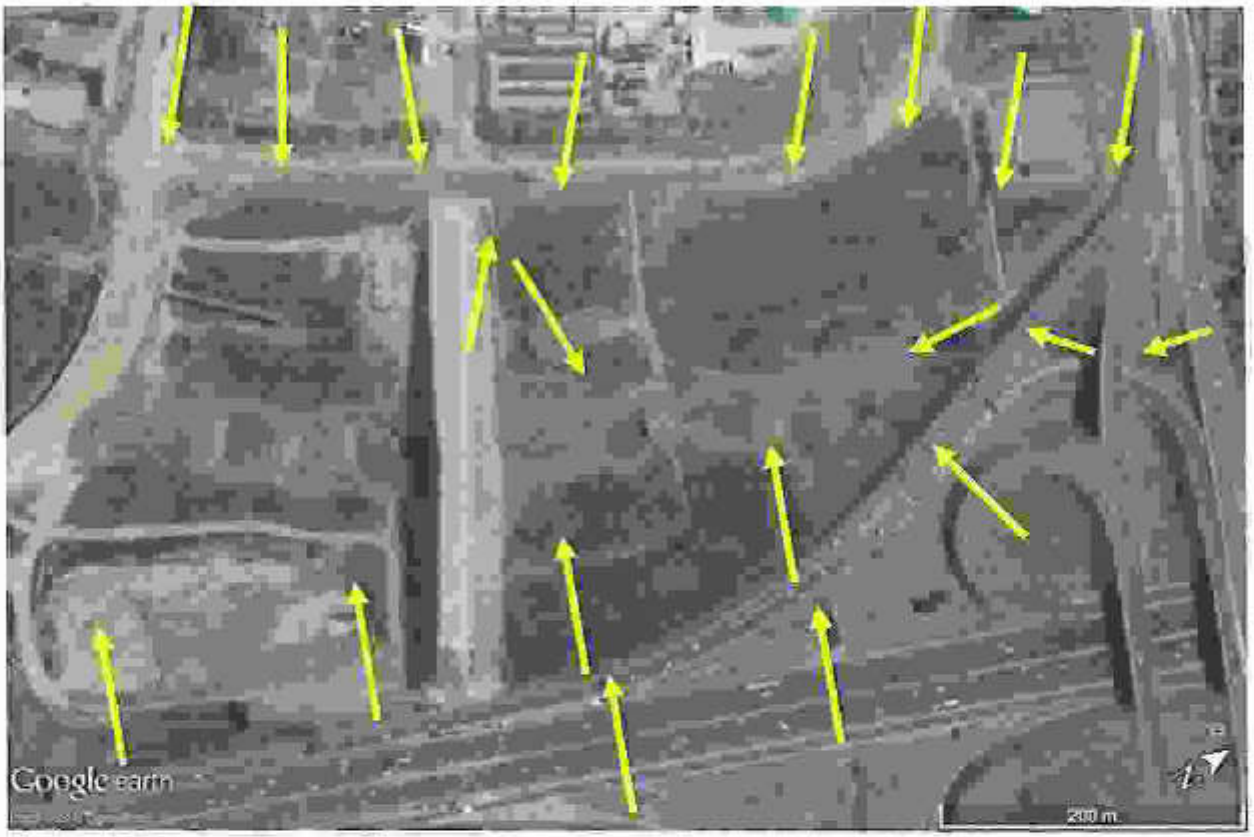

Figure 29 Storm water runoff increase and areas on the site (indicated by yellow arrows)

8.2 WETLAND CLASSIFICATION / TYPES

Based on the information generated in this document the wetland area is classified as a highly altered valley bottom wetland system with significant impacts on the original hillslope seeps and hydrological functioning.

8.3 WETLAND FUNCTIONALITY

The functionality of the wetland system has been highly compromised through human activities, building and urban infrastructure development within the catchment and destruction of wetland and drainage systems feeding into the drainage feature. The watercourse has been stabilised but in the process its functionality has been altered completely, albeit into a more positive water energy dissipation and sediment trapping function.

8.4 PRESENT ECOLOGICAL STATUS (PES) DETERMINATION

The PES determination requires a comparison between the reference state and the current state of the watercourse/wetland. As there is a drastic hydrological alteration due to the surrounding activities as well as the wetland rehabilitation exercise the reference state has been altered completely. A new reference state has been established and the success of such an intervention can only be determined through continued monitoring and maintenance of the constructed system.

9. MANAGEMENT REQUIREMENTS AND MITIGATION OF STORM WATER

It is imperative that the wetland (and other open soil areas on the site) be protected against increased erosion pressures through the implementation of the following:

1. Adequate storm water mitigation throughout the construction site (from start to completion) to prevent large pulses in storm water.
2. Sediment containment structures throughout the site to prevent sediment runoff and accumulation in the wetland area.

It is not the purpose of this document to provide detailed designs for mitigation measures as these should be generated by a suitably qualified engineer in conjunction with a suitably qualified wetland soil specialist. There are a few general pointers though that should be adhered to namely:

1. Subsurface lateral flow of water leads to the interception of such water once foundations are sunk into the soils and weathered rock / hard plinthite. Adequate drainage structures should be constructed to prevent damp problems in structures arising within the soil profiles and landscape start filling with water once rainfall increased during summer months.
2. In many areas it has been found that the water moving downslope in the fractured rock is under positive pressure (due to gravity) with a consequent squirting out from severed preferential flow structures. This implies that in some areas water ingress into foundations and basements can occur from below (leading to the expression of a "wet basement syndrome" as mentioned under section 5.8). Structures constructed in areas with such risks should have additional water removal mechanisms implemented at the structure / ground interface. These can include dedicated containment and drainage features. Where cut and fill operations take place with a consequent large volume of "overburden" material over the soil a specific capillary break layer with associated drainage should suffice.
3. Surface sealing of the landscape through roads, parking areas, roof covered areas and general soil compaction leads to accelerated and increased surface water runoff. In order to mitigate the potential large volumes over a large area numerous small containment structures with choked outflows should be constructed throughout a site. The fewer these structures are the larger other structures have to be to contain the said water. As a minimum requirement these structures should be adequate and enough to contain the standard storm water runoff from a site before it reaches the wetland /drainage feature area.
4. Several soft engineering approaches exist for the successful mitigation of storm water. If these are incorporated into the design and layout of development sites impacts on the wetlands and drainage features can be successfully mitigated.
5. In terms of both the NWA (National Water Act) and NEMA (National Environmental Management Act) landowners have a duty to protect water resources, watercourses and wetlands. In addition, CARA (Conservation of Agricultural Resources Act) and the municipal bylaws address storm water aspects that are of importance to land owners and managers. Insufficient attention to storm water related impacts during the design phase of a

development can lead to administrative and criminal liabilities for the developer / land owner post development.

6. Important: In the absence of adequate management of storm water, wetland impacts in terms of erosion will be inevitable therefore exposing the relevant entities involved with the development to unacceptable punitive administrative action or even criminal prosecution.

10. DEVELOPMENT FOOTPRINT AND BUFFER REQUIREMENT

The development footprint envisaged for the site is indicated in **Figure 30.**

Figure 30 Development footprint for the site

Within the context of the developments planned for the site as well as the very extensive historical modifiers and impacts a standard 30 m buffer, which requires land to be left open along the delineated wetland, is considered totally ineffectual. The main reason for this statement is the fact that the entire catchment has been altered and that dedicated management is now required to stabilise soils on the site and in drainage features. It is therefore proposed that a buffer requirement be replaced with a dedicated storm water management plan for the site. Due to the enlargement of the drainage channel through rehabilitation, many of the functions assigned to a buffer can be performed by the widened and stabilised channel. In this regard it is recommended that the edge of the new drainage channel be stabilised and that dedicated storm water infrastructure be constructed on the site within the original buffer area. Encroachment of building footprints is acceptable within the context of the drastic historical impacts with the provision that the storm water planning be conducted in such a manner as to lead to a stable post development site.

11. CONCLUSIONS AND RECOMMENDATIONS

A wetland investigation and soil survey yielded that:

1. The wetland area and its catchment have been altered significantly through historical human activities in the form of urban infrastructure development and storm water alteration.
2. The eroded drainage channel / watercourse has been rehabilitated and widened to accommodate more water and attenuate water energy and flows. This construction has widened the channel in such a way that the original buffer area has been altered significantly in terms of structure and functioning. Due to the widened channel many of the functions assigned to a buffer could be performed by the newly established drainage feature.
3. A no-go buffer on the rehabilitated wetland is considered problematic as the site requires very significant and focussed storm water planning and intervention for the stabilisation of the watercourse as well as prevention of sediment generation. As such it is recommended that the original buffer requirements be removed entirely and that a dedicated storm water and erosion mitigation plan be generated by the engineers and architects. Encroachment of building footprints into the original buffer area is allowed on the condition that storm water structures and sediment mitigation structures be included throughout in the layout of the urban developments.
4. Due to the alteration of hydrological parameters on the site it is advised that all building foundations be assessed in terms of water flow around and under and that adequate damp proofing and engineering interventions be planned to prevent post development water problems.

REFERENCES

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Annexure I

Details of Proposed Name Change

7. AMENDMENTS APPLIED FOR IN TERMS OF PART 1 AMENDMENT PROCESS

Describe the amendments being applied for and motivation as to why the amendments are required,.

Amendment requested	Reason why amendment is required
Amendment of the current Holder of Authorization: Current Holder of Authorization- **Waterval Islamic Institute** **Contact Person:** Mr. Hercules Coenraad Bezuidenhout (authorized representative of the Land-Owner – *Refer to Addendum B for Power of Attorney*)	The name and contact details of the applicant changed and the Decision requires that the Department be informed of a name change and transfer of responsibilities.

New/Amended Holder of Authorization- **Postal Address:** ATTACQ WATERFALL INVESTMENT COMPANY (Pty) Ltd (AWIC) P.O. Box 2527 Sunninghill 2157 **Physical Address:** Building 2 Maxwell Office Park Maxwell Crescent West Waterval City Jukskei View 2090	

Please provide reasons why the amendment will not change the scope of Environmental Authorisation, why the amendment will not increase the level or nature of impact, which impact was assessed and considered when application was made for an Environmental Authorization and as well as how such impact will affect the Interested and Affected Parties

Part 1 of this amendment application is for a name change.

Take note that this amendment application also includes a request for the reduction of a wetland buffer. This amendment will be more substantial and will therefore qualify for a part 2 amendment.

Please provide the nature of impact (positive or negative) that will arise as a result of granting or not granting the proposed amendment and how such impact will affect the Interested and Affected Parties

No impact

Annexure J

Storm Water Management Plan

C-PLAN CIVIL ENGINEERS (PTY) LTD
Reg No 2000/006107/07

Address : 459 Ontdekkers Road, Florida Hills
Postal Address : PO Box 6622, Westgate, 1734
Tel : (011) 472-2277
Fax : (011) 472-2305
E-mail : kc@cplan.co.za

Atterbury Property Development
Maxwell Office Park
Magwa Crescent West
c/o
Bokamoso
Mr C Niemandt

Thursday, 12 May 2016

BUFFER RELAXATION – IMPACT ON LOWER LYING AREAS

C- Plan Civil Engineers have been appointed to investigate the impact of the possible relaxation of the buffer zone currently on the stormwater channel in Pocket 10 at Waterfall City.

Currently the land is undeveloped and consists mainly of natural / planted veld grass, once the area is developed it will consist of buildings / paving and landscaping

The runoff will change from natural veld grass to hard stand affecting the natural infiltration rate

Attached are the calculation and hydrographs for the scenario explained above. The additional affected are is a total of 42 175m²
The 1:5 and 1:25 year rainfall recurrence have been used typically for the Gauteng area

A further swale as per drawing **16533-100-C01** has been proposed to counter the additional runoff. The swale is not fixed in its position and can move up or down the stream with ±35m to suit existing site conditions
From the attached calculations it can be deduced that adding the additional swale will counter the additional runoff.
It is recommended that the swale is constructed to counter the additional runoff should the buffer zone be relaxed as proposed

We trust that this is acceptable, should there be any additional information required, please do not hesitate to contact the writer

Yours faithfully,

KC Ooijkaas
C-Plan Civil Engineers
0823362563

1) SUMMARY

The report has taken into account the whole catchment area that will be going into the attenuation pond. Two separate simulations were performed for the development, please refer to the following below:

i. Pre development

The average slope of the proposed development is 5% with one catchment area. The catchment slopes in the western direction.

ii. Post development

A total of **1** catchment was grouped into **a** basic hydrological zone mainly consisting of hard surface areas.

iii. Summary of Maxima (Out-flows)

Based on numerous simulation runs performed on the development, the following criteria meet the requirements of Johannesburg Roads Agency, Please refer to the tables below.

1) Return Period 1:5 year storm

Pre Development				Post Development			
Node No.	Peak outlet m^3/s	Time of concentration	Page No.	Node No.	Peak outlet m^3/s	Storm duration	Page No.
Zone1	0.186	60 (Minutes)		Res1	0.157	60 (Minutes)	

2) Return Period: 1:25 year storm

Pre Development				Post Development			
Node No.	Peak outlet m^3/s	Time of concentration	Page No.	Node No.	Peak outlet m^3/s	Storm duration	Page No.
Zone1	0.367	60 (Minutes)		Res1	0.157	40 (Minutes)	

The catchment area affected is 4.2 ha, the catchment area requires a dam volume of 1470m^3.

iv. Sizing of attenuation pond:

Description	Volume
Res 1	1 473 m^3

1 473 m^3

Please note the following parameters were utilized

a) Pre Development

a. Regional Layouts

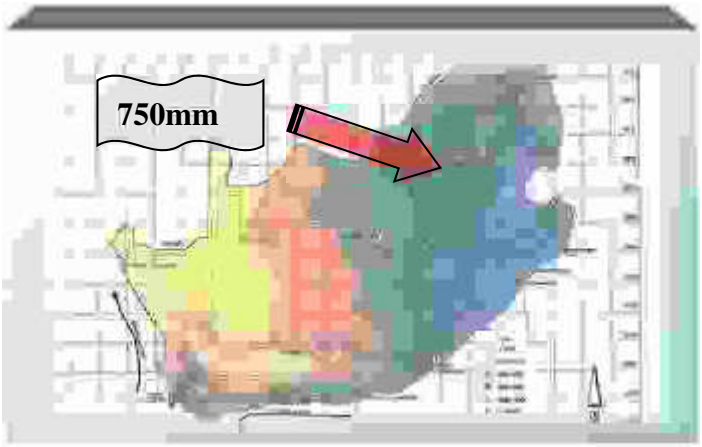


Figure 1 *Depth duration rainfall frequency*

Figure 2 *Inland - Coastal regions*

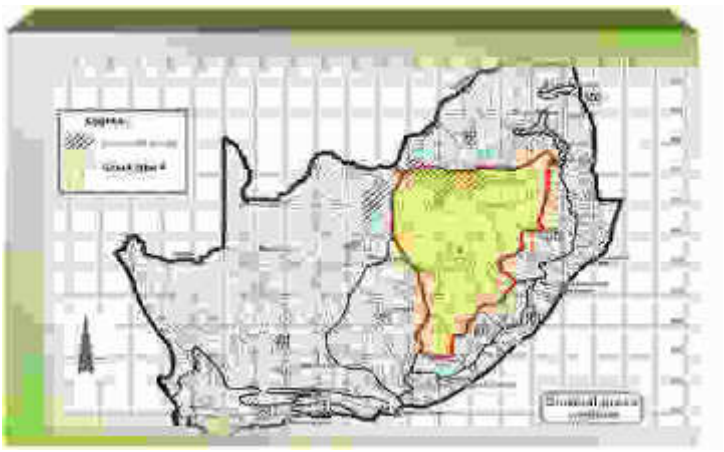


Figure 3 *General grass regions*

b. Time of Concentration

i. Overland Flow

Equation 1 *Time of Concentration: Overland Flow*

Tc = Time of concentration (Min)
L = Length of water path (km)
S = Average slope (m/m)

Surface description	r
Paved areas	0.02
Clean compacted soil, no stones	**0.1**
Sparse grass over fairly rough surface	0.3
Medium grass cover	0.4
Thick grass cover	0.8

c. Rainfall Intensity

i. Intensity Duration Frequency (IDF)

$$\text{Intensity (i)} = \frac{a\,T}{(b+t)^c}$$

Equation 2 *Intensity Duration Frequency*

t = *Time of concentration (minutes)*
T = *years (Return Period)*
MAP = *Mean Annual Precipitation (mm)*
a,b,c = *Constants*

i = *Rainfall Intensity (mm/hr)*

b) Post development

Initial Curve Numbers for selected land cover and treatment classes, stormflow potentials and hydrological soil groups

Land Cover	Land treatment			Stormflow Potential	Hydrological Soil group						
					A	A/B	B	B/C	C	C/D	D
Urban /	1	=	Open spaces, parks, cemeteries	75% grass cover	39	51	61	68	74	78	80
Sub-urban	2	=	Open spaces, parks, cemeteries	75% grass cover	49	61	69	75	79	82	84
	3	=	Commercial / Business	85% impervious	89	91	92	93	94	95	95
	4	=	Industrial districts	75% impervious	81	85	88	90	91	92	93
	5	=	Residential: stand size 500m^2	65% impervious	77	81	85	88	90	91	92

Reference:

- *Federal Highway Administration Publication No. FHWA-NHI-02-001 Published in October 2002*
- *National engineering handbook published in August 1972*
- *The 1085 method for gradient determination was used in calculating overland and defined watercourse slopes.*

Mean **A**nnual **P**recipitation (M.A.P) = 750mm

Storm type = Triangular

Infiltration = Modified Horton model

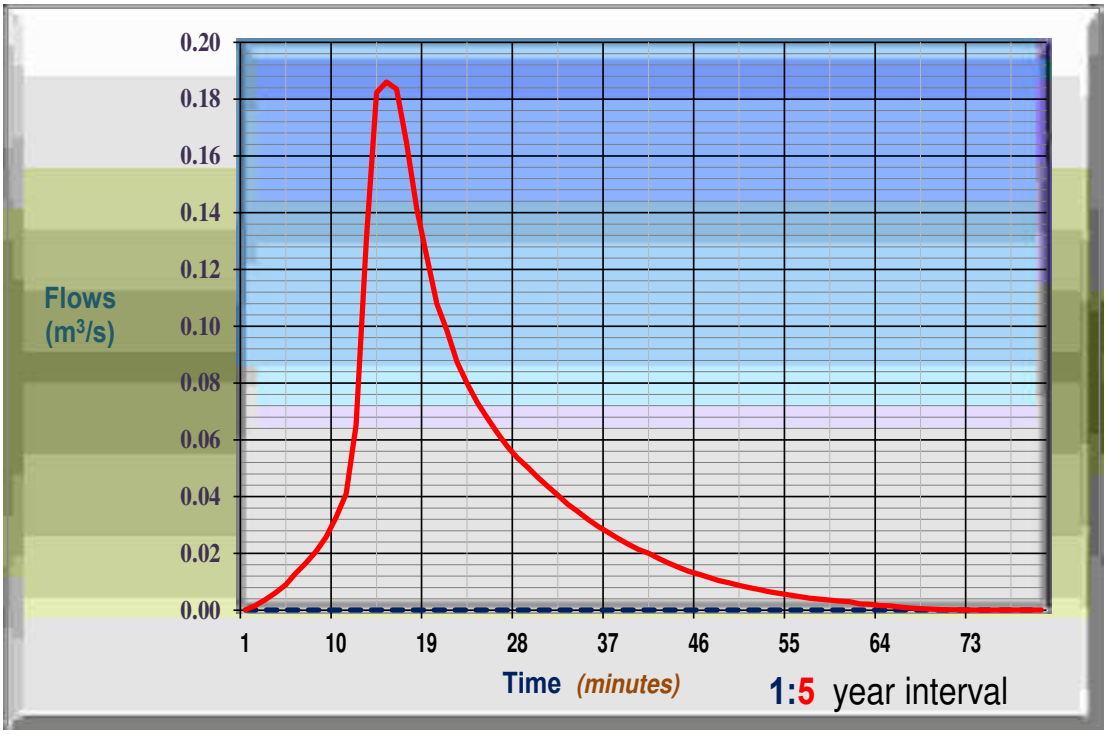
Design storm = IDF (**I**ntensity **D**uration **F**requency) : HRU/78

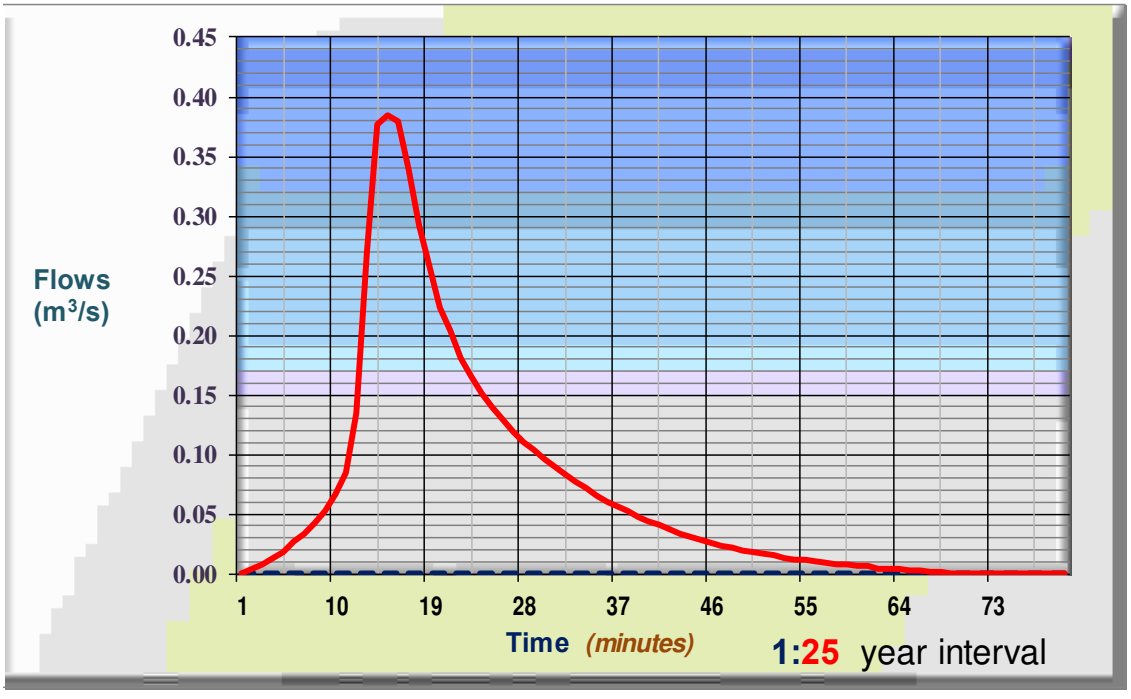
Flood routing type = kinematic routing approach

Region = Inland

1) MAXIMA graphics

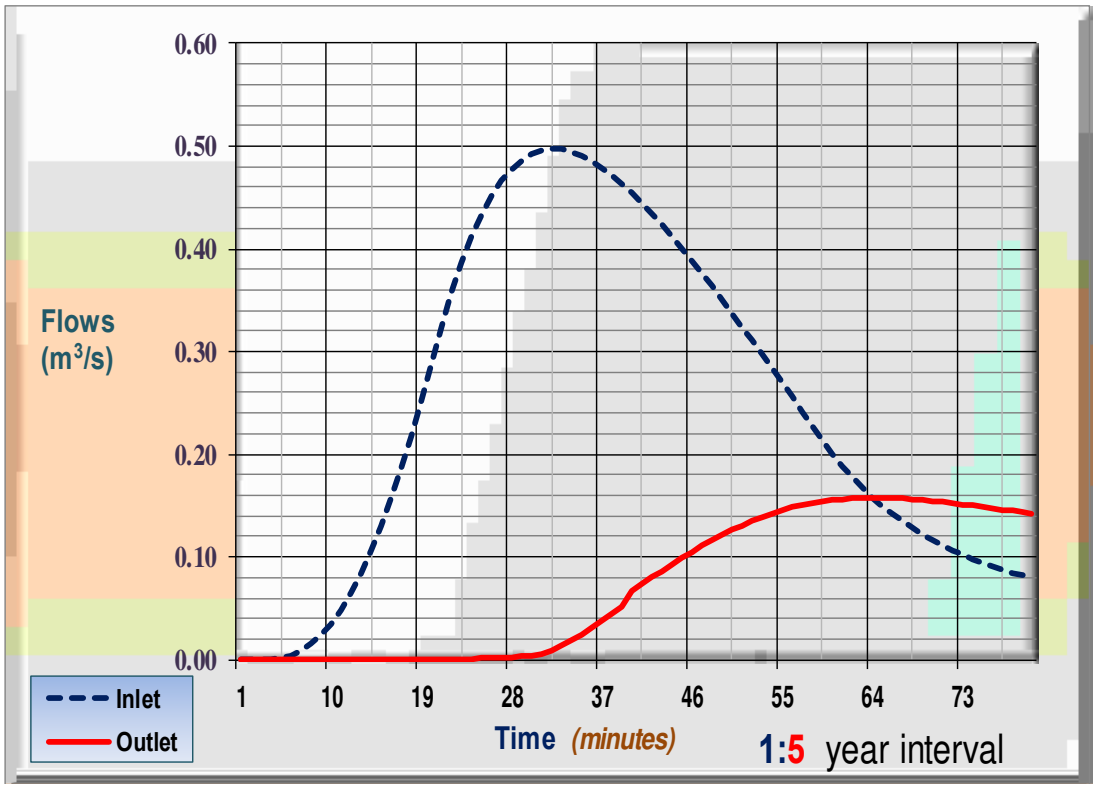
a) Pre development Zone 1

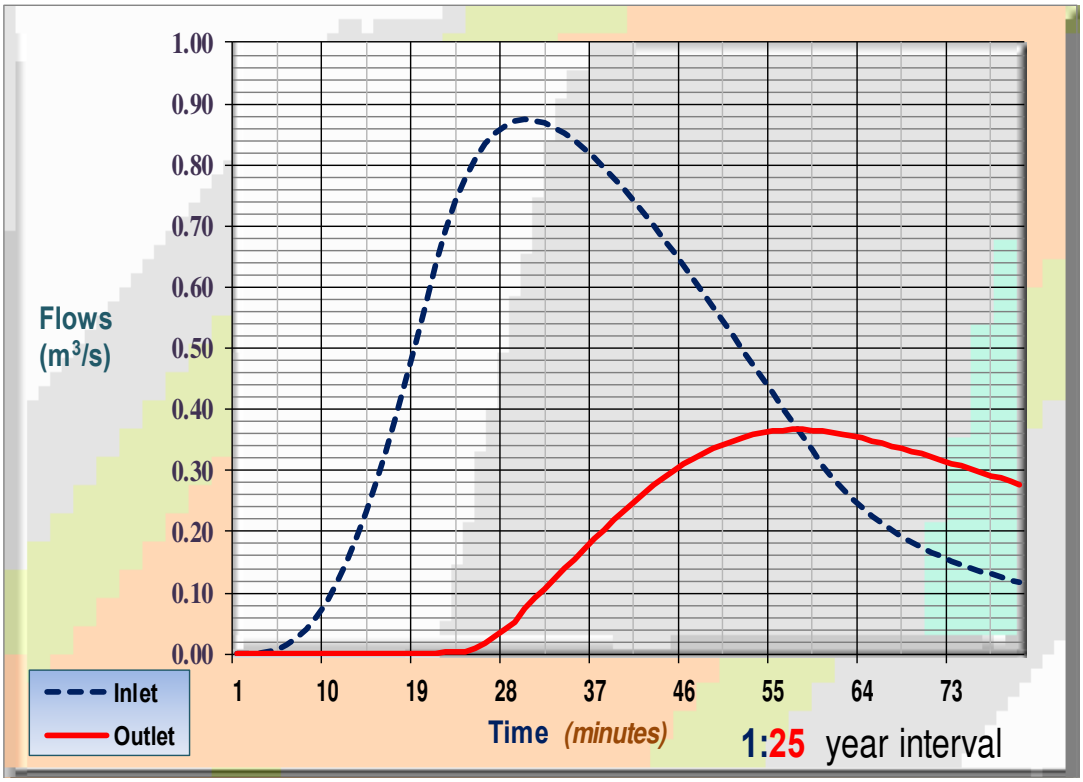




b) Post development

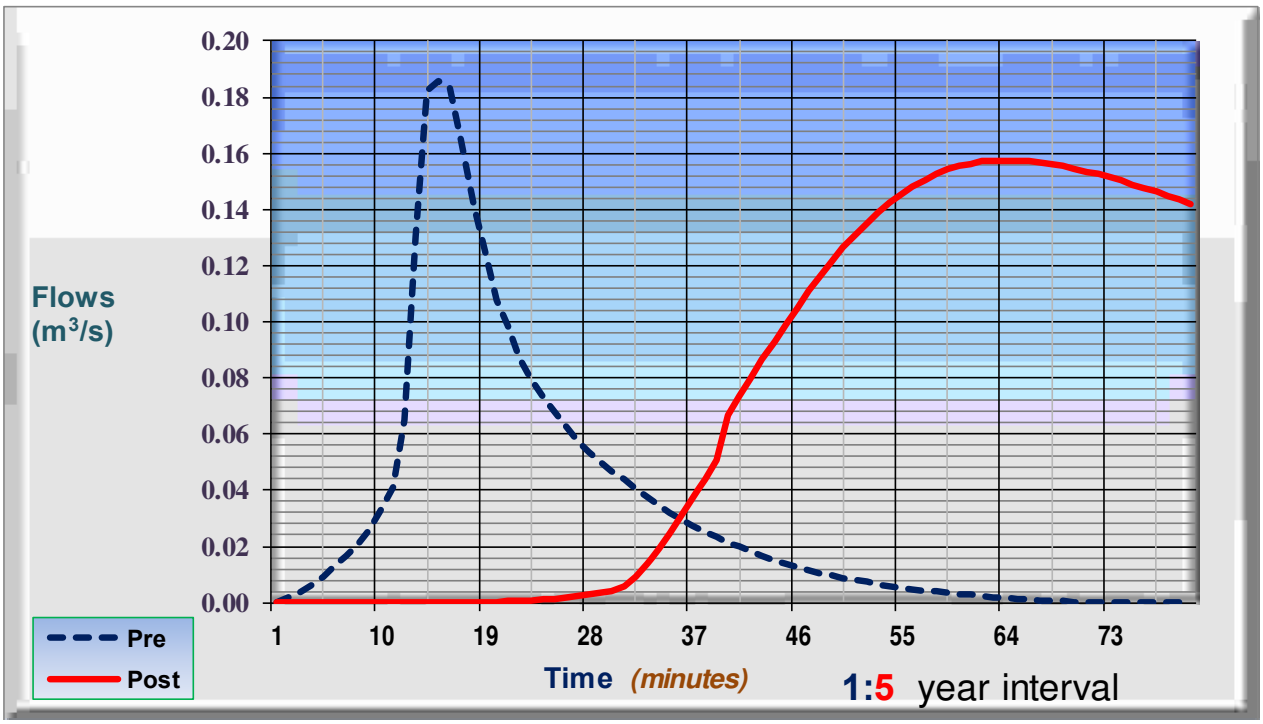
Res 1

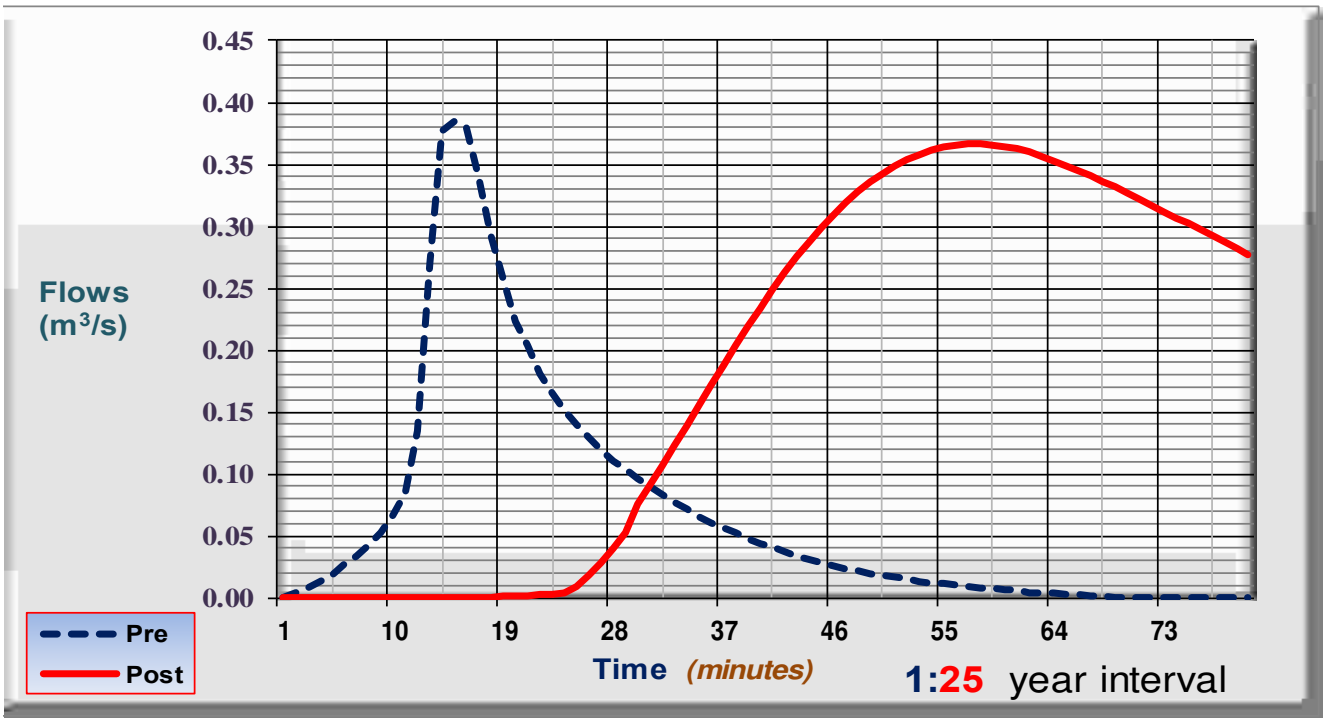


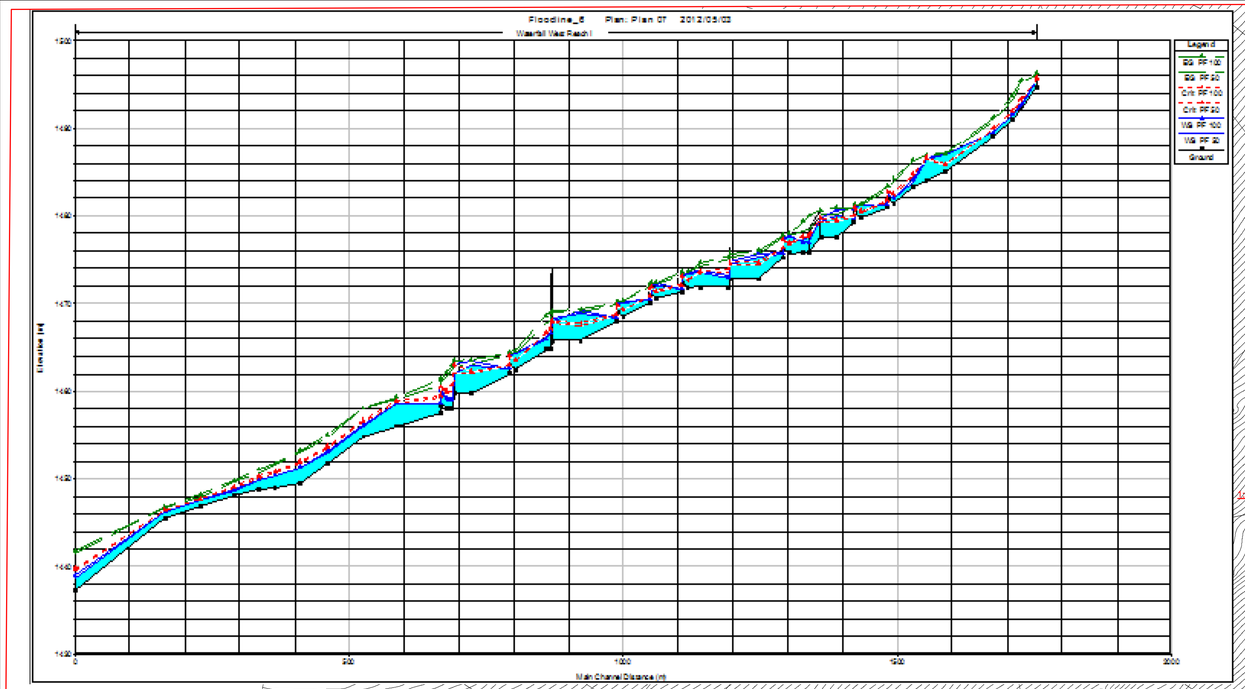


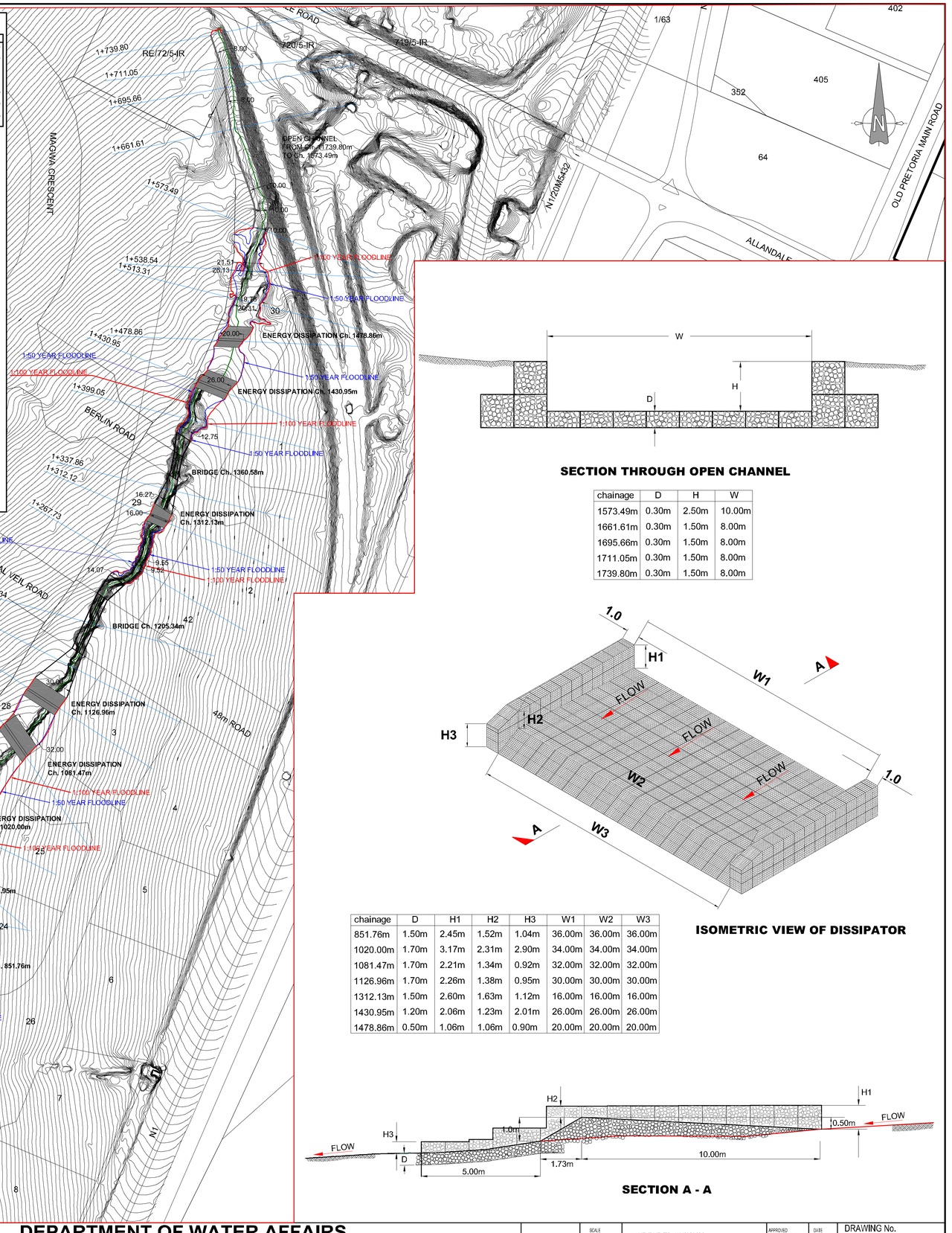
c) Pre and Post Development

Zone 1/ Res1









SECTION THROUGH OPEN CHANNEL

chainage	D	H	W
1573.49m	0.30m	2.50m	10.00m
1661.61m	0.30m	1.50m	8.00m
1695.66m	0.30m	1.50m	8.00m
1711.05m	0.30m	1.50m	8.00m
1739.80m	0.30m	1.50m	8.00m

chainage	D	H1	H2	H3	W1	W2	W3
851.76m	1.50m	2.45m	1.52m	1.04m	36.00m	36.00m	36.00m
1020.00m	1.70m	3.17m	2.31m	2.90m	34.00m	34.00m	34.00m
1081.47m	1.70m	2.21m	1.34m	0.92m	32.00m	32.00m	32.00m
1126.96m	1.70m	2.26m	1.38m	0.95m	30.00m	30.00m	30.00m
1312.13m	1.50m	2.60m	1.63m	1.12m	16.00m	16.00m	16.00m
1430.95m	1.20m	2.06m	1.23m	2.01m	26.00m	26.00m	26.00m
1478.86m	0.50m	1.06m	1.06m	0.90m	20.00m	20.00m	20.00m

ISOMETRIC VIEW OF DISSIPATOR

SECTION A - A

DEPARTMENT DEPARTEMENT	APPROVED GOEDGEKEUR	DESIGNATION AMPSBENAMING	DATE DATUM

CONSULTING ENGINEERS - RAADGEWENDE INGENIEURS

C-Plan CIVIL ENGINEERS (PTY) LTD

C-PLAN CIVIL ENGINEERS (PTY) LTD
455 ONTDEKKERS RD
FLORIDA HILLS
P.O.BOX 1822
WESTGATE
1716
TEL (011) 472 - 2277
FAX (011) 472 - 2265
E-MAIL brendon@cplan.co.za

PRIVATE
DRAWING No
TEKENING Nr
FIGURE 1

APPROVED GOEDGEKEUR: J.B.Besseling
Pr.Tech., Eng. No. Pr. Tek. Ing. Nr.: *2002270026*
DATE -DATUM: 20 April 2012

SURVEYED - OPGEMEET
DESIGNED - ONTWERP
DRAWN - GETEKEN
CHECKED - NAGESIEN
SERVICES CHECKED
DIENSLEIDINGS NAGESIEN
GEOTECHNICAL INVESTIGATION
GEOTOGNOSSE ONDERSOEK
SERVITUDES
SERWITUTE
APPROVED
GOEDGEKEUR

DEPARTMENT OF WATER AFFAIRS

water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Private x 313
PRETORIA
0001
185 Schoeman Street
PRETORIA
0001

Telephone +27 (012) 336 8387
Facsimile +27 (012) 336 8664
Toll-Free Number: 0830 200 200
Email : centrali@dwaf.gov.za

DEPARTMENT OF WATER AFFAIRS

WATERFALL ESTATES JUKSKEI VIEW 67

FLOODLINE AND CONTROL STRUCTURES

Sheet 1 Of 2

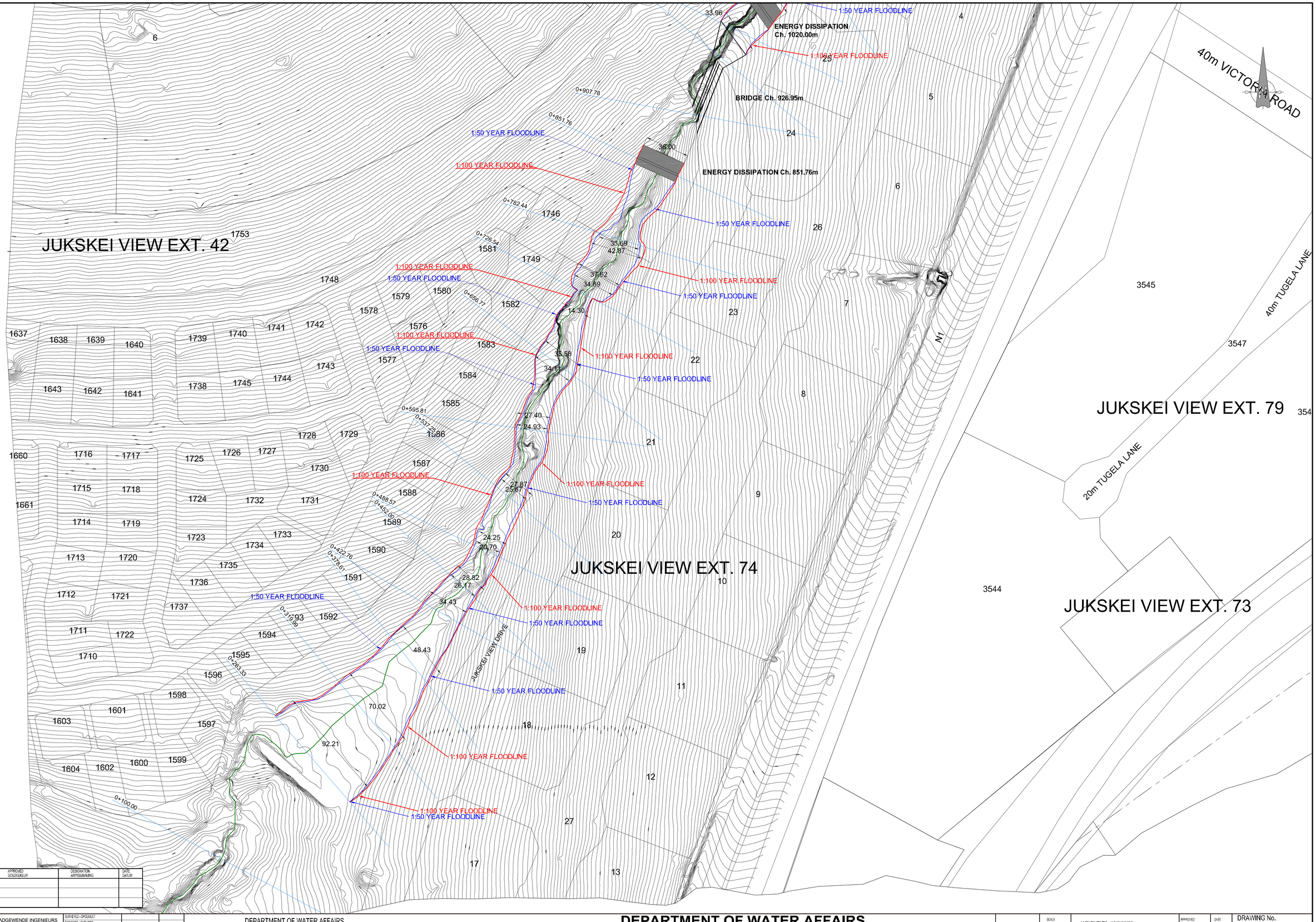
DESIGN MANAGER
BESTUURDER ONTWERP
DATE DATUM

SCALE SKAAL: 1: 1000

	AMENDMENTS - WYSIGINGS	APPROVED GOEDGEKEUR	DATE DATUM
1	INITIAL FLOOD DERERMINATION		17 Nov. 2009
2	REVISED FLOOD DERERMINATION		17 April 2012

DRAWING No.
TEKENING Nr.

FILE No
LEER Nr



DEPARTMENT / DEPARTEMENT	APPROVED / GOEDGEKEUR	DESIGNATION / AMPSBENAMING	DATE / DATUM

CONSULTING ENGINEERS - RAADGEWENDE INGENIEURS

C-PLAN CIVIL ENGINEERS (PTY) LTD
455 ENTOS AVENUE
FLORIDA HILLS
P.O.BOX 4602
WESTGATE
1734
TEL (011) 472 - 2277
FAX (011) 472 - 2295
E-MAIL brendon@cplan.co.za

PRIVATE
DRAWING No
TEKENING Nr
FIGURE 2

APPROVED
GOEDGEKEUR: J.B.Besseling
Pr.Tech.,Eng. No. *200270026*
Pr. Tek. Ing. Nr.
DATE /DATUM: 20 April 2012

SURVEYED - OPGEMEET	
DESIGNED - ONTWERP	
DRAWN - GETEKEN	
CHECKED - NAGESIEN	
SERVICES CHECKED	
DIENSLEIDINGS NAGESIEN	
GEOTECHNICAL INVESTIGATION	
GEOTEGNIESE ONDERSOEK	
SERVITUDES	
SERWITUTE	
APPROVED	
GOEDGEKEUR	

DEPARTMENT OF WATER AFFAIRS

water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Private x 313
PRETORIA
0001
185 Schoeman Street
PRETORIA
0001

Telephone +27 (012) 336 6387
Facsimile +27 (012) 336 6664
Toll-Free Number 0800 200 200
Email : centralj@dwaf.gov.za

DEPARTMENT OF WATER AFFAIRS

WATERFALL ESTATES JUKSKEI VIEW 67

FLOODLINE AND CONTROL STRUCTURES

Sheet 2 Of 2

DESIGN MANAGER
BESTUURDER ONTWERP
DATE DATUM

SCALE / SKAAL: 1: 1000

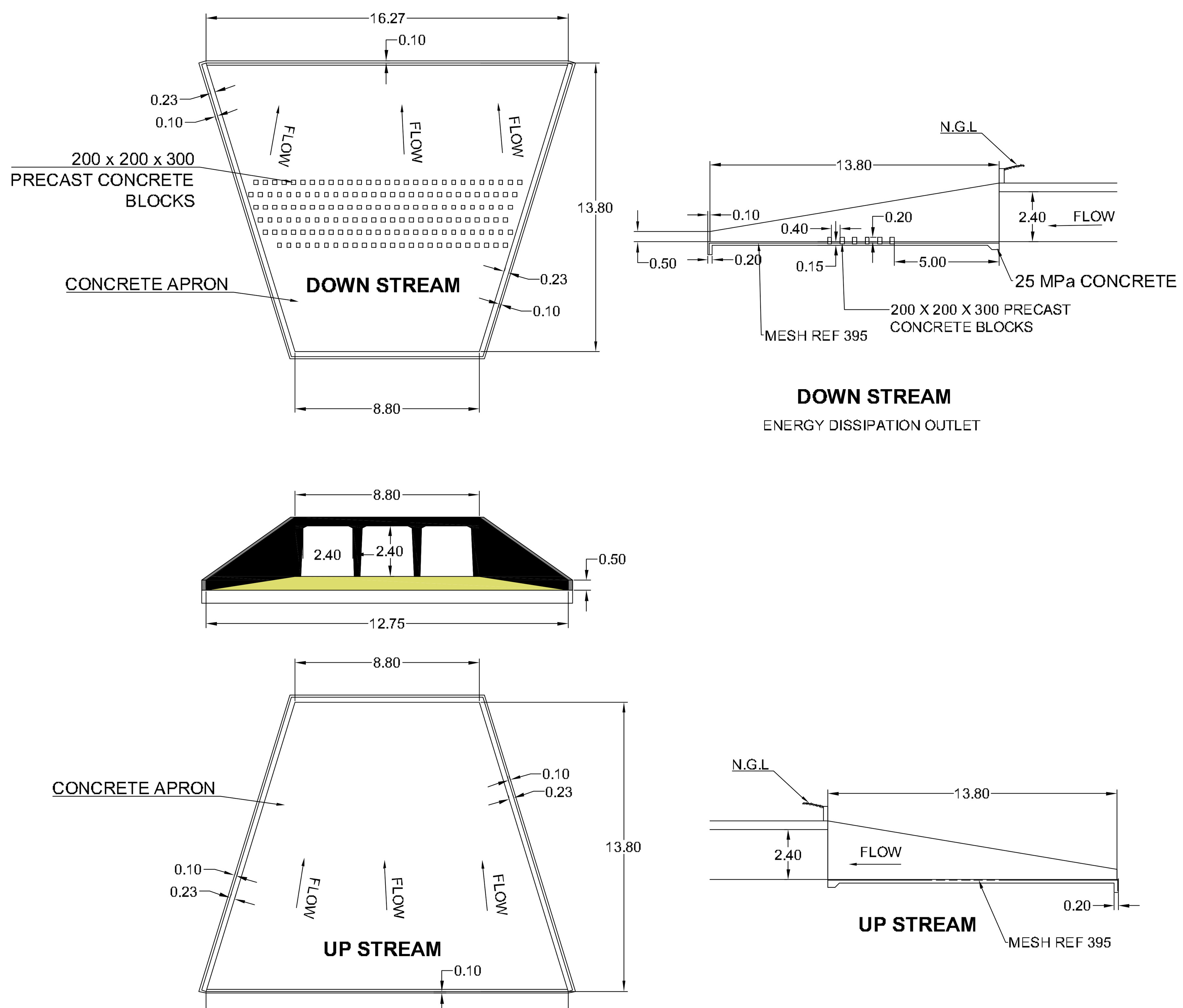
	AMENDMENTS - WYSIGINGS	APPROVED / GOEDGEKEUR	DATE / DATUM
1	INITIAL FLOOD DERERMINATION		17 Nov. 2009
2	REVISED FLOOD DERERMINATION		17 April 2012

DRAWING No.
TEKENING Nr.

FILE No
LEER Nr

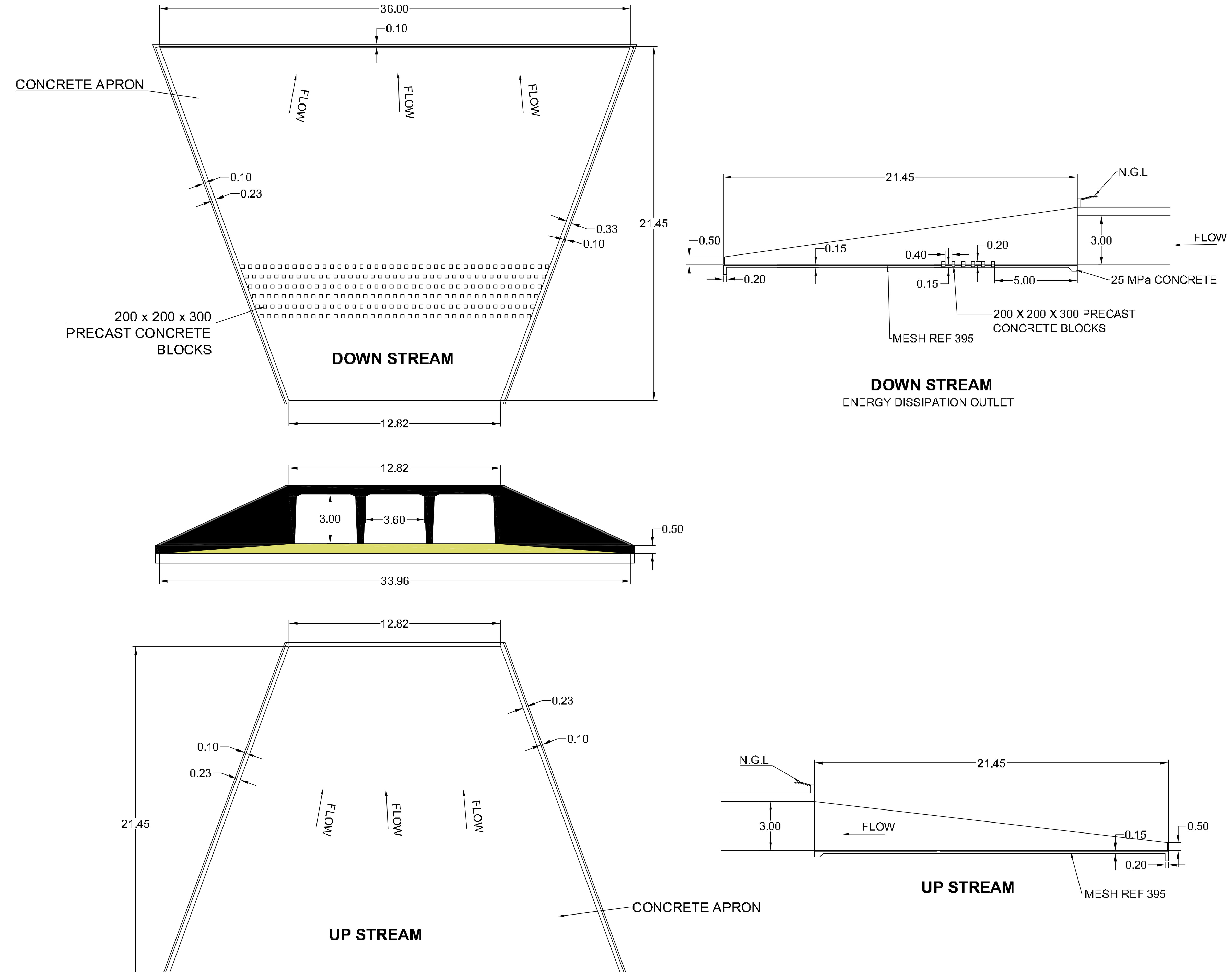
NOTES:

1. ALL CONCRETE INLET AND OUTLET STRUCTURES TO BE 25 MPa WITH WOOD FLOAT FINISH
2. MINIMUM COVER TO REINFORCEMENT = 25mm
3. ALL ROAD WORKS TO COMPLY WITH SABS 1200 SPECIFICATIONS.
4. THE MATERIAL FOR A DEPTH OF 150mm UNDER APRON SLAB MUST BE COMPACTED TO A MINIMUM DENSITY OF 90% OF MOD. AASHTO DENSITY.
5. ONLY BRICKS OF AN ENGINEERING STANDARD IN ENGLISH BOND WITH POINTING MUST BE USED.
6. ONE LAYER OF MESH REF 395 TO BE PLACED ON FLOOR AND CUT - OFF WALL AS SHOWN WITH 40mm COVER AND MIN. LENGTH OF 350mm
7. ALL CONCRETE INCLUDING PRECAST CONCRETE BLOCKS IN
8. ENERGY DISSIPATING OUTLETS TO BE CHAMFERED 25 x 25 ON EXPOSED EDGES.
9. WITH WATER ABSORBTION <14% AND EFFLORANCE < 10
10. DENSITY OF 90% OF MOD. AASHTO DENSITY.



CH. 1360.58m

3 x 2.40m Depth x 2.40m Width



CH. 926.95m

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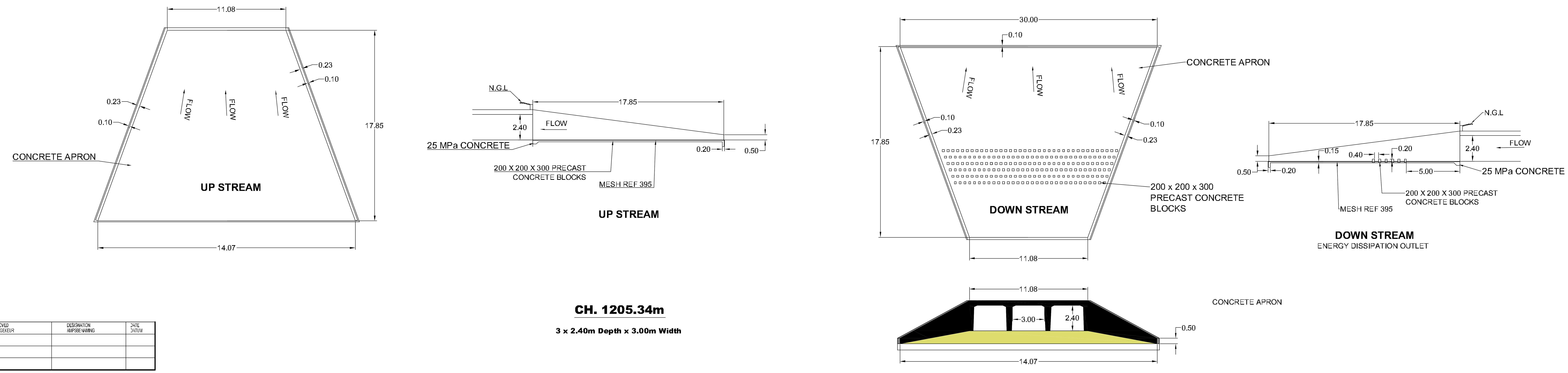


CH. 1205.34m

3 x 2.40m Depth x 3.00m Width

DEPARTMENT DEPARTEMENT	APPROVED GOEDGEKEUR	DESIGNATION AMPSBENAMING	DATE DATUM

CONSULTING ENGINEERS - RAADGEWENDE INGENIEURS

C-plan CIVIL ENGINEERS (PTY) LTD

PRIVATE DRAWING No / PRIVAAT TEKENING Nr: 12508-400-02

APPROVED / GOEDGEKEUR: J.B.Besseling, Pr.Tech. Eng. No. 2002700026, DATE - DATUM 17 April 2012

DEPARTMENT OF WATER AFFAIRS

DEPARTMENT OF WATER AFFAIRS

WATERFALL ESTATES

DETAILS OF INLET AND OUTLET CONTROL STRUCTURES FOR JUKSKEI VIEW 67

	AMENDMENTS - WYSIGINGS	APPROVED GOEDGEKEUR	DATE DATUM
1	INITIAL FLOOD DERERMINATION		
2	REVISED FLOOD DEREMINATION		

SCALE SKAAL 1 : 200

DRAWING No. TEKENING Nr.

FILE No LEER Nr

Annexure K

Application Submitted to
Delegated Authority

ATTERBURY

Atterbury Property Developments

16 November 2015

Gauteng Department of Agriculture and Rural Development
Ground floor,
Diamond Building,
11 Diagonal Street
Johannesburg
2000

Attention: Deputy Director: Strategic Administrative Unit of the Sustainable Utilization of the Environment (SUE) Branch

APPLICATION FORM FOR AMENDMENT OF ENVIRONMENTAL AUTHORISATION AND ENVIRONMENTAL MANAGEMETN PROGRAMME IN TERMS OF NATIONAL MANAMENT ACT, 1998 (ACT No. 107 OF 1998), AS AMENDED AND THE ENRIONMENTAL IMPACT ASSESSMENT REGARULATIONS, 2014

I, **Hercules Coenraad Bezuidenhout** (representative of ATTACQ WATERFALL INVESTMENT COMPANY (PTY) LTD (AWIC)) hereby confirms that AWIC accepts the rights and obligations contained in the Environmental Authorizations (002/08-09/N0993) and (002/05-06/1476).

I also confirm that I have the ability to implement the mitigation and management measures as well as to comply with the conditions of the Environmental Authorization.

Yours Faithfully,

Hercules Coenraad Bezuidenhout

Atterbury Property Developments (Pty) Ltd 2004/015758/07
Business Building Commercial Bridge 1 Dreaming Street Lynnwood Manor 0081
Postnet Suite 205 Private Bag X20000 Garsfontein 0042
T +27 12 471 1970 F +27 12 471 1971

Midrand Mineral Office Park Magwa Crescent West Waterfall City Jukskei View 2090
P O Box 5537 Sunninghill 2157
T +27 10 593 9900 F +27 86 726 1173
www.atterbury.co.za

It's a matter of association

① LP10 002/05-06/1476

002/05-06/1476

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

AMENDMENT APPLICATION FORM

Application Form for Amendment of Environmental Authorisation and Environmental Management Programme in terms of National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014

For official use only

Application Reference Number:	
NEAS Reference number:	
Date Received:	

Kindly note that:

1. This application form is current as of December 2014. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority.
2. This form must be used to apply for the amendment of an environmental authorisation or Environmental Management Programme. An amendment includes adding, substituting, removing or changing a condition or requirement, updating and changing details and correcting a technical error.
3. An amendment application for an Environmental Authorisation is only provided for in law if the Environmental Authorisation is still valid. The subject amendment application should thus be submitted at least 3 months prior to the expiry of the validity period of an Environmental Authorisation; failure to submit the amendment application within the said period prior to the expiry of the validity period of an Environmental Authorisation may result in the competent authority not being able to process the application for amendment in time and thus resulting in the lapsing of the Environmental Authorisation
4. No amendment to a valid Environmental Authorisation is provided for in terms of the 2014 EIA Regulations, if such amendments applied for will constitute a listed or specified activity; in this case an application for Environmental Authorisation for listed or specified activity in terms of Chapter 4 of the EIA Regulations, 2014.
5. A copy of the Environmental Authorisation and /or approved Environmental Management Programme (EMPr) which is the subject of the amendment application must be submitted together with this form.
6. An application for amendment lapses if the applicant fails to meet any of the timeframes prescribed in terms of the 2014 EIA Regulations. If authorisation is required from a number of different authorities, the authorities might also require that an integrated process be followed.
7. The application must be typed within the spaces provided in the form. The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided. Spaces are provided in tabular format and will extend automatically when each space is filled with typing.
8. The use of the phrase "**not applicable**" in the form must be done with circumspection. Should it be done in respect of material information required by the competent authority for assessing the application, it may result in the refusal of the application.
9. Three copies of this form must be submitted at the offices of the relevant competent authority as detailed below.
10. No faxed or e-mailed applications shall be accepted. Only hand delivered, couried or posted applications will be accepted
11. Unless protected by law, all information filled in on this application will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this application on request, during any stage of the application process.

1476 LP10

LIST OF ANNEXURES:

ANNEXURE 1:	PROOF OF PAYMENT
ANNEXURE 2:	N/A – NO EXCLUSIONS REQUIRED
ANNEXURE 3:	N/A – ONLY ONE PROPERTY
ANNEXURE 4:	ENVIRONMENTAL AUTHORISATION
ANNEXURE 5:	FIGURES
ANNEXURE 5a:	AERIAL PHOTOGRAPH

LIST OF ADDENDUMS:

ADDENDUM A:	CONSENT FORM
ADDENDUM B:	DECLARATIONS APPLICANT
ADDENDUM C:	DECLARATIONS EAP
ADDENDUM D:	POWER OF ATTORNEY SUPPLIED BY LAND-OWNER
ADDENDUM E:	EAP COMPANY PROFILE AND CV

1. DEPARTMENTAL DETAILS

Postal Address
Gauteng Department of Agriculture and Rural Development
Attention: Deputy Director: Strategic Administrative Unit of the Sustainable Utilization of the Environment (SUE) Branch
P. O. Box 8769
Johannesburg
2000

Physical Address
Administrative Unit of the Sustainable Utilisation of the Environment (SUE) Branch
Ground floor, Diamond Building, 11 Diagonal Street
Johannesburg

Queries should be directed to the Strategic Administrative Unit at:

Administrative Unit telephone number	(011) 240 3061/3052
Administrative Unit fax number	(011) 240 3055
Departmental central telephone number	(011) 240 2500

View the Department's website at http://www.gdard.gov.za for the latest version of the documents

Application for Environmental Authorisation in terms of NEMA

Proof of payment must accompany this application. The application will not be processed without proof of payment unless one of the exclusions provided for in the fee Regulations is applicable **AND** such information in the exclusion section of this application form has been confirmed by this Department.

2. FEES

Gauteng Department of Agriculture and Rural Development' details for the payment of application fees

Payment Enquiries:
Contact person: Boniswa Belot
Tel: (011) 240 3377/3051
Email: Boniswa.Belot@gauteng.gov.za

Department Banking details:

Bank Name:	FNB Bank
Account Name:	GPG Agriculture and Rural Development PMG
Account Number:	62298144058
Branch Name and Number:	Global Transactional Services Johannesburg - 255005

Reference number: EIA - Date (Y – M – D) of payment e.g. EIA20140401 **(please quote this reference number when making payment)**

Application form to be submitted with proof of payment attached as **Annexure 1**

Tax exemption status:
Status: Tax Exempted

EXCLUSIONS

An applicant is excluded from paying fees if:

- The activity is a community based project funded by a government grant; or
- The applicant is an organ of state.

Applicants are required to tick the appropriate box below to indicate that either proof of payment is attached or that, in the applicant's view, exclusion applies. Proof and a motivation for exclusions must be attached to this application form as **Annexure 2.**

Proof attached	☐
Exclusion applies	☐

TYPE OF EXCLUSION	Tick where applicable. Proper motivation must be attached to the application
The activity is a community based project funded by a government grant	
The applicant is an organ of state	

FEE AMOUNT

Application	Fee
Applications for an amendment of environmental authorisation in terms of the Environmental Impact Assessment Regulations	**R2 000**

3. DETAILS RELATING TO THE ENVIRONMENTAL AUTHORISATION

Initial Environmental Authorisation Ref No:	002/05-06/1476 **(Refer to Annexure 4 for Environmental Authorisation)**
Date of issue of EA and EA's expiry date:	Date of issue: 20/10/2007 EA's expiry date: 20/10/2012

Project Title:	The authorization applies in respect of establishment of the Northern Residential Estate mixed-use township within the development area indicated on the layout submitted (Drawing Number 050-S-018;0) including associated structures and infrastructure. The authorization includes the upgrading of Allandale Road (Section between Maxwell Boulevard and the N1) and the upgrade of Woodmead Drive (Section between Maxwell Boulevard and the proposed K60 alignment). The following land-uses were approved: Residential, Educational, Institutional, Special for Gym, Special for Offices, Training Centres, Conference Facilities, ...rooms, Hotel, Club House and Public Open Space (PoS).
Property description	Portions of the Remainder of Portion 1 of the Farm Waterval 51R situated to the west of the N1 freeway. The study area falls within the area of jurisdiction of the City of Johannesburg Metropolitan Municipality.

(Farm/Erf name(s) and number, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application as **Annexure 3**.

Physical/Street address of proposed sites:	The study area is situated within the area of jurisdiction of the City of Johannesburg Metropolitan Municipality. It is furthermore situated to the south of Allandale Road and to the west of the N1 Freeway, in close proximity of the N1/ Allandale Road off-ramp.
Closest City/Town	Midrand
Current Zoning of site(s)	Was formerly zoned as agriculture, but extensive development already took place on the property. Township establishment already took place in the form of various development pockets that are known as the Jukskei View Townships (various Jukskei View extensions already exist)

Property size(s) (ha / m²):	2083,2179ha (Original Property)		
Development footprint size(s) in ha / m²:	± 654ha		
SG Digit code(s) of all proposed sites:	T0IR00000000011400074		
Coordinates of all sites: Latitude (S)	26°	15′	59.55″
Longitude (E)	28°	18′	03.43″

Locality map:	A locality map must be attached to the application form. The scale of the locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map. The map must include the following: • an accurate indication of the project site position as well as the positions of the alternative sites, if any; • road names or numbers of all the major roads as well as the roads that provide access to the site(s) • a north arrow; • a legend; and • GPS co-ordinates (Indicate the position of the proposed activity with the latitude and longitude at the centre point for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should be to at least three decimal places. The projection that must be used in all cases is the WGS-84 spheroid in a national or local projection) ***(Refer to Annexure 5 for Figures)***

A certified copy of the environmental authorisation must be attached to this application as **Annexure 4**. In addition, if the amendment requested will affect the layout plan or any designs related to the development, the initial layout plan or deigns must be attached to the application together with the new plans or designs.

4. DETAILS OF THE HOLDER OR HOLDERS OF THE ENVIRONMENTAL AUTHORISATION

Name of Applicant:	Waterval Islamic Institute		
Trading name (if any):	N/A		
Contact person:	Mr. Ibrahim Mia Take note that Mr. Hercules Coenraad Bezuidenhout is now the authorized representative of the Waterval Islamic Institute for this specific environmental authorization ***(Refer to Addendum D for Power of Attorney)***		
Physical address:	**Physical Address:** Building 2 Maxwell Office Park Maxwell Crescent West Waterval City Jukskei View 2090		
Postal address:	P.O. Box 2527 Sunninghill		
Postal code:	2157	**Fax:**	010 596 9801
Telephone:	010 596 9800		
E-mail:	alex@atterbury.co.za		

The above section must be duplicated if there is more than one applicant

5. DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Company of Environmental Assessment Practitioner:	Bokamoso Landscape Architects and Environmental Consultants CC **(Addendum E)**		
EAP name / Contact person:	Lizelle Gregory		
Postal address:	P.O. Box 11375, Maroelana		
Postal code:	0161	**Cell:**	083 255 8384
Telephone:	012 346 3810	**Fax:**	012 460 7079
E-mail:	lizelleg@mweb.co.za		
EAP Qualifications	Registered Landscape Architect and Environmental Consultant (degree obtained at the University of Pretoria) over 24 years' experience in the following fields Environmental Planning and Management; Landscape Architecture; and Landscape Contracting L. Gregory also lectured at the Technicon of South Africa and the University of Pretoria Professional Practice Number: 97078		
EAP Registration / Associations	IAIA, SACLAP, ILASA, IFLA		

6. DETAILS OF THE LANDOWNER

Name of landowner / entity:	Witwatersrand Estates Limited		
Contact person:	Mr. Hercules Coenraad Bezuidenhout (authorized representative of the Land-Owner – ***Refer to Addendum D for Power of Attorney***)		
Postal address:	**Physical Address:** Building 2 Maxwell Office Park Maxwell Crescent West Waterval City Jukskei View 2090 **Postal Address:** P.O. Box 2527 Sunninghill		
Postal code:	2157	**Cell:**	

Telephone:	010 596 9800	Fax:	010 596 9801
E-mail:	alex@afterbury.co.za		

Consent: Form in Addendum 1 must be filled if the applicant is not the landowner or person in control of the land where the development will / is taking place. Further, the above section must be duplicated in instances where there is more than one landowner.

Municipality in whose jurisdiction the development is located:	City of Johannesburg Metropolitan Municipality		
Contact person:	Mr. Lebo Molefe		
Postal address:	P.O. Box 1049 Johannesburg South Africa 2000		
Postal code:		Cell:	
Telephone:	(011) 587-4201	Fax:	086 627 751 6
E-mail:	noziphom@joburg.org.za		

The above section must be duplicated in instances where there is more than one municipality involved.

7. AMENDMENTS APPLIED FOR IN TERMS OF PART 1 AMENDMENT PROCESS

Describe the amendments being applied for and motivation as to why the amendments are required.

Amendment requested	Reason why amendment is required
Amendment of the current Holder of Authorization: Current Holder of Authorization- **Waterval Islamic Institute** **Contact Person:** Mr. Hercules Coenraad Bezuidenhout (authorized representative of the Land-Owner – ***Refer to Addendum B for Power of Attorney***)	The name and contact details of the applicant changed and the Decision requires that the Department be informed of a name change and transfer of responsibilities.

New/Amended Holder of Authorization- **Postal Address:** ATTACQ WATERFALL INVESTMENT COMPANY (Pty) Ltd (AWIC) P.O. Box 2527 Sunninghill 2157 **Physical Address:** Building 2 Maxwell Office Park Maxwell Crescent West Waterval City Jukskei View 2090	

Please provide reasons why the amendment will not change the scope of Environmental Authorisation, why the amendment will not increase the level or nature of impact, which impact was assessed and considered when application was made for an Environmental Authorization and as well as how such impact will affect the Interested and Affected Parties

Part 1 of this amendment application is for a name change.

Take note that this amendment application also includes a request for the reduction of a wetland buffer. This amendment will be more substantial and will therefore qualify for a part 2 amendment.

Please provide the nature of impact (positive or negative) that will arise as a result of granting or not granting the proposed amendment and how such impact will affect the Interested and Affected Parties

No impact

7.1 Amendments with respect to proposed change of ownership or transfer of rights and obligations

If the amendment relates to the change of ownership or transfer of rights and obligations, please attach to this form, a letter by the person to whom the rights and obligations are to be transferred, indicating that the person accepts the rights and obligations contained in the Environmental Authorisation and that the person has the ability to implement the mitigation and management measures as well as to comply with the conditions of the Environmental Authorisation.

8. AMENDMENTS APPLIED FOR IN TERMS OF PART 2 AMENDMENT PROCESS

8.1 ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE PROPOSED AMENDMENT

A report with respect to an assessment of all impacts related to the proposed change (including the advantages and disadvantages associated with the proposed change) and measures to ensure avoidance, management and mitigation of impacts associated with such proposed change; and any proposed changes to the EMPr (including an amended EMPr with the proposed changes effected) must be submitted to the Department:

- within 90 days of receipt of the application by the Department, which report has been subjected to a public participation process which must be agreed to with the Department; or
- within 140 days of receipt of the application by the Department, as significant changes have been made or significant new information has been added to the report, which changes or information was not contained in the report consulted on during the initial public participation process which was agreed to with the Department and undertaken as part of the amendment application and that the revised report will be subjected to another public participation process of at least 30 days.

Describe the proposed assessments that will be undertaken to inform the application for the substantive amendment:

The amendment application will be for the relaxing of the wetland buffer related conditions imposed in the Decision (Condition 4.2.2 (a), Condition 4.2.3. (d) (i), Condition 4.2.4 and Condition 4.2.6) in an area that accommodates a very disturbed wetland/ riparian zone. The wetland specialist and Bokamoso are of the opinion that no wetland/ riparian buffer is required around the disturbed watercourse.

The study area for this amendment is situated just to the west of the N1 and just to the south of Allandale Road and the applicant already completed some rehabilitation works in this very disturbed and artificial watercourse.

Take note that two related EIA Authorizations that restrict any form of development within the buffer area were issued. The reference number of the other EIA Authorization is Gaut: 002/08-09/N0993.

It will therefore also be necessary to apply for the amendment of this EIA Authorization. A separate Amendment application will be submitted for the proposed amendment of such Decision (the two amendment applications will be submitted as parallel applications and we will illustrate in the Impact Assessment how the two applications dove-tail).

The following assessments/surveys will be conducted as part of the EIA to be submitted:

- A historical survey of the origin of the watercourse and identification of human impacts that caused the modification of the watercourse;
- A revised wetland delineation and assessment of the status of the wetland;
- An assessment of the impacts of the proposed new activities within the buffer area on the watercourse and ecological systems.

A proposed new layout for development within and around the buffer area together with an amended storm water management plan will also be incorporated as part of the amendment application.

The application process will also involve a public participation process. The public participation will be conducted in line with the NEMA Guidelines for public participation and in line with Chapter 6 of the Amended NEMA EIA Regulations.

9. AUTHORISATION FROM OTHER GOVERNMENT DEPARTMENTS

Are any permit(s), licenses or other authorisations required from any other departments before the requested amendments can be effected?

Yes [X] No [ ]

If yes, please complete the table below.

Name of department and contact person	Authorisation required	Authorisation applied for (yes/ no)
Department of Water and Sanitation (DWS)	Amendment of Section 21 WUL	In Process

Annexure 1

Standard Bank

Customer Care: 0860 123 000
Website: www.standardbank.co.za
26 April 2016

Payment receipt

Beneficiary name
GPG Agriculture and

Bank
FIRST NATIONAL BANK

Branch
RMB CORPORATE BANKING (25500500)

Account number
62298144058

Your reference
Application

Beneficiary reference
AmendLP10-1

Payment date
26 April 2016

Amount
R 2 000.00

The Standard Bank of South Africa Limited (Reg. No. 1962/000738/06. Authorised financial services provider. VAT Reg No. 4100105461 Registered credit provider (NCRCP15). We subscribe to the Code of Banking Practice of the Banking Association South Africa and, for unresolved disputes, support resolution through the Ombudsman for Banking Services.

1476.
LP10.

Annexure 2

N/A.

Annexure 4

AGRICULTURE, CONSERVATION, AND ENVIRONMENT

Office of the Head of Department

Diamond Corner Building, 66 Eloff & Market Street, Johannesburg
P O Box 5760, Johannesburg, 2000

Telephone: (011) 355-1300
Fax: (011) 333-0667
Email:steven.cornelius@gauteng.gov.za
Website: http://www.dacel.gpg.gov.za

Reference: 002/05-06/1476
Enquiries: Mr Hein Pienaar
Telephone: (011) 355 1596
E-mail: Hein.pienaar@gauteng.gov.za

Waterval Islamic Institute
PO Box 5
JOHANNESBURG
2000

Attention: Mr. Ibrahim Mia

Fax No: 011 802 1563

BY FACSIMILE AND REGISTERED MAIL

Dear Sir

GRANTING OF CONDITIONAL AUTHORISATION FOR PROJECT REFERENCE GAUT 002/05-06/1476

Please find attached the Record of Decision in respect of your application for authorisation in terms of Government Notice R1183 (as amended) promulgated under sections 21, 22, 26 and 28 of the Environment Conservation Act, 1989 (Act 73 of 1989).

Yours faithfully

Dr ST Cornelius
Head: Agriculture, Conservation and Environment
Date: 12/10/2007

CC: Strategic Environmental Focus — Attn: Dave Rudolph, Tel: 012-349 1307, Fax: 012-349 1229

City of Johannesburg Metropolitan Municipality — Attn: Rajeshree Bhana, Tel: (011) 407 6439, Fax: (011) 403 4142

Mr. W van Rhyn — Fax: (011) 253 9229

AGRICULTURE, CONSERVATION AND ENVIRONMENT

Diamond Corner Building, 68 Eloff & Market Street,
Johannesburg
P O Box 8769, Johannesburg, 2000

Telephone: (011) 355-1900
- Fax: (011) 355-1000

Website: http://www.gdace.gpg.gov.za

RECORD OF DECISION FOR PROJECT REFERENCE GAUT 002/05-06/1476

By virtue of the powers delegated by the Minister in terms of Section 22 of the Environment Conservation Act, 1989 (Act 73 of 1989) ("the Act"), the Department of Agriculture, Conservation and Environment ("the Department") hereby authorises Waterval Islamic Institute to undertake the activity specified/ detailed below subject to the indicated conditions.

1. DESCRIPTION, EXTENT AND LOCATION OF THE ACTIVITY:

1.1 The activities applied for include *inter alia* the following:

- "The construction, erection or upgrading of roads, railways, airfields and associated structures": item 1(d) of Government Notice R1182
- "The construction, erection or upgrading of canals and channels, including structures causing disturbances to the flow of water in a river bed, and water transfer schemes between water catchments and impoundments": item 1(i) of Government Notice R1182
- "The construction, erection or upgrading of dams, levees or weirs affecting the flow of a river": item 1(j) of Government Notice R1182
- "The construction, erection or upgrading of public and private resorts and associated infrastructure": item 1(m) of Government Notice R1182
- "The change of land use from agriculture or undetermined use to any other land use": item 2 (c) of Government Notice R1182
- "The cultivation or any other use of virgin ground": item 10 of Government Notice R1182

The above activities fall within the ambit of Government Notice R1182 (as amended) promulgated under sections 21, 26 and 28 of the Act.

1.2 The proposed development components as described in the Scoping Report include *inter alia*:

- Residential 1 and 2 erven
- Private Open Space
- A hotel
- Commercial erven
- A school
- A gym
- 2 club houses

- Cemetery
- Private and public roads

The establishment of the Northern Residential Estate is proposed to take place on portions of the Remainder of Portion 1 of the Farm Waterval 5 IR situated to the west of the N1 freeway as indicated on layout plan (Drawing number 0505-S-018,0) dated January 2007. The site falls within the jurisdiction of the City of Johannesburg Metropolitan Municipality.

2 KEY FACTORS INFORMING THE DECISION:

2.1 In reaching its decision in respect of the application, the Department has taken, *inter alia*, the following into consideration:

a) The information contained in the:
- The pre-application checklist (Exemption application) submitted by Strategic Environmental Assessment in October 2005.
- The Plan of Study for Scoping submitted by Strategic Environmental Assessment in October 2005.
- Scoping report (volumes 1-3) compiled by Strategic Environmental Assessment dated June 2006.
- Comments from the Directorate of Conservation dated 4 August 2006 and 6 September 2006.
- Environmental Management Plan compiled by Strategic Environmental Assessment dated July 2006.
- Draft Alternative Analysis for the proposed establishment of the Northern Residential Estate compiled by Strategic Environmental Assessment dated May 2007.
- Technical response to information requested for the proposed Northern Residential Estate compiled by Strategic Environmental Assessment dated July 2007.
- The Memorandum of Agreement for the purchase of a property or properties to offset the Egoli Granite Grassland areas located on the proposed site signed between the Department and Waterval Islamic Institute ; Witwatersrand Estates Limited; Waterfall Golf Estate (Pty) limited and Waterfall Properties WUQF (Pty) Limited.
- The public participation process undertaken by the applicant from 19 January 2006 to 5 May 2006
- Technical response to information requested for the proposed Northern Residential Estate compiled by Strategic Environmental Assessment (SEF) dated September 2007, the SEF response letter dated 1 October 2007 and the final layout plan (Drawing no: 0505-S-018,0) dated January 2007.

b) Information obtained from the Departmental information base including *inter alia:*
- Geographic Information System
- C-plan version 2

c) The general principles of biodiversity offsets and literature that support these principles.

d) Compliance with applicable departmental, provincial and national legislation, policies and guidelines:
- The principles contained in Section 2 of the National Environmental Management Act, 1998 (Act 107 of 1998)(as amended)
- The Gauteng Red Data Policy (June 2006)
- The Gauteng Ridges Policy (June 2006)
- The Kyalami - Modderfontein Environmental Management Framework (EMF) dated May 2007

e) The findings of a site visit undertaken by Mr David Hadzi during December 2005 and a further site visit by Ms Felicity Elliott and Mr Hein Pienaar on 24 April 2007.

f) The identification of an appropriate portion of land for conservation purposes as part of the Proposed Property indicated in the Memorandum of Agreement referred to in paragraph (a) above on which Ms Lorraine Mills conducted a site visit in October.

2.2 Based on the evaluation of the above information, the Department concluded *inter alia* that:

A large part of the proposed development site is irreplaceable and important (C- Plan 2). Sites designated as irreplaceable and important in terms of C-Plan 2 analyses are highly sensitive areas that are essential/important for the conservation of biodiversity in Gauteng and therefore must be protected from transforming land uses. Land uses incompatible with biodiversity conservation must be avoided in areas designated as irreplaceable and /or important. The site under consideration for the proposed activity has the following biodiversity features that need to be conserved:

- Egoli Granite Grassland, a severely transformed and extremely poorly conserved vegetation type that is endemic to Gauteng. The grassland within this project area is the most valuable contiguous remnant patch of Egoli Granite Grassland within the urban environment, within Gauteng and within South Africa.
- The proposed site further contains large granite dome/ridge outcrops as well as a meta-quartz discontinuous ridge which provides habitat for red data plants (*Bowiea volubilis*) and other protected plants and potential habitat for other red data plants and its therefore considered to be of high conservation value. Ridges form biodiversity hotspots, as they provide resources needed for survival, reproduction and movement; they are also ideal refuges for wildlife in an urbanised landscape. Ridges, and the interface between the lower slopes and the flat ground adjoining a ridge, provide important habitat required for the completion of the life cycles of many invertebrates, many of which provide essential ecosystem services (including pollination, evolutionary processes and hydrological processes). Ridges form naturally existing corridors that can functionally interconnect isolated natural areas and therefore play an important role in wildlife dispersal.
- Watercourses and associated wetlands are well represented on this site and the specialist studies undertaken has confirmed the Departmental position that this site contains some watercourses and wetlands in pristine or near pristine condition and hence these systems require measures to ensure their continued function and eco system services to the site as well as the wider catchment area.
- A population of *Bowiea volubilis subsp. volubbilis*, a plant species currently indicated as a Red list plant, were recorded on site. To ensure adequate protection of the red list species suitable buffers need to be implemented around the known species and habitats.
- Habitat suitable for Grass Owl (*Tyto capensis*), a Red list bird species currently considered vulnerable in South Africa and threatened by habitat loss and degradation of habitat. To ensure adequate protection of the red list species suitable buffers need to be implemented around the known species and habitats.
- A number of historical farm buildings and cultural elements exist on site. These structures and elements need to be preserved and where appropriate incorporated into the development plans for the site.
- The Kyalami – Modderfontein EMF indicates areas /zones as "Conservation priority zones – Zone 1" in order to ensure that the "development of these areas should be limited to development where conservation of the natural resource is the key element of the development' The above site has been indicated as a "Zone 1" area due to the above sensitive biodiversity features on site.

3 DEPARTMENTAL DECISION

One or more of the above mentioned sensitive features may be detrimentally affected or permanently lost from the site should the proposed activity be authorised without appropriate mitigation measures. Further, uncertainty exists with regards to the occurrence of the Grass Owl (*Tyto capensis*) and suitable habitat as well as the locality and extent of the ridges and associated Red list plants and buffer zones. The full extent of wetlands (inclusive of 3 wetlands draining runoff from the N1 Road) on site and the future management thereof is not properly provided for in the submitted final layout plan.

In view of the above, the following activities have not been included in this authorisation:

- The proposed litter trap/s on the Jukskei River as a separate application will be submitted by the applicant.
- The proposed grey water treatment plant as this is no longer required due to the exclusion of golf course element.
- The section of a public road along the alignment of the K60 road is dependent on the approval of the K60 road. The latter is currently under a separate EIA process. Consequently, should the K60 road alignment be changed, the alignment of the said public road would need to be reconsidered.
- The section of Jukskei Road located within the part of the Farm Waterval that was excluded from this application (Commercial District).
- The proposed road and bridge from the above Jukskei Road through the watercourse and commercial area linking across the N1 to the east of the site – due to lack of information and motivation.
- The outfall sewer (diverted sewer line – drawing no 300-P01) located to the north of the Jukskei river as per the applicant's request.
- The outfall sewer located south of the Jukskei River.
- Any bulk services provision located outside of the application site.

However, careful consideration of the integrated sensitivity analysis indicated that a large component of the sensitivity associated with this site is related to the occurrence of Egoli Granite Grasslands on this site. Having considered and accepted a proposal to accommodate the Egoli Granite Grasslands on a separate piece of egoli grassland site secured by the applicant, the Department is of the view that the proposal can be allowed to proceed provided appropriate mitigating measures are put in place for other sensitivities on site.

Based on the above, the Department's conclusion is that this activity will not lead to substantial detrimental impact on the environment, alternatively, that potential detrimental impacts resulting from this activity can be mitigated to acceptable levels and that the principles contained in section 2 of NEMA can be upheld.

The Department has accordingly decided to grant **Waterval Islamic Institute** authorisation in terms of Regulations R1182 and R1183 (as amended) promulgated under sections 21, 22, 26 and 28 of the Environment Conservation Act (Act 73 of 1989) subject to the conditions and provisions listed below.

4 CONDITIONS

4.1 Description and extent of the activity

The authorisation applies in respect of establishment of the Northern Residential Estate mixed use township within the development area indicated on the layout submitted (Drawing number 0505-S-018,0) including associated structures and infrastructure. Authorisation includes the upgrade of Allendale Road (Section between Maxwell Boulevard and the N1) and the upgrade of Woodmead Drive (Section between Maxwell Boulevard and the proposed K60 alignment).

The relevant activities applied for include *inter alia* the following:

- "The construction, erection or upgrading of roads, railways, airfields and associated structures": item 1(d) of Government Notice R1182.
- "The construction, erection or upgrading of dams, levees or weirs affecting the flow of a river": item 1 (j) of Government Notice R1182.
- "The construction, erection or upgrading of sewage treatment plants and associated infrastructure": Item 1 (n) of Government Notice R1182 for the pump station.
- "The construction, erection or upgrading of public and private resorts and associated infrastructure": Item 1(m) of Government Notice R1182.
- "The construction, erection or upgrading of canals and channels, including structures causing disturbances to the flow of water in a river bed, and water transfer schemes between water catchments and impoundments": item 1(j) of Government Notice R1182.

- "The change of land use from agriculture or undetermined use to any other land use": item 2 (c) of Government Notice R1182.

The above activities fall within the ambit of Government Notice R1182 (as amended) promulgated under sections 21, 26 and 28 of the Act.

4.2 Specific conditions

1) The applicant needs to comply fully with the content of the signed Memorandum of Agreement relating to the conservation of the Egoli Granite Grassland. Any non-compliance with the content of the above signed Memorandum of Agreement will be considered non compliance with this authorisation.
2) The layout plan submitted needs to be amended and resubmitted to the Department for approval prior to the commencement of construction activities on site. The following is required:

a) All wetlands (including 3 (three) wetlands draining runoff from the N1) and associated 30 m buffer zones on site as indicated in the wetland specialist report (Wetland delineation and functional assessment – Figure 32) dated May 2006 needs to be indicated on the layout plan. The exact position and extent of the Hydro-geomorphic units 3 and 5 needs to be confirmed as documents submitted are providing contradictory information.
b) The existence or not of the *Bowiea volubilis* Red data plants needs to be confirmed by means of a specialist study during the growing season to be able to confirm the findings regarding the removal of these plants as indicated in the SBF response letter dated 1 October 2007. The above investigation and outcome needs to be submitted to the Department for review.
c) A detailed report on the alignment of part of the southern outfall sewer (South of the Jukskei River) needs to be submitted to the Department for review before a final decision on this matter can be considered. This report needs to investigate alternative routes (alignment) for this sewer pipe in the area where it will traverse 2 (two) sensitive hillslope wetlands with shallow ferricrete or hard plintic sediments which creates perched aquifers close to the soil surfaces. Alternative route options needs to be investigated before a final decision on this matter can be considered.

3) The Environmental Management Plan (EMP) submitted (dated September 2007) is approved and will constitute an extension of this Record of Decision, and non-compliance with the conditions set out in the EMP will constitute an offence. The EMP must amongst other inclusions as indicated below, extend to the following:
   a) The mandatory conditions imposed by the Department in this Record of Decision;
   b) An agreement undersigned by the developer acknowledging that he/she recognises and understands the contents of the EMP and the possible legal ramification resulting from non-compliance with the EMP.
   c) An independent, suitably qualified and experienced individual in the natural sciences must be appointed and act as the Environmental Control Officer (ECO).
   d) The Department must be furnished with the contact details of the ECO responsible for compliance monitoring of the EMP.
      i. All buffer zones (no go areas – 32 m buffer and all wetland and riparian areas) must be fenced off from the remainder of the site by means of a clearly defined fence before construction is initiated and remain fenced off for the duration of the construction phase. This is to ensure that the "no go areas" are clearly indicated and that accidental impacts on these areas are avoided. Only the construction of bridges as indicated on the layout plan will be allowed within the above buffer zones.
      ii. Detailed plans indicating the "footprint" of bridges and the areas that will be affected by construction activity associated with these bridges, needs to be submitted to the Department for approval before commencement of construction.
      iii. Detailed method statements for the construction of bridges needs to be submitted to the Department for approval before commencement of construction. These method statements needs to clearly indicate the methods to be used to construct these bridges,

The applicant must comply with the conditions set out in this letter. Failure to comply with any of the above conditions may result in, *inter alia*, the Department withdrawing the authorisation, issuing directives to address the non-compliance – including an order to cease the activity – as well as instituting criminal and/or civil proceedings to enforce compliance.

7 **APPEALS:**

Appeals in respect of this decision must be directed to the MEC, Mr Khabisi Mosunkutu, Agriculture, Conservation and Environment, Gauteng Provincial Government within 30 (thirty) days of the date of this decision. Appeals can be submitted utilizing one of the following methods:

By facsimile:	(011) 333 0620;
By post:	P.O. Box 8769, Johannesburg 2000;
By hand:	16th Floor, Diamond Corner Building, 68 Eloff Street, Johannesburg.

Please note that all appeals must comply with Section 35 of the Environment Conservation Act, 1989 read together with Government Notice R1183 of 5 September 1997. In terms of the above section and regulations, your appeal must set out all the facts as well as the grounds of appeal. Furthermore, all the relevant documents or copies thereof must accompany the appeal and a commissioner of oaths must certify them as true.

The applicant is required to inform all registered interested and affected parties of the decision contained in this Record of Decision as well as the process for appeal described above within 7 (seven) calendar days of the date of signature of this Record of Decision. Failure to inform interested and affected parties within the stipulated time period will constitute non-compliance with this Record of Decision.

Should the applicant wish to appeal any aspect of this decision, the applicant must notify and furnish copies of the appeal which will be submitted to the MEC to all registered interested and affected parties. Proof of such notification must be submitted to the MEC with the appeal. Failure to comply with this provision may result in the MEC refusing to consider the appeal.

Please note that any development that commences prior to the expiry of the time period allowed for the submission of an appeal, or before the MEC has reached a decision on any appeal submitted, is done solely at the applicant's risk.

Yours faithfully

Dr. S.T. Cornelius
Head: Agriculture, Conservation and Environment
Date: 12/10/2007

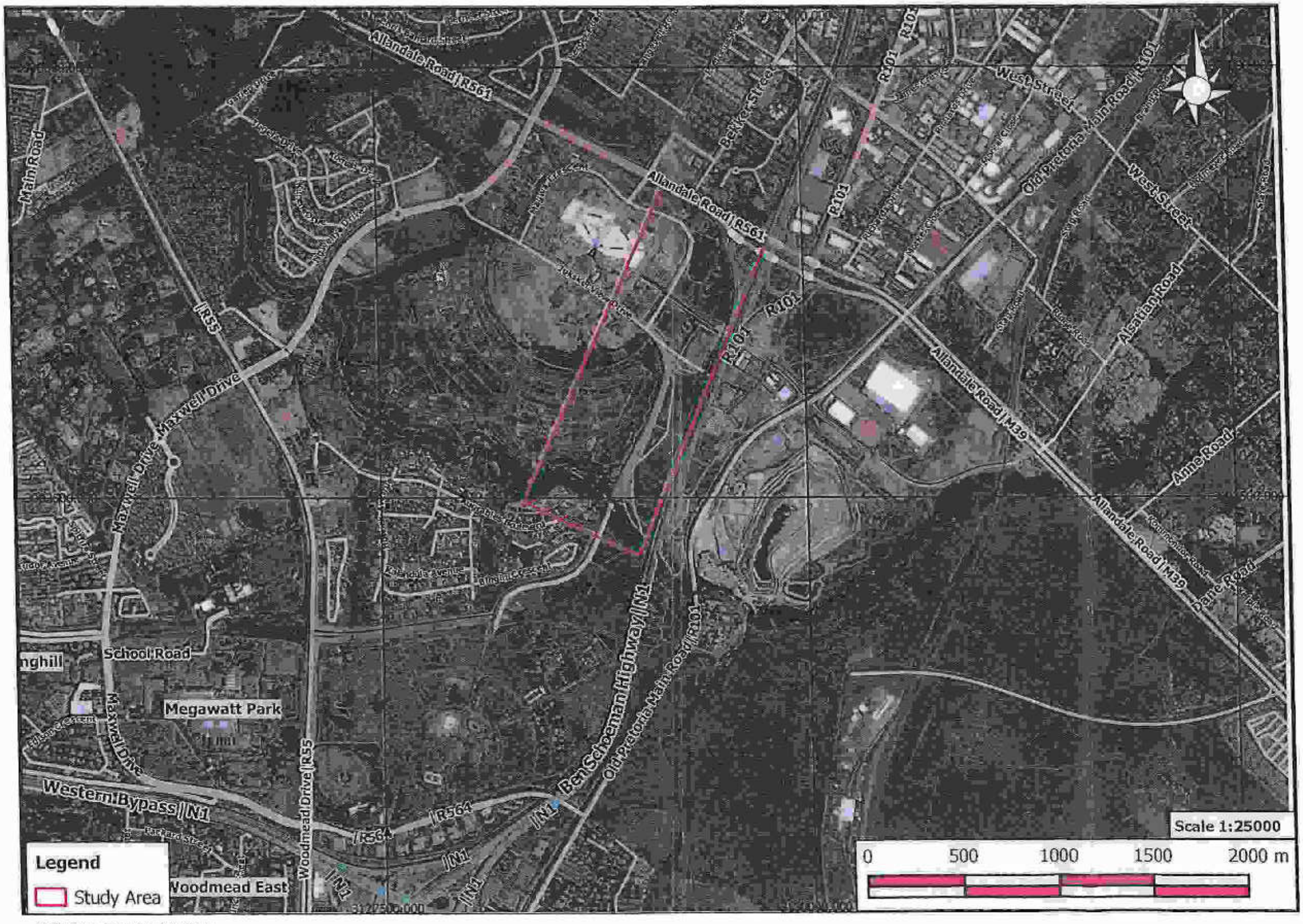
CC:	Strategic Environmental Focus	Attn:	Dave Rudolph
		Tel:	012-349 1307
		Fax:	012-349 1229
	City of Johannesburg Metropolitan Municipality	Attn:	Rajesfuree Bhana
		Tel:	(011) 407 6439
		Fax:	(011) 403 4142
	Mr. W van Rhyn	Fax:	(011) 253 9229

Annexure 5

Bokamoso Environmental Consultants
Website: www.bokamoso.biz
E-Mail: Lizelleg@mweb.co.za

Amendment Application

Aerial Map



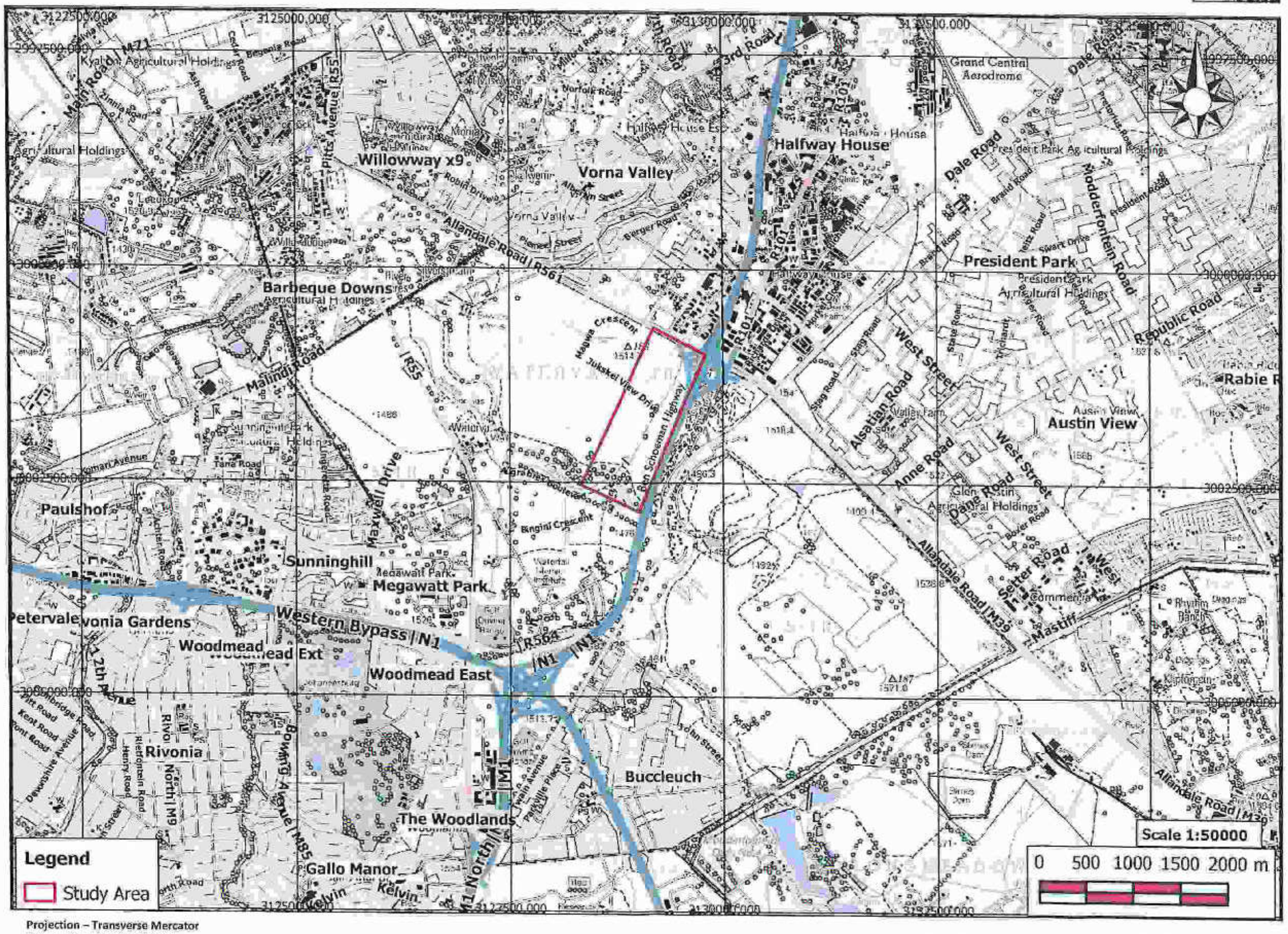
Projection – Transverse Mercator
Datum- Hartebeeshoek 1994
Reference Ellipsoid –WGS 1984
Central Meridian -29

GAUT Reference Nr: 002/08-09/N0993

Bokamoso Environmental Consultants
Website: www.bokamoso.biz
E-Mail: Lizelleg@mweb.co.za

Amendment Application

Locality Map



Projection – Transverse Mercator
Datum- Hartebeeshoek 1994
Reference Ellipsoid –WGS 1984
Central Meridian -29

GAUT Reference Nr: 002/08-09/N0993

Addendum A

ADDENDUM A (CONSENT IN TERMS OF REGULATION 39 OF THE NEMA EIA REGULATIONS)

Consent in terms of Regulation 39 of the 2014 NEMA EIA Regulations by the landowner or person in control of the land that the proposed activity/ies may be undertaken on the land in question

When to use this form

Note: This form must be completed when an application for amendment in terms of the 2014 NEMA EIA Regulations is submitted where the proposed amendment will impact on the activity undertaken/to be undertaken on the land or if the amendment relates to the transfer of rights and obligations.

Notes for completing and submitting this form

(1) This form is current as of December 2014. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been released by the Department.

(2) This form must be attached to the application form for amendment.

(3) Unless protected by law, all information contained in the form will become public information.

CONTACT INFORMATION

Name of land owner/ person in control of the land	**Witwatersrand Estates Limited**		
Trading name (if any):	N/A		
Contact person:	Hercules Coenraad Bezuidenhout (authorized representative of the Land-Owner – ***Refer to Addendum B for Power of Attorney***) Take note that Mr. Bezuidenhout also represents the new applicant.		
Physical address:	**Physical Address:** Building 2 Maxwell Office Park Maxwell Crescent West Waterval City Jukskei View 2090		
Postal address:	P.O. Box 2527 Sunninghill		
Postal code:	2157	**Cell:**	
Telephone:	010 596 9800	**Fax:**	010 596 9801
E-mail:	alex@afterbury.co.za		

CONSENT

1. I/we the undersigned (insert the name/s of the owner/s of the land)

Witwatersrand Estates Limited

of identity number/registration number (insert the owner/s ID number/s or the registration number of the legal entity)

1934/005481/06

am/ are the registered owner/s of the property (insert description of the property/ies and title deed numbers)

Portions of the Remaining extent of Portion 1 of the Farm Waterval 5 IR (Section 10), Johannesburg Metropolitan Municipality

Title Deed Number:

T 116467/05

located at *(insert physical address or a brief description of the location of the property)*

The study area is situated within the area of jurisdiction of the City of Johannesburg Metropolitan Municipality. It is furthermore situated to the south of Allandale Road and to the west of the N1 Freeway, in close proximity of the N1/ Allandale Road off-ramp.

2. I/ we hereby give consent to the applicant /person to whom the rights are to be transferred *(insert the name/s of the applicant/person/s)*

ATTACQ WATERFALL INVESTMEN COMPANY (PTY) LTD – ALSO REFERRED TO AS **AWIC**

of identity number/registration number *(insert the owner/s ID number/s or the registration number of the legal entity)*

Registration Number: 2000/013587/07

to undertake the following activity(ies) on the property *(insert a brief description of the project and identified activity(ies) in question and amendment that will be applied for):*

The approved development of the above mentioned property includes the following:

The authorization applies in respect of establishment of the Northern Residential Estate mixed-use township within the development area indicated on the layout submitted (Drawing Number 050-S-018,0) including associated structures and infrastructure. The authorization includes the upgrading of Allandale Road (Section between Maxwell Boulevard and the N1) and the upgrade of Woodmead Drive (Section between Maxwell Boulevard and the proposed K60 alignment).

ATTACQ will apply (in this amendment application) for the relaxation of one of the wetland buffers imposed by the original authorization issued for the development.

Signature of land owner/person in control of the land or authorised representative

Name of authorised person if the landowner is a legal entity

HERCULES COENRAAD BEZUIDENHOUT

Date

18/11/2015

Addendum B

ADDENDUM B

10. DECLARATIONS

DECLARATION OF THE APPLICANT

I HERCULES COENRAAD BEZUIDENHOUT declare under oath that I

- am, or represent, the applicant in this application;
- have appointed / will appoint (delete that which is not applicable) an Environmental Assessment Practitioner (EAP) to act as the independent EAP for this application / will obtain exemption from the requirement to obtain an environmental assessment practitioner;
- will provide the EAP and the competent authority with access to all information at my disposal that is relevant to the application;
- will be responsible for the costs incurred in complying with the Regulations, including but not limited to –
  - costs incurred in connection with the appointment of the EAP or any person contracted by the EAP;
  - costs incurred in respect of the undertaking of any process required in terms of the Regulations;
  - costs in respect of any fee prescribed by the Minister or MEC in respect of the Regulations;
  - costs in respect of specialist reviews, if the competent authority decides to recover costs; and
  - the provision of security to ensure compliance with conditions attached to an environmental authorisation, should it be required by the competent authority;
- will ensure that the EAP is competent to comply with the requirements of the Regulations and will take reasonable steps to verify that the EAP
  - know the Act and the regulations, and how they apply to the proposed development
  - know any applicable guidelines
  - perform the work objectively, even if the findings do not favour the applicant
  - disclose all information which is important to the application and the proposed development
  - have expertise in conducting environmental impact assessments
  - complies with the Regulations
- will inform all registered I&APs of any suspension of the application as well as of any decisions taken by the competent authority in this regard;
- am responsible for complying with the conditions of any environmental authorisation issued by the competent authority;
- hereby indemnify the Government of the Republic, the competent authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action which the applicant or EAP is responsible for in terms of these Regulations;
- will not hold the competent authority responsible for any costs that may be incurred by the applicant in proceeding with an activity prior to obtaining an environmental authorisation or prior to an appeal being decided in terms of these Regulations;
- will perform all other obligations as expected from an applicant in terms of the Regulations;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the ~~applicant/ Signature on behalf of the~~ applicant:

AWC

Name of company (if applicable):

18/11/2015

Date:

Signature of the Commissioner of Oaths:

18/11/2015

Date:

ADVOCATE OF THE HIGH COURT

Designation:

Commissioner of Oaths Official stamp (below)

The Deponent declared that:
(a) he knows and understands the contents of this affidavit and that it is the truth;
(b) that he views the prescribed oath as binding on his conscience;
(c) That there was compliance with Government Notice R1258 of 21 July 1972 (as amended).

18/11/2015

COMMISSIONER OF OATHS DATE

ALEXANDER COENRAAD DE BEER
Commissioner of Oaths
Ex Officio
Advocate of the High Court of South Africa
02 Magwa Cres West, Waterfall City 2090

Addendum C

Addendum C

DECLARATION OF THE EAP

I, Lizelle Gregory, declare that -

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the Regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the Act.

Signature of the Environmental Assessment Practitioner:

Bokamoso Landscape Architects & Environmental Consultants CC
Name of company:

5/5/2016
Date:

Signature of the Commissioner of Oaths:

05/05/2016
Date:

Designation:

Commissioner of Oaths Official stamp (below)

GESERTIFISEER IN WAKE AFSKRIF
VAN DIE OORSPRONKLIKE
CERTIFIED A TRUE COPY OF THE ORIGINAL

AR VAN ART
Commissioner of Oaths/Kommissaris van Ede
Professionale Rekenmeester (SAIPA), Lid no : 8140
Chris Hougaard 262, Wierdapark, 0149

Addendum D

ROUND ROBIN RESOLUTION OF A MEETING OF THE BOARD OF DIRECTORS OF

ATTACQ WATERFALL INVESTMENT COMPANY (PTY) LTD

Registration Number 2000/013587/07

("AWIC" / "the Company ")

IT IS RESOLVED -

1. That the Company, in order to give effect to the effective and efficient execution of the provisions of the Development Rights Agreement (" the **DRA**"), dated 21 August 2008 and concluded between Attacq Property Fund Limited (which name was changed to Attacq Limited – "Attacq") and Waterval Investment Company (Pty) Ltd and Waterval Development Company (Pty) Ltd, as amended (Attacq ceded and assigned its rights and obligations under the DRA to AWIC on 4 December 2009), and or to the provisions of any similar agreement to be concluded between the same parties and/or others pertaining to the **property** known as the remainder of portion 1 of the farm Waterval 5 IR, the remainder of portion 62 of the farm Waterval 5 IR , Registration Division IR (collectively referred to as "the **Waterfall Property**"), any land acquired by **AWIC** or Attacq or related party in respect of the Waterfall Property and/or any township established thereon or any erf in such a township in respect of the Waterfall Property (hereinafter referred to as the "**Property**") authorizes:

ROUND ROBIN RESOLUTION OF A MEETING OF THE BOARD OF DIRECTORS OF

ATTACQ WATERFALL INVESTMENT COMPANY (PTY) LTD

Registration Number 2000/013587/07

("AWIC" / "the Company ")

IT IS RESOLVED -

1. That the Company, in order to give effect to the effective and efficient execution of the provisions of the Development Rights Agreement (" **the DRA**"), dated 21 August 2008 and concluded between Attacq Property Fund Limited (which name was changed to Attacq Limited – "Attacq") and Waterval Investment Company (Pty) Ltd and Waterval Development Company (Pty) Ltd, as amended (Attacq ceded and assigned its rights and obligations under the DRA to AWIC on 4 December 2009), and or to the provisions of any similar agreement to be concluded between the same parties and/or others pertaining to the **property** known as the remainder of portion 1 of the farm Waterval 5 IR, the remainder of portion 82 of the farm Waterval 5 IR , Registration Division IR (collectively referred to as "**the Waterfall Property**"), any land acquired by **AWIC** or Attacq or related party in respect of the Waterfall Property and/or any township established thereon or any erf in such a township in respect of the Waterfall Property (hereinafter referred to as the "**Property**") authorizes:

ATTERBURY PROPERTY DEVELOPMENTS PROPRIATERY LIMITED

Registration number 2004/01670/07

"APD"

in its capacity as Development Manager appointed in terms of the Development Management Agreement dated 7 December 2014 the **("DMA")** and **APD** is hereby also specifically authorized hereby to appoint any director or and, when such Director is not available, in the alternative, any other Director of **APD** , both which Directors can act independently and severally, with the power of substitution:

to sign documents on behalf of the Company, in respect of the provisions of the **DRA,** Developments , Development and Development Management Functions or any other matter as defined in the **DMA** which,

1.1 shall include a power of attorney, and/ or;

1.2 may include any documents deemed necessary by such authorized Director to give effect to this Resolution;

1.3 directly or indirectly pertain to the matters listed hereinafter including documents directed to the Registrar of Deeds and the Surveyor General in terms of the applicable legislation; and /or

B

1.4 are directed to or required by any Municipality or any Provincial or National Department, Authority or body, as the case may be; and/ or

1.5 are intended for procurement of any approval or permission or authorization of whatsoever nature required in respect of the **Property** mentioned hereinbefore or in respect of any part, portion or component thereof, from the authorities and or bodies mentioned; and/ or

1.6 are required in order to pursue any such aforementioned applications to finality; and /or

1.7 are required for purposes of the execution of any such aforementioned approvals and or permissions obtained; and/ or

1.8 are required to, for all the purposes mentioned hereinbefore, in order to deal with such mentioned authorities by way of negotiations, attendances, the lodgment of Appeals and/or applications to a competent Court on behalf of the Company in his capacity as Director or by way of Consultants, legal Counsel and expert persons, the appointment of whom may include the granting of a power of substitution to such appointees whenever such appointments, in the discretion of such authorized Director, is deemed necessary.

2. The authority granted above by way of paragraph 1, shall pertain to the following applications and actions:

2.1 <u>TOWN PLANNING AND ENVIRONMENTAL MATTERS</u>

2.1.7 to apply for an extension of boundaries of an existing township in terms of section 88 of the **Ordinance**;

2.1.8 to apply for street closures in terms of section 67 of the Local Government **Ordinance** 1939;

2.1.9 to apply for park closures in terms of section 68 of the Local Government **Ordinance** 1939;

2.1.10 to apply for the removal of restrictive title deed conditions in terms of the Gauteng Removal of Restrictions Act 3 of 1996 in respect of the **property** or any portion thereof which authority shall include the lodgment of a simultaneous application for amendment of a prevailing Town Planning Scheme;

2.1.11 to apply for the approval of a Site Development Plan in terms of any conditions of establishment or the conditions imposed in terms of an approved Town Planning Scheme;

2.1.12 to apply for approvals in terms of section 82 and 101 of the **Ordinance** in respect of a township mentioned hereinbefore and for the issue of certificates in respect of any such township by the Local Authority involved;

2.1.13 to apply for any authorizations in terms of Provincial or National Legislation for any water use license, environmental authorization or road access, road construction and way-leaves from any applicable authority;

2.1.14 to apply for the permission to utilize Eskom power line servitudes for parking and to sign any documents which may be necessary to amend the conditions in any existing registered servitude at the Registrar of Deeds;

2.1.15 to apply for the division of farm land in terms of the provisions of the Subdivision of Land **Ordinance** 1986 or if applicable, the Subdivision of Agricultural Land Act, Act 70 of 1970;

2.1.16 to apply for a land development area, authorization, permission, land use change or consent as mentioned hereinbefore, in terms of any other applicable legislation or other existing or future legislation.

2.1.17 to apply for the relaxation of building lines in terms of the provisions of the prevailing town planning scheme;

2.1.18 to apply for the cancellation or partial cancellation or the encroachment of servitudes in terms of the applicable legislation; and

2.1.19 to apply for any other permission or consent or approval in terms of the legislation or requirements mentioned in this paragraph.

2.1.20 marketing functions as contemplated in terms of clause 6.31 of the **DMA**.

2.2 **APPLICATIONS FOR APPROVALS IN TERMS OF THE NATIONAL BUILDING REGULATIONS & BUILDING STANDARDS ACT 103 OF 1977**

2.2.1 to apply for approval of building plans in terms of section 4 of the National Building Regulation and Building Standards Act 1977 (hereinafter referred to as the "**NBRBSA**");

2.2.2 to apply for approval envisaged in terms of section 7(6) of the NBRBSA to commence with construction without approved building plans and for a further extension of the duration of such approval after initial procurement thereof;

2.2.3 to lodge an appeal against the decision of the Local Authority in respect of building plans submitted to the Review Board in terms of Section 9 of the NBRBSA;

2.2.4 to apply for the connection of any engineering services as may be required by the Local Authority or any other Authority for purposes of the

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3.1.4 to enter into and on behalf of the Company, into a services agreement and or infrastructure maintenance agreement in respect of any approved township envisaged hereinbefore and sign such agreement on behalf of the Company and to also conclude an agreement with the Local Authority with regard to the payment of bulk service contributions as is envisaged in terms of section 63 of the **Ordinance;**

3.1.5 The authority granted by way of paragraph 3.1.1 hereof may, in the event that deviation from the standard form of lease agreement (as amended), for a Pocket Lease or Stand Lease or any addenda thereto as referred to in the Development Rights Agreement is required, only be entered into after consultation with the Director authorized by **AWIC** Asset Manager (Attacq Management Services Proprietary Limited) or when that Director is not available, after consultation with any other Director of that Company.

3.1.6 To enter into Tenant leases subject to approval by the Director authorized by **AWIC** Asset Manager (Attacq Management Services Proprietary Limited) and the provisions of clause 6.23 of the **DMA** or when that Director is not available after consultation with any other Director of that Company .

4. The resolutions of the Board dated 15 February 2014 and 29 May 2014 regarding the same matters and authorization is hereby substituted with

ROUND ROBIN RESOLUTION OF A MEETING OF THE BOARD OF DIRECTORS OF ATTACQ WATERFALL INVESTMENT COMPANY (PTY) LTD

Registration Number 2008/013587/07

("AWIC" / "the Company")

IT IS RESOLVED -

1. That the Company, in order to give effect to the effective and efficient execution of the provisions of the Development Rights Agreement (" **the DRA**"), dated 21 August 2008 and concluded between Attacq Property Fund Limited (which name was changed to Attacq Limited – "Attacq") and Waterval Investment Company (Pty) Ltd and Waterval Development Company (Pty) Ltd, as amended (Attacq ceded and assigned its rights and obligations under the DRA to AWIC on 4 December 2009), and or to the provisions of any similar agreement to be concluded between the same parties and/or others pertaining to the **property** known as the remainder of portion 1 of the farm Waterval 5 IR, the remainder of portion 62 of the farm Waterval 5 IR , Registration Division IR (collectively referred to as "**the Waterfall Property**"), any land acquired by **AWIC** or Attacq or related party in respect of the Waterfall Property and/or any township established thereon or any erf in such a township in respect of the Waterfall Property (hereinafter referred to as the "**Property**") authorizes:

ATTERBURY PROPERTY DEVELOPMENTS PROPRIATERY LIMITED

Registration number 2004/01670/07

"APD"

in its capacity as Development Manager appointed in terms of the Development Management Agreement dated 7 December 2014 the **("DMA")** and **APD** is hereby also specifically authorized hereby to appoint any director or and, when such Director is not available, in the alternative, any other Director of **APD** , both which Directors can act independently and severally, with the power of substitution:

to sign documents on behalf of the Company, in respect of the provisions of the **DRA**, Developments , Development and Development Management Functions or any other matter as defined in the **DMA** which,

1.1 shall include a power of attorney, and/ or;

1.2 may include any documents deemed necessary by such authorized Director to give effect to this Resolution;

1.3 directly or indirectly pertain to the matters listed hereinafter including documents directed to the Registrar of Deeds and the Surveyor General in terms of the applicable legislation; and /or

1.4 are directed to or required by any Municipality or any Provincial or National Department, Authority or body, as the case may be; and/ or

1.5 are Intended for procurement of any approval or permission or authorization of whatsoever nature required in respect of the **Property** mentioned hereinbefore or in respect of any part, portion or component thereof, from the authorities and or bodies mentioned; and/ or

1.6 are required in order to pursue any such aforementioned applications to finality; and /or

1.7 are required for purposes of the execution of any such aforementioned approvals and or permissions obtained; and/ or

1.8 are required to, for all the purposes mentioned hereinbefore, in order to deal with such mentioned authorities by way of negotiations, attendances, the lodgment of Appeals and/or applications to a competent Court on behalf of the Company in his capacity as Director or by way of Consultants, legal Counsel and expert persons, the appointment of whom may include the granting of a power of substitution to such appointees whenever such appointments, in the discretion of such authorized Director, is deemed necessary.

2. The authority granted above by way of paragraph 1, shall pertain to the following applications and actions:

2.1 <u>TOWN PLANNING AND ENVIRONMENTAL MATTERS</u>

2.1.1 to apply for the establishment of a township in terms of the Town Planning and Township **Ordinance** no. 15 of 1986 ("The **Ordinance**") which authority shall include the authority to change the name of the township owner in terms of section 78(1) of such **Ordinance**; or to apply for and effect any amendment to such township in terms of section 98(5) and section 100 of such **Ordinance**;

2.1.2 to apply for a consent use in terms of the **Ordinance** read with the applicable Town Planning Scheme;

2.1.3 to apply for the amendment of a Town Planning Scheme in terms of section 56 or 28 of the **Ordinance**;

2.1.4 to apply for a consolidation or subdivision of erven in the township in terms of section 92 of the **Ordinance**;

2.1.5 to apply for the division of an approved township in terms of section 99 of the **Ordinance**;

2.1.6 to apply for the amendment or cancellation of a general plan pertaining to a township in terms of section 89 of the **Ordinance**;

2.1.7 to apply for an extension of boundaries of an existing township in terms of section 88 of the **Ordinance**;

2.1.8 to apply for street closures in terms of section 67 of the Local Government **Ordinance** 1939;

2.1.9 to apply for park closures in terms of section 68 of the Local Government **Ordinance** 1939;

2.1.10 to apply for the removal of restrictive title deed conditions in terms of the Gautang Removal of Restrictions Act 3 of 1996 in respect of the **property** or any portion thereof which authority shall include the lodgment of a simultaneous application for amendment of a prevailing Town Planning Scheme;

2.1.11 to apply for the approval of a Site Development Plan in terms of any conditions of establishment or the conditions imposed in terms of an approved Town Planning Scheme;

2.1.12 to apply for approvals in terms of section 82 and 101 of the Ordinance in respect of a township mentioned hereinbefore and for the issue of certificates in respect of any such township by the Local Authority involved;

2.1.13 to apply for any authorizations in terms of Provincial or National Legislation for any water use license, environmental authorization or road access, road construction and way-leaves from any applicable authority;

2.1.14 to apply for the permission to utilize Eskom power line servitudes for parking and to sign any documents which may be necessary to amend the conditions in any existing registered servitude at the Registrar of Deeds;

2.1.15 to apply for the division of farm land in terms of the provisions of the Subdivision of Land Ordinance 1986 or if applicable, the Subdivision of Agricultural Land Act, Act 70 of 1970;

2.1.16 to apply for a land development area, authorization, permission, land use change or consent as mentioned hereinbefore, in terms of any other applicable legislation or other existing or future legislation.

2.1.17 to apply for the relaxation of building lines in terms of the provisions of the prevailing town planning scheme;

2.1.18 to apply for the cancellation or partial cancellation or the encroachment of servitudes in terms of the applicable legislation; and

2.1.19 to apply for any other permission or consent or approval in terms of the legislation or requirements mentioned in this paragraph.

2.1.20 marketing functions as contemplated in terms of clause 6.31 of the DMA.

2.2 **APPLICATIONS FOR APPROVALS IN TERMS OF THE NATIONAL BUILDING REGULATIONS & BUILDING STANDARDS ACT 103 OF 1977**

2.2.1 to apply for approval of building plans in terms of section 4 of the National Building Regulation and Building Standards Act 1977 (hereinafter referred to as the "NBRBSA");

2.2.2 to apply for approval envisaged in terms of section 7(6) of the **NBRBSA** to commence with construction without approved building plans and for a further extension of the duration of such approval after initial procurement thereof;

2.2.3 to lodge an appeal against the decision of the Local Authority in respect of building plans submitted to the Review Board in terms of Section 9 of the **NBRBSA**;

2.2.4 to apply for the connection of any engineering services as may be required by the Local Authority or any other Authority for purposes of the

approval of any of the applications referred to in paragraphs 2.1 and 2.2 of this Resolution;

2.2.5 to apply for any consent or approval which may be deemed necessary by the relevant Authority to obtain temporary or permanent occupancy of any buildings erected by the Company on the property as is envisaged in terms of Section 14 or Section 14A of the NBRBSA.

2.2.6 to, if required, lodge an Internal Appeal in terms of Section 62 of the Local Government: Municipal Systems Act 2000, in respect of any decision of a Local Authority granted in respect of any Applications referred to in paragraphs 2.1 and 2.2 of this Resolution and or approach a competent Court with an application for urgent interim, mandatory or any other relief considered appropriate to procure the reasonable and expeditious processing of the Applications envisaged in paragraphs 2.1 and 2.2 of this Resolution and the review, set aside or correct any such decisions of the Authorities mentioned.

3. The authority granted by way of paragraph 1 above, shall also pertain to the following actions:

3.1 **NOTARIAL AND TENANT LEASE AGREEMENTS WITH THE LANDLORD IN RESPECT OF THE PROPERTY REFERRED TO IN PARAGRAPH 1 HEREOF AND OTHER AGREEMENTS WITH THIRD PARTIES**

Subject to clause 13 of the **DMA** :

3.1.1 To enter, subject to the provisions of paragraph 3.1.4, into any notarial lease agreement, or sign a release in respect of such notarial lease agreement regarding any portion of the **property** regarding a development pocket, a Township or a Stand established or procured in respect of such **property;**

3.1.2 to enter into any agreement relating to the construction of infrastructure, a building or structures or the appointment of contractors or professional team as defined in the **DMA** in execution of procured land use rights in respect of any portion of the **property** or a development pocket, township or erf established on such **property** as well as any agreements and arrangements as contemplated in clause 13.1 of the **DMA;**

3.1.3 to enter into any agreement or arrangement as contemplated in clause 13.2 of the **DMA;**

3.1.4 to enter into and on behalf of the Company, into a services agreement and or infrastructure maintenance agreement in respect of any approved township envisaged hereinbefore and sign such agreement on behalf of the Company and to also conclude an agreement with the Local Authority with regard to the payment of bulk service contributions as is envisaged in terms of section 63 of the **Ordinance**;

3.1.5 The authority granted by way of paragraph 3.1.1 hereof may, in the event that deviation from the standard form of lease agreement (as amended), for a Pocket Lease or Stand Lease or any addenda thereto as referred to in the Development Rights Agreement is required, only be entered into after consultation with the Director authorized by **AWIC** Asset Manager (Attacq Management Services Proprietary Limited) or when that Director is not available, after consultation with any other Director of that Company.

3.1.6 To enter into Tenant leases subject to approval by the Director authorized by **AWIC** Asset Manager (Attacq Management Services Proprietary Limited) and the provisions of clause 6.23 of the **DMA** or when that Director is not available after consultation with any other Director of that Company .

4. The resolutions of the Board dated 15 February 2014 and 29 May 2014 regarding the same matters and authorization is hereby substituted with

Immediate effect: Provided that everything done or still in process on behalf of the Company by virtue of or in terms of such substituted Resolutions, shall remain valid and binding on the Company and shall be pursued to finality by the authorized representatives and agents of the Company in terms of such substituted Resolution.

5. Any of the Directors of **AWIC** is hereby authorized to sign any documents to give effect to this Resolution.

6. Everything done by **APD** in accordance with the resolutions dated 15 February 2014 and 29 May 2014 mentioned under paragraph 4 above as well as in terms of the **DMA** thusfar is hereby ratified.

PIERRE TREDOUX DATE: 17/02/2015

MELT HAMMAN DATE: 16-02-2015

MORNE CORNELIUS WILKEN DATE: 16/02/2015

STEWARD SHAW- TAYLOR DATE:

ROUND ROBIN RESOLUTION OF A MEETING OF THE BOARD OF DIRECTORS OF ATTERBURY PROPERTY DEVELOPMENTS PROPRIATERY LIMITED ("APD")

Registration number 2004/01670/07

("the Company ")

IT IS RESOLVED

1. That the Company, in order to give effect to the effective and efficient execution of the provisions of the Development Rights Agreement ("the **DRA**"), dated 21 August 2008 and concluded between Attacq Property Fund Limited and Waterval Investment Company (Pty) Ltd and Waterval Development Company (Pty) Ltd read with the provisions of the Development Management Agreement ("the **DMA**") dated 7 December 2014 and or to the provisions of any similar agreement to be concluded between the same parties and/or others pertaining to the **property** known as:

   (a) the remainder of portion 1 of the farm Waterval 5 IR; and/or

   (b) the remainder of portion 62 of the farm Waterval 5 IR , Registration Division IR and/or (collectively referred to as the **Waterfall Property**)

   (c) any land acquired by **AWIC** or Attacq or related party thereto in respect of the **Waterfall Property**; and /or

(d) any townhip established thereon or any erf in such a township in respect of the **Waterfall Property**;

(hereinafter referred to as the "**property**") authorizes:

HERCULES COENRAAD BEZUIDENHOUT

in his capacity as Director of the Company and, when such Director is not available, in the alternative, any other Director of Such Company, both which Directors can act independently and serverally, with the porwer of substitution, to sign any document on behalf of the Company, which ducuments, where applicable,

1.1 shall include a power of attorney, and/ or;

1.2 may include any documents deemed necessary by such authorized Director to give effect to this Resolution;

1.3 directly or indirectly pertain to the matters listed hereinafter including documents directed to the Registrar of Deeds and the Surveyor General in terms of the applicable legislation; and /or

1.4 are directed to or required by any Municipality or any Provincial or National Department, Authority or body, as the case may be; and/ or

1.5 are intended for procurement of any approval or permission or authorization of whatsoever nature required in respect of the **property** mentioned hereinbefore or in respect of any part, portion or component thereof, from the authorities and or bodies mentioned; and/ or

1.6 are required in order to pursue any such aforementioned applications to finality; and /or

1.7 are required for purposes of the execution of any such aforementioned approvals and or permissions obtained; and/ or

1.8 are required to, for all the purposes mentioned hereinbefore, in order to deal with such mentioned authorities by way of negotiations, attendances, the lodgment of Appeals and/or applications to a competent Court on behalf of the Company in his capacity as Director or by way of Consultants, legal Counsel and expert persons, the appointment of whom may include the granting of a power of substitution to such appointees whenever such appointments, in the discretion of such authorized Director, is deemed necessary.

2. The authority granted above by way of paragraph 1, shall pertain to the following applications and actions:

2.1 **TOWN PLANNING AND ENVIRONMENTAL MATTERS**

2.1.1 to apply for the establishment of a township in terms of the Town Planning and Township Ordinance no. 15 of 1986 ("The **Ordinance**") which authority shall include the authority to change the name of the township owner in terms of section 78(1) of such **Ordinance**; or to apply for and effect any amendment to such

township in terms of section 98(5) and section 100 of such **Ordinance**;

2.1.2 to apply for a consent use in terms of the **Ordinance** read with the applicable Town Planning Scheme;

2.1.3 to apply for the amendment of a Town Planning Scheme in terms of section 56 or 28 of the **Ordinance**;

2.1.4 to apply for a consolidation or subdivision of erven in the township in terms of section 92 of the **Ordinance**;

2.1.5 to apply for the division of an approved township in terms of section 99 of the **Ordinance**;

2.1.6 to apply for the amendment or cancellation of a general plan pertaining to a township in terms of section 89 of the **Ordinance**;

2.1.7 to apply for an extension of boundaries of an existing township in terms of section 88 of the **Ordinance**;

2.1.8 to apply for street closures in terms of section 67 of the Local Government Ordinance 1939;

2.1.9 to apply for park closures in terms of section 68 of the Local Government Ordinance 1939;

2.1.10 to apply for the removal of restrictive title deed conditions in terms of the Gauteng Removal of Restrictions Act 3 of 1996 in respect of the **property** or any portion thereof which authority shall include the lodgment of a simultaneous application for amendment of a prevailing Town Planning Scheme;

2.1.11 to apply for the approval of a Site Development Plan in terms of any conditions of establishment or the conditions imposed in terms of an approved Town Planning Scheme;

2.1.12 to apply for approvals in terms of section 82 and 101 of the **Ordinance** in respect of a township mentioned hereinbefore and for the issue of certificates in respect of any such township by the Local Authority involved;

2.1.13 to apply for any authorizations in terms of Provincial or National Legislation for any water use license, environmental authorization or road access, road construction and way-leaves from any applicable authority;

2.1.14 to apply for the permission to utilize Eskom power line servitudes for parking and to sign any documents which may be necessary to amend the conditions in any existing registered servitude at the Registrar of Deeds;

2.1.15 to apply for the division of farm land in terms of the provisions of the Subdivision of Land Ordinance 1986 or if applicable, the Subdivision of Agricultural Land Act, Act 70 of 1970;

2.1.16 to apply for a land development area, authorization, permission, land use change or consent as mentioned hereinbefore, in terms of any other applicable legislation or other existing or future legislation.

2.1.17 to apply for the relaxation of building lines in terms of the provisions of the prevailing town planning scheme and provide comments in respect of building line relaxations on adjacent properties;

2.1.18 to apply for the cancellation or partial cancellation or the encroachment of servitudes in terms of the applicable legislation; and

2.1.19 to apply for any other permission or consent or approval in terms of the legislation or requirements mentioned in this paragraph.

2.1.20 marketing functions as contemplated in terms of clause 6.31 of the **DMA.**

2.2 APPLICATIONS FOR APPROVALS IN TERMS OF THE NATIONAL BUILDING REGULATIONS & BUILDING STANDARDS ACT 103 OF 1977

2.2.1 to apply for approval of building plans in terms of section 4 of the National Building Regulation and Building Standards Act 1977 (hereinafter referred to as the "**NBRBSA**");

2.2.2 to apply for approval envisaged in terms of section 7(6) of the **NBRBSA** to commence with construction without approved building plans and for a further extension of the duration of such approval after initial procurement thereof;

expeditious processing of the Applications envisaged in paragraphs 2.1 and 2.2 of this Resolution and the review, set aside or correct any such decisions of the Authorities mentioned.

3. The authority granted by way of paragraph 1 above, shall also pertain to the following actions:

3.1 **NOTARIAL AND TENANT LEASE AGREEMENTS WITH THE LANDLORD IN RESPECT OF THE PROPERTY REFERRED TO IN PARAGRAPH 1 HEREOF AND OTHER AGREEMENTS WITH THIRD PARTIES**

Subject to clause 13 of the **DMA**:

3.1.1 To enter, subject to the provisions of paragraph 3.1.4, into any notarial lease agreement, or sign a release in respect of such notarial lease agreement regarding any portion of the property regarding a development pocket, a Township or a Stand established or procured in respect of such property;

3.1.2 to enter into any agreement relating to the construction of infrastructure, a building or structures or the appointment of contractors or professional team as defined in the **DMA** in execution of procured land use rights in respect of any portion of the property or a development pocket, township or erf established on such property as well as any agreements and arrangements as contemplated in clause 13.1 of the **DMA**;

3.1.3 to enter into any agreement or arrangement as contemplated in clause 13.2 of the **DMA**;

3.1.4 to enter into and on behalf of the Company, into a services agreement and or infrastructure maintenance agreement in respect of any approved township envisaged hereinbefore and sign such agreement on behalf of the Company and to also conclude an agreement with the Local Authority with regard to the payment of bulk service contributions as is envisaged in terms of section 63 of the Ordinance;

3.1.5 The authority granted by way of paragraph 3.1.1 hereof may, in the event that deviation from the standard form of lease agreement (as amended), for a Pocket Lease or Stand Lease or any addenda thereto as referred to in the Development Rights Agreement is required, only be entered into after consultation with the Director authorized by **AWIC** Asset Manager (Attacq Management Services Proprietary Limited) or when that Director is not available, after consultation with any other Director of that Company.

3.1.6 To enter into Tenant leases subject to approval by the Director authorized by **AWIC** Asset Manager (Attacq Management Services Proprietary Limited) and the provisions of clause 6.23 of the **DMA** or when that Director is not available after consultation with any other Director of that Company.

and generally for effecting the purpose aforesaid, to do or cause to be done whatsoever shall be requisite, as fully and effectually, for all intents and purposes, as I might or could do if personally present and acting herein, hereby ratifying, allowing and confirming and promising and agreeing to ratify, allow and confirm all and whatsoever my Agent shall lawfully do, or cause to be done, by virtue of these present.

SIGNED AT Waterfall City, Midrand **on this the** 17 February 2015

day of FEBRUARY 2015

AS WITNESSES:

DIRECTOR

2.

EXTRACTS OF THE MINUTES OF A MEETING OF THE RESOLUTION PASSED AT A MEETING OF THE DIRECTORS OF WITWATERSRAND ESTATES LIMITED
Registration Number 1934/005481/06
(the "Company")
HELD AT WOODMEAD ON 4 NOVEMBER 2015

RECORDED THAT:

1. The Gauteng Department of Agriculture, Conservation and Environment (GDACE) and the Gauteng Department of Agriculture and Rural Development (GDARD) respectively issued Record of Decisions (ROD's) in respect of the buffer areas associated with the demarcated wetlands on the remainder of portion1 of the farm Waterval 5 IR.

2. The first ROD was by GDACE to the Waterval Islamic Institute on 12 October 2007 (GAUT 002/05-06/1476 and the second ROD by GDARD to Atterbury Investment Holdings on 29 April 2010. (GAUT 002/08-09/N0993).

3. An appeal was lodged to the MEC for Agriculture, Rural and Social Development of the Gauteng to relax the northern wetland buffer of 30 meters situated immediately to the west of the N1 highway and to the south of Allandale road which was rejected on 13 September 2013.

4. An application was then lodged to the High Court by WEL and AWIC on 23 May 2014 to set aside the decision of MEC mentioned under 3 below.

5. Due to changes to the regulations of the National Environmental Management Act, 107 of 1998 it is possible to submit new amendment applications to relax the 30 meter buffers imposed in terms of the mentioned ROD's and once accepted and approved in principle by GDARD, the High Court Application will be withdrawn.

RESOLVED THAT:

1. the Company grants a power of attorney to

   ATTACQ WATERFALL INVESTMENT COMPANY PROPRIETARY LIMITED
   Registration Number 2000/013587/07

   1.1 to Lodge an application(s) to amemd the record of decisions of :

   (a) GDACE on 12 October 2007 (ref GAUT 002/05-06/1476; and

   (b) GDARD 29 April 2010. (GAUT 002/08-09/N0993)

   for relaxation of the 30m northern wetland buffers or any matters incidental thereto immediately to the west of the N1 freeway and to the south of Allandale road situated within the proposed townships Jukskei View Extention 74, 106, 91, 92 and 89 situated on a part of the remainder of portion 1 of the farm Waterfal 5 IR and;

2. AWIC is hereby authorised to sign the relevant documents with the Power of Subsitution which may be necessary to effect to the resolution in 1 above including the appointment of a professional team and agrees that AWIC may delegate such authority to any director or manager in the full-time employ of AWIC or any of its associated companies to execute and action or power which AWIC is authorised to execute in terms of this resolution.

3. All actions taken by AWIC thus far in respect of the above is hereby ratified.

4. That **IBRAHIM MIA** in his capacity as a Director be and is hereby authorised to sign the relevant power of attorney as may be necessary to give effect to this resolution.

CERTIFIED A TRUE COPY

CHAIRMAN

Addendum E

POWER OF ATTORNEY

I, the undersigned, IBRAHIM MIA, in my capacity as director and duly authorised hereto by virtue of a resolution of

WITWATERSRAND ESTATES LIMITED
Registration Number 1934/005481/06

(the "Company")

do hereby nominate, constitute and appoint

ATTACQ WATERFALL INVESTMENT COMPANY PROPRIETARY LIMITED
Registration Number 2000/013587/07
("AWIC")

with the Power of Substitution to be our Agent(s) to –

1. to Lodge an application(s) in terms of the National Environmental Managment Act ,107 of 1998 and regulations to amemd the record of decisions of the:

   (a) Gauteng Department of Agriculture Conservation and Environment(GDACE) on 12 October 2007 (ref GAUT 002/05-06/1476; and

   (b) Gauteng Department of Agriculture and Rural Development (GDARD) 29 April 2010. (GAUT 002/08-09/N0993).

   for relaxation of the 30m northern wetland buffers or any matters incidental thereto immediately to the west of the N1 freeway and to the south of Allandale road situated within the proposed townships Jukskei View Extention 74, 106, 91, 92 and 89 situated on a part of the remainder of portion 1 of the farm Waterfal 5 IR and;

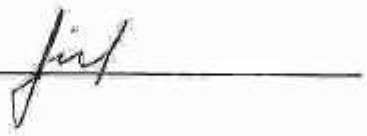
2. AWIC is hereby authorised to sign the relevant documents with the Power of Subsitution inluding the appointment of a professional team, which may be necessary to give effect to 1 above and agrees that AWIC may delegate such authority to any director or manager in the full-time employ of AWIC or any of its associated companies to execute any action or power which AWIC is authorised to execute in terms of this power of attorney.

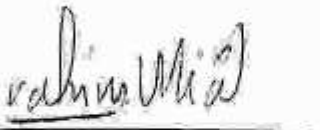
   and generally, for effecting the purposes aforesaid, to do or cause to be done whatsoever shall be requisite, as fully and effectually, for all intents and purposes, as the Company might or could do if personally present and acting therein; hereby ratifying all actions already taken, allowing and confirming all and whatsoever the said Agent/s shall lawfully do or cause to be done by virtue of these presents.

Signed at WOODMEAD on 4/11/2015 In the presence of the undersigned witnesses.

AS WITNESSES :

1. 

2. 



On behalf of WITWATERSRAND ESTATES LIMITED

"ADDENDUM E"

POWER OF ATTORNEY

I, the undersigned, HERCULES COENRAAD BEZUIDENHOUT, duly authorised hereto by virtue of a resolution of

ATTERBURY PROPERTY DEVELOPMENTS (PTY) LTD
REGISTRATION NUMBER 2004/01670/07 ("APD")

(the "Company")

do hereby nominate, constitute and appoint

LIZELLE GREGORY OF BOKOMOSO (LANDSCAPE ARCHITECTS & ENVIRONMENTAL CONSULTANTS CC).

with the Power of Substitution to be our Agent(s) to –

1. to Lodge an application(s) in terms of the National Environmental Managment Act ,107 of 1998 and regulations to amemd the record of decisions of the:

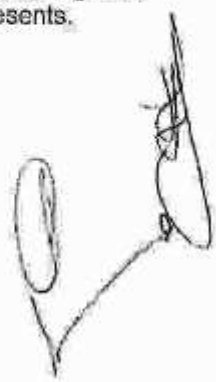
   (a) Gauteng Department of Agriculture Conservation and Environment(GDACE) on 12 October 2007 (ref GAUT 002/05-06/1476; and

   (b) Gauteng Department of Agriculture and Rural Development (GDARD) 29 April 2010. (GAUT 002/08-09/N0993).

   for relaxation of the 30m northern wetland buffers or any matters incidental thereto immediately to the west of the N1 freeway and to the south of Allandale road situated within the proposed townships Jukskei View Extention 74, 106, 91, 92 and 89 situated on a part of the remainder of portion 1 of the farm Waterfal 5 IR and;

2. Lizellie Gregory is hereby authorised submit and sign the relevant documents with the Power of Subsitution inluding the appointment of a profeesional team, which may be necessary to give effect to the resolution in 1 above and agrees that may delegate such authority to any director or manager in the full-time employee of Lizelle Gregory and Bokomoso or any of its associated companies to execute any action or power which AWIC is authorised to execute in terms of this power of attorney.

   and generally, for effecting the purposes aforesaid, to do or cause to be done whatsoever shall be requisite, as fully and effectually, to all intents and purposes, as the Company might or could do if personally present and acting therein; hereby ratifying all actions already taken, allowing and confirming all and whatsoever the said Agent/s shall lawfully do or cause to be done in the premises by virtue of these presents.



Signed at Midrand on

in the presence of the undersigned witnesses.

AS WITNESSES :

1. _____

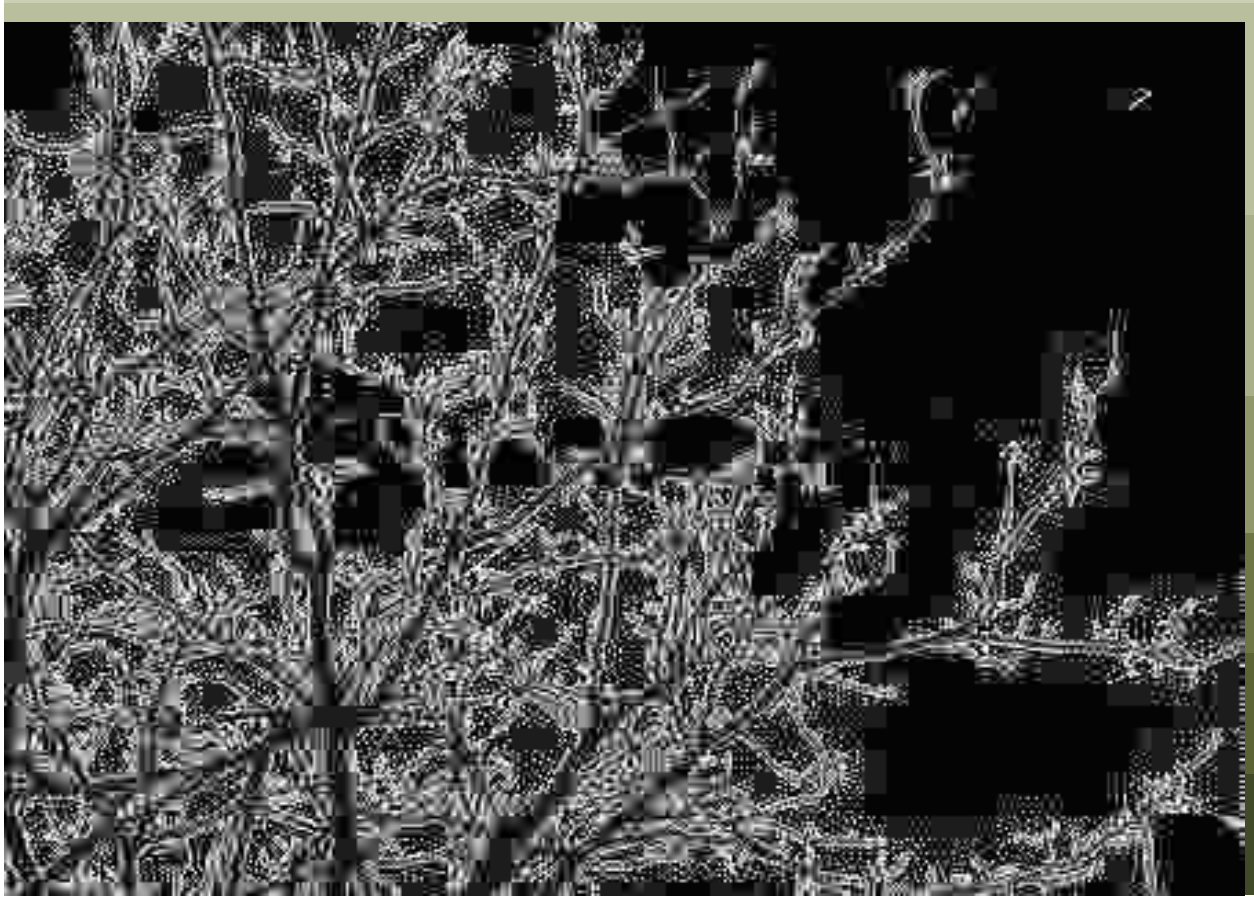
2. _____

_____
On behalf of APD and AWIC


Bokamoso

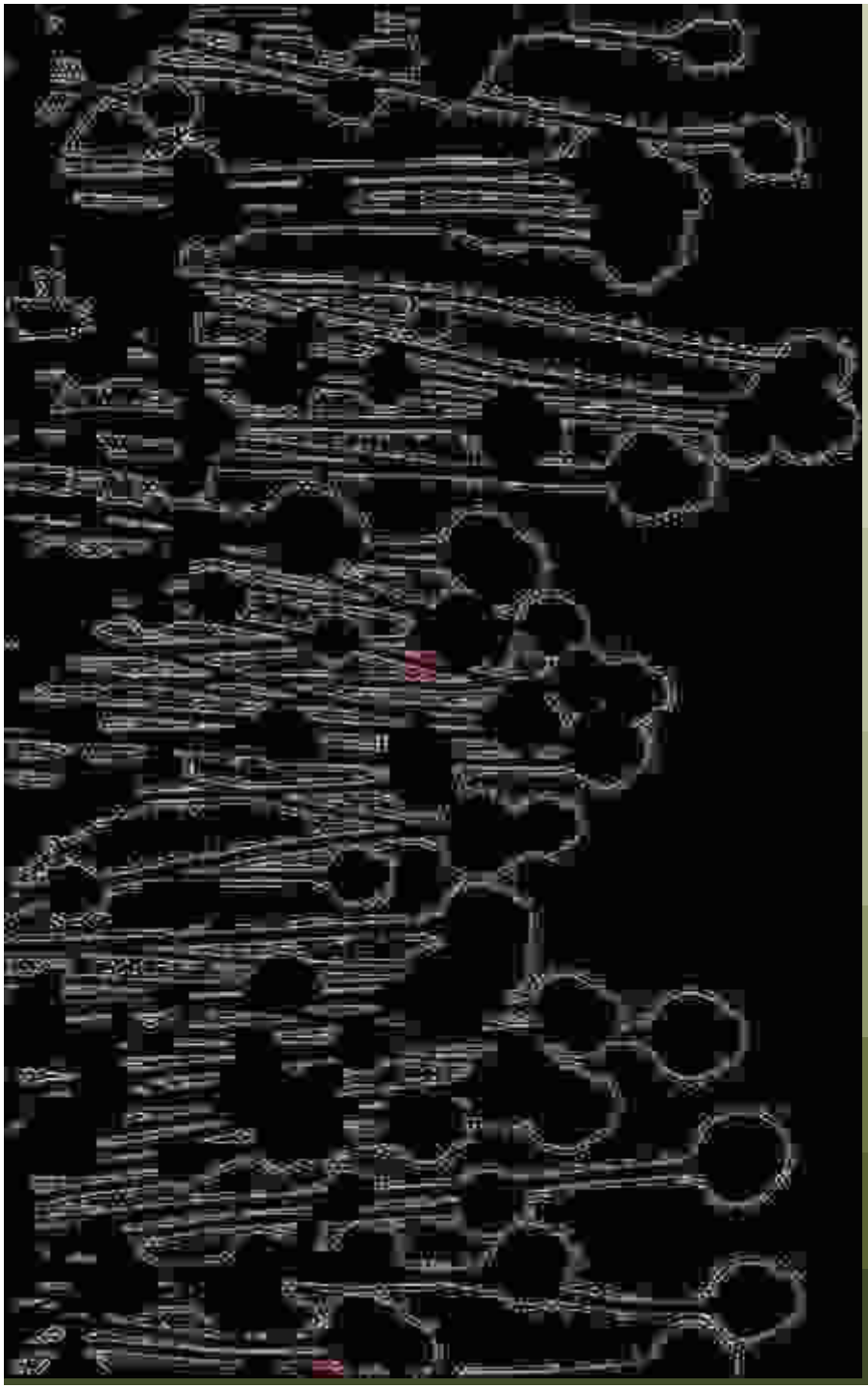
Bokamoso specialises in the fields of Landscape Architecture and all aspects of Environmental Management and Planning. Bokamoso was founded in 1992 and has shown growth by continually meeting the needs of our clients. Our area of expertise stretches throughout the whole of South Africa. Our projects reflect the competence of our well compiled team. The diversity of our members enables us to tend to a variety of needs. Our integrated approach establishes a basis for outstanding quality. We are well known to clients in the private, commercial as well as governmental sector.

At Bokamoso we stand on a firm basis of environmental investigation in order to find unique solutions to the requirements of our clients and add value to their operations.



01 Executive Summary

011 Company Overview



Vision:

At Bokamoso we strive to find the best planning solutions by taking into account the functions of a healthy ecosystem. Man and nature should be in balance with each other.

Mission:

We design according to our ethical responsibility, take responsibility for successful completion of projects and constitute a landscape that contributes to a sustainable environment. We add value to the operations of our clients and build long term relationships that are mutually beneficial.

Values:

Integrity

Respect

Bokamoso

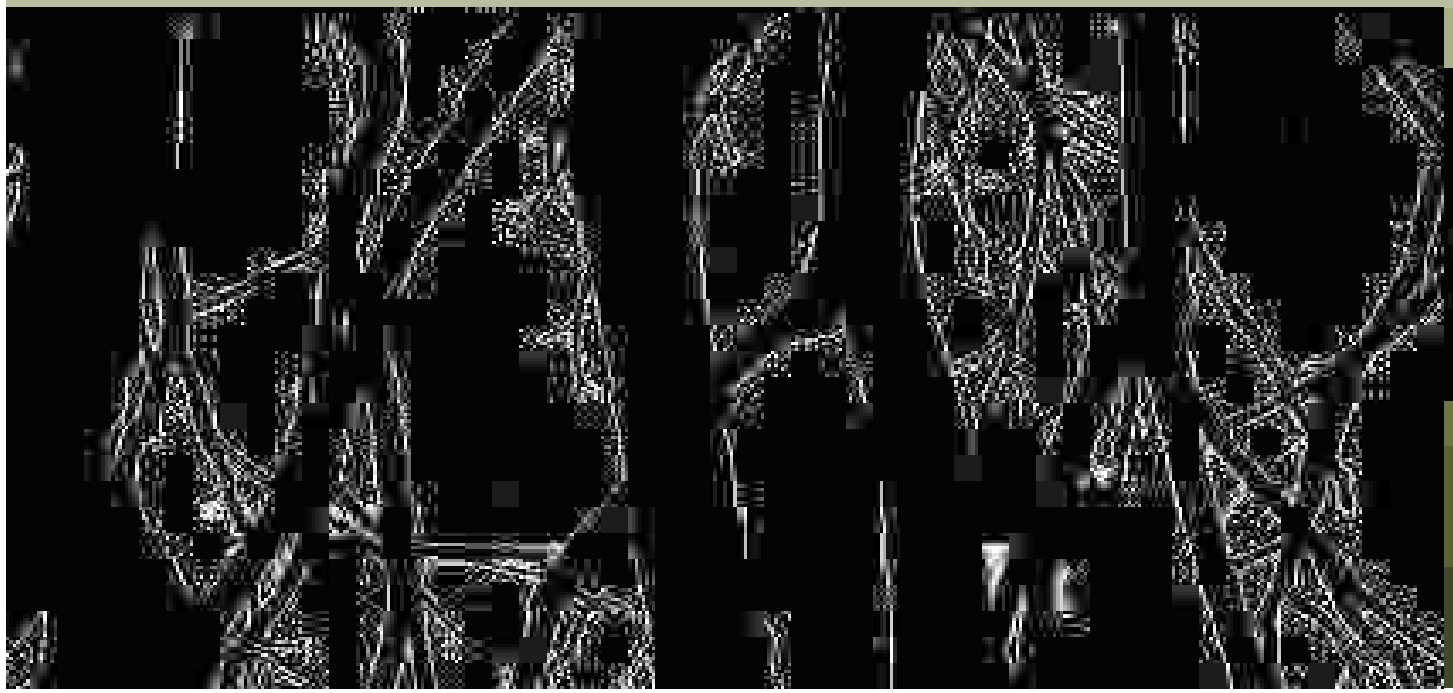
02 Vision, Mission & Values

Bokamoso stands on the basis of fairness. This include respect within our multicultural team and equal opportunities in terms of gender, nationality and race.

We have a wide variety of projects to tend to, from complicated reports to landscape installation. This wide range of projects enables us to combine a variety of professionals and skilled employees in our team.

Bokamoso further aids in the development of proficiency within the working environment. Each project, whether in need of skilled or unskilled tasks has its own variety of facets to bring to the table.

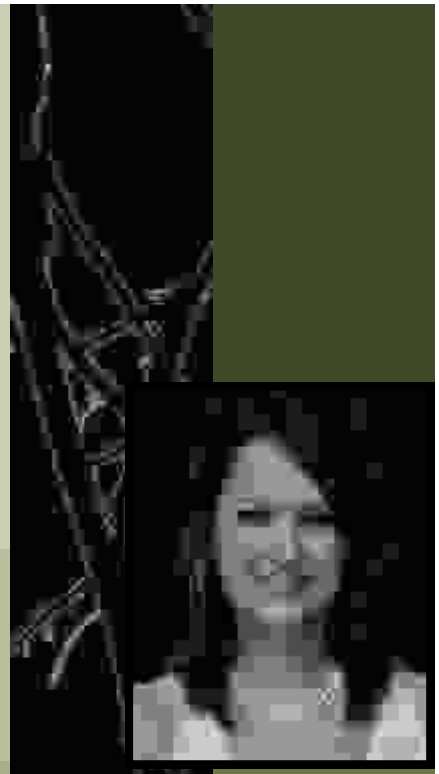
We are currently in the process of receiving our BEE scorecard. We support transformation in all areas of our company dynamics.



03 Human Resources

031 Employment Equity

Lizelle Gregory (100% interest)



Lizelle Gregory obtained a degree in Landscape Architecture from the University of Pretoria in 1992 and passed her board exam in 1995.
Her professional practice number is PrLArch 97078.

Ms. Gregory has been a member of both the Institute for Landscape Architecture in South Africa (ILASA) and South African Council for the Landscape Architecture Profession (SACLAP), since 1995.

Although the existing Environmental Legislation doesn't yet stipulate the academic requirements of an Environmental Assessment Practitioner (EAP), it is recommended that the Environmental Consultant be registered at the International Association of Impact Assessments (IAIA). Ms. Gregory has been registered as a member of IAIA in 2007.

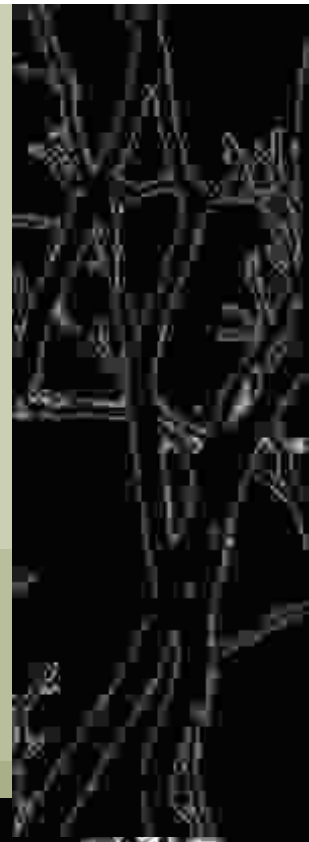
Ms. Gregory attended and passed an International Environmental Auditing course in 2008.
She is a registered member of the International Environmental Management and Assessment Council (IEMA).

She has lectured at the Tshwane University of Technology (TUT) and the University of Pretoria (UP). The lecturing included fields of Landscape Architecture and Environmental Management.

Ms. Gregory has more than 20 years experience in the compilation of Environmental Evaluation Reports:
Environmental Management Plans (EMP);
Strategic Environmental Assessments;
All stages of Environmental input ;
EIA under ECA and the new and amended NEMA regulations and various other Environmental reports and documents.

Ms. Gregory has compiled and submitted more than 600 Impact Assessments within the last 5-6 years. Furthermore, Ms. L. Gregory is also familiar with all the GDARD/Provincial Environmental policies and guidelines. She assisted and supplied GAUTRANS/former PWV Consortium with Environmental input and reports regarding road network plans, road determinations, preliminary and detailed designs for the past 12 years.

Consulting



Anè Agenbacht

Introduction to Sustainable Environmental Management—An overview of Principles, Tools,& Issues (Potch 2006)
Leadership Training School (Lewende Woord 2010)
BA Environmental Management (UNISA 2011)
PGCE Education (Unisa 2013) - CUM LAUDE
Project Manager
More than 10 years experience in the compilation of various environmental reports

Mary-Lee Van Zyl

Msc. Plant Science (UP)
BSc (Hons) Plant Science (UP)
BSc Ecology (UP)
More than 3 years working experience in the Environmental field
Specialises in ECO works, Basic Assessments, EIA's, and Flora Reports
Compilation of various Environmental Reports

Dashentha Moodley

BA Honours Degree in Environmental Management (UNISA) - CUM LAUDE
Bachelor of Social Science in Geography & Environmental Management (UKZN)
More than 6 years experience in WUL Applications & Integrated Environmental Management within water resource management.
Senior Environmental Practitioner & Water Use Licence Consultant
Specialises in Water Use License & Compilation of various Env. Reports

Nadine Duncan

BSc (Hons) Geography (UP)
BSc Landscape Architecture (UP)
More than 10 years experience in compilation of Basic Assessments and EIA Reports
Compilation of various Environmental Reports

Ben Bhukwana

BSc Landscape Architecture (UP)
More than 6 years experience in the field of Landscape Architecture (Design, Construction, Implementation, and Management).
Specialises in Landscape Design, ECO, Rehabilitation Plans and Compilation various environmental reports and Compilation of Tender documents

Juanita de Beer

Diploma Events Management and Marketing (Damelin)
Specializes in Public relations and Public Participation Processes (4 years experience)
Specialises in compiling various environmental reports

Alfred Thomas

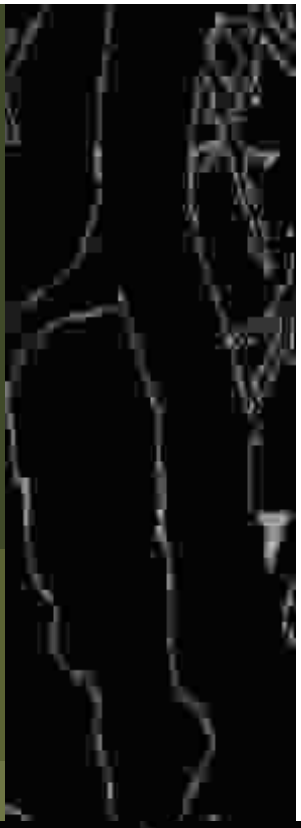
CIW Foundation& Internet Marketing (IT Academy)
12 years experience in GIS and IT in general.
GIS Operator and Multimedia Specialist.

Bianca Reyneke

Applying SHE Principles and Procedures (NOSA)
Intro to SAMTRAC Course (NOSA)
SHEQ Coordinator and compilation of environmental reports
Specialises in compiling various environmental reports

A.E. van Wyk

BSc. Environmental Sciences (Zoology and Geography)
Specialises in compiling various environmental reports



In-house Specialists

Mark Cooper

Pr. Sci. Nat. Biological Science (SACNASP)
M.Sc. Zoology (UCT 1998)
B.Sc. (Hons) Zoology (UCT 1995)
B.Sc. Botany & Zoology (Wits 1994)
Specialises identifying Red-Listed Species
Compilation of various fauna and flora reports

Corné Niemandt

M.Sc. Plant Science (UP 2015) – Cum Laude
B.Sc. (Hons) Zoology (UP 2012)
B.Sc. Ecology (UP 2011)
Specialises in vegetation and plant surveys

Garth van Rooyen

BSc. (Hons) Environmental Soil Science
BSc. Geology
Specialises in vegetation and plant surveys
Compilation of fauna and flora specialist reports

Sampie van Rooyen

M.Sc. Environmental Sciences in Botany (Candidate) (NWU)
B.Sc. (Hons) Ecological Remediation (NWU)
B.Sc. Environmental Sciences and Tourism (NWU)
Specialises in conducting ecological surveys and plant identification

CW Vermeulen

B.Sc. Environmental & Biological Sciences (NWU)
Junior Environmental Assessment Practitioner
Field expert in avifauna and the compilation of avifaunal reports

Elsa Viviers

Interior Decorating (Centurion College)
(Accounting/ Receptionist) and Secretary to Lizelle Gregory

Loura du Toit

N. Dip. Professional Teacher (Heidelberg Teachers Training College)
Librarian and PA to Project Manager

Merriam Mogalaki

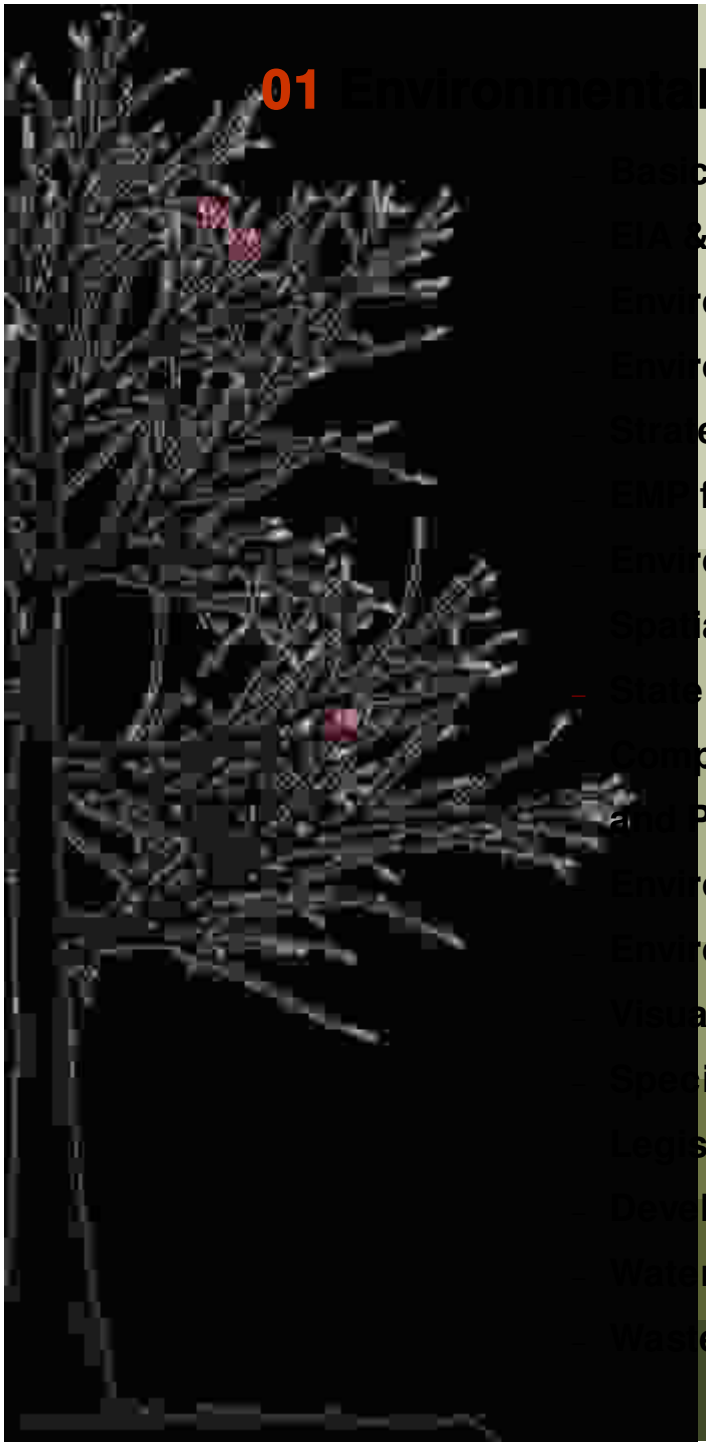
Administration Assistant with in-house training in bookkeeping

Landscape Contracting

Elias Maloka

Assisting with Public Participations, Office Admin
Site manager overseeing landscape installations.
Irrigation design and implementation.
Landscape maintenance
More than 18 years experience in landscape construction work

The contracting section compromises of six permanently employed black male workers. In many cases the team consists of up to 12 workers, depending on the quantity of work.



01 Environmental Management Services

- Basic Assessment Reports
- EIA & Scoping Reports
- Environmental Management Plans
- Environmental Scans
- Strategic Environmental Assessments
- EMP for Mines
- Environmental Input and Evaluation of
- Spatial Development Frameworks
- State of Environmental Reports
- Compilation of Environmental Legislation
- and Policy Documents
- Environmental Auditing and Monitoring
- Environmental Control Officer (ECO)
- Visual Impact assessments
- Specialist Assistance with Environmental
- Legislation Issues and Appeals
- Development Process Management
- Water Use License applications to DWA
- Waste License Application

Bokamoso

04 Services

041 Consulting Services

02 Landscape Architecture

- Master Planning
- Sketch Plans
- Planting Plans
- Working Drawings
- Furniture Design
- Detail Design
- Landscape Development Frameworks
- Landscape Development Plans (LDP)
- Contract and Tender Documentation
- Landscape Rehabilitation Works

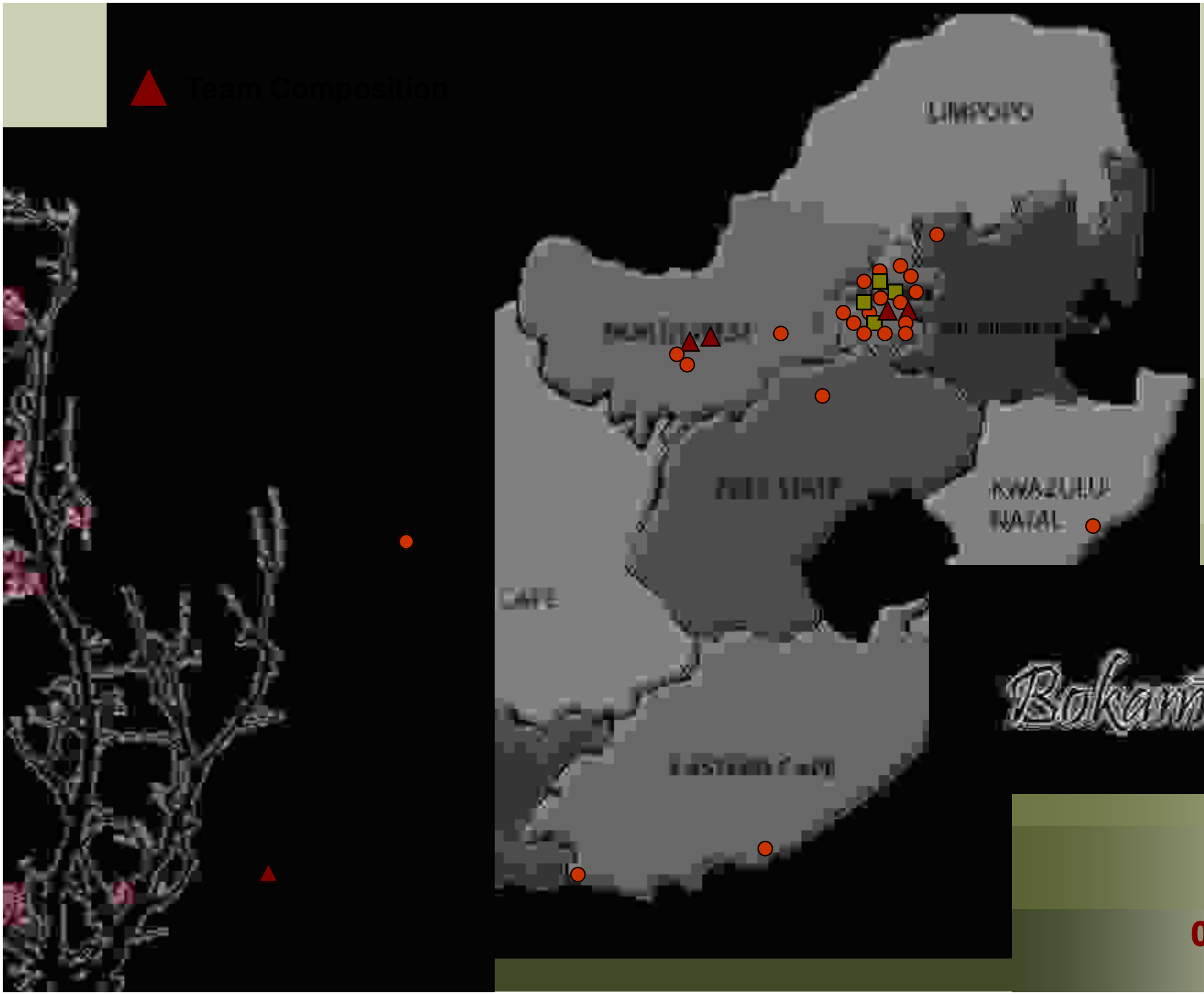
03 Landscape Contracting

Implementation of Plans for:

- Office Parks
- Commercial/ Retail / Recreational Development
- Residential Complexes
- Private Residential Gardens
- Implementation of irrigation systems

04 Services

042 Contracting Services



04 Services

043 Orientation

05 Landscape Projects– Current

051 Commercial

01 Valpre Bottling Plant, Heidelberg

05 Landscape Projects– Current

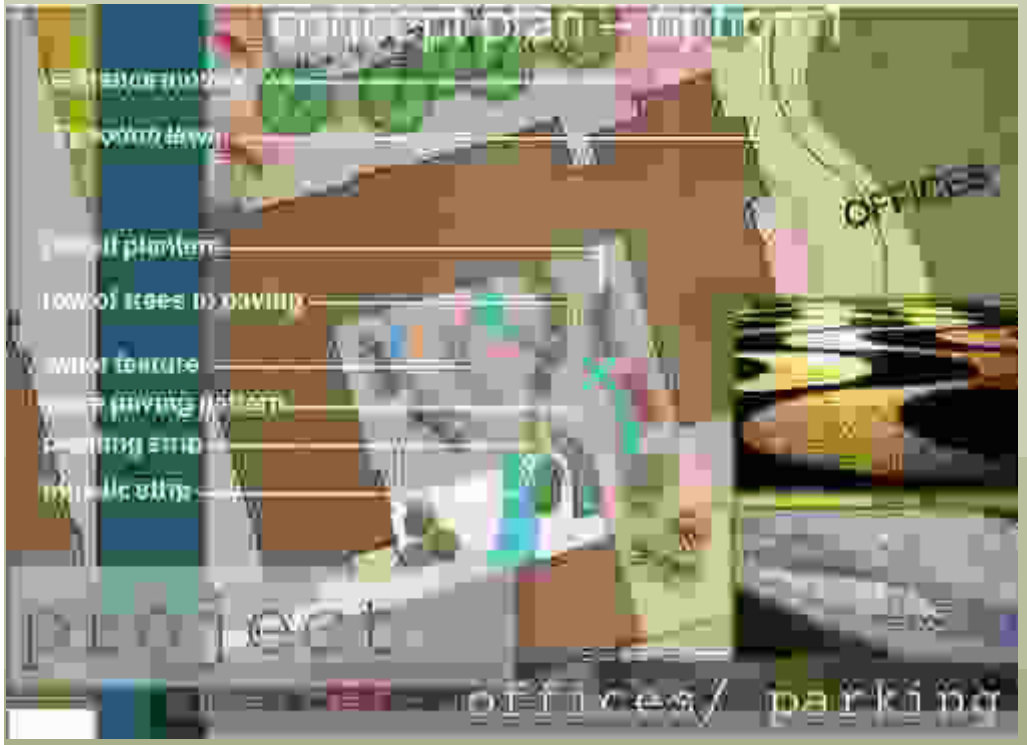
051 Commercial

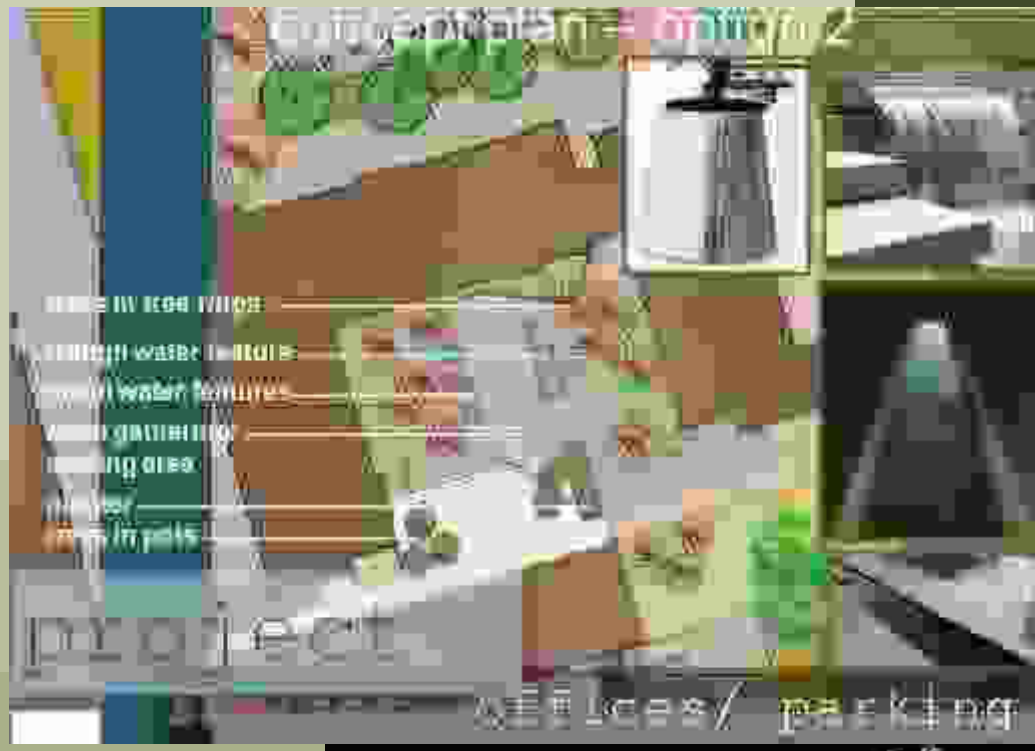
01 Valpre Bottling Plant, Heidelberg

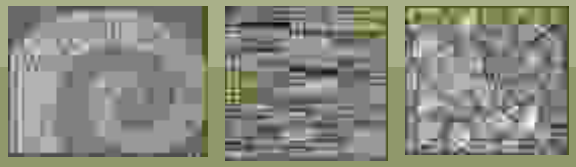
05 Landscape Projects– Current

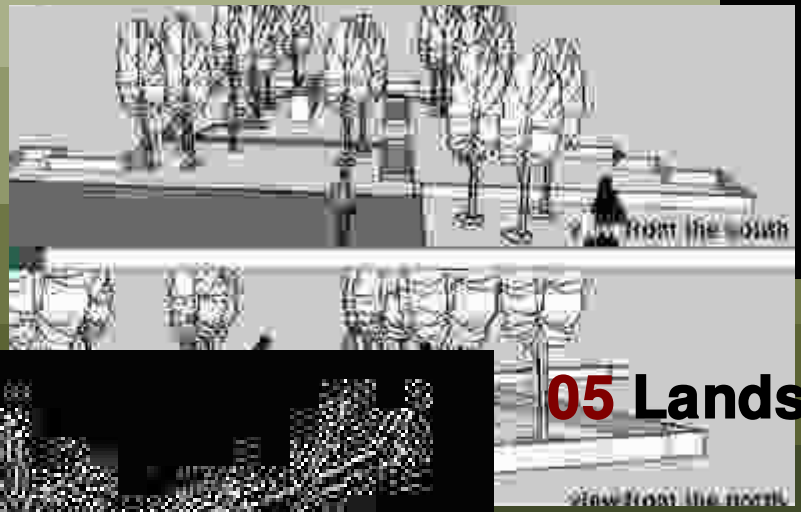
051 Commercial

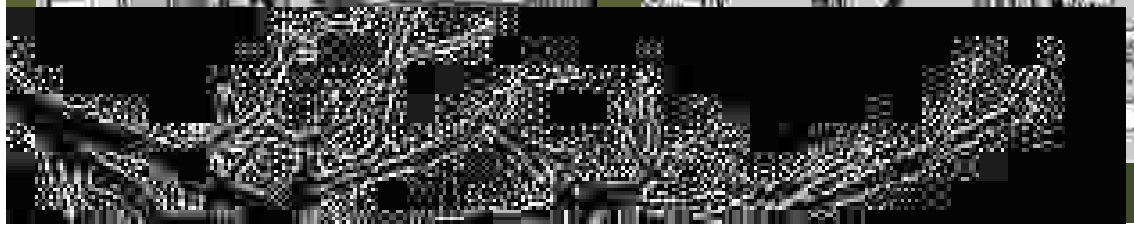
01 Valpre Bottling Plant, Heidelberg







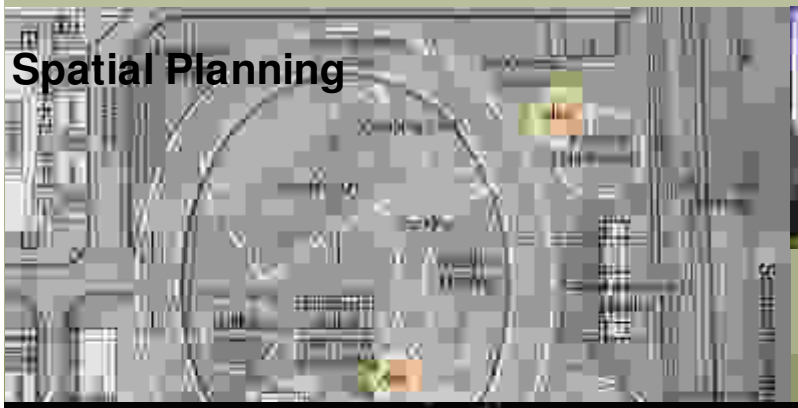




05 Landscape Projects– Current

051 Commercial

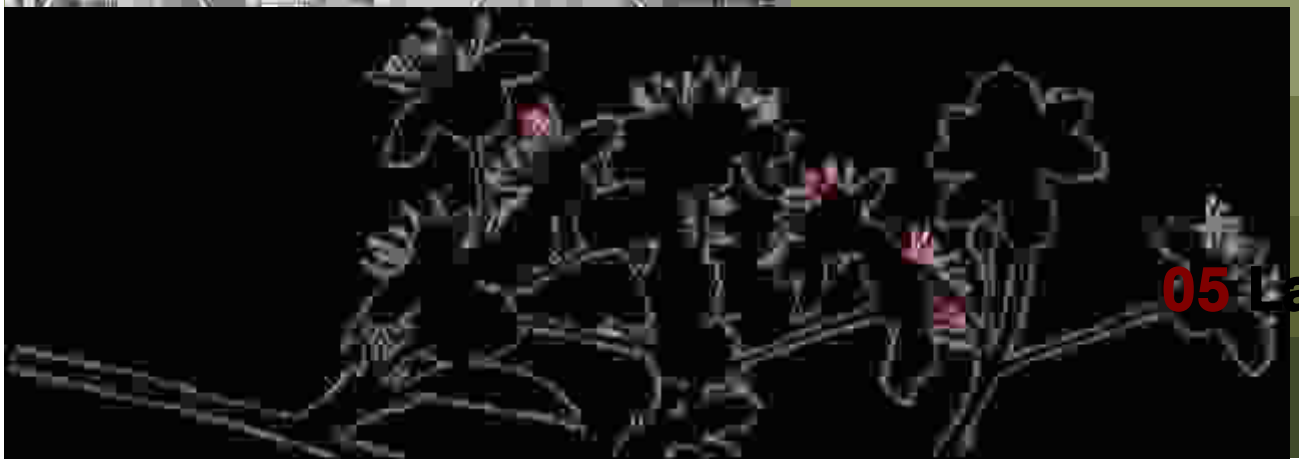
02 Melodie Waters, Hartebeespoortdam



Spatial Planning

Streetscape

Indigenous Planting

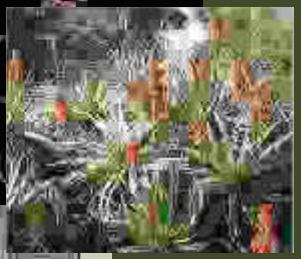


05 Landscape Projects – Current

052 Commercial/Recreational

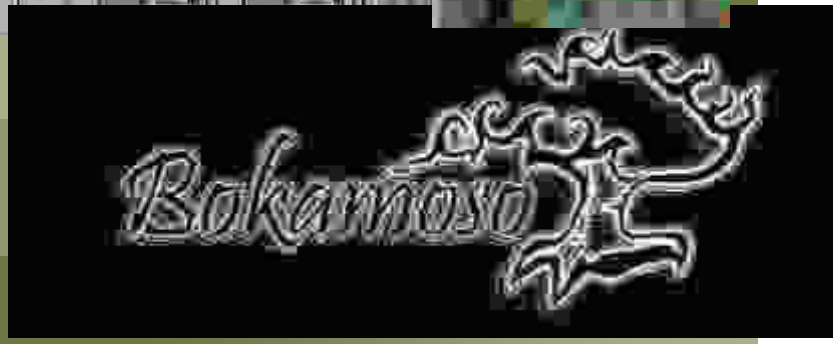
02 Melodie waters, Hartebeestpoortdam

Development Framework



Rehabilitation

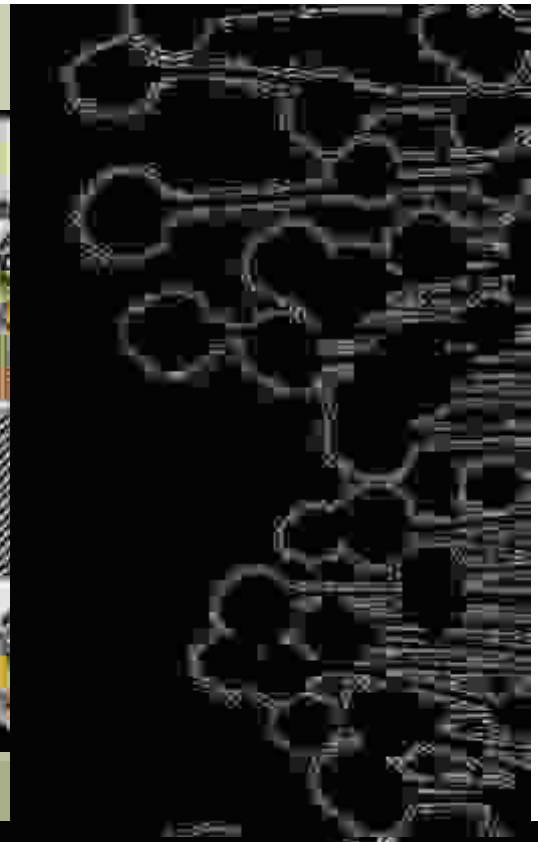
Area Layout



05 Landscape Projects– Current

052 Commercial/Recreational

03 Grain Building, Pretoria

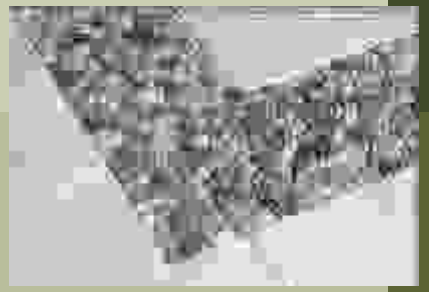


Bokamoso

05 Landscape Projects– Completed

053 Offices

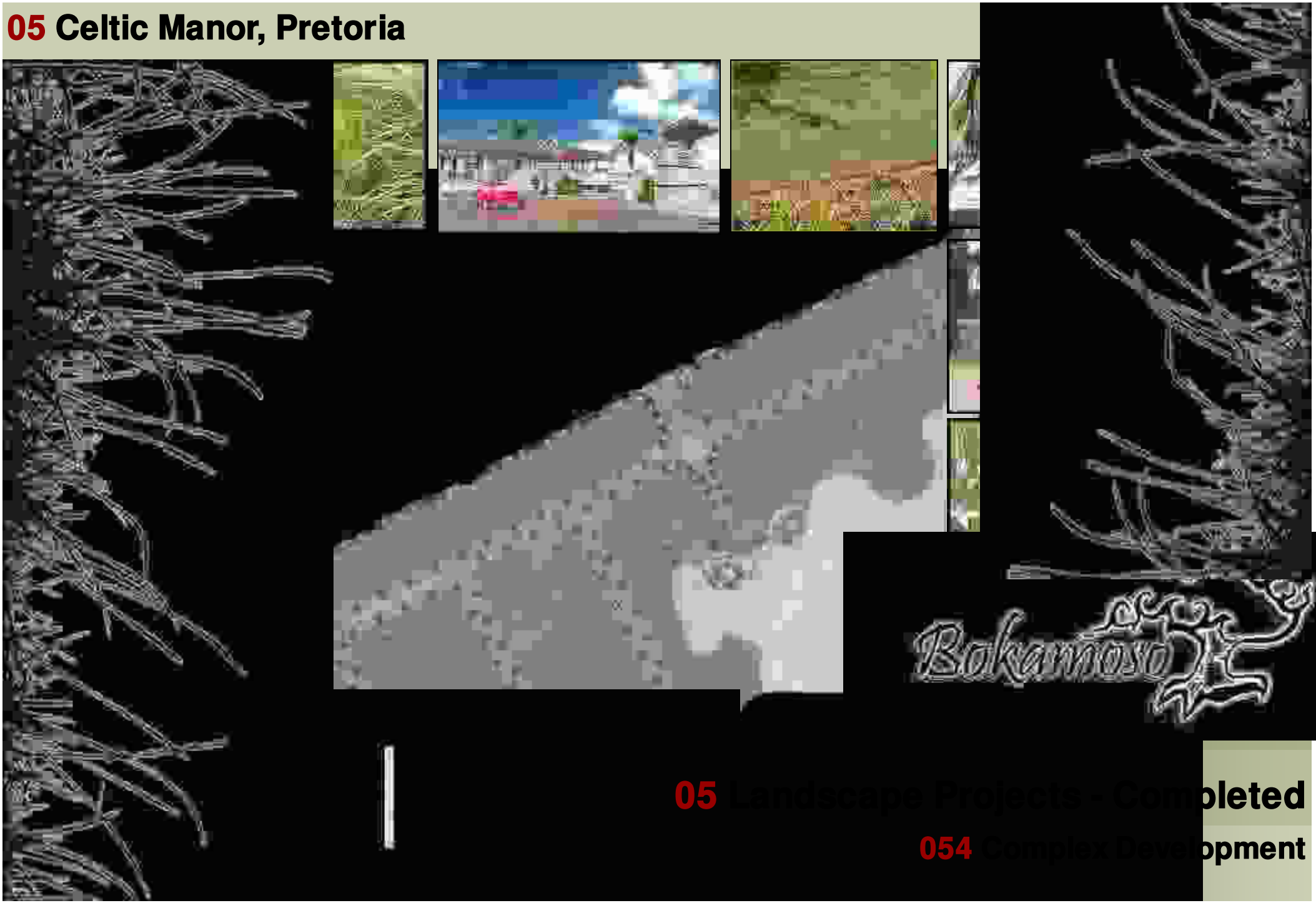
04 Ismail Dawson offices, Pretoria

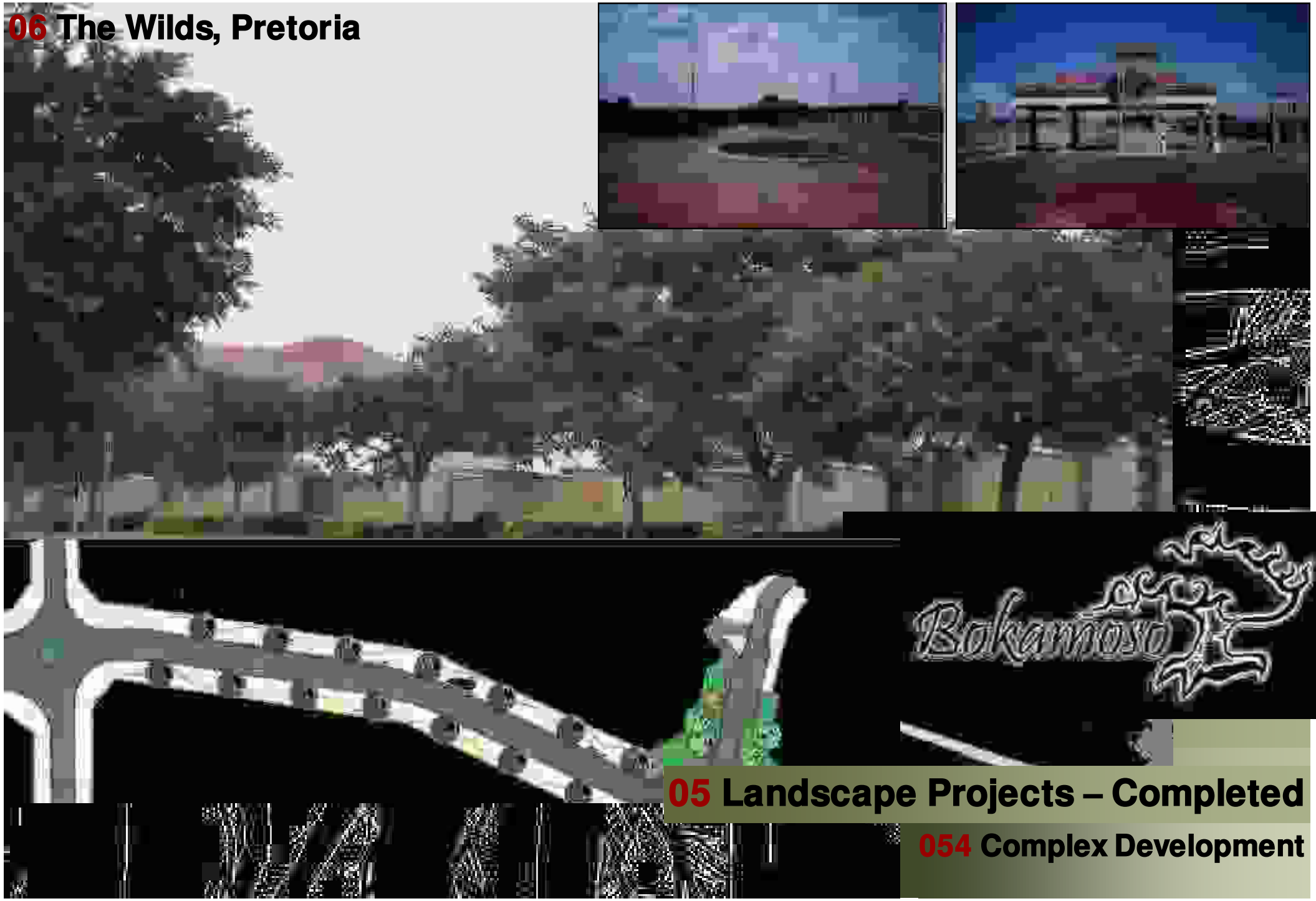


05 Landscape Projects – Conceptual

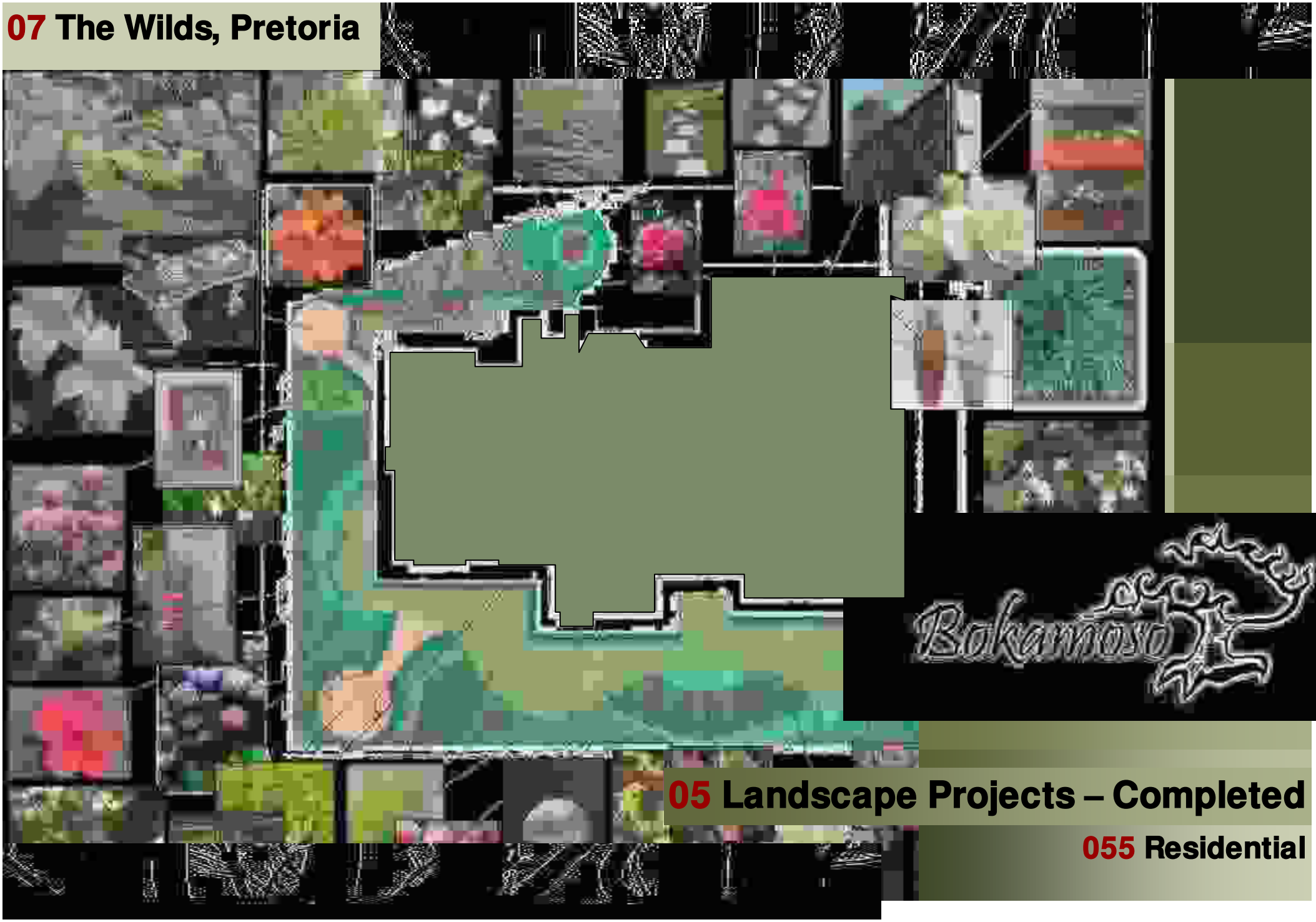
053 Offices

05 Celtic Manor, Pretoria




06 The Wilds, Pretoria
Bokamoso
05 Landscape Projects – Completed
054 Complex Development

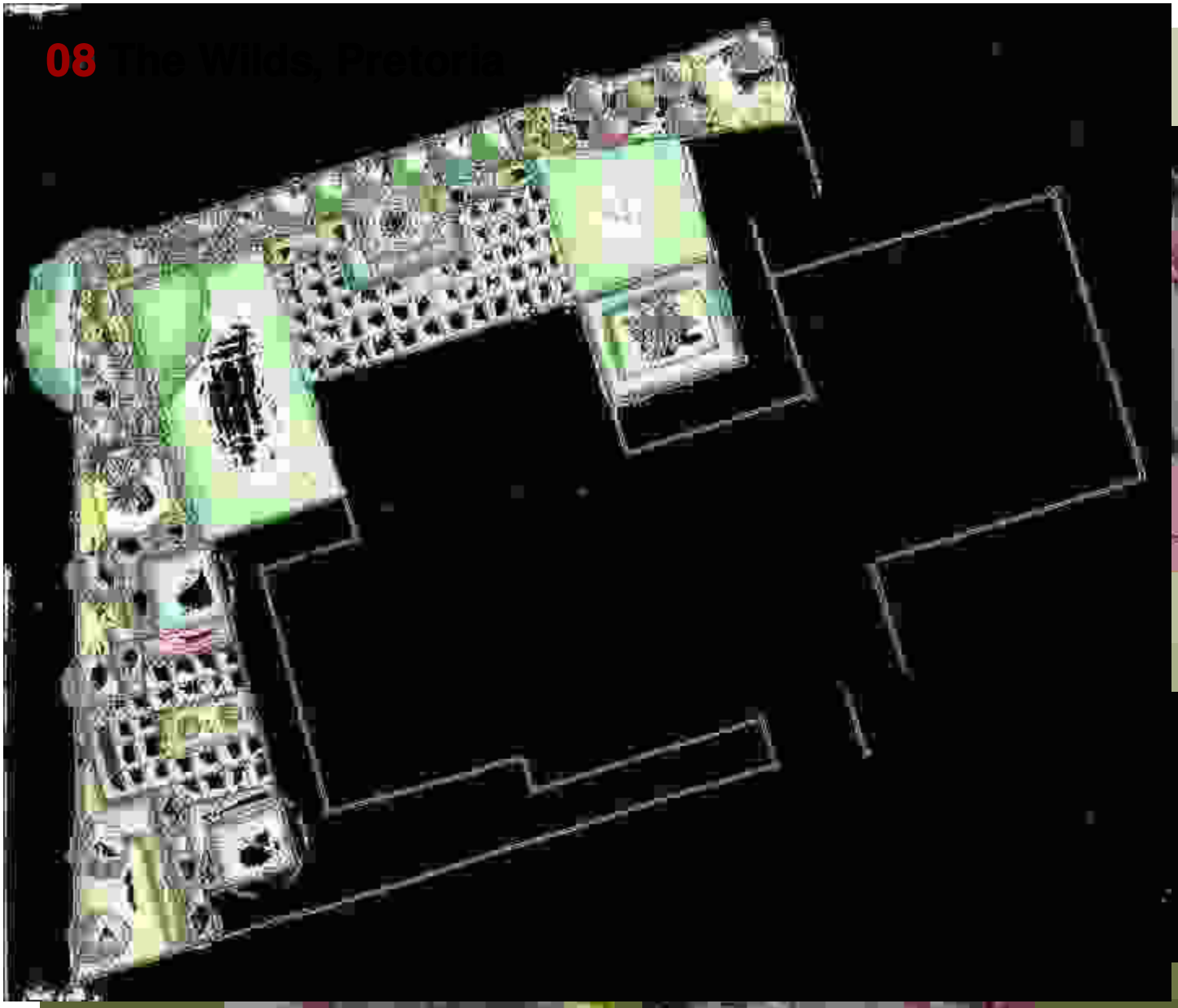
07 The Wilds, Pretoria



Bokamoso

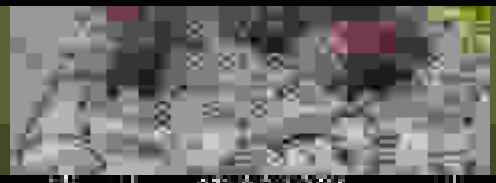
05 Landscape Projects – Completed

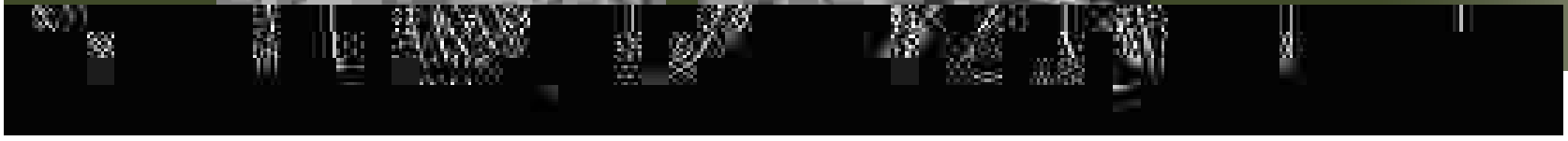
055 Residential



08 The Wilds, Pretoria

Bokamoso

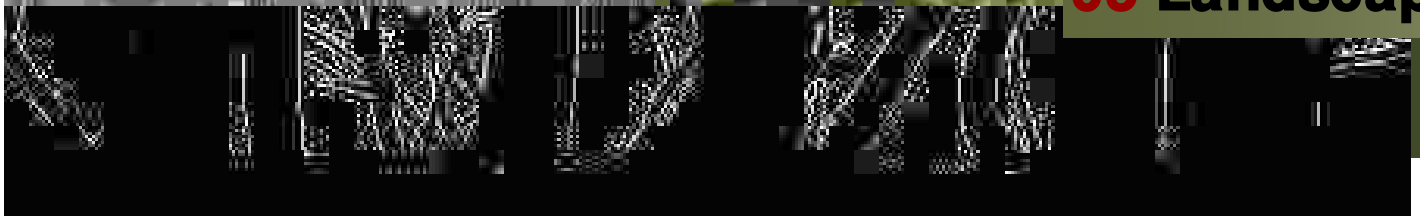




05 Landscape Projects – Completed

055 Residential

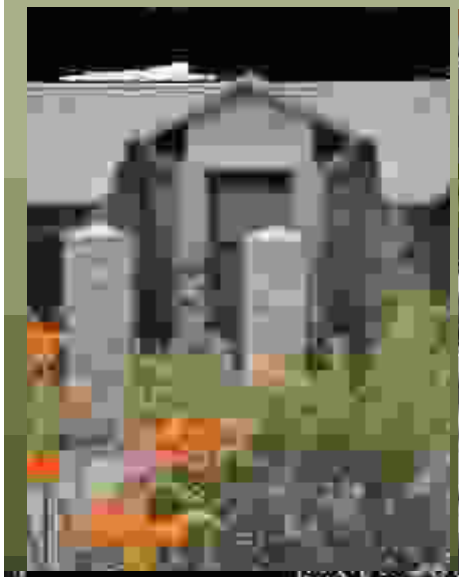
09 The Wilds, Pretoria



05 Landscape Projects – Completed

055 Residential

010 The Wilds, Pretoria



05 Landscape Projects – Completed

055 Residential

011 Governor of Reserve Bank's Residence, Pretoria

Plant Palette

Option 1

Option 2

05 Landscape Projects – Conceptual

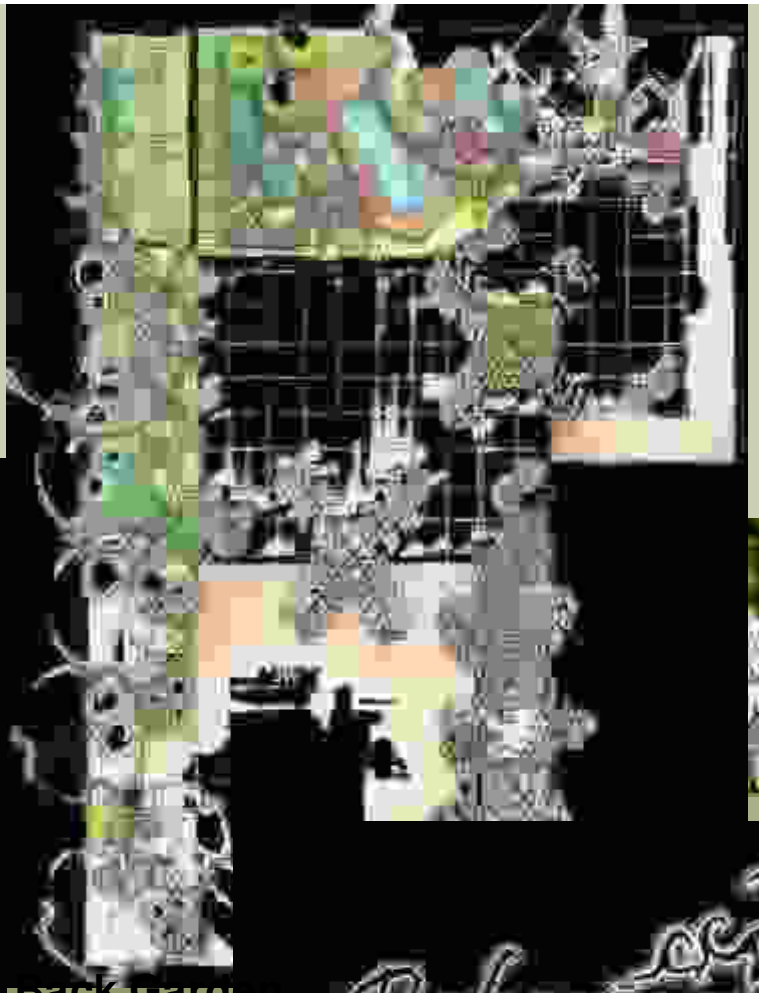
055 Residential

012 House Ismail, Pretoria

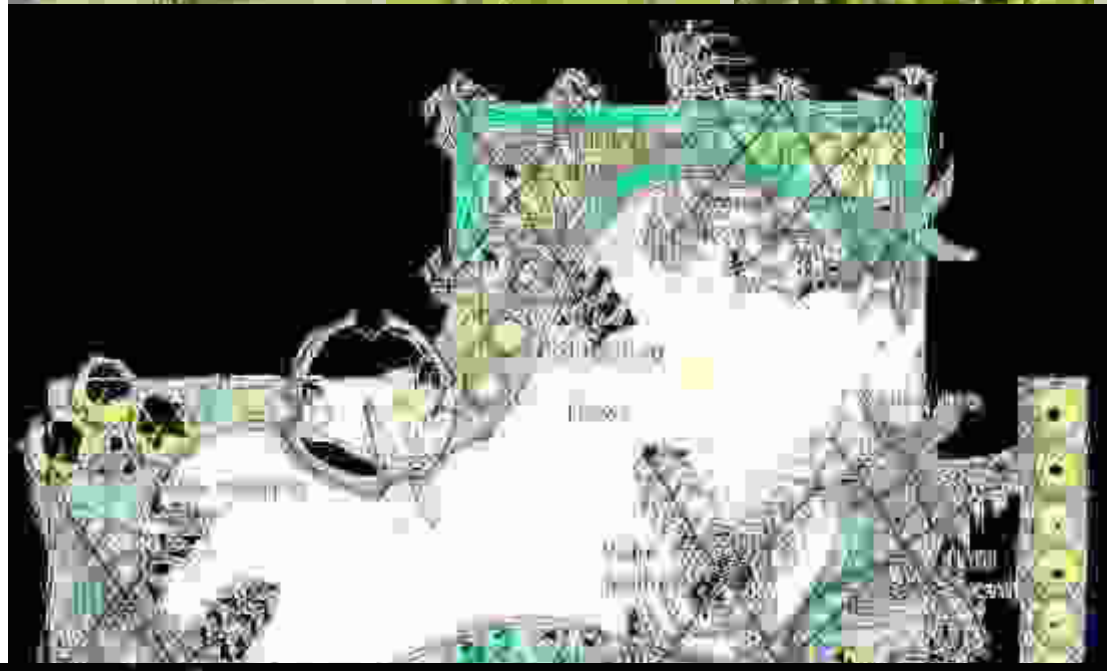




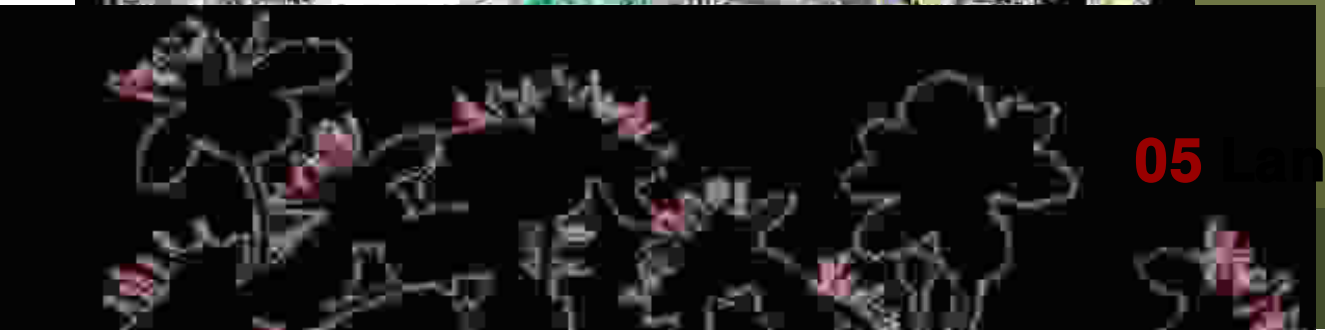






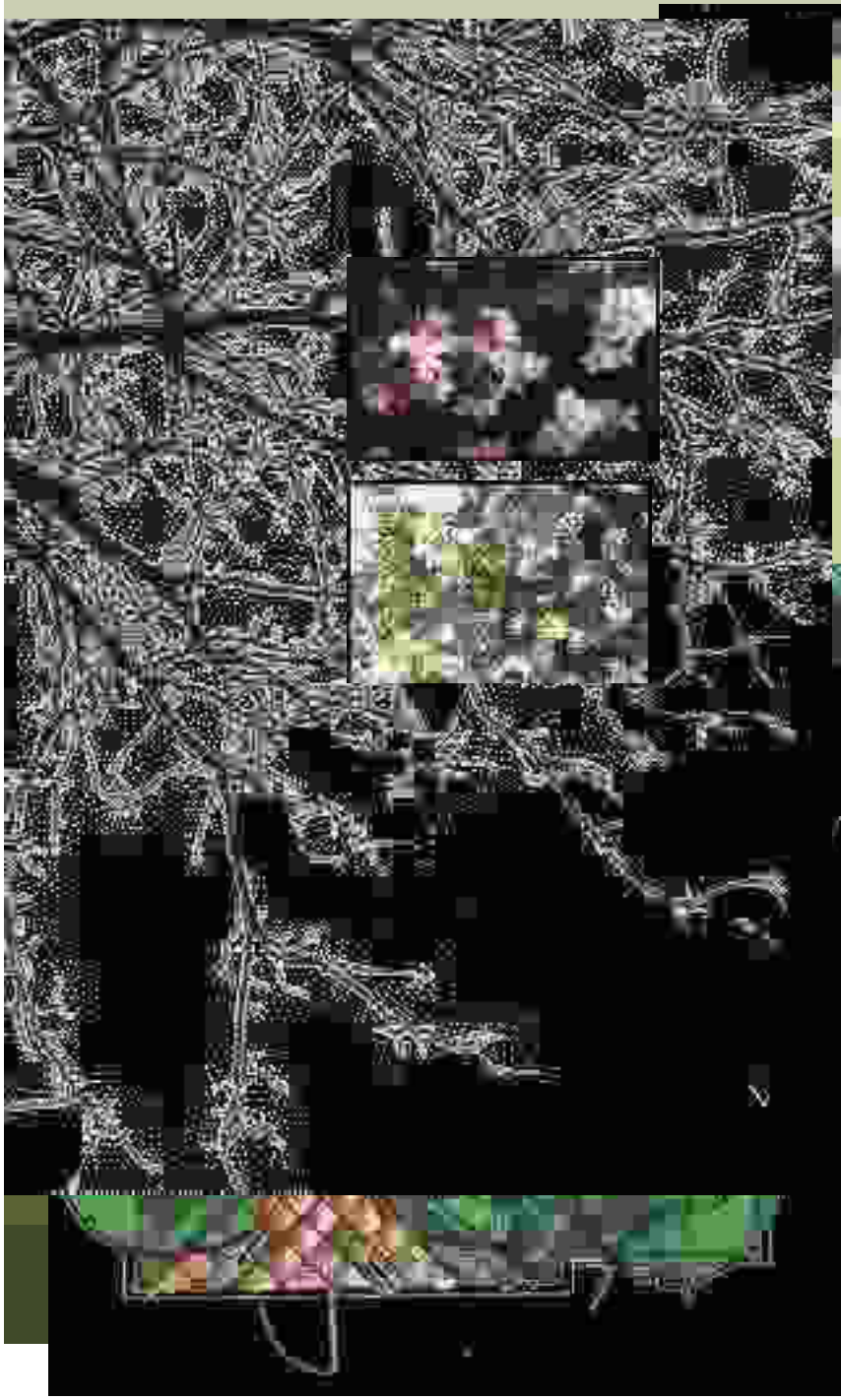
Back Garden



05 Landscape Projects - Conceptual

055 Residential

013 Forest Garden, Pretoria



05 Landscape Projects – Completed

055 Residential

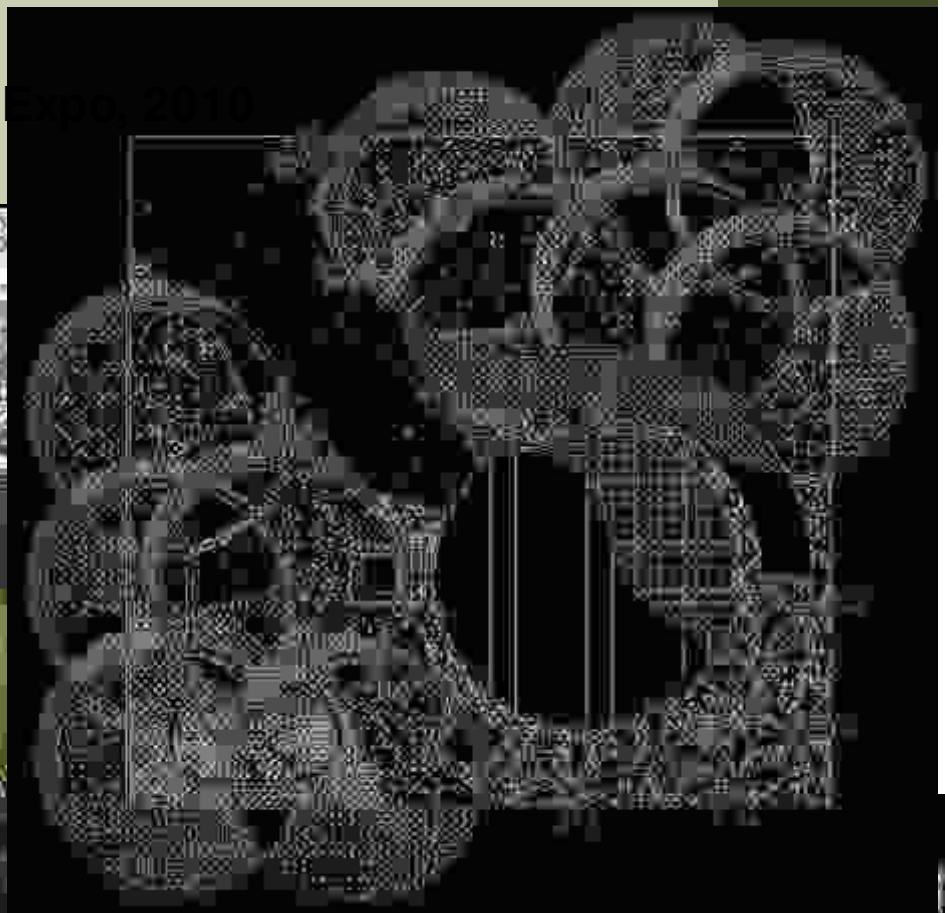
015 Forest Garden, Pretoria

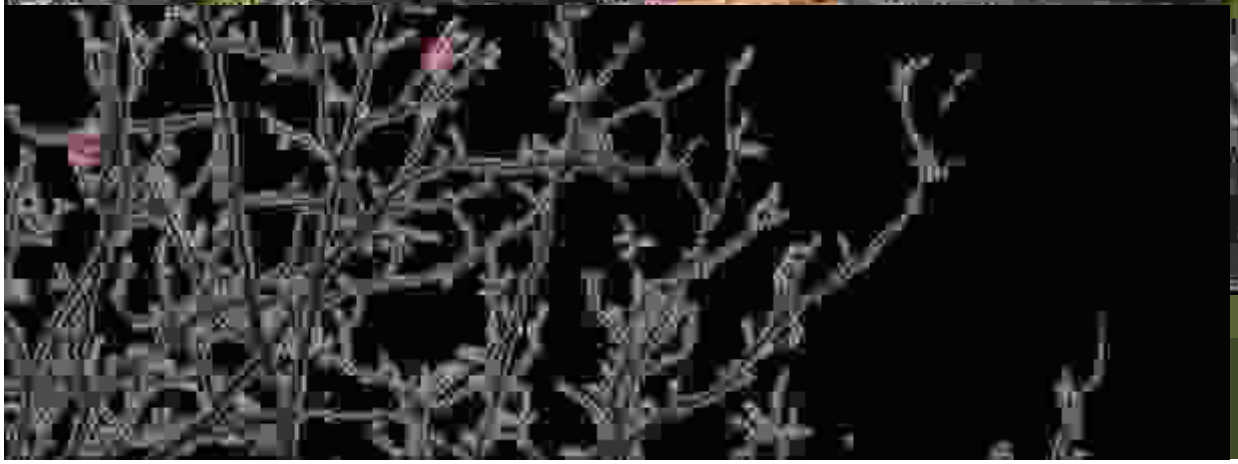
05 Landscape Projects - Completed

055 Residential

01 Safari Garden Expo

Received a Silver Certificate at the Safari Garden Expo, 2010





06 Corporate Highlights

061 Awards

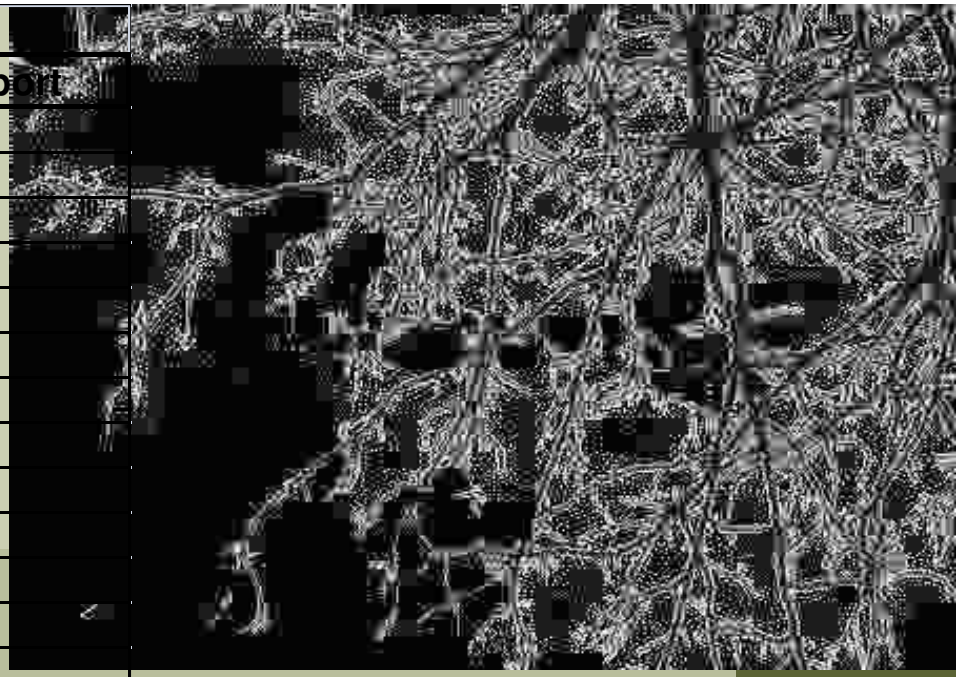
02 UNISA Sunnyside Campus, Pretoria

Best Commercial Paving Plan in Gauteng, 1997

06 Corporate Highlights

061 Awards

Project Name	Status	Project
Environmental Impact Assessment(EIA) and Scoping Report		
Junction 21	ROD	EIA
5 O'clock site access	In Progress	EIA
Bokamoso X 1	In Progress	Scoping & EIA
Doornvallei Phase 6 & 7	In Progress	EIA
Engen Interchange	In Progress	Scoping & EIA
Erasmia X15	In Progress	EIA
Franschkloof	In Progress	EIA
K113	Amendment of ROD	EIA
K220 East	ROD	EIA
K220 West	ROD	EIA
K54 ROD conditions	In Progress	EIA
Knopjeslaagte 95/Peachtree	ROD	EIA
Knopjeslaagte portion 20 & 21	ROD	EIA
Lillieslief/Nooitgedacht	In Progress	EIA
Mooiplaats 70 (Sutherland)	In Progress	EIA
Naauwpoort 1 - 12/Valley View	In Progress	EIA
PeachTree X5	In Progress	EIA
Strydfontein 60	In Progress	EIA
Thabe Motswere	In Progress	Scoping & EIA
Vlakplaats	In Progress	EIA
Waterval Valley	In Progress	EIA
Environmental Opinion		
Doornkloof 68 (Ross)	In Progress	Opinion
Monavoni X 53	In Progress	BA & Opinion
Mooikloof (USN)	In Progress	Opinion
Norwood Mall/Sandspruit	In Progress	Opinion
Riversong X 9	In Progress	Opinion
Sud Chemie	In Progress	Opinion
USN Benjoh Fishing Resort	In Progress	Opinion



The adjacent list host the status of our current projects. Only a selected amount of projects are displayed.

07 Current Environmental Projects

071 EIA, Scoping& Opinion

Project Name	Status	Project
Basic Assessment(BA)		
Annlin X 138	In Progress	BA
Clubview X 29	ROD	BA
Darrenwood Dam	In Progress	BA
Durley Holding 90 & 91	In Progress	BA
Elim	In Progress	BA
Fochville X 3	In Progress	BA
Hartebeeshoek 251	In Progress	BA
Klerksdorp (Matlosana Mall)	In Progress	BA
Monavoni External Services	ROD	BA
Monavoni X 45	Amendment of ROD	BA
Montana X 146	In Progress	BA
Rooihuiskraal X29	In Progress	BA
Thorntree Mall	In Progress	BA
Environmental control officer (ECO)		
Grace Point Church	In Progress	ECO
R 81	In Progress	ECO
Highveld X 61	In Progress	ECO
Mall of the North	In Progress	ECO
Olievenhoutbosch Road	In Progress	ECO
Orchards 39	In Progress	ECO
Pierre van Ryneveld Reservoir	In Progress	ECO
Project Shelter	In Progress	ECO
S24 G		
Wonderboom	In Progress	S24 G
Mogwasi Guest houses	Completed	S24 G

07 Current Environmental Projects

072 BA, ECO & S24 G

Project Name	Status	Project
Objection		
Colesberg WWTW	In Progress	Objection
Nigel Steelmill	Completed	Objection
Chantilly Waters	Completed	Objection
Development facilitation Act- Input (DFA)		
Burgersfort	In Progress	DFA & BA
Doornpoort Filling Station	In Progress	DFA & EIA & Scoping
Eastwood Junction	In Progress	DFA
Ingersol Road (Erf 78, 81 - 83)	In Progress	DFA
Roos Senekal	In Progress	DFA & EIA & Scoping
Thaba Meetse 1	In Progress	DFA & EIA & Scoping
Water Use License Act (WULA)		
Britstown Bulk Water Supply	In Progress	WULA
Celery Road / Green Channel	In Progress	WULA
Clayville X 46	In Progress	WULA
Dindingwe Lodge	In Progress	WULA
Doornpoort Filling Station	In Progress	WULA+DFA+EIA+SC
Eco Park Dam	In Progress	WULA
Groote Drift Potch	In Progress	WULA
Jozini Shopping Centre	In Progress	WULA+BA
K60	Completed	WULA
Maloto Roads	In Progress	WULA
Kwazele Sewage Works	In Progress	WULA
Monavoni External Services	In Progress	WULA+BA
Nyathi Eco Estate	In Progress	WULA
Prairie Giants X 3	In Progress	WULA
Waveside Water Bottling Plant	Completed	WULA

07 Current Environmental Projects

073 Objection, DFA & WULA

Project Name	Status	Project
Environmental Management Plan(EMP)		
Heidelberg X 12	ROD	EMP
Monavoni Shopping Centre	Completed	EMP
Forest Hill Development	Completed	EMP
Weltevreden Farm 105KQ	Completed	EMP+EIA
Raslouw Holding 93	Completed	EMP+BA
Durley Development	Completed	EMP+BA
Rooihuiskraal North X 28	Completed	EMP

Rehabilitation Plan		
Norwood Mall/Sandspruit	In Progress	Rehabilitation
Project Shelter Heidelberg	In Progress	Rehabilitation
Sagewood Attenuation Pond	ROD	Rehabilitation
Velmore Hotel	Completed	Rehabilitation
Grace Point Church	Completed	Rehabilitation
Mmamelodi Pipeline	Completed	Rehabilitation

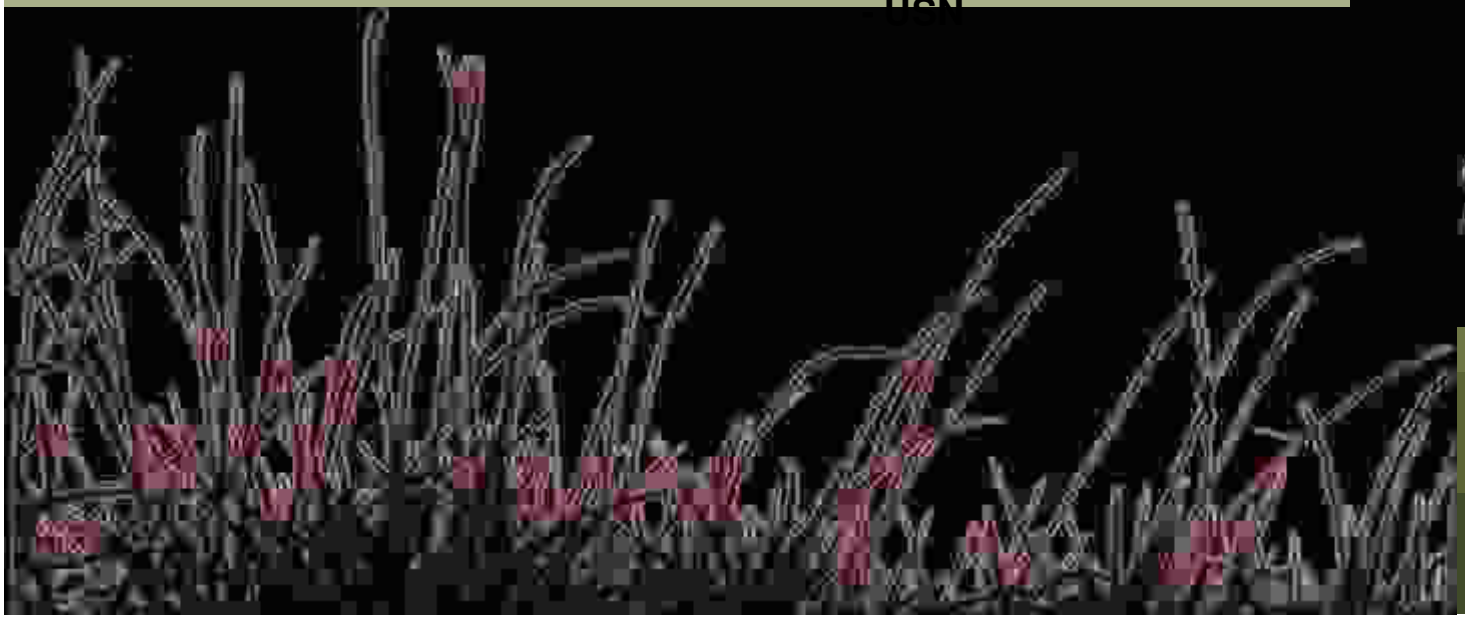
Visual Impact Assessment		
Swatzkop Industrial Developme	Completed	Assessment +DFA
Erasmia	Completed	Assessment

Signage Application		
Menlyn Advertising	Completed	Signage
The Villa Mall	Completed	Signage+EMP+BA

07 Current Environmental Projects

074 EMP, Rehabilitation , Waste Management & Signage Application

- Billion Property Group
- Cavaleros Developments
- Centro Developers
- Chaimberlains
- Chieftain
- Century Property Group
- Coca Cola
- Elmado Property Development
- Flanagan & Gerard
- Gautrans
- Hartland Property Group
- Moolman Group
- MTN
- M&T Development
- Old Mutual
- Property Investment Company
- Petroland Developments
- RSD Construction
- SAND
- Stephan Parsons
- Twin City Developments
- Urban Construction
- USN



Bokamoso

08 Indicative Clients

- Adobe Illustrator CS3
- Adobe Photoshop CS3
- Adobe InDesign CS3
- AutoCAD
- Google SketchUP
- GIS
- Microsoft Office Word
- Microsoft Office Excel
- Microsoft Office Publisher
- Microsoft Office Power Point

Bokamoso

09 Tools

Qualifications And Experience In The Field Of Environmental Planning And Management (Lizelle Gregory (Member Bokamoso)):

Qualifications:

-Qualified as ***Landscape Architect*** *at UP 1991;*
-Qualified as ***Professional Landscape Architect in 1997****;*
-A Registered Member at The ***South African Council for the Landscape Architect Profession (SACLAP)*** *with Practise Number:* ***PrLArch97078****;*
- A Registered Member at the ***International Association for Impact Assessment Practitioners (IAIA)****;*
- Qualified as an ***Environmental Auditor in July 2008*** *and also became a Member of the International Environmental Management Association (IEMAS) in 2008.*

Working Experience:

-Worked part time at Eco-Consult – 1988-1990;
-Worked part time at ***Plan Associates as Landscape Architect in training*** *– 1990-1991;*
-Worked as Landscape Architect at ***Environmental Design Partnership (EDP)*** *from 1992 - 1994*
-Practised under ***Lizelle Gregory Landscape Architects*** *from 1994 until 1999;*
*-****Lectured*** *at Part-Time at* ***UP*** *(1999) – Landscape Architecture and* ***TUT*** *(1998- 1999)- Environmental Planning and Plant Material Studies;*
-Worked as ***part time Landscape Architect and Environmental Consultant at Plan Associates*** *and* ***managed their environmental division for more that 10 years*** *– 1993 – 2008 (assisted the* ***PWV Consortium*** *with various road planning matters which amongst others included environmental Scans, EIA's, Scoping reports etc.)*
-Renamed business as ***Bokamoso in 2000*** *and is the only member of Bokamoso Landscape Architects and Environmental Consultants CC;*
*-****More than 20 years experience in the compilation of Environmental Reports,*** *which amongst others included the compilation of various* ***DFA Regulation 31 Scoping Reports****, EIA's for EIA applications in terms of the applicable environmental legislation, Environmental Management Plans, Inputs for Spatial Development Frameworks, DP's, EMF's etc. Also included EIA Application on and adjacent to mining land and slimes dams (i.e. Brahm Fisherville, Doornkop)*

Qualifications And Experience In The Field Of Landscape Architecture (Lizelle Gregory (Member Bokamoso)):

Landscape Architecture:

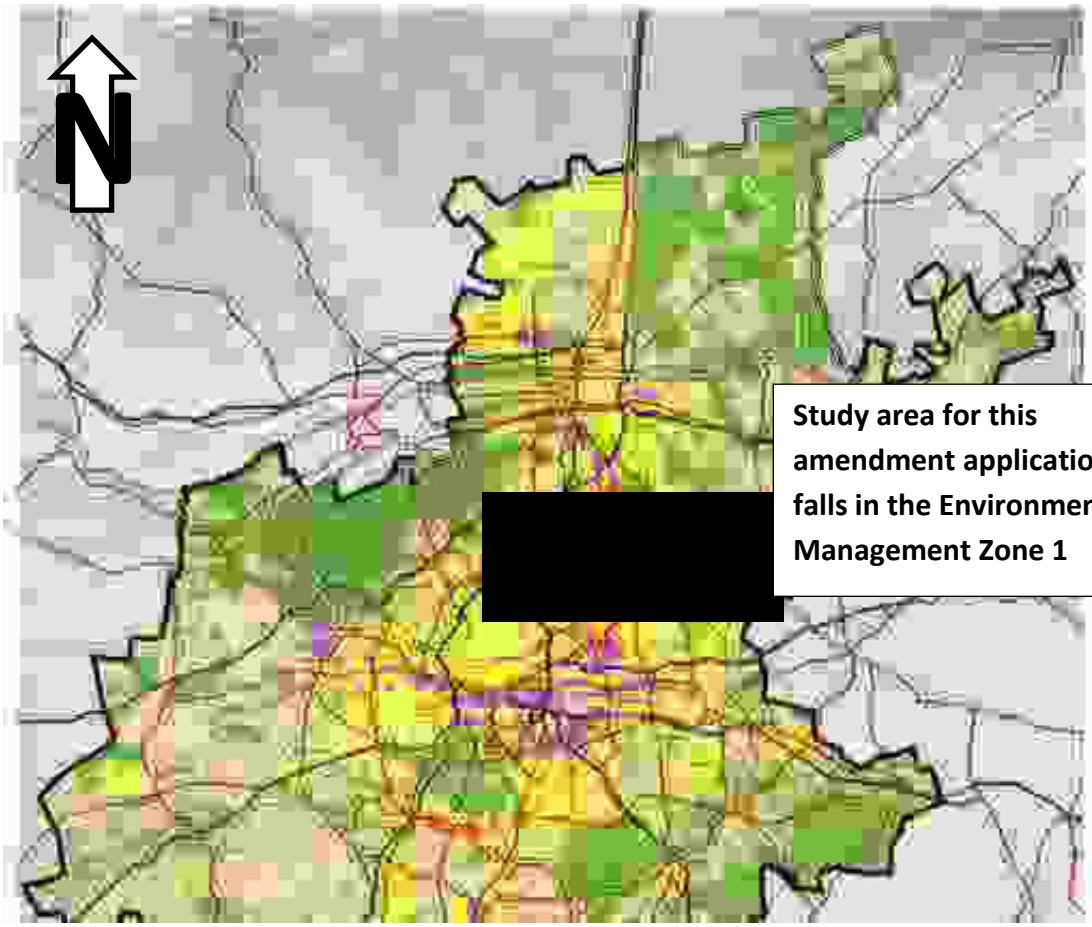
-Compiled landscape and rehabilitation plans for more than 22 years.

The most significant landscaping projects are as follows:
-Designed the Gardens of the Witbank Technicon (a branch of TUT). Also supervised the implementation of the campus gardens (2004);
-Lizelle Gregory was the Landscape Architect responsible for the paving and landscape design at the UNISA Sunnyside Campus and received a Corobrick Golden Award for the paving design at the campus (1998-2004);
-Bokamoso assisted with the design and implementation of a park for the City of Johannesburg in Tembisa (2010);
-The design and implementation of the landscape gardens (indigenous garden) at the new Coca-Cola Valpre Plant (2012-2013);
-Responsible for the rehabilitation and landscaping of Juksei River area at the Norwood Shopping Mall (johannesburg) (2012-2013);
-Designed and implemented a garden of more than 3,5ha in Randburg (Mc Arthurpark). Bokamoso also seeded the lawn for the project (more than 2,5 ha of lawn successfully seeded) (1999);
-Bokamoso designed and implemented more than 800 townhouse complex gardens and submitted more than 500 Landscape Development Plans to CTMM for approval (1995 – 2013);
-Assisted with Landscape Designs and the Masterplan at Eco-Park (M&T Developments) (2005-2011);
-Bokamoso designed and implemented an indigenous garden at an office park adjacent to the Bronberg. In this garden it was also necessary to establish a special garden for the Juliana Golden Mole. During a recent site visit it was established that the moles are thriving in this garden. Special sandy soils had to be imported and special indigenous plants had to be established in the natural section of the garden.

-Lizelle Gregory also owns her own landscape contracting business**. For the past 20 years she trained more than 40 PDI jobless people (sourced from a church in Mamelodi)** to become landscape contracting workers. All the workers are (on a continuous basis) placed out to work at nurserys and other associated industries;
-Over the past 20 years the Bokamoso team compiled more than 800 landscape development plans and also implemented most of the gardens. Bokamoso also designed and implemented the irrigation for the gardens (in cases where irrigation was required). Lizelle regarded it as important to also obtain practical experience in the field of landscape implementation.

Annexure L

Locality of Study Area
According to GPEMF



MAP LEGEND:

ENVIRONMENTAL MANAGEMENT ZONES

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 5
- Special Control Zones
- Special Control Zone for Conservation, Recreation and Tourism

- Gauteng Provincial Boundary

Roads

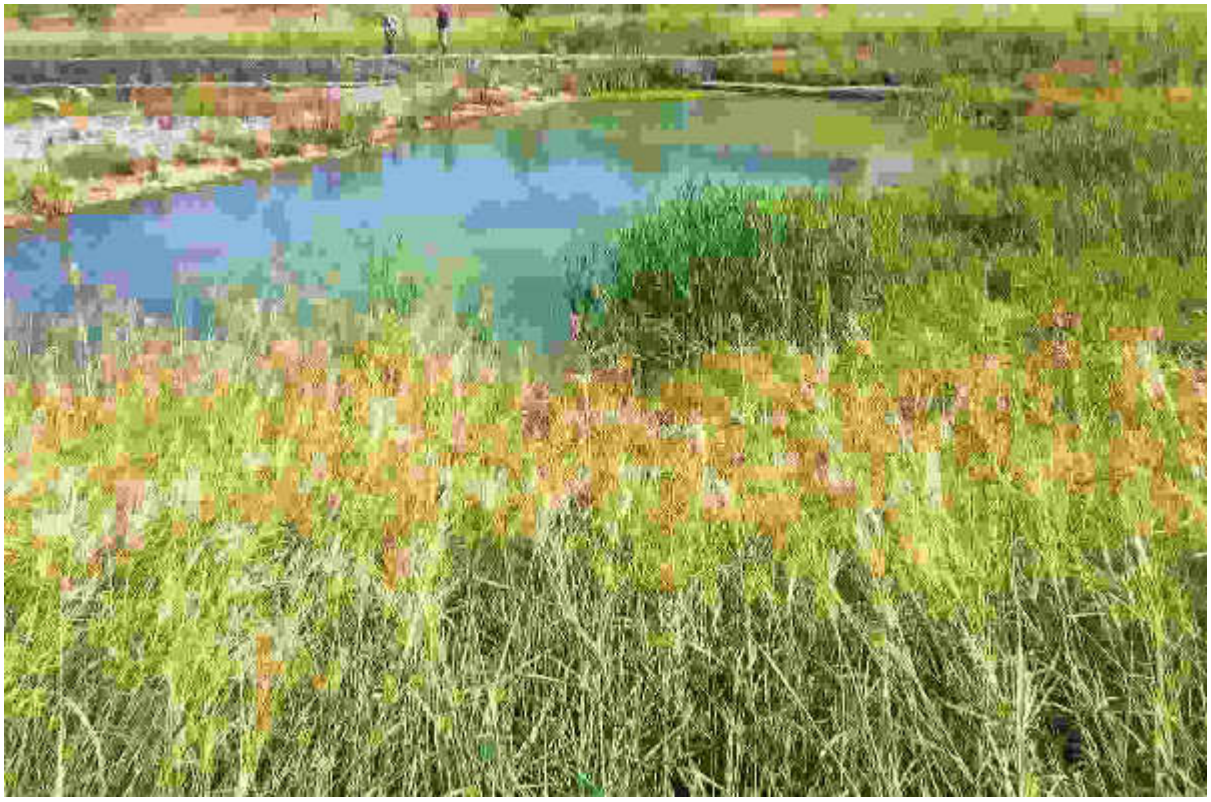
- National Road
- Arterial Road

Special Control Zones:
(a) Dinokeng
(b) CoHWHS
(c) Vaaldam
(d) Jhb South
(e) Jhb North

Annexure M

Flora and Fauna Reports

FLORA ASSESSMENT
OF THE
REMAINING EXTENT OF PORTION 1 OF THE FARM WATERFALL 5-IR



May 2016

Landscape Architects &

Environmental Consultants: Specialist Division

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Report Author: Corné Niemandt

Reviewed by: J.V. van Greuning (Pri. Sci. Nat. reg. no. 400168/08)

Specialist

Specialist investigator: Mr. C. Niemandt (*M.Sc. Plant Science*)

Declaration of independence:

I, the above mentioned specialist investigator responsible for conducting this particular specialist flora study, declare that:

• I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP);

• At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development, except for financial compensation for work done in a professional capacity;

• Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part;

• I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse the proposed development, but aim to present facts, findings and recommendations based on relevant professional experience, guidance from professional experts and scientific data;

• I do not have any influence over decisions made by the governing authorities;

• I have the necessary qualifications and guidance from professional experts (registered Pr. Nat. Sci.) in conducting specialist reports relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;

• This document and all information contained herein are and will remain the intellectual property of Bokamoso Environmental: Specialist Division. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigator.

VERIFICATION STATEMENT

This communication serves to verify that the flora report compiled by Corné Niemandt has been prepared under my supervision, and I have verified the contents thereof.

Declaration of independence: I, Dr. J.V. van Greuning (Pr. Sci. Nat. reg. no. 400168/08) declare that I:

- am committed to biodiversity conservation but concomitantly recognise the need for economic development. Whereas I appreciate the opportunity to also learn through the processes of constructive criticism and debate, I reserve the right to form and hold my own opinions and therefore will not willingly submit to the interests of other parties or change my statements to appease them;
- abide by the Code of Ethics of the S.A. Council of Natural Scientific Professions;
- act as an independent specialist consultant in the field of Botany;
- am subcontracted as specialist consultant by Bokamoso Environmental Consultants for the proposed Mixed Use development of the remaining extent of portion 1 of the farm Waterfall 5-IR described in this report;
- have no financial interest in the proposed development other than remuneration for work performed;
- have or will not have any vested or conflicting interests in the proposed development;
- undertake to disclose to Bokamoso Environmental Consultants and its client as well as the competent authority any material information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations, 2014.

Dr. J. V. van Greuning

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1. INTRODUCTION

Bokamoso Environmental: Specialist Division was commissioned to conduct a flora assessment for the proposed mixed used development on the remaining extent of portion 1 of the farm Waterfall 5-IR. The objective was to conduct plant species survey to determine which species occur in the site of the proposed mixed used development. Special attention was given to possible habitats for the recording of Red and Orange List plant species that may occur in the area. Furthermore, the ecological status and sensitive habitats of the site were investigated.

2. OBJECTIVES OF THE STUDY

- To assess the habitat component and current ecological status of the area;
- To identify and list the plant species occurring on the site and indicate whether they are Red and Orange List species;
- Make recommendations if any Red and Orange List species are found;
- To indicate the sensitive habitats of the area;
- To highlight the current impacts on the flora of the site; and
- Provide recommendations to mitigate negative impacts and enhance positive impacts on the current flora should the proposed development be approved.

3. SCOPE OF STUDY

This report:

- Lists all plant species, including alien species, recorded during the flora survey;
- Provide recommendations on Red and Orange List plant species;
- Indicate medicinal plant species recorded;
- Comments on ecological sensitive areas;
- Comments on current impacts affecting the flora of the site;
- Evaluates the conservation importance and significance of the area in and adjacent to the proposed development, with special emphasis on the current status of threatened species; and
- Provides recommendations to mitigate or reduce negative impacts, should the proposed development be approved.

4. STUDY AREA

4.1 Regional vegetation

The study site lies in the quarter degree square (QDS) 2628AA. The site falls in the Egoli Granite Grassland vegetation unit (Mucina and Rutherford, 2006). This vegetation unit is considered Endangered according to the National list of threatened terrestrial ecosystems for South Africa, 2011 (National Gazette no. 34809, 2011). 38% is still in a natural state with only 3% protected in Diepsloot and Melville Koppies Nature Reserves (National Gazette no. 34809, 2011; Mucina and Rutherford, 2006). The landscape is described as moderately undulating plains and low hills supporting tall, *Hyparrhenia hirta*-dominated grassland, with some woody species on rocky outcrops or rock sheets (National Gazette no. 34809, 2011). The rocky habitats show a high diversity of woody species, which occur in the form of scattered shrub groups or solitary small trees (National Gazette no. 34809, 2011). No serious alien infestation occurs within this vegetation unit, although *Eucalyptus* species are common (Mucina and Rutherford, 2006).

4.2 The study site

The proposed mixed used development is situated in Midrand, Gauteng, on the remaining extent of portion 1 of the farm Waterfall 5-IR. The extent of the study site is approximately 108.8 ha. This site is located west of the N1 highway, east of The Mall of Africa and south of Allendale road (Figure 1). Towards the south of the study site flows the Jukskeiriver.

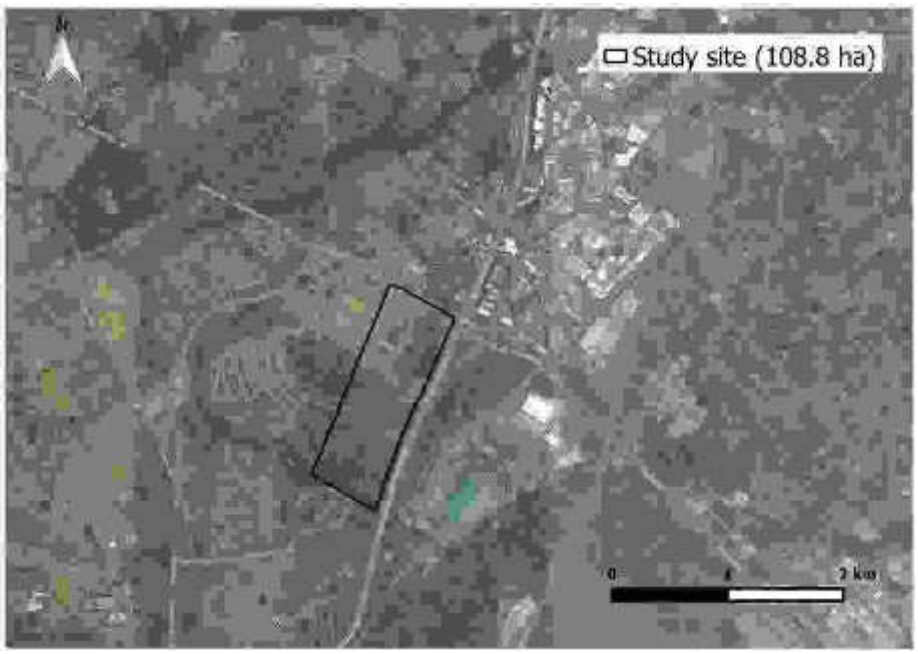

Figure 1 Aerial map to indicate the locality.

5. METHODS

The study site was visited on the 7th of April 2016. A species list was compiled for all plants recorded within each study unit by means of a 100 x 100 m rectangular plot. The drainage line vegetation was sampled by recording species within a 100 x 50 m rectangular plot. Field guides such as those by Germishuizen & Meyer (2003), Koekemoer *et al.* (2014), Pooley (1998), van Ginkel *et al.* (2011), van Oudtshoorn *et al.* (2014), van Wyk & Malan (1998) and van Wyk & van Wyk (2013) were used to identify the species. Species which could not be identified in the field were taken for identification to the H.G.W.J. Schweickerdt Herbarium (PRU), University of Pretoria. Each study unit was further assessed for the occurrence of alien plant species (Bromilow, 2010; Henderson 2001, 2007).

The survey also included information about the occurrence of Red and Orange List plant species obtained from GDARD (Pfab, 2002; Pfab and Victor, 2002; Annexure A). The *Red List Plant Species Guidelines* and *Requirements for Biodiversity Assessments* v3 issued by GDARD (2014) were consulted. A desktop study was done, indicating suitable habitats for the Red and Orange List plant species known to occur in the QDS 2628AA (Annexure A). The plant species list for this QDS obtained from SANBI (Plants of Southern Africa: an online checklist) was consulted to verify the record of occurrence at the proposed township development site. In addition to identifying Red and Orange List species in the defined study units (Figure 2), a 200 m zone outside the boundary of the study site was also scrutinised where possible, therefore excluding residential and recreational areas. The Gauteng Conservation Plan v3.3 (GDARD, 2014) was used to evaluate Critical Biodiversity Areas which is based on numerous criteria, such as Red List species.

For each plant species, the medicinal properties were assessed (van Wyk *et al.*, 2013). Medicinal plants are marked with an asterisk (*) in the respective tables (Tables 3 – 7). Harvesting of medicinal plants causes a decline of the particular species and, therefore, threatens the conservation of these species.

6. RESULTS

6.1 Study units

Five study units were identified (Figure 2):

1. Drainage line vegetation
2. Grassland vegetation
3. Rocky ridge vegetation
4. Riverine vegetation
5. Mixed alien and indigenous vegetation

The total numbers of plant species per study unit are listed in Table 1.

Table 1 The number of plant species recorded per study unit, including the total number of medicinal and alien plant species.

Study unit	Total number of species per unit
Drainage line vegetation	21
Grassland vegetation	39
Rocky ridge vegetation	60
Riverine vegetation	30
Mix alien and indigenous vegetation	50

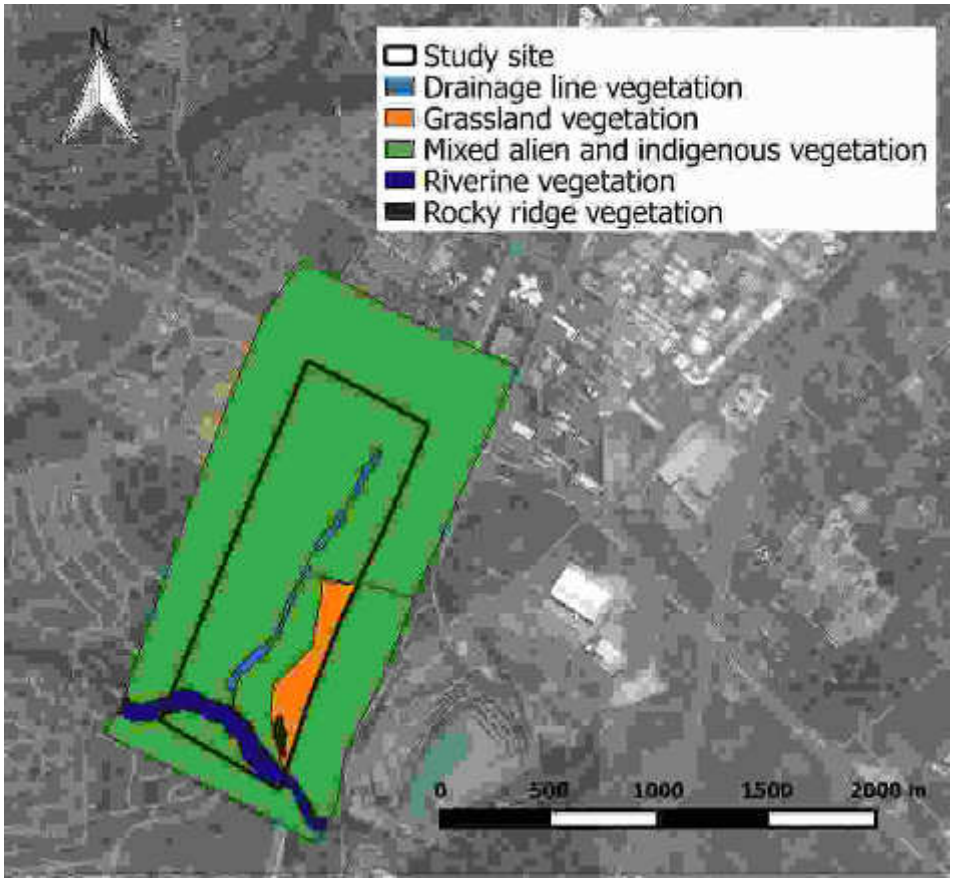

Figure 2 Study units identified in the site for the proposed residential development.

6.2 Alien plants

The total number of alien plants per Category is indicated in Table 2. For each alien species the Category is indicated according to the Alien and Invasive species lists (2014) amended in NEMBA (National Environmental Management: Biodiversity Act (ACT NO, 10 OF 2004).

For Category 1a declared weeds removal is compulsory in terms of the regulations formulated under "The Conservation of Agricultural Resources Act" (Act No. 43 of 1983), as amended. Alien invasive species in this Category may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway.

Category 1b alien species are major invaders that may need government assistance to remove (Act No. 43 of 1983), as amended. These alien species must be contained, and in many cases they already fall under a government sponsored management programme such as Working for Water. Alien invasive species in this Category may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway.

All Category 2 declared weeds should likewise be removed (Act No. 43 of 1983), as amended, unless a permit is obtained to control it in a demarcated area or a biological control reserve.

Category 3 declared weeds may not occur on any land or inland water surface other than in a biological control reserve. However, these provisions shall not apply if plants listed in Category 3 are already in existence at the time of the commencement of said regulations. In such cases, a land user must take all reasonable steps to restrict the spreading of propagating material of Category 3 plants.

Alien plants within the species lists are indicated in bold (Tables 4-6) as they suggest the particular state of each vegetation community. The respective Category is also indicated (Tables 4-6).

Table 2 Number of alien plant species per study unit

Study unit	Total species	CAT 1a	CAT 1b	CAT 2	CAT 3	Not declared
Drainage line vegetation	8	0	4	0	0	4
Grassland vegetation	8	0	3	0	0	5
Rocky ridge vegetation	9	0	7	0	0	2
Riverine vegetation	22	0	8	6	2	6
Mixed alien and indigenous vegetation	22	0	6	1	1	14

6.3 Medicinal plant species

Medicinal plant species (Table 3) are marked with an asterisk * in Tables 4 to 7. For the entire study site, eight plant species with medicinal properties were recorded, mainly in the rocky ridge vegetation. Of these, *Hypoxis hemerocallidea* is the most threatened species (Annexure A).

Table 3 Number of medicinal plant species per study unit

Study unit	Total number of species per unit	No. of medicinal species per unit
Drainage line vegetation	21	2
Grassland vegetation	39	2
Rocky ridge vegetation	60	5
Riverine vegetation	30	5
Mix alien and indigenous vegetation	50	3

6.4 Red and Orange List species

Red and Orange List species occur within the QDS 2628AA (Annexure A). The Orange List species *Hypoxis hemerocallidea* was recorded in this study site. Although not recorded in any study unit, *Boophone disticha* and *Crinum* cf. *bulbispermum* were found in plastic containers between the trees at the rocky ridge. These species, amongst others, were probably collected to be sold and/or used for their medicinal properties.

6.5 Drainage line vegetation

6.5.1 Composition and Connectivity

This study unit has been rehabilitated by means of gabion structures and culverts (Figure 3 and 4), and is therefore not natural. The species recorded are typically found in drainage lines, with some alien encroaching plant species (Figure 4). Dominant species recorded include *Cyperus* sp., *Fuirena* sp., *Imperata cylindrica, Schoenoplectus* sp., and *Typha capensis* (Figure 5). Indigenous trees such as *Celtis africana, Combretum erythrophyllum*, *Olea europaea* subsp. *africana, Searsia lancea* and *Vachellia karroo* were planted on the embankments of the drainage line (Figure 5). A wetland specialist should be consulted to delineate and determine the extent of the buffer zone for this drainage line. Connectivity

between the constructed drainage line and the Jukskeiriver needs to be maintained in order to ensure sustainability of all biota relying on the drainage line.

6.5.2 Red and Orange List species

No Red or Orange List species have been recorded in the Drainage Line vegetation study unit. The probability of finding a Red or Orange List species in this study unit is low, but as this constructed drainage line matures in age, Red or Orange List plant species might establish in the Drainage Line vegetation study unit.

6.5.3 Medicinal and Alien species

Four of the alien species are Category 1b invaders and needs to be eradicated. Two medicinal species (Table 4) are listed for this study unit.

6.5.4 Sensitivity

The Drainage line vegetation study unit is highly sensitive (Figure 15), but requires no buffers prior to construction, as this study unit is man-made and transformed.

Table 4 Species list for the drainage line vegetation.

Growth form	Invasive Category
SHRUBS	
Gomphocarpus fruticosus subsp. *fruticosus**	
SEDGES	
Cyperus esculentus var. *esculentus*	
Cyperus obtusiflorus var. *obtusiflorus*	
Fuirena cf. *pubescens*	
Juncus sp.	
Schoenoplectus sp.	
GRASSES	
Cynodon hirsutus	
Imperata cylindrica	
Melinis repens	
Panicum sp.	
Paspalum dilatatum	
Paspalum urvillei	
FORBS	
Ipomoea purpurea	**1b**
Persicaria lapathifolia	
Persicaria limbata	
Ranunculus multifidus	
Tagetes minuta	
*Typha capensis**	

Verbena bonariensis	**1b**
Verbena brasiliensis	**1b**
Xanthium spinosum	**1b**

Alien species are indicated in **bold**; medicinal species are indicated with *.

Figure 3 Gabion and culverts used to rehabilitate the drainage line.

Figure 4 The drainage line with indigenous and alien species.

Figure 5 The drainage line vegetation with indigenous trees planted on the embankments.

6.6 Grassland vegetation

6.6.1 Composition and Connectivity

Although this grassland (Figure 6) is still in a natural state, it is isolated by the N1 freeway towards the southeast, Allendale road towards the north, the Kliprivier towards the south and development towards the west. Dominant grass species include *Aristida congesta, Cynodon dactylon, Digitaria eriantha, Eragrostis* spp.*,* and *Paspalum* spp. Forbs dominating the study unit include *Commelina africana, Gerbera ambigua, Helichrysum rugulosum, Hypoxis* spp.*, Polygala hottentotta*, *Tagetes minuta* and *Verbena* spp**.** (Table 5).

6.6.2 Red and Orange List species

The Orange List species *Hypoxis hemerocallidea* was recorded in this study unit. Although not recorded in the field, *Boophone disticha* was found in a plastic container close to the study unit (Figure 7). This plant was probably harvested from the study unit, but as it was not recorded there and was omitted from the species list.

6.6.3 Medicinal and Alien species

Two medicinal and nine alien plant species have been listed for this study unit (Table 5). *Verbena* spp. and *Cortaderia selloana* are 1b invades and needs to be eradicated in order to protect the indigenous vegetation.

6.6.4 Sensitivity

This study unit has a medium sensitivity status, due to its natural condition (Figure 15). It is already isolated from other similar study units and will ultimately be transformed as no movement of species to other grasslands is possible.

Table 5 Species list for the grassland vegetation.

Growth form	Invasive Category
Trees and shrubs	
Searsia lancea	
Seriphium plumosum	
*Vachellia karroo**	
Grasses	
Aristida congesta subsp*. barbicollis*	
Cortaderia selloana	**1b**
Cymbopogon sp*.*	
Cynodon dactylon	
Dactyloctenium giganteum	
Digitaria eriantha	

Eragrostis curvula
Eragrostis gummiflua
Hyparrhenia hirta
Paspalum dilatatum
Paspalum urvillei
Setaria sphacelata var. *torta*
Sporobolus africanus

Forbs
Commelina africana
Cucumis zeyheri
Eriosema cf. *salignum*
Gerbera ambigua
Gladiolus crassifolius
Gomphrena celosioides
Helichrysum rugulosum
Hibiscus trionum
Hilliardiella hirsuta
*Hypoxis hemerocallidea**
Hypoxis iridifolia
Hypoxis rigidula
Ledebouria revoluta
Macledium zeyheri
Nidorella podocephala
Oxalis obliquifolia
Polygala hottentotta
Richardia brasiliensis
Selago densiflora
Tagetes minuta
Tephrosia capensis
Verbena aristigera **1b**
Verbena bonariensis **1b**

Alien species are indicated in **bold**; medicinal species are indicated with *.

Figure 6 The grassland vegetation.

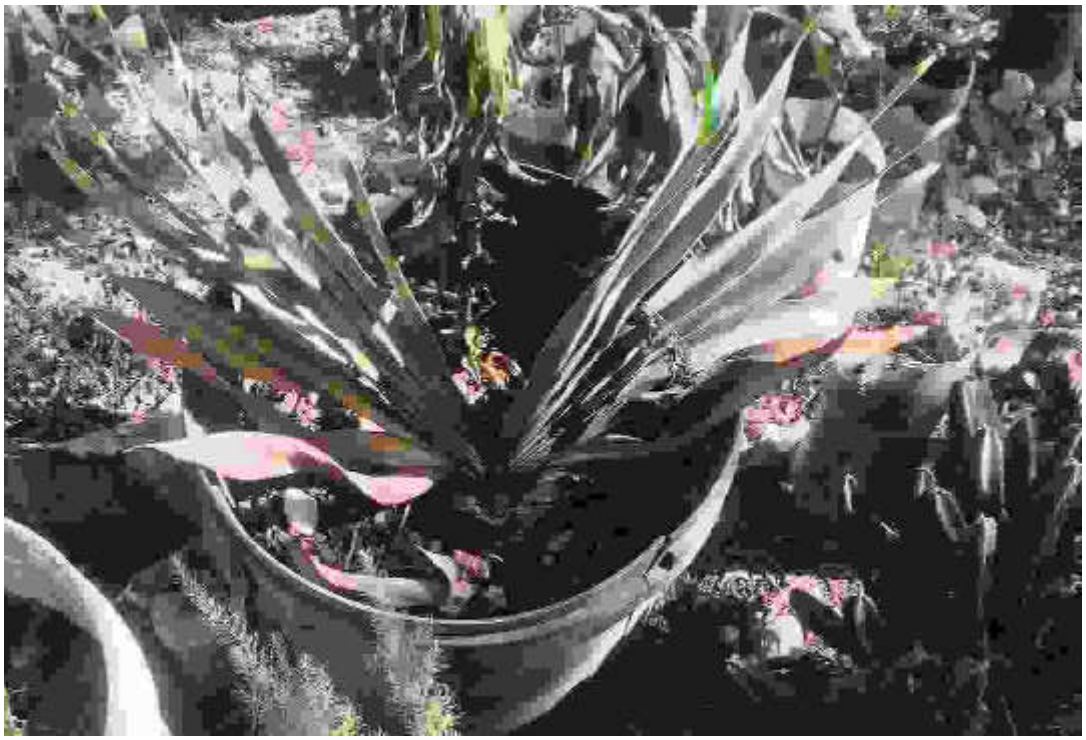

Figure 7 *Boophone disticha* found in a plastic container on site.

6.7 Rocky ridge vegetation

6.7.1 Composition and Connectivity

Numerous trees occur in this unit, and herbaceous species not found elsewhere in the study site (Table 6; Figure 8). Species dominant in the unit include *Aloe greatheadii* var.*davyana, Andropogon schirensis, Celtis africana, Diheteropogon amplectens, Diospyros lycioides, Kalanchoe rotundifolia, Ledebouria revoluta, Pygmaeothamnus zeyheri, Searsia pyroides, Themeda triandra* and *Ziziphus mucronata.* The Orange List species *Hypoxis hemerocallidea* was recorded in this study unit. Between the trees, plastic containers were found of species presumably harvested from the surrounding study site (Figure 9).

6.7.2 Red and Orange List species

The Orange List species *Hypoxis hemerocallidea* was recorded in this study unit (Annexure A).

6.7.3 Medicinal and Alien plant species

Five medicinal and nine alien species were recorded for this study unit (Table 6).

6.7.4 Sensitivity

This study unit has a medium sensitivity status, due to its natural condition (Figure 15). It is already small and isolated from other similar study units and will ultimately be transformed as no movement of species to other grasslands is possible.

Table 6 Species recorded in the rocky ridge vegetation.

Growth form	Invasive Category
Trees and shrubs	
Asparigus larisinus	
Asparagus suaveolens	
Canthium cf*. inerme*	
Celtis africana	
*Combretum erythrophyllum**	
Diospyros lycioides subsp*. guerkei*	
*Elephantorrhiza elephantina**	
Euclea crispa	
Lantana camara	**1b**
Olea europaea* subsp*. africana*	
Pygmaeothamnus zeyheri	
Pyracantha coccinea	**1b**
Searsia pyroides	
*Ziziphus mucronata**	
Ziziphus zeyheriana	

Grasses

Andropogon schirensis	
Brachiaria cf*. serrata*	
Cymbopogon caesius	
Cynodon dactylon	
Diheteropogon amplectens var*. amplectens*	
Eragrostis chloromelas	
Hyparrhenia hirta	
Melinis repens	
Panicum sp.	
Schizachyrium sanguineum	
Themeda triandra	
Trichoneura grandiglumis	
Urochloa panicoides	

Forbs/Succulents

Aloe greatheadii var*.davyana*	
Bidens bipinnata	
Cephalaria zeyheriana	
Cleome maculata	
Commelina africana	
Commelina benghalensis	
Crabbea angustifolia	
Cyanotis speciosa	
Datura ferox	**1b**
Delospermum sp.	
Dicoma zeyheri	
Eucomis sp.	
Gladiolus crassifolius	
Hilliardiella hirsuta	
*Hypoxis hemerocallidea**	
Hypoxis rigidula	
Ipomoea purpurea	**1b**
Kalanchoe rotundifolia	
Ledebouria inquinata	
Ledebouria ovatifolia	
Ledebouria revoluta	
Macledium anamala	
Opuntia* cf*. stricta	**1b**
Pentanisia angustifolia	
Solanum panduriforme	
Stachys hyssopoides	
Tephrosia elongata var*. elongata*	
Trachyandra sp*.*	
Tritonia nelsonii	
Verbena bonariensis	**1b**
Verbena brassiliensis	**1b**

Ferns

Cheilanthes sp*.*	

Alien species are indicated in **bold**; medicinal species are indicated with *.

Figure 8 The rocky ridge vegetation.

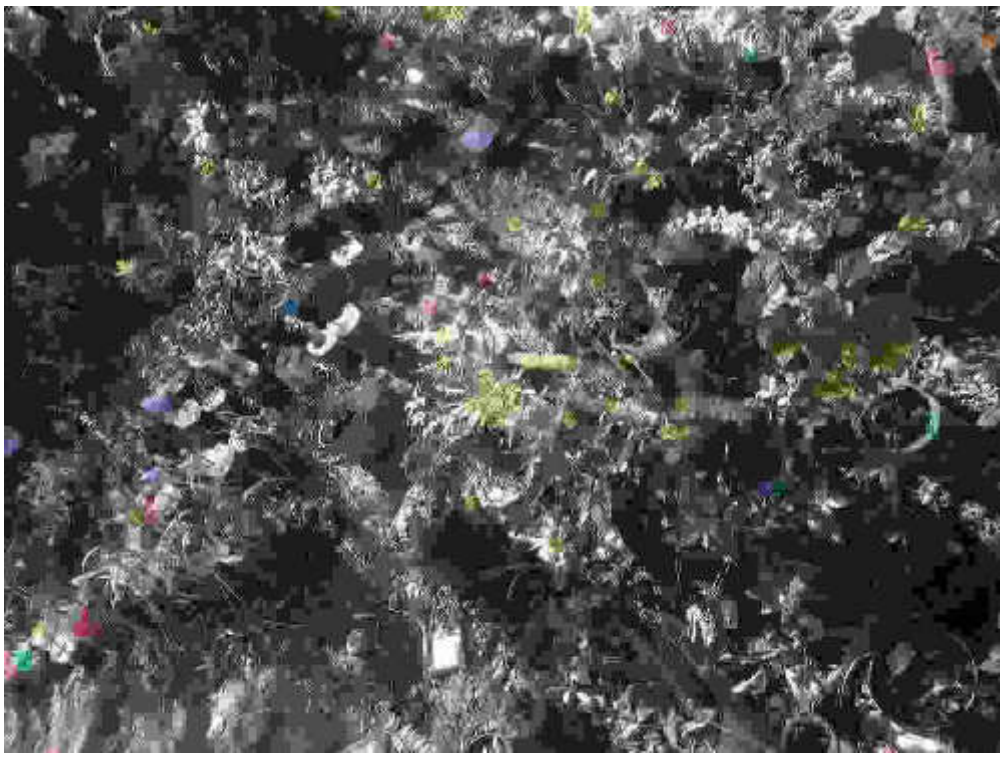

Figure 9 Containers with plant species found between the trees in the rocky ridge vegetation.

6.8 Riverine vegetation

6.8.1 Composition and Connectivity

This site is highly disturbed due rubbish flushed down the river (Figure 10), storm water outflow into the river (Figure 11) and the presence of 22 alien plant species dominating in abundance (Table 7; Figure 12). Indigenous trees that occur in this unit include *Celtis africana, Combretum erytrophyllum, Gymnosporia buxifolia* and *Vachellia karroo.* Connectivity of this study unit is very important as biota depends on the water movement for seed dispersal and migration (Table 7).

6.8.2 Red and Orange List species

No Red List species were recorded for this site.

6.8.3 Medicinal and Alien species

Of the 22 alien species, eight are listed as Category 1b invaders, six species as Category 2 invaders and two species as Category 3 invaders. Five medicinal species were listed for this study unit.

6.8.4 Sensitivity

Although this area of the Jukskeiriver is disturbed and polluted, the status still remains sensitive. Rehabilitation of this study unit is critically important to ensure sustainability of the riverine system.

Table 7 Species recorded for the riverine vegetation.

Growth form	Invasive Category
TREES and SHRUBS	
Acacia mearnsii	**2**
Acacia dealbata	**2**
Celtis africana	
Celtis australis	**3**
*Combretum erytrophyllum**	
Gomphocarpus fruticosus subsp. *fruticosus**	
Gymnosporia buxifolia	
Morus alba	**3**
Platanus wrightii	
Populus alba	**2**
Populus x canescens	**2**
Ricinus communis* var. *communis*	**2**
Salix babylonica	**2**
Solanum mauritianum	**1b**
*Vachellia karroo**	

GRASSES	
Arundo donax	**1b**
Cymbopogon nardus	
Cynodon dactylon	
Eragrostis curvula	
Paspalum dilatatum	
Pennisetum clandestinum	
FORBS	
Amaranthus hybridus* subsp. *hybridus* var. *hybridus	
Datura stramonium*	**1b**
Flaveria bidentis	**1b**
Ipomoea pupurea	**1b**
Mirabilis jalapa	**1b**
Persicaria lapathifolia	
Tagetes minuta	
Verbena bonariensis	**1b**
Xanthium spinosum	**1b**

Alien species are indicated in **bold**; medicinal species are indicated with *.

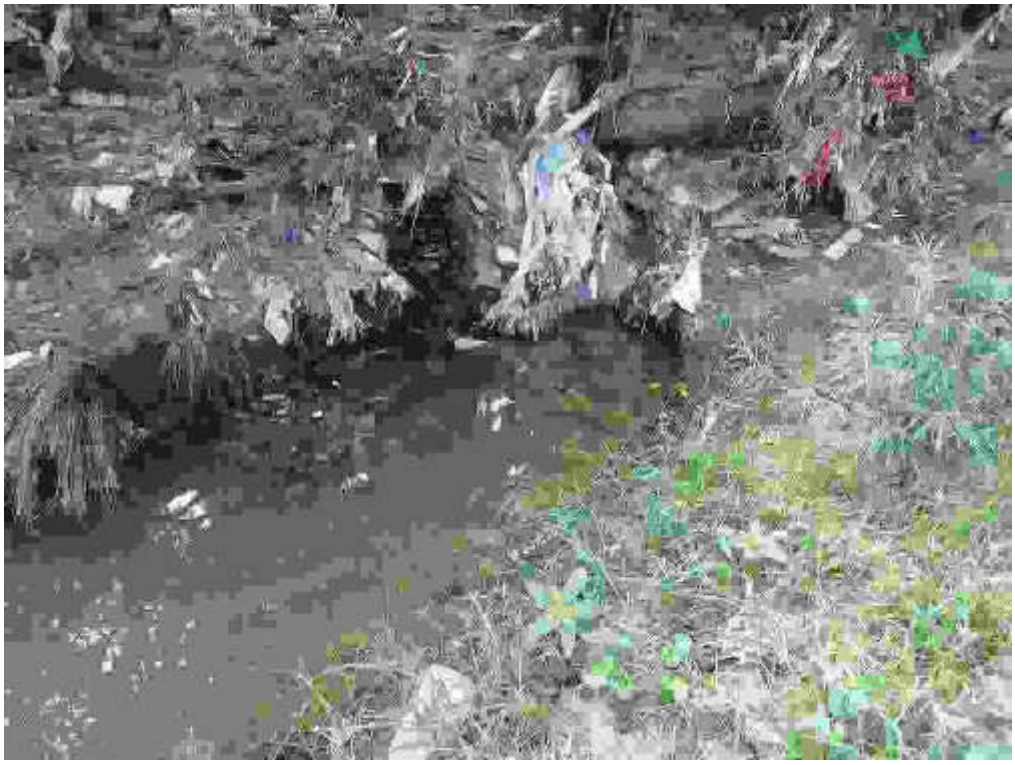

Figure 10 Rubbish dumping in the riverine vegetation.

Figure 11 Possible polluted outflow into the Jukskeiriver.

Figure 12 Alien species such as *Populus* sp. and *Salix babylonica* dominanting the riverine vegetation.

6.9 Mixed alien and indigenous vegetation

6.9.1 Composition and Connectivity

This study unit covers the largest part of the study site (Figure 2, 13). Dominant species include *Datura stramonium, Digitaria eriantha, Gerbera ambigua, Ledebouria revoluta, Seriphium plumosum, Setaria sphacelata, Tagetes minuta, Verbena* spp., *and Zinnia peruviana* (Table 8).

6.9.2 Red and Orange List species

The Orange List species *Hypoxis hemerocallidea* was recorded in this study unit.

6.9.3 Medicinal and Alien species

21 of the 50 species recorded are alien species. Only three medicinal plant species have been recorded in this study unit.

6.9.4 Sensitivity

This study unit is not considered ecologically sensitive due to the high number of alien species found and their extensive coverage across the site.

Table 8 Species recorded for the mixed alien and indigenous vegetation.

Growth form	Invasive Category
TREES and SHRUBS	
Acacia mearnsii	**2**
Gomphocarpus fruticosus subsp. *fruticosus**	
Melia azedarach	**3**
***Pinus* sp.**	
Seriphium plumosum	
GRASSES	
Aristida congesta subsp. *barbicollis*	
Cortaderia selloana	**1b**
Cymbopogon sp.	
Cynodon dactylon	
Dactyloctenium giganteum	
Digitaria eriantha	
Eragrostis curvula	
Eragrostis gummiflua	
Hyparrhenia hirta	
Paspalum dilatatum	
Paspalum urvillei	
Setaria sphacelata var. *torta*	
Sporobolus africanus	

FORBS	
Alternanthera pungens	
Amaranthus hybridus* subsp. *hybridus* var. *hybridus	
Bidens bipinnata	
Bidens pilosa	
Campuloclinium macrocephalum	**1b**
Commelina africana	
Conyza bonariensis	
Conyza podocephala	
Cucumis zeyheri	
Datura stramonium *	**1b**
Eriosema cf. *salignum*	
Gerbera ambigua	
Gomphrena celosioides	
Helichrysum rugulosum	
Hibiscus trionum	
Hilliardiella hirsuta	
*Hypoxis hemerocallidea**	
Hypoxis iridifolia	
Hypoxis rigidula	
Ipomoea purpurea	**1b**
Ledebouria revoluta	
Oxalis obliquifolia	
Pachycarpus schinzianus	
Polygala hottentotta	
Richardia brasiliensis	
Selago densiflora	
Tagetes minuta	
Tephrosia capensis	
Verbena aristigera	
Verbena bonariensis	**1b**
Xanthium spinosum	**1b**
Zinnia peruviana	

Alien species indicated in **bold**; Medicinal species indicated with *.

Figure 13 Mixed alien and indigenous vegetation.

7. FINDINGS AND POTENTIAL IMPLICATIONS

The drainage line vegetation and the riverine vegetation are considered ecologically sensitive. The drainage line has been altered and is not considered natural. Dumping occurs in the riverine vegetation and there is a high presence of alien species in the riverine vegetation, which needs to be rehabilitated. An alien species clearance management plan should be implemented throughout the study site. The Jukskeiriver is in need of a clean-up and possible rehabilitation. The grassland and rocky ridge are considered medium to low ecologically sensitive (Figure 15) as they are in good ecological states, but are highly fragmented with minimal connectivity to similar vegetation units.

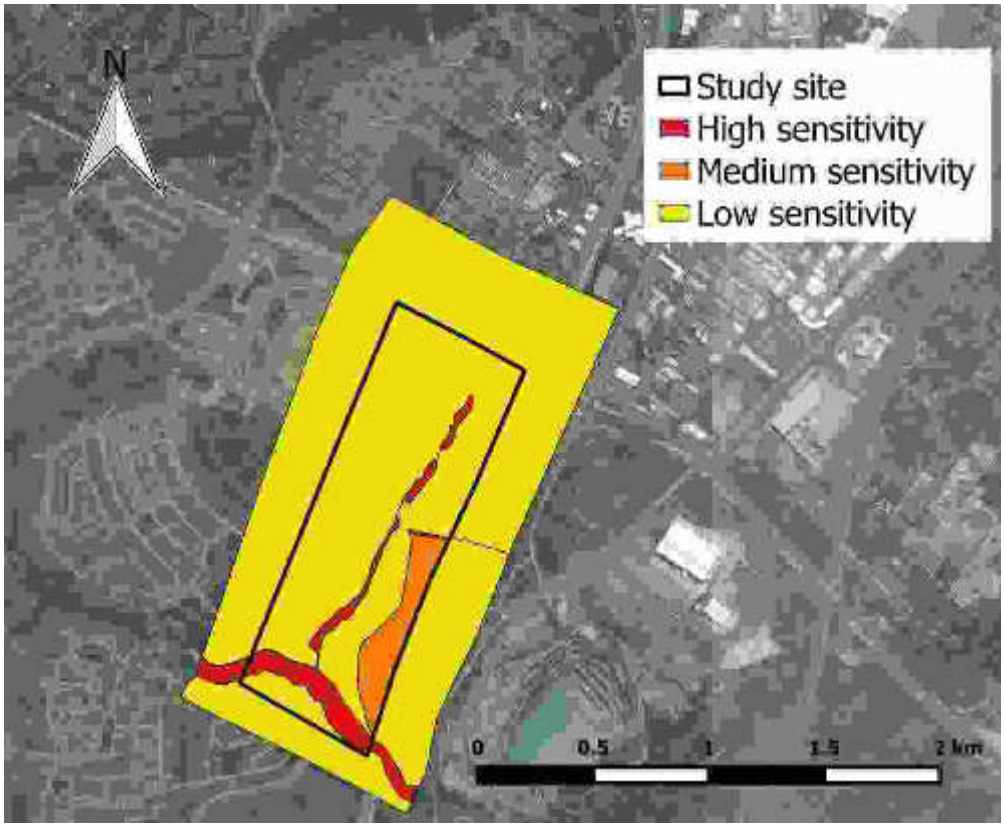

Figure 14 Map indicating the sensitive areas of the study site.

8. DISCUSSION, RECOMMENDATIONS AND MITIGATION IMPLICATIONS

Competent and appropriate management authority should be appointed to implement the Ecological Management Plan (EMP) and Environmental Impact Assessment (EIA) conditions throughout all phases of development, including the operational phase. The EMP should comply with the *Minimum Requirements for Ecological Management Plans* according to GDARD. The EMP and EIA should take into account all recommendations and mitigation measures as outlined by all vegetation assessments conducted for the EIA process. The following recommendations and mitigation measures are proposed:

- The attached sensitivity map should be used as a decision tool to guide the layout design.
- All areas designated as sensitive in the attached sensitivity map should be incorporated into an open space system. Development should be located on the areas of lowest sensitivity.

- The open space system should be managed in accordance with the EMP that complies with the *Minimum Requirements for Ecological Management Plans* and forms part of the EMP.
- Before construction is initiated, the open space system should be fenced-off from ecologically sensitive areas, and all construction-related impacts must be contained within the fenced-off development areas. These areas should be demarcated on site layout plans. All construction-related impacts (including service roads, temporary housing, temporary ablution, disturbance of natural habitat, storing of equipment/building materials/vehicles or any other activity) should be excluded from the open space system. An overspill of construction activities into areas outside of the study area is permitted within designated non-sensitive areas. No personnel or vehicles may be permitted in ecologically sensitive areas except for those authorised to do so.
- A pre- and post-construction alien and invasive control, monitoring, and eradication programme must be implemented along with an ongoing programme to ensure persistence of indigenous species, especially in the drainage line vegetation and the surrounding areas. A qualified botanist/ecologist should compile and supervise the implementation of this programme.
- Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a specialist registered in terms of the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science.
- Where active rehabilitation or restoration is mandatory for terrestrial systems, it should make use of indigenous plant species native to the study area, but would otherwise be destroyed during clearing for development purposes, for example *Celtis africana*, *Vachellia karroo,* and *Hypoxis hemerocallidea.* The species selected should strive to represent habitat types typical of the ecological landscape prior to construction. Forage and host plants required by pollinators should also be planted in landscaped areas.
- It is strongly prohibited for Red List species to be relocated, but should be protected *in situ*. This means that if any Red List species is recorded on site, all development activity should be stopped, a qualified botanist should be consulted and the relevant buffers should be applied. No construction may take place within a buffered area of a Red List species.

9. CONCLUSIONS

It is recommended that sensitive areas (Figure 14) be excluded from construction, including the drainage line and riverine vegetation. The above mitigation measures and recommendations should be included in the EMP for this study site. Dumping of builders' rubble and other waste must be prevented in ecologically sensitive areas. All alien species, especially in Category 1 and 2 must be eradicated as a matter of urgency to preclude their spreading during the construction phase.

10. LITERATURE SOURCES

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