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Final

Environmental Impact Assessment

**HELDERWYK PROPOSED MIX-USED DEVELOPMENT
AND ASSOCIATED INFRASTRUCTURE TO BE
ESTABLISHED ON THE REMAINDER OF PORTION 62 OF
THE FARM WITPOORTJIE 117 IR-BRAKPAN
EKURHULENI MUNICIPALITY**

Ref: GAUT: 002/19-20/E2403



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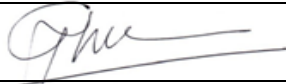
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Executive Summary

INTRODUCTION

LEAP Landscape Architect and Environmental Planner CC was appointed by Purple Moss 19 (Pty) Ltd as Independent Environmental Consultant to undertake the appropriate environmental process for the proposed Mixed-Use Development and associated infrastructure to be established on the Mix-Used Development and associated infrastructure to be established on the Remainder of Portion 62 of the Farm Witpoortjie 117 IR Brakpan within the City of Ekurhuleni Metropolitan Municipality. The process was registered for an EIA (Scoping) process with the Gauteng Department of Agriculture and Rural Development (GDARD) under Regulation 982 to 985 as amend by 324 to 327 of the National Environmental Management Act (Act No 107 of 1998) and was assigned the reference number **GAUT 002/19-20/E2403**.

GENERAL SITE DESCRIPTION

The proposed mixed-use development is situated on the Mix-Used Development and associated infrastructure to be established on the Remainder of Portion 62 of the Farm Witpoortjie 117 IR Brakpan within the Ekurhuleni Metropolitan Municipality. The subject property is situated approximately 3.5km south west of the N17/Heidelberg Road intersection (refer to **Figure 1 & 2**). Carnival City is sited approximately 3km north east of the proposed development site.

The land use of the site is zoned as Agricultural. Currently a small portion of the site is used as a model aircraft flying club.

The surrounding land uses are predominantly characterised by residential dwellings on Agricultural Holdings and vacant land with grassland. Industrial developments are also encountered in the surrounding areas. Various retail and commercial functions are located in the nearby and surrounding areas. To the north east of the site lies a slimes dam that is currently in the process of being rehabilitated.

The proposed development site has an extent of approximately 300 hectares.

RECEIVING ENVIRONMENT

Topography and Hydrology

The predominant topography of the site is that of a gentle undulating nature with open grassland being the predominant feature. Areas of limited woody cover are also encountered on the subject site. A slimes dam occupies the northern portion of the site.

The most elevated point on the proposed development site is situated on the southern portion of the site at 1606 masl. The site then gently slopes down towards the non-perennial stream that is present on

the site towards the south west. This stream is likely to be a tributary of the Rietspruit which is located approximately 500m south of the subject site.

The average slope of the site is approximately 3%, and no rocky outcrops or ridges occur on the site.

Climatic Conditions

The site is located within the Highveld Climatic Zone which experiences cool to cold winters and warm and wet summers. Summers precipitation occurs in the form of convectional thundershowers and ranges from 680mm to 750mm per year (Low & Rebello, 1996). Most of the rain falls in the summer months of November, December and January. The winter months of July and August usually receive on average less than 9mm of rain (Environmental Potential Atlas for Gauteng).

Average daily temperatures range from a maximum of 23.7°C to a minimum of 9.8°C. Summer temperatures reach a maximum of 27.0°C in January. The average winter minimum is 2.7°C in June and July. The prevailing wind direction is North West.

Extreme weather conditions include thundershowers, hail and fog. Snowfall is rare.

Construction should take place during the dryer periods to limit disturbance due to the inclement weather. This will also minimize possible erosion and contamination of surface water during the construction phase. Provision must be made for positive storm water runoff especially in the flatter areas. No potential impact on the climatic conditions is anticipated.

General Geology

The site was suitable for township establishment and indicated that no dolomite occurs on the site and the site does not include an underground cavern or cave.

The PWV 15 is located on the watershed centrally on the site running north to south. The west portion drains to the northwest and west to various wetlands. The east portion drains to a natural water course to the east. The site has a slope to the north west and to the south east of 2 to 5%.

The site is classified as Zone C1/C2 and H1/H2 as per NHBRC classification. A localized depression is noted on the northern and western boundary of the proposed development that would concentrate storm water runoff and is the possible start of the wetlands.

In 2013, Geo Buro undertook additional investigations of the geology of the site in order to ascertain the Dolomite Stability of the area. This follows from a requirement from City of Ekurhuleni as records suggested the site may be at risk due to dolomite. Six (6) boreholes drilled across the site all represented suitable conditions from an ingress scenario for the proposed land uses. No dolomite was encountered in the western portion of the site, and quartzite was encountered at depth, which indicates that this portion of the site must be considered as non-dolomitic.

The preliminary investigations seem to suggest that the eastern portions of the site may be underlain by dolomite at a depth of less than 30m. Borehole HW1 might represent a high risk (IHC6) from a dewatering perspective, since dolomite residuum with rapid penetration rates were encountered below groundwater level. The borehole might not be suitable for residential type developments, but commercial development types might be considered in this area. For this reason, the consultant recommended that the entire development area be considered as dolomitic until proven otherwise. This would include additional drilling to test areas earmarked for development.

Four (4) Wetlands were identified on the subject site. Wetland 1 consist of an extensive unchanneled valley bottom wetland and is highly modified. Wetland 2 and 3 has been altered by the slimes dam and severe sedimentation was observed in the stream to the west of the tailings dam. Wetland 4 (pans) has been significantly affected by alien encroachment.

Agriculture

According to the Gauteng Agricultural Potential Atlas (GAPA) the majority of the site has build-up and small pitches of moderate Agricultural potential, however the site is situated within an urban area with high density developments occurring on all sides and therefore it would not be viable to retain the site for Agricultural use. Furthermore, due to the small size of the site in relation to the size of land required for agricultural uses, any agricultural activities will be intensive and would thus lead to soil becoming fallow and unusable for Agricultural purposes.

In conclusion, the property is not a viable farming unit and no impacts in respect of the proposed development are anticipated with regards to the loss of land with high agricultural potential are expected.

Air Quality

The prevailing wind field is from the north-east, north and north-west with infrequent winds from the south with slight variations between the months of October 2015 to March 2016. The wind speeds were similar; ranging between 2.1 and 8.8 m/s. The months of October and November 2015 had slightly higher wind speeds. The months with the lowest and highest rainfall were October 2015 (17.6 mm) and March 2016 (137 mm), respectively.

Dustfall deposition rates from the Airshed network for the month of March 2016 were low and well within the NDCR limit for residential areas. Similarly, dustfall deposition rates from the ERPM network (January to March 2016) and form the ERGO network (October to December 2015) were low and well below the NDCR limit for residential areas.

Daily PM10 concentrations did not exceed the daily NAAQ limit of 75 $\mu\text{g}/\text{m}^3$ during the sampling period 2 March to 29 March 2016, with the highest concentration sampled of 59.72 $\mu\text{g}/\text{m}^3$.

Conclusion

The six months' (October 2015 to March 2016) dust fallout results in the vicinity of the slimes storage facility indicate low dust fall rates. The one month's (March 2016) PM10 concentrations indicate acceptable concentrations in comparison to the NAAQ limit.

Ecology

○ **Vegetation**

The study area consists of various wetland sections that are mostly seasonally wet. A large slimes dam occurs in the northern part of the site with the largest part of the study area consisting of the wetland and drainage areas and the large mostly natural grassland area. The area is open and easily accessible with sections of the grassland being degraded due to various human-induced activities (grazing by cattle, frequent fires, poor conservation practices etc.).

No detailed vegetation survey was conducted, though the study area was traversed to determine the presence or not of red data species or suitable habitat to be able to verify the findings of the previous red data report conducted by Eco Assessments in 2011. The area received low rainfall prior to the visit resulting in a low growth rate of the plants. Other than the presence of a number of populations of the Orange listed geophyte *Hypoxis hemerocallidea*, no other red data plants were observed within the grassland section and close to the artificial pans. Marginal habitat exists for three other species, though it is mostly around the natural pan areas. These species have a low-medium probability to be present on the site.

Since the most sensitive habitats are located in and around the natural pans, it is important that suitable buffer zones are implemented around these wetland systems to ensure protection of the habitat close to and around the wetlands. It is also important that connectivity between the three natural pans be ensured to maintain their ecological functioning.

○ **Invertebrate**

During site visits, no invertebrates of conservation concern were located. It must however be mentioned that whilst employing the Rapid Biodiversity Assessment (RBA) method, there does exist the possibility that certain other rare invertebrate species may not have been encountered.

Four invertebrate species of conservation concern are known to occur in the vicinity of the survey area. These include three species of butterfly and one species of cetonid beetle. None of these species were encountered during the survey. This, however, does not imply that one is unlikely to encounter any of these species in the study area as they may have been missed by sampling due to multiple factors.

Lepidochrysops praeterita, commonly known as the Highveld Blue, is rare and localized on highveld grassland between Potchefstroom in North West Province, Sasolburg in the Free State Province and Walkerville in Gauteng Province. This butterfly frequents hillsides on which *Becium grandiflorum* grows, flying fast and close to the ground from September to November. A small population has been detected in the Walkerville area which is located more than 50km to the east of the survey area. No specimens

were observed during the survey. Due to the absence of suitable habitat (highveld grassland with trees) as well as its larval food plant, the species can be considered absent from the survey area.

Chrysothrix aureus, commonly known as the Heidelberg Copper Butterfly, is a monophagous, myrmecophilous butterfly species, known from a handful of localities on the Heidelberg- Balfour- Greylingstad ridge system. It is not immediately apparent what the habitat of this species is, ie what factors determine suitable habitat. The known records represent colonies of this butterfly which occur around rock faces inhabited by the host ant species and where the host plant also occurs. Colonies are made up several tens of individuals which are active over an area of about 100m² in the vicinity of the ant colonies. The butterflies do not occur in areas where the host plant grows larger than about 1m in height. It has been speculated that the species only occurs at the highest altitudes on the ridge system, but there are some colonies found lower than the proposed suitable altitudinal range. It has also been speculated that it only occurs in 'rain shadow' areas on the ridge, usually on SE facing slopes, where the resultant water stress inhibits the production of allelochemicals in the host plant, but this has not been tested. Fire has been demonstrated to be important for the species in that it keeps the vegetation structure open (Terblanche et al 2003). Specimens of this species were not observed during the survey, nor does suitable habitat occur on the site.

Aloeides dentatis dentatis is a butterfly species known to be threatened by urban development in Gauteng. This species is known from three colonies in Gauteng, namely the Witpoortjie colony, the Glenvista colony and the Suikerbosrand colony. The latter colony is protected in the Suikerbosrand Nature Reserve and its larval foodplant is *Lotononis eriathrina*. This plant was not found to be present on the site. The Witpoortjie colony is protected in the Ruimsig Entomological Reserve and its larval foodplant is either *Hermannia depressa* or *Hermannia jacobefolia*. A concerted effort was made to locate either the species itself, any of its three larval foodplants or its associated ant species *Lepisiota capensis*. Despite extensive searching, none of the three larval foodplants were observed on the site. It can therefore be confidently stated that *Aloeides dentatis dentatis* is absent from the site.

Ichnestoma stobbiai is a cetonid beetle of immense scientific interest and conservation concern. Females are flightless, and adults emerge for only 2 - 4 days, thereby severely restricting this species in terms of gene flow and dispersal ability. *I. stobbiai* was previously thought to be extremely habitat specific and reside almost exclusively under tufts of the grass species *Eragrostis micrantha*. The location of new populations of this species in caravan parks and exotic gardens suggest that the species is more robust than previously thought. Apart from one population near Hartbeespoort dam, this species is found only in Gauteng and is severely threatened due its poor dispersal ability. There are currently eleven confirmed populations of this beetle in Gauteng, none of which occur in close vicinity of the survey area.

- **Grass Owl Habitat**

African Grass Owls are found exclusively in rank grass, typically, although not only, at fair altitudes. African Grass Owls are secretive and nomadic breeding in permanent and seasonal vleis or valley bottom wetlands which it vacates while hunting or post-breeding, although it will breed in any area of long grass and it is not necessarily associated with wetlands.

The species can also be found in shorter grass (40-50cm) in association with hydrophilic or hygrophilous sedges (*Juncus* sp., *Scirpus* sp and *Cyperus* sp.) and grasses (*Imperata cylindrica*) which forms impenetrable thickets which provide enough substrate for the owls' characteristic "tunnel" nests as well as favourable roosting habitat (pers.obs). The conditions described above are normally associated with pristine, well managed grasslands usually in close proximity of water, hence the threatened status of the species, as these grasslands are extremely rare in South Africa. However, the species is proving itself to be adaptable to such an extent that viable populations can exist in areas which are completely transformed, provided basic food and shelter requirements are met.

No African Grass Owls or Marsh Owls were flushed in the rank grass vegetation (*Imperata cylindrica*) occurring within the western portion adjacent to the poorly defined, mainly unchanneled valley bottom wetland. No evidence of any recent nesting, roosting sites or pellets were observed within the *Imperata cylindrica* areas as well as around the seasonal pans.

Three Marsh Owls (*Asio capensis*) were previously flushed from site as well as a confirmed nesting site was recorded during a previous avifaunal habitat assessment (Lockwood 2008). The valley bottom wetland and seasonally inundated depressions or pans and associated rank (*Themeda triandra-Imperata cylindrica*, *Carex* sp. *Juncus* sp, *Schoenoplectus* sp.) grassland and hygrophilous vegetation offers favourable roosting and possible nesting habitat for Marsh Owls as well as possibly African Grass Owls. The surrounding open Tsakane Clay grasslands offer foraging areas especially adjacent to the valley bottom wetland where large colonies of burrowing rodents were observed. The trampling by cattle, disturbances by off-road vehicles and quad bikes and presence of dogs are immediate threats to African Grass Owls due to their ground nesting breeding strategy. Road fatalities on the M43 cannot be eliminated.

More intensive surveys conducted over extended periods during the peak breeding period between February and April are required to ascertain the current population size of African Grass Owls on the site and immediate adjacent area.

- **Invertebrate**

During site visits, no invertebrates of conservation concern were located. It must however be mentioned that whilst employing the Rapid Biodiversity Assessment (RBA) method, there does exist the possibility that certain other rare invertebrate species may not have been encountered.

Four invertebrate species of conservation concern are known to occur in the vicinity of the survey area. These include three species of butterfly and one species of cetonid beetle. None of these species were encountered during the survey. This, however, does not imply that one is unlikely to encounter any of these species in the study area as they may have been missed by sampling due to multiple factors.

Wetland Assessment

The site lies within the C22C quaternary catchment and forms part of the headwaters of the Rietspruit. This catchment therefore forms part of the Vaal River Water Management Area.

Four (4) wetland areas were identified in the delineation although wetland 2 (in the north) does not form part of the proposed development area.

- Wetland 1 – This consists of an extensive unchannelled valley bottom wetland which becomes channelled in some sections towards the south.
- Wetland 3 – This is the remains of a historical stream found in an area originating from tailings seepage. The channel probably only contains water following heavy downpour. The vegetation in this wetland is not typical nor pristine but in fact dominated by exotic species such as *Verbena bonariensis* and *Pseudognaphalium luteo-album*. The dominant grass, *Cynodon dactylon* is also indicative of disturbance. The presence of such species can mostly be attributed to increased wetness from seepage from the tailings dam, rather than a natural wetland system that may have historically been found there. Some impact on the vegetation due to impacts on soil chemistry is also deemed likely.
- Further south west of the slimes dam the channel is found. Although no water was observed in the channel, indigenous water loving grass species, eg. *Setaria sphacelata* and *Andropogon appendiculatus*, and herbaceous species, eg. *Nidorella anomala*, were abundant. Overall there was a low diversity of indigenous species as well as an abundance of exotic species. This area can be considered to have suffered a large loss of natural habitat, biota and basic ecosystem functions.
- Wetland 4 – Three (3) endorheic pans are located at the centre of the site. These pans have generally been significantly affected by alien encroachment, with special mention of *Verbena bonariensis* and *Bidens formosa*. Other significant impacts observed included disturbance of the pan substrate, as well as frequent veld fires impacting on the vegetation.
- The presence of the tailings dam has altered the integrity of wetland 3. Severe sedimentation is observed in the river to the east of the tailings dam. The tailings dam has also severely degraded the terrain at wetland 3.

Following the field investigation undertaken in September 2018, it was concluded that the freshwater resource delineations presented in SAS (2009) remain unchanged and are valid. No additional freshwater resources or wetland features were identified within the study area. However, current legislation requires the application of Government Notice (GN) 509 of 2016 as it relates to the National Water Act, 1998 (Act 36 of 1998) (NWA) to identify all potential freshwater resources that may potentially be impacted by the proposed development. Therefore, the freshwater resources identified within 500m of the study area were delineated in fulfilment of GN509 of the NWA using desktop methods.

The freshwater resources within the study area have been historically altered through impacts from mining activities (northern section of the study area), residential developments (in the broader catchment) and through the construction of road and railway infrastructure traversing the system.

The reclamation of the tailings storage facility (TSF) located to the north of the study area will result in the loss of hydraulic head and possibly redirect the recharge of the wetland to the catchment to the east of the catchment feeding this wetland. This change in the landscape will lead to the removal of the primary hydrological driver of the hillslope seep wetland adjacent to the TSF (hillslope seep 1). Thus,

the need for future conservation of this wetland is questionable considering the long-term viability of the system functioning in the landscape.

Recommendation

- The use of Sustainable Drainage Systems (SUDs) to manage stormwater is considered critical if roads and large paved parking areas are to be planned within close proximity to the freshwater environment, in order to prevent significant impacts on the hydrological functioning of the freshwater area, reduce the risk of flooding during high flow periods and reduce the risk of increased erosion. Furthermore, any discharge of runoff into the freshwater system must be done in such a way as to prevent erosion. In this regard, it is highly recommended that a suitably qualified engineer be consulted with regards to the use of SUDs. Examples of these which may be applicable to this development include permeable paving, rainwater harvesting, soakaways, swales and bio-retention facilities or attenuation ponds to ensure that post-development runoff does not exceed pre-development runoff volumes and lead to altered flood peaks.
- Areas which are to be cleared of vegetation, including contractor laydown areas, must remain as small as possible, particularly in the residential development areas, in order to reduce the risk of proliferation of alien vegetation, and in order to retain a level of protection to the freshwater resources during construction (e.g. sediment trapping, slowing of stormwater runoff etc.). Contractor laydown areas are to remain outside of the delineated wetland and riparian zones and their associated buffers, and as much as feasible no natural/indigenous wetland vegetation is to be cleared;
- It is highly recommended that an alien vegetation management plan be compiled during the planning phase and implemented concurrently with the commencement of construction;
- A soil management plan must be compiled during planning and implemented when construction commences. It is essential that the following be included in the soil management plan:
 - All exposed soils are to be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the freshwater resources. This is considered essential as the soils in the vicinity are highly dispersive;
 - No stockpiling of soils is to take place within the freshwater areas or the 50m Gauteng Department of Agriculture and Rural Development (GDARD) setback area, and stockpiles may not exceed 2m in height;
 - Any remaining soils following the completion of construction activities are to be levelled and re-seeded with indigenous flora species to minimise the risk of further sedimentation of the freshwater area, and to aid in the natural reclamation process; and
 - The residual impacts of the proposed development on the freshwater resources are to be offset.

It is the opinion of the specialist therefore that the proposed development, from a freshwater resource perspective, be considered favourably, with the proviso that strict adherence to mitigation measures is enforced, in order to ensure that the ecological integrity of the freshwater resources is not further compromised.

Cultural Heritage Impact Assessment

The study area was assessed both on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey to cover the extent of the Remainder of Portion 62 as development plans are not available at this stage.

A large slime dam is situated inside the survey area and takes up about 25 % of the Northern part of the survey area. The study area is further disturbed by waterline servitudes and cultivation from the 1970's (Figure 9). Although these activities would have impacted on surface indications of heritage sites 11 features including Stone tools and historical industrial artefacts, a ruin as well as a large cemetery and stone cairns (that could mark informal graves) were identified.

In terms of the built environment of the area (Section 34), no standing structures older than 60 years occur within the study areas.

Stone Age artefacts were recorded during the survey. The features comprise dispersed scatters of a low density and are located on the edges of pans. Due to ecological reasons it is not expected that these areas will be developed, and this will ensure that the features are preserved. No further mitigation prior to construction is recommended in terms of the archaeological components of Section 35 for the proposed development to proceed. Based on the SAHRA sensitivity map the area is of very high significance and additional studies are required prior to development. In terms of Section 36 of the Act 1 cemetery and two areas with three and five stone cairns respectively were recorded.

If any graves are located in future, they should ideally be preserved in-situ or alternatively relocated according to existing legislation. No public monuments are located within or close to the study area. The surrounding area has been developed and the proposed project is in line with the current land use and will not impact negatively on significant cultural landscapes or viewsapes. During the public participation process conducted for the project no heritage concerns was raised.

Recommendation

- Implementation of a chance find procedure.
- It is recommended that Site 2,3 and 4 should be assessed by an industrial archaeologist prior to construction.
- It should be confirmed whether the stone cairns identified represent graves. If the features are confirmed to be graves the graves should be retained in situ. If the features relate to clearing activities, they are of no importance and no further action is required.
- Graves should be retained in situ if this is not possible as a last resort the graves can be relocated adhering to legal requirements.
- Stone Age Sites – the sites are located on the edges of a pan and due to ecological reasons, it is not expected that the area will be developed. It is recommended that these sites should be retained in situ.

INFRASTRUCTURE AND SERVICES

• Traffic

Based on a good knowledge of the transportation system in the vicinity of the proposed Helderwyk Estate, previous traffic impact assessment (Salfin Extension 1, 2 and 3 as well as Badenhorst Estate), consultation with the Municipality, other developers and the Gauteng Department of Roads and Transport, consultation with the Passenger Rail Agency of South Africa (PRASA), an evaluation of the provincial road network as required in terms of the Gauteng Transport infrastructure Act (Act 8, 2011), a traffic analysis for the 2021 horizon year and a capacity analysis of all significant intersection in the study area for two land uses scenarios, it is concluded that:

- The proposed provincial and metropolitan major road networks can accommodate the projected future traffic demand, including Helderwyk Estate, as well as other known township applications in the area.
- Traffic signals have to be installed at the intersection of Keurboom Street and P58-1 (K132). The developer of Salfin X1 and X2 has accepted the responsibility to install traffic signals at this intersection.
- Barry Marais Road (K155) will have to be doubled within the 10-years planning period, without the traffic generated by Helderwyk Estate (or the approved and planned townships in the area).
- Local network improvements can be implemented on a phased basis as the development progresses.
- Public transport will play a major role to accommodate the expected future traffic demand and provision must be made for public transport facilities.
- Walking is an important mode of transport and provision must be made for paved pedestrian walkways along all arterial roads, as well as residential collector streets.
- A rail commuter station can be expected in the medium to long term and the township layout and road network should enable efficient and convenient access to the station area.

At the meeting between developers, the Municipality and the Gauteng Department of Roads and Transport, it was agreed that although the planning by the Municipality provides a good basis for the planning of the area, it may be necessary to amend the proposals of the Municipality to mitigate the impact of these proposals on adjoining developments. After consultation with the affected landowners, it has been concluded that it is technically feasible to amend the road network to reduce its impact on adjoining properties and that such changes will not have a significant impact on traffic patterns on the major road network. It would therefore not be necessary to amend the 'traffic demand estimate or the capacity analysis and that the proposed network would be able to accommodate both Helderwyk Estate and the other developments in the area. The traffic study was expanded to include these recommendations.

Based on the traffic assessment it is recommended from a traffic engineering point of view that:

- The major road network proposed by the City of Ekurhuleni should be acceptable in principle, including the intersection of the new proposed metropolitan arterial road on the proposed quarter link that connects K155 (Barry Marais Road) and K132 (P58-1 North Boundary Road).
- The township establishment application for Helderwyk Estate be granted.

- A record of decision that will enable the development of the township be issued.
- The township layout should take pedestrians and public transport into consideration, particularly the planned commuter rail station.
- Road design should include provision for pedestrians and public transport lay-bys.
- Provision be made for a public transport modal transfer facility as part of the land earmarked for community facilities.
- The applicant should contribute to the upgrading of the external road network according to the engineering services contribution policy of the City of Ekurhuleni.
- Road infrastructure be provided in phases as the proclamation of portions of Helderwyk Estate progresses and the extent of roads and road improvements must be specified in the Engineering Services Agreement between the Municipality and the applicant.

- **Civil**

- **Water Capacity and Supply**

The proposed link to the existing Rand Water line and internal reticulation will consist of uPVC Class 12 pipes (Z lock type) in 400mm, 200mm, 160mm and 110mm diameter pipes with designed concrete restraint blocks.

All fire hydrants will be positioned to meet the requirements of the Emergency Services and Ekurhuleni Water Department.

The estimated average daily peak demand of the water is in the order of 22 756 kl/day, with a peak factor of 4.0 and an average demand of 2300 litres/500m²/day for sectional title and 1200liters/day per stand. This is a flow rate of 263.4 litres per second.

Currently an EIA is under way for the expansion of the Rand Water Line from the South to the Rynfield Water Reservoir.

Design and installation will be completed according to the minimum standard of Ekurhuleni Metro Municipality

- **Sewerage Capacity & Outfall**

The proposed sewer reticulation will consist of 200mm and 160mm diameter uPVC Class 34 or Maincor Class 400 sewer pipes. All manholes will be 1050mm diameter precast rings, with concrete covers and frames with sealed joints. A maximum spacing of 80m between manholes will be designed for. House connections will be provided for as either long or short connections, 1.0m within the stand boundary and a maximum depth of 2.5m. The design flow is as follows:

Discharge per 500m ² /day	2000litres
Peak Factor	2.3
Extraneous Flow	15%
Peak wet Weather design flow	12 579.6 Kl/day (145.6 litres/sec)

Design and installation will be completed according to the minimum standard of Ekurhuleni Metropolitan Municipality

- **Stormwater Management**

The total area of the development is 322 ha draining to both the south eastern water course and to the north and west wetlands. Stormwater generated by the proposed development will be piped and discharged into individual storm water attenuation structures for each phase of the development, from where it will flow to the low lying wetland areas to the west, and to the existing water course in the east.

The internal discharge for each residential 3 stands would be collected in attenuation dams sized to attenuate both the 5 year and 25 year post developed runoff to the pre-develop run off. The attenuation dams will be sized on an average size of 360m³ per hectare.

No attenuation will be located within the 1:100-year floodline and appropriate discharge structures will be constructed to include riffle beds and headwalls that prevent erosion at outlet points. These are envisaged to extend an area of 20m x 10m and serve as anti-erosion measures downslope of the attenuation ponds.

The minor storm will be calculated on a 1:5-year recurrence period, and the major storm would discharge to the existing water course. The anticipated discharge from the free hold stands will be collected on site in order to be used for watering of gardens and possible flushing of toilets and the excess will be discharged into a piped system varying from 450mm to 900mm diameter pipes. The remaining stands will discharge to the existing wetlands and area drainage system.

It is proposed that where roadways cross the wetlands, that these crossings be constructed as culvert sections (eg. 2.0 x 2.0 m sections) in order to allow for the build-up of stormwater discharge to flow freely throughout the wetland area, and also allow for safe movement of animals. There is one proposed crossing with the crossing widths of 40m.

- **Electricity Services Report**

A load forecast shows that the proposed development is likely to require approximately 16.8 MVA and that the total demand needed for the area is in the order of 40 MVA.

A phased approach to catering for the demand includes the following –

Stage 1 – Install two 120mm² PILC Cu cables from the Fortmann substation to a new 11kV switching station. This switching station will be designed and positioned such that it will become part of the 88/11kV substation. A third 120mm² PILC Cu cable can be installed at a later stage from the Formann substation to secure the capacity. This will provide the load requirements up to February 2014.

Stage 2 – Build a new 88 kV line from Eskom Brenner distribution station to a new 88/11kV Helderwyk substation. The substation will provide for 3 x 40 MVA, 88/11kV transformers to provide for the

estimated load as well as cater for future developments. This station will also be diverted to the Van Eck station in order to alleviate the current load demand on the Van Eck substation.

Both Eskom and the City of Ekurhuleni confirmed that this solution is acceptable. Eskom has confirmed that sufficient capacity is available at Brenner distribution station. EMM has already requested a cost estimate from Eskom for the supply point at Brenner distribution station.

The electrical engineers therefore confirm that electrical capacity for the proposed development can be made available, subject to City of Ekurhuleni conditions and requirements.

City of Ekurhuleni will be responsible to install and construct all relevant bulk electrical services and this will include obtaining relevant environmental authorisations and/or water use license applications for relevant sites and activities

GENERAL PROJECT DESCRIPTION

Project Background

In 1971 the Schachat Cullum Group made application for a township establishment through HL Khun and Partners on a portion of the remainder of Portion 62 of the farm Witpoortje 117IR. In terms of the title deed 20914/1969 the landowner at that stage was Mria Mynbou (Pty) Ltd and the mineral rights belonged to Van Dyk Consolidated Mines Limited. The land measured 789 morgen.

Van Dyk Consolidated Mines Limited, who sold the land to Moria Mynbou (Pty) Ltd, consented to township establishment on the entire portion.

On the 19th July 1974, a notice appeared in the Government Gazette reserving the land of 547 Ha for township purposes.

The township establishment application submitted was the first of 5 townships to be established on the land. These were Welgelegen Proper, Welgelegen X1, Welgelegen X2, Welgelegen X3 and Welgelegen X4. This was application then advertised and circulated.

The first township name Welgelegen was rejected by the province (place names committee) due to a place name conflict. The name was subsequently changed to Helderwyk.

In 2004, the land was sold to Purple Moss 19 (Pty) Ltd who is the current owner.

Table 1: A summary of the Helderwyk projects to date

Was	Welgelegen	Welgelegen X1	Welgelegen X2	Welgelegen X3	Welgelegen X4
Now	Helderwyk Proper	Helderwyk X1	Helderwyk X2	Helderwyk X3	Helderwyk X4

Province Reference	PB 4/2/2/3951	PB 4/2/2/4031	PB 4/2/2/4131	PB 4/2/2/3579	PB 4/2/2/4040
Status	Proclaimed	Approved in principle but no formal townships board approval, pending before Administrator since 1972	Approved COE's and GP in place	Pending before Administrator since 1972	Pending before Administrator since 1972
Issues		PWV 15, class 2 road planning. Environmental factors	Ext 3 & 7 sold to Ekurhuleni. Ext 4, 5 and 6 needs new layouts to conform to class 2 road planning	PWV 15, class 2 road planning. Environmental factors.	PWV 15, class 2 road planning. Environmental factors. Possible dolomite.
Rights		Special Residential (Res 1), General Residential, Res 3, Community facilities, business and parks	Special Residential (Res 1), General Residential, Res 3, Community facilities, business and parks	To be confirmed	To be confirmed
Amended Extensions		X1 / X8	X3, 4, 5, 6 & 7	To be confirmed	To be confirmed

In 2008, the Gauteng Department of Finance and Economic Affairs approved the establishment of three (3) township applications located on Portions of the Remaining Extent of Portion 62 of the Farm Witpoortje 117 IR. These townships included Helderwyk X4, Helderwyk X5 and Helderwyk X6.

Table 2: Current status of three (3) townships located within the site.

	Helderwyk X4	Helderwyk X5	Helderwyk X6
Residential 1	412.64	10.25	9.92
Park	0.02	0.02	-
Residential 3	-	-	2.30
Streets	4.62	4.67	5.26
Total ha	17.28ha	14.94ha	17.48ha

These township approvals set the premise around which the larger and amended application (that includes this application) have been centred and based upon.

Proposed Development

The applicant, in the process of consolidating the previous approvals and by means of obtaining additional land for development, has produced an integrated land development application that seeks to cater for a sustainable development.

The proposed development comprises the establishment of a mixed-use Residential Township located on the Remainder of Portion 62 of the Farm Witpoortje 117 IR, Brakpan within City of Ekurhuleni.

Table 3: Township Data for the proposed development on the Remainder of Portion 62 of the Farm Witpoortje 117 IR, Brakpan Ekurhuleni.

Zoning and Land uses	Ha	Percentage (%)	Number of Units
Future Roads & Main Roads	34.4	11.06	N/A
Possible Wetlands (Inclusive of Buffer Areas)	53.5	17.20	N/A
Residential (up to 60U/Ha)	177.3	57.01	8150
Mixed Use including Business, High density residential and Community Facilities	38	12.22	990
Commercial	7.8	2.51	N/A
Total	311ha	100%	9140

The total area for the proposed development comprises 311 ha.

The proposed (preferred) layout consists of mixed land use, including medium and high-density residential uses, commercial uses, community facilities, public and private open spaces and roads.

The proposed high-density residential development will be compatible with the uses occurring within the surrounding area. The development will further meet the residential demand in the specific area and be designed to minimize the impact on the existing residential character.

Approximately 17. % of the site or 53 ha will include passive open space, wetlands and buffers. The wetland areas have been buffered by 32m and the pans by 50m. These areas are included in the Passive Open Space category of the development layout.

The remainder of the site (i.e. 258 ha) will be developed for roads, streets, residential land uses along with educational & community facilities and business/commercial land uses. Approximately 11. % of the layout includes Future Roads to be developed for the PWV15 that bisects the site. The timing for this road is currently unknown and is not part of the application.

The **residential land use (Residential 1 and 2)** (up to a maximum of 60du/ha) extends over the largest portion of the site (i.e. 177ha) and offers a mix of single, 2 and 3 storey walk-ups. The recommended building controls include 60% coverage and a maximum height of 3 storeys.

The **Mixed Land Use / High density Residential (Residential 3 and 4)** (Res 3 up to a maximum of 85du/ha and res 4 more than 85du/ha) caters for a smaller portion of the site (i.e. 38 ha) and will offer single, 2 and 3 storey units located with a communal open space. The recommended building controls include a coverage of 50% and a maximum height of 3 storeys

The **mixed land use** also includes various business and community facilities, including the schools, crèches, etc. that will be designed & developed based on market demand.

A **Business/Commercial Node** is proposed along Barry Marais Drive and comprises 7.8ha.

The business component will include a zoning of Business 2 with a coverage of 70% and height of 2 storeys. The Commercial component will include a coverage of 60% and a height of 2 storeys. Parking will be prescribed to comply with town planning requirements.

The layout includes a significant passive open space area that offers tremendous opportunity for conservation, environmental awareness & education, recreation and protection of the environment. The developer has proposed the inclusion of various parkways, walkways and educational centres that can serve the previously mentioned purposes. This detail will be provided with each SDP for each phase as it is developed.

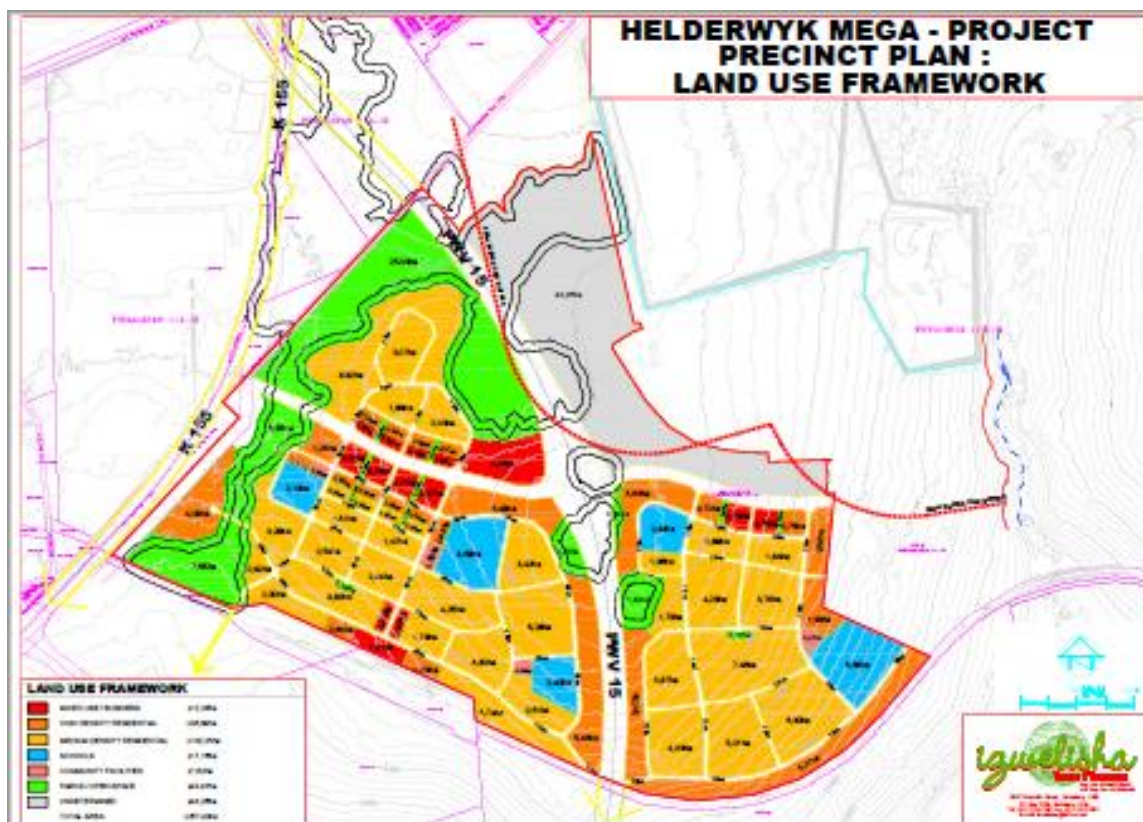
The proposed PWV 15, which is a significant south east / north west development corridor, is envisaged to bisect the site, although this road will not be managed, developed or constructed by the developer. Instead this is a project that will be under the jurisdiction and control of the South African National Roads Agency/GDRT.

The proposed development will be built according to architectural and environmental guidelines and will provide for an aesthetically pleasing development located within an ecologically managed environment. The proposed development is earmarked for establishment in several phases or extensions (Helderwyk X9, X10, X11 and X12) in order to minimize the cumulative impacts and facilitate cash flow and service delivery over time.

The development will offer housing units for people seeking residential units in the area and will also aid with the creation of open space, management of storm water and will further serve as an economic centre for the area. The proximity of the site to Lindelani Township and the N17 Freeway, allows for units to be suitable for a wide spectrum of society. The proposed development will also lead to employment opportunities (short, medium and long term) as well as markets for service industries in the direct area and beyond. The local community will benefit directly from the proposed development in the sense that a part of the labour force required for the proposed development will be sourced from surrounding/neighbouring areas and communities.

The envisaged development includes a combination of land use types and at different densities in order to be both attractive and affordable to the proposed market.

The proposed development thus offers an integrated township with various housing typologies supported by relevant community facilities and work opportunities. This is proposed to provide for a more sustainable urban design as the township will minimise the movement distance between work and residence and residence and school. The proposed pedestrian walk ways, nearby locality to rail transport (to be developed over time and with increased need as the township grows), provincial road ways and a developing service infrastructure, suggest that this development layout is feasible, sustainable and attractive to future home owners, businesses, community centres and the overall environment.



Proposed Development (Amended to exclude multiple crossings over wetlands)

RISKS AND KEY ISSUES

Potential risks and impacts include, but are not limited to, the following:

- Biophysical impacts including alteration of fauna and flora habitats, as well as the potential loss of land with limited agricultural potential
- Socio-economic impacts including visual, safety and security, increased traffic and the provision of adequate services and the lack of services in the area

Key issues assessed include:

- Provision of services
- Loss of areas of ecological significance
- Responsiveness to the City of Ekurhuleni Metropolitan Municipality’s requirements

IMPACTS AND MITIGATION MEASURES

Relevant issues were evaluated in terms of the most important parameters applicable to the environmental management. Several mitigation measures have been identified that could manage the impacts or mitigate them successfully.

CONCLUSION

The development proposal accommodates and avoids the sensitive areas, and in the areas, that have been identified as development land, has no fatal flaws in terms of the institutional, bio-physical or socio-economic environments.

RECOMMENDATION

It is recommended that the **proposed mixed-Use development and associated Infrastructure receive a positive Environmental Authorisation on the Remainder of Portion 62 of the Farm Witpoortjie 117 IR-Brakpan City of Ekurhuleni and that the preferred alternative is utilised.**

Furthermore, it is recommended that this application be authorised, subject to the recommendations of the:

- The Environmental Impact Assessment Report
- The Environmental Management Program (EMPr)
- All specialist studies
- All requirements of the City of Ekurhuleni Metropolitan Municipality

Table of Contents

1.0	NEMA REQUIREMENTS	5
2.0	INTRODUCTION	7
3.0	OBJECTIVES	7
4.0	ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)	8
5.0	LOCATION	8
6.0	BRIEF DESCRIPTION OF the PROPOSED DEVELOPMENT	11
6.1	Proposed land uses	11
6.1.1	Need and Desirability	13
6.2	Township Layout	14
7.0	NEMA LISTED ACTIVITIES TO BE APPLIED FOR	16
8.0	DESCRIPTION OF THE INSTITUTIONAL ENVIRONMENT	18
8.1	INTERNATIONAL CONTEXT	18
	Table 2: International context	18
8.2	NATIONAL CONTEXT	19
8.2.1	Spatial Planning Land Use Management (SPLUMA) Act No. 16 of 2013	19
8.2.2	National Environmental Management Act (NEMA), 1998 (Act No 107 of 1998) and the Environmental Impact Assessment Regulations	21
8.2.3	The National Water Act, 1998 (Act No 36 of 1998)	23
8.2.4	National Environmental Management: Biodiversity Act, (Act No 10 of 2004)	24
8.2.5	The National Heritage Resources Act, 1999 (Act No 25 of 1999) (NHRA)	25
8.3	PROVINCIAL CONTEXT	26
8.3.1	Gauteng Planning and Development Act (Act No 3 of 2003) (GPDA)	26
8.3.2	Gauteng Spatial Development Framework (GSDF)	28
8.3.3	The Gauteng Draft Red Data Policy	30
8.3.4	The Gauteng Draft Ridges Policy	32
8.3.1	GDARD Conservation Plan, Version 3	33
8.3.1	Protection of Agricultural Land in Gauteng Revised Policy (June 2006)	33
8.4	LOCAL CONTEXT	34
8.4.1	Ekurhuleni Metropolitan Municipality Spatial Development Framework (SDF)	34
8.4.1	Ekurhuleni Metropolitan Open Space Framework (EBOSS)	36
9.0	DESCRIPTION OF THE BIO-PHYSICAL ENVIRONMENT	42
9.1	CURRENT LAND USE, ZONING AND SITE CHARACTER	42
9.2	SURROUNDING LAND USE, ZONING AND CHARACTER	42
9.3	TOPOGRAPHY & hydrology	44
9.4	CLIMATIC CONDITIONS	46
9.5	GEOTECHNICAL INVESTIGATION	46
9.5.1	Methodology	46
9.5.2	Geology and typical soil profiles	46
10.0	air quality monitoring assessment	47
10.1.1	Background information	49
10.1.1.1	Current Land Use and Potential Sensitive Receptors in the Area	49
10.1.1.2	Atmospheric Dispersion Potential	49
10.1.1.3	Local wind field	50
10.1.1.4	Precipitation	50
10.1.2	Dustfall results	51
10.1.2.1	Airshed Network	51
10.1.2.2	ERPM Network	52
10.1.2.3	ERGO Network	53
10.1.2.4	PM10 Results	54
10.1.3	Main Findings and Conclusion	54
10.1.3.1	Main findings	54
10.1.3.2	Conclusion	55
10.2	AGRICULTURAL POTENTIAL	55
10.3	ECOLOGICAL ASSESSMENT	55
10.3.1	Methods	55
10.3.2	General Description of the study area	56
10.3.2.1	Existing Impacts	56
10.3.2.2	Elevation profile	56
10.3.3	Vegetation type and floral Results	56
10.3.3.1	Broad Vegetation Units	57
10.3.3.2	Red Data Species	58
10.3.3.3	Conclusion	59
10.4	African Grass Owl habitat assessment	59
10.4.1	Results of Specialist Habitat Assessment	60
10.4.1.1	Recommendation of African Grass Owl Management	62
10.5	GIANT BULLFROG HABITAT ASSESSMENT	64

10.5.1	RESULTS OF SPECIALIST GIANT BULLFROG HABITAT ASSESSMENT	64
10.5.1.1	Temporary pools or pans that are large enough to hold water for approximately a month:	65
10.5.1.2	Breeding pans must be accessible to frogs:	65
10.5.1.3	The substrate must be suitable for aestivation:	65
10.5.1.4	Frogs must have sufficient foraging areas:	66
10.6	INVERTEBRATE Impact STUDY	67
10.6.1	Results of Invertebrate	68
10.7	Wetland / Riparian Delineation and Functional Assessment	70
10.7.1	Scoping of Work	70
10.7.2	ASSESSMENT APPROACH	70
10.7.3	Background	70
10.7.4	Initial Report	70
10.7.4.1	Wetland Assessment	71
10.7.4.2	Rietspruit River Status	71
10.7.4.3	Wetland Functionality & Habitat Integrity	72
10.7.5	Freshwater Resource Field Verification	72
10.7.5.1	Field Verification Results	72
11.0	DESCRIPTION OF SOCIO-ECONOMIC ENVIRONMENT	76
11.1	CULTURAL HERITAGE ASSESSMENT	76
11.1.1	Methodology	76
11.1.2	History of land use	76
11.1.3	Findings	78
11.2	SOcio – Economic Impact	81
11.2.1	Social and Economic Environment in relation to the proposed development	84
11.3	VISUAL INTEGRITY OF THE AREA	84
	Table 10: Visual Impact Analysis	85
12.0	Environmental composite map	86
13.0	INFRASTRUCTURE AND SERVICES	88
13.1	Traffic and Access Routes	88
13.1.1	Background to the Existing Transportation System	88
13.1.2	These scenarios consider the following aspects –	90
13.1.3	The capacity analysis of the three traffic scenarios indicates the following:	90
13.1.4	CONCLUSION AND RECOMMENDATION	94
13.2	Civil Services	97
13.2.1	Water Capacity and Supply	97
13.2.1.1	Existing:	97
13.2.1.2	Proposed:	97
13.2.2	Sewerage Capacity & Outfall	97
13.2.2.1	Existing:	97
13.2.2.2	Proposed:	98
13.2.3	Stormwater Management	98
13.3	Electrical Supply	99
13.3.1	Electrical Capacity & Supply	99
13.3.1.1	Existing:	99
13.3.1.2	Proposed:	99
14.0	PUBLIC PARTICIPATION	102
14.1	Notification of Interested and Affected Parties	102
14.2	Public Meeting	102
14.3	Issues and Concerns	102
14.4	Public Insight	103
14.5	Issues and response register	104
15.0	Alternatives Identified & Motivation for Proposed Development	136
15.1	Demand Alternatives	136
15.2	Process Alternatives	138
15.3	Scheduling Alternatives	138
15.4	Location Alternatives	139
15.4.1	Inner-city location	139
15.4.2	Suburban location	139
15.4.3	Urban edge / rural location	139
15.4.4	Infill development location (preferred)	139
15.5	Land Use Alternatives	140
15.5.1	Alternative 1: No-go Option	140
15.5.2	Alternative 2: Single-use: Low density residential	140
15.5.3	Preferred alternative: Mix use Development	140
16.0	Comparison of alternative land uses	142
17.0	potential impacts	146
17.1	Methods used to identify potential impacts	146

17.2	Specialist Study Findings	146
17.3	Site Inspection	155
17.4	Public Participation	156
17.5	GDARD Policies, Review / Terms of Reference	156
17.6	Impact SUMMARY	156
17.6.1	Physical Impacts	156
17.6.2	Biophysical	156
17.6.3	Socio-economic Impacts	156
17.7	Assessment of Impacts	157
17.7.1	Definition of terms	157
17.7.2	Methodology	157
17.8	ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	158
17.8.1	Construction Phase	159
17.8.1.1	Physical Impacts	159
17.8.1.2	Biophysical Impacts	160
17.8.1.3	Socio-economic Impacts	161
17.8.2	Operational Phase	164
17.8.2.1	Physical Impacts	165
17.8.2.2	Biophysical Impacts	166
17.8.2.3	Socio-economic Impacts	167
18.0	Conclusions	171
19.0	Recommendations	171

LIST OF FIGURES

Figure 1 :	Location map of the site shown by a red polygon	9
Figure 2 :	Location map of the site	10
Figure 3 :	Development -Note that the PVW 15 is NOT included in this application.	15
Figure 4 :	C-Plan 3 (Source: GDARD policies)	37
Figure 5 :	Rivers, wetlands and Ridges according to GDARD's C-plan 3	38
Figure 6:	Gauteng Agricultural Potential Atlas (GAPA) (Source GDARD)	39
Figure 7:	GDARD’s Gauteng Environmental Management Framework above indicates that most of the site is located in Zone 1	40
Figure 8:	500-meter Buffer of the slime dams	41
Figure 9:	Approximate site boundary on aerial photograph depicting surrounding land uses	43
Figure 10:	Contour map	45
Figure 11:	Locations for the Airshed dustfall and PM ₁₀ sampling network	49
Figure 12:	Monthly dustfall deposition rate per sampling location (March 2016)	51
Figure 13:	Monthly dustfall deposition rate per sampling location (January 2016 to March 2016)	52
Figure 14:	Monthly dustfall deposition rate per sampling location (October 2015 to December 2015)	53
Figure 15:	PM ₁₀ concentrations (March 2016)	54
Figure 16:	Approximate locations of wetland areas noted on the study area (1=large drainage/wetland system; 2=natural pans; 3=artificial pans) (Source: Google Maps)	57
Figure 17:	Giant Bullfrog Habitats Sensitivity Map	66
Figure 18:	The location of the freshwater resources associated with the study area and regulated area.	74
Figure 19:	Conceptual presentation of the GDARD Setback areas and the zone of regulation in terms GN509 of 2016 as it relates to the NWA, in relation to the delineated wetlands.	75
Figure 20:	Identified Heritage sites on the proposed development	79
Figure 21:	The composition and size of the different population groups in Ekurhuleni	81
Figure 22:	Population projections in Ekurhuleni	82
Figure 23:	Population Pyramid	83
Figure 24:	Education Levels	83
Figure 25:	Combined Sensitivity Map over layout (Refer to Figure 3 for most recent layout)	87
Figure 26:	Gautrans roads	96
Figure 27:	Existing and proposed bulk services	100
Figure 28:	Proposed 88/11kv Substation	101

ANNEXURES

- Annexure A1 - Location Map
- Annexure A2 - Wetland Map
- Annexure B - Township Layout
- Annexure C - Geotechnical Report
- Annexure D – Air Quality Assessment
- Annexure E – Ecological Impact Assessment
- Annexure F - African Grass Owl Habitat
- Annexure G - Giant Bullfrog Impact Assessment
- Annexure H - Invertebrate Impact Assessment Report
- Annexure I1 - Wetland Delineation Initial report
- Annexure I2 - Wetland verification report
- Annexure J - Cultural Heritage Impact Assessment
- Annexure K - Town Planning Memorandum
- Annexure L - Traffic Impact Study
- Annexure M - Services Report
- Annexure N - Electrical Service Report
- Annexure O - Public Participation Report
- Annexure P - Environmental Management Program (EMPr)
- Annexure Q – Memorandum indicating the principle approval
- Annexure R - Prof Gwen Theron’s Curriculum Vitae

1.0 NEMA REQUIREMENTS

In accordance with the Regulations in terms of Chapter 5 of the NEMA, 1998, Section 31 Environmental Impact Assessment Reports require the following:

Environmental impact assessment reports

An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-

- (a). details of-*
 - (i). the EAP who prepared the report; and*
 - (ii). the expertise of the EAP, including a curriculum vitae;*
- (b). the location of the activity, including:*
 - (i). the 21-digit Surveyor General code of each cadastral land parcel;*
 - (ii). where available, the physical address and farm name; and*
 - (iii). where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;*
- (c). a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-*
 - (i). a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;*
 - (ii). on land where the property has not been defined, the coordinates within which the activity is to be undertaken;*
- (d). a description of the scope of the proposed activity, including-*
 - (i). all listed and specified activities triggered and being applied for; and*
 - (ii). a description of the associated structures and infrastructure related to the development;*
- (e). a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;*
- (f). a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;*
- (g). a motivation for the preferred development footprint within the approved site;*
- (h). a full description of the process followed to reach the proposed development footprint within the approved site, including:*
 - (i). details of the development footprint alternatives considered;*
 - (ii). details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;*
 - (iii). a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;*
 - (iv). the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;*
 - (v). the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-*
 - (aa) can be reversed;*
 - (bb) may cause irreplaceable loss of resources; and*

- (cc) can be avoided, managed or mitigated;
- (vi). the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;
- (vii). positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
- (viii). the possible mitigation measures that could be applied and level of residual risk;
- (ix). if no alternative development locations for the activity were investigated, the motivation for not considering such; and
- (x). a concluding statement indicating the preferred alternative development location within the approved site;
- (i). a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-
 - (i). a description of all environmental issues and risks that were identified during the environmental impact assessment process; and
 - (ii). an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;
- (j). an assessment of each identified potentially significant impact and risk, including-cumulative impacts;
 - (i). the nature, significance and consequences of the impact and risk;
 - (ii). the extent and duration of the impact and risk;
 - (iii). the probability of the impact and risk occurring;
 - (iv). the degree to which the impact and risk can be reversed;
 - (v). the degree to which the impact and risk may cause irreplaceable loss of resources; and
 - (vi). the degree to which the impact and risk can be mitigated;
- (k). where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;
- (l). an environmental impact statement which contains-
 - (i). a summary of the key findings of the environmental impact assessment;
 - (ii). a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and
 - (iii). a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;
- (m). based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;
- (n). the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;
- (o). any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation

- (p). *a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;*
- (q). *a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;*
- (r). *where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;*
- (s). *an undertaking under oath or affirmation by the EAP in relation to:*
 - (i). *the correctness of the information provided in the reports;*
 - (ii). *the inclusion of comments and inputs from stakeholders and I&APs;*
 - (iii). *the inclusion of inputs and recommendations from the specialist reports where relevant; and*
 - (iv). *any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;*
- (t). *where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;*
- (u). *an indication of any deviation from the approved scoping report, including the plan of study, including-*
 - (i). *any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and*
 - (ii). *a motivation for the deviation;*
- (v). *any specific information that may be required by the competent authority; and*
- (w). *any other matters required in terms of section 24(4)(a) and (b) of the Act.*

2.0 INTRODUCTION

LEAP was appointed by Purple Moss 19 (Pty) Ltd as Independent Environmental Consultants to undertake the appropriate environmental process for the proposed Mixed-use development and associated infrastructure to be established on the Remainder of Portion 62 of the Farm Witpoortje 117 IR, Brakpan Ekurhuleni within the City of Ekurhuleni Metropolitan Municipality. The process was registered for an EIA with the Gauteng Department of Agriculture and Rural Development (GDARD) under Regulation 983, 984 & 985 as amended by 324, 325, 326 and 327 of the National Environmental Management Act (Act No 107 of 1998) and was assigned the reference number by Gauteng Department of Agriculture and Rural Development **GAUT 002/19-20/E2403**.

3.0 OBJECTIVES

The following objectives have been set:

- Preparation of the Environmental Impact Assessment Report by describing the context of the proposed development, including the bio-physical, socio-economic and institutional environments;
- Identification of impacts that the proposed development could have on the bio-physical and social environment;
- Assessment of the attitudes of the surrounding landowners and other interested and affected parties (I&APs) to such a proposed development;

- Recommendation of measures that will reduce, mitigate or eliminate identified negative impacts and improve the positive impacts; and therefore
- Determine whether the proposed development site is deemed suitable for the proposed development from an environmental perspective.

4.0 ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

The Environmental Assessment Practitioner is Dr Gwen Theron who is a registered professional member of the following associations:

- SACLAP (South African Council for Landscape Architectural Profession)
- ILASA (Institute of Landscape Architects South Africa)
- IAIA (International Association for Impact Assessments)

Please refer to **Annexure R** – Dr Gwen Theron’s Curriculum Vitae

5.0 LOCATION

The subject site is located on the Remainder of Portion 62 of the Farm Witpoortje 117 IR, Brakpan Ekurhuleni, and is situated approximately 3.5km south west of the N17/Heidelberg Road intersection (refer to Figure 1 and 2 below). Carnival City is sited approximately 3km north east of the proposed development site.

The site is located in the southern part of the Ekurhuleni Metropolitan Municipality’s area of jurisdiction. The Boksburg correctional services Prison is located opposite the proposed development site towards the west, across Barry Marais Road.

The land use of the site is zoned as Agricultural. Currently a small portion of the site is used as a model aircraft flying club.

The surrounding land uses are predominantly characterised by residential dwellings on Agricultural Holdings and vacant land with grassland. Industrial developments are also encountered in the surrounding areas. Various retail and commercial functions are located in the nearby and surrounding areas. To the north east of the site lies a slimes dam that is currently in the process of being rehabilitated.

The proposed development site has an extent of approximately 311 hectares.



Figure 1 : Location map of the site shown by a red polygon

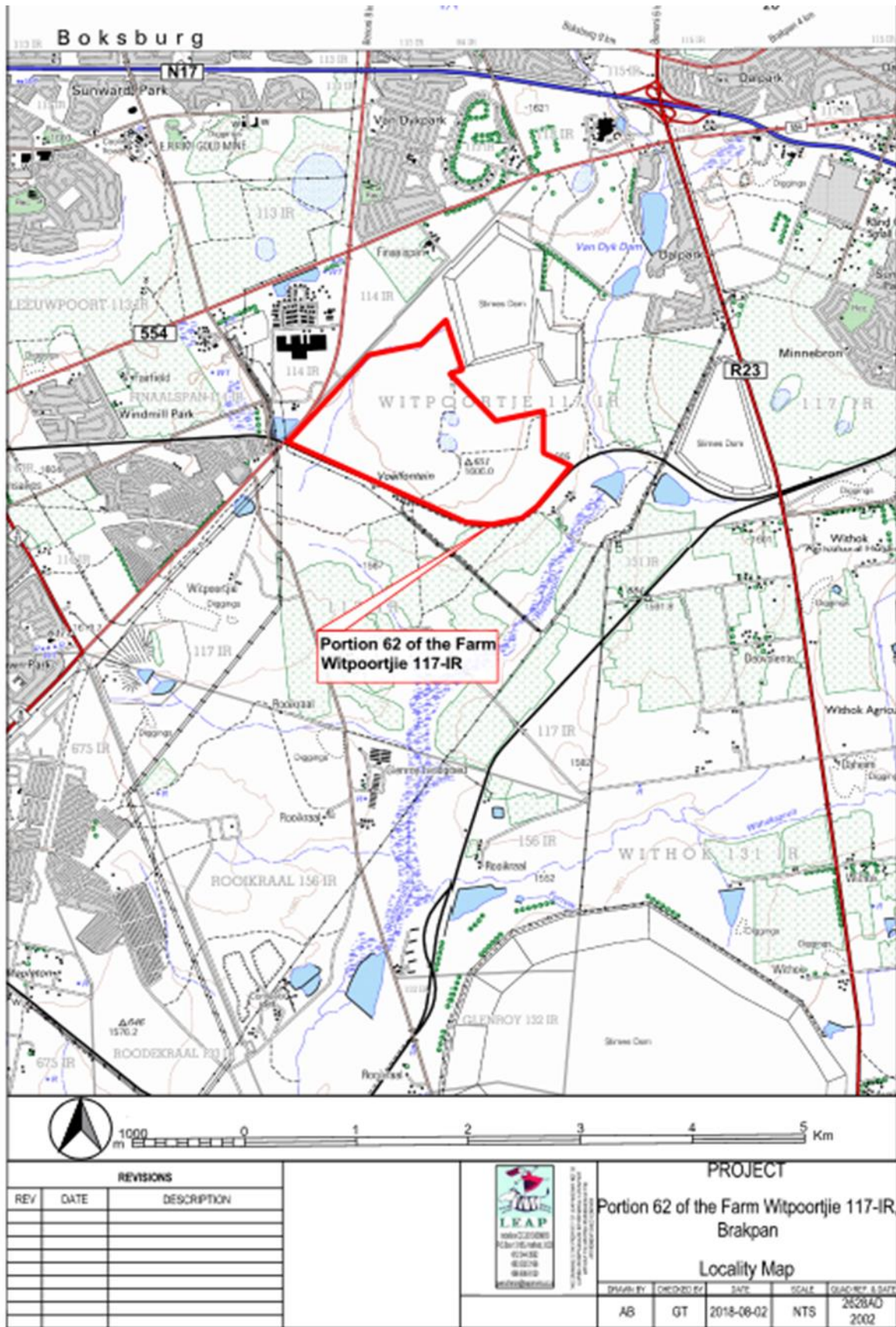


Figure 2 : Location map of the site

6.0 BRIEF DESCRIPTION OF THE PROPOSED DEVELOPMENT

6.1 PROPOSED LAND USES

A township application is made in in terms of Section 96 of the Town Planning and Townships Ordinance (No. 15 of 1986) and Section 2(2) and the relevant provisions of the Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) for the establishment of the Mix-Used Development and associated infrastructure to be established on the Remainder of Portion 62 of the Farm Witpoortjie 117 IR-Brakpan City of Ekurhuleni. Once completed and all requirements of the City of Ekurhuleni Metropolitan Municipality are met.

a) Proposed Helderwyk

The proposed development consists of mixture of residential 2,3 as well as Residential 4, Open Space (Wetlands), Business and Commercial land uses. Pre-primary, Primary and Secondary Schools will also form part of the proposed development.

Please note that the Town planning Memo does not reflect the amended layout that will be included in the Final Environmental Impact Assessment Report.

The proposed development will comprise the following:

Zoning and Land uses	Ha	Percentage (%)	Number of Units
Future Roads & Main Roads	34.4	11.06	N/A
Possible Wetlands (Inclusive of Buffer Areas)	53.5	17.20	N/A
Residential (up to 60U/Ha)	177.3	57.01	8150
Mixed Use including Business, High density residential and Community Facilities	38	12.22	990
Commercial	7.8	2.51	N/A
Total	311ha	100%	9140

Please note that the PVW 15 is NOT included in this application

The area for the proposed development comprises approximately 311 hectares of which approximately 17% includes wetlands which will be delineated as open space (approximately 53 Hectares).

Of the total developable area, Future Roads and Residential Streets will occupy approximately 11. % of the site. The Residential component of the proposed development will occupy the largest portion of land, with Residential 2 & 3 occupying approximately 57. % and Residential 3 & 4, 3. % respectively.

The business component, which will consist of a Central Business Node, Barry Marais Node and a Station Node, will occupy approximately 7. % of the total area of the site. Approximately 2% of the subject site will be allocated to commercial uses whilst Educational and Community facilities comprise 8 % and 12% of the site respectively.

The proposed development will be developed according to architectural Guidelines and will provide for an aesthetically pleasing development. the proposed development will be subdivided into different phases.

Initial soil quality test results for the Helderwyk application site show no Uranium or Radon residues as this was not used in the mining operation and processing.

The prevailing wind direction is North West which means that the majority of the site (which lies south west of the slimes dam) is not affected by dust fall.

The envisaged services infrastructure for the proposed development includes the following-

- Sewage infrastructure associated with the linkage into the bulk sewage reticulation system.
- Various Electrical Mini substation to distribute 11 KvA electricity across the site
- Storm water structures including attenuation ponds
- Potable water infrastructure
- Several Roads and Access points

Barry Marais Road will provide access to the site. Three class 2 roads will be constructed off Barry Marais Road which will lead into phase 1 & 2 of the proposed development. The construction of all three of these roads will require a water use license from DWS due to them crossing the wetland area. The future planned PWV 15 Route which transects the subject site from north-west to south will be connected to one of these Class 2 roads.

The aim of the proposed development is to assist with fulfilling the greater need for housing in the surrounding area. According to the Ekurhuleni Regional Spatial Framework (November 2003), the projected number of housing units that will be required up until 2020 is approximately 30000 units. This would require approximately 1835 ha of land. This development will provide land and units that will assist the Council with the overall requirements for housing as a result of the urbanization process.

The proposed project is in line with the Regional Spatial Development Framework. This plan demarcates the site as falling within an area earmarked for Residential Land Use. The development will also assist with the creation of necessary services in the area.

On a local scale, the proposed development will offer housing units to people residing in the area and its surrounds. The proximity of the site to Carnival City and the N17 Freeway allows for units to be suitable for a wide spectrum of society. The development will also assist with the creation of open space, management of storm water and will further serve as an economic centre for the area. This will lead to job creation (short and long term) as well as markets for service industries in Helderwyk and beyond.

Immediate benefits are likely to accrue to the staff of the Brakpan Correctional Services (which is located opposite the proposed development site) as well as to a variety of people who seeks housing in proximity to their area of work.

The local community in the surrounding area will be benefited through employment opportunities available in the proposed township. This will also include immediate opportunities for house construction, service provision and material suppliers. The long-term employment opportunities include domestic employment, service industries, employment in schools as well as employment in commercial centres and business nodes.

The proposed development will further support the envisaged establishment of the Railway Station to the south of the site. The proposed PWV 15, which is earmarked for development, will greatly increase the need and desire of the proposed township.

The proposed development will contribute in reducing the impact of climate change by implementing the following.

Conventional construction equipment will be used during the construction phase, with energy and water saving devices. Brick and other material will be sourced where it is the least expensive with regard to the sustainability of the development. During construction rain water will be harvested as it falls and retained in the soil or tanks so that it can be later used as a source of clean water.

The appropriate Green Building bylaws will be implemented
Measures will put in place to make the development as ecologically responsible as possible such as the installation of:

- Energy efficient light bulbs
- Solar heating units,
- Low flow water taps
- Use of local labour
- Use of local materials
- Compact fluorescents
- Passive infra reds switches to switch off lighting when areas are unoccupied

6.1.1 Need and Desirability

The aim of the proposed development is to assist with fulfilling the greater need for housing in the surrounding area. In addition, the development of schools, community centres and business nodes will further assist in creating an integrated development that will function to provide accommodation, housing, places of work, places of education and community support, places of recreation and open space as well as transport systems and relevant services.

According to the Ekurhuleni Regional Spatial Framework, the projected number of housing units that will be required is 36 695 units. This would require approximately 1835 ha of land. This development will provide land and units that will assist the Council with the overall requirements for housing as a result of the urbanization process.

The proposed project is in line with the Regional Spatial Development Framework. This plan demarcates the site as falling within an area earmarked for Residential Land Use. The development will also assist with the creation of necessary services in the area.

The proximity of the site to Carnival City and the N17 Freeway allows for units to be suitable for a wide spectrum of society. The development will also assist with the creation of open space, management of storm water and will further serve as an economic centre for the area. This will lead to job creation (short and long term) as well as markets for service industries in Helderwyk beyond.

Immediate benefits are likely to accrue to the staff of the Brakpan Correctional Services (which is located opposite the proposed development site) as well as to a variety of people who seeks housing in proximity to their area of work. The local community in the surrounding area will be benefited through employment opportunities available in the proposed township. This will also include immediate opportunities for house construction, service provision, material supplies and domestic employment.

Currently the site caters for no service or activity for the local community. The creation of housing units will fulfil a requirement in the area and offer a convenient land use for people that are seeking housing in the area of Helderwyk and its immediate surrounds. The proposed township will offer community facilities such as a pre-primary, primary and secondary school. The open space included as part of the proposed development will provide some opportunity for the ecological value of the area to be retained.

In addition, the project will create economic activity in the area by means of supporting local churches, schools, shopping centres and associated community facilities. The regional and local accessibility of the site is exceptional and easy access to the N17 highway and the railway line to the south of the subject site will guarantee the popularity of the proposed residential township.

See **Annexure K** for Town planning motivations

6.2 TOWNSHIP LAYOUT

The conceptual layout of the proposed development is indicated on **Figure 3**. However, to fully understand the layout it is important to review the remainder of the report specifically the environmental factors, and the town planning components. Also see **Annexure B** for A3 copies of the township layout plan.

The development consists of the mixed land uses, including medium and high-density residential uses, business uses, commercial uses, community facilities, public and private open spaces and roads.

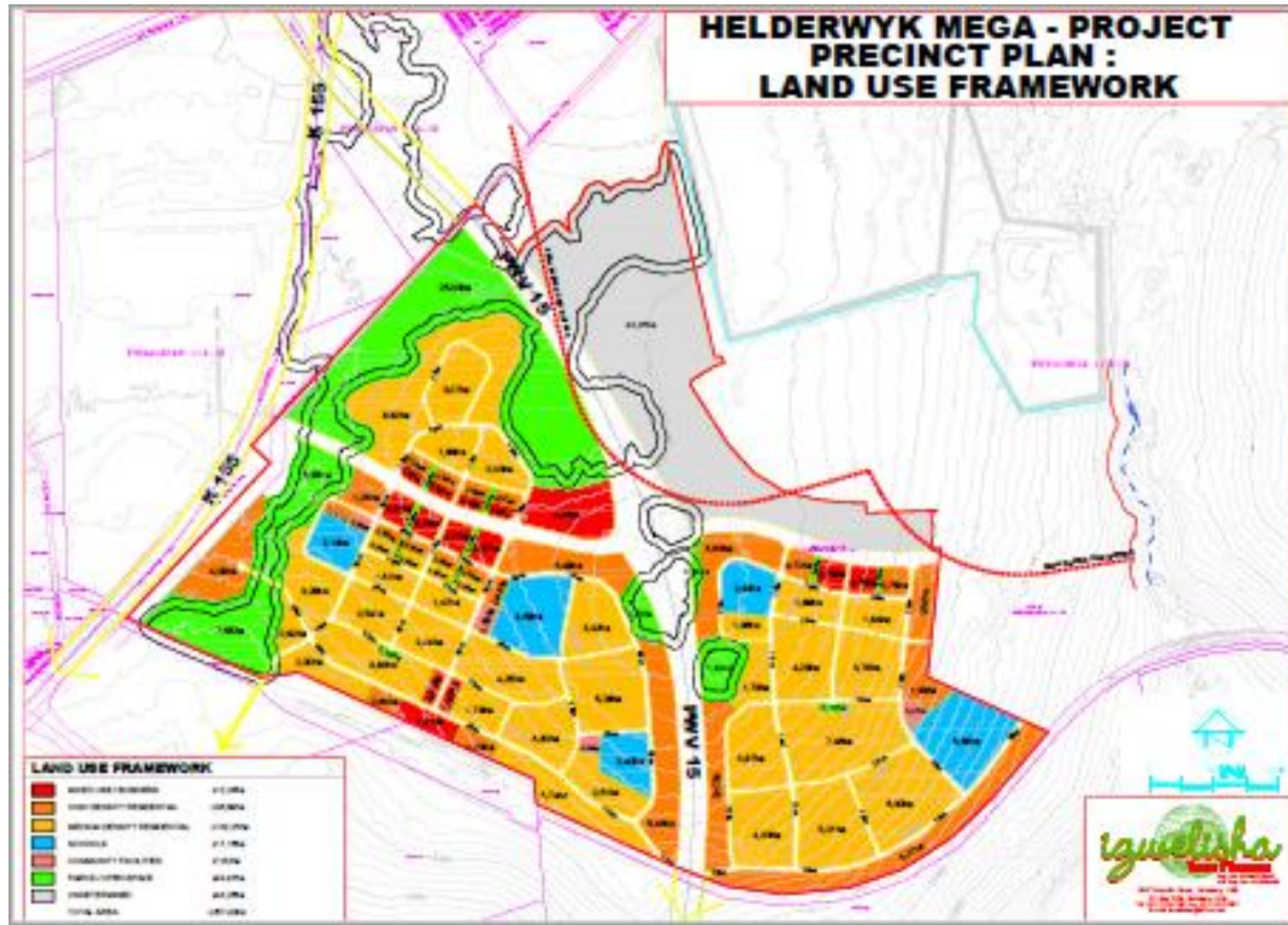


Figure 3 : Development -Note that the PWV 15 is NOT included in this application.

7.0 NEMA LISTED ACTIVITIES TO BE APPLIED FOR

In April 2006 the Minister of Environmental Affairs and Tourism passed Environmental Impact Assessment Regulations in terms of Chapter 5 of the National Environmental Management Act, 1998 (NEMA). The regulations replaced the Environmental Impact Assessment (EIA) regulations which were promulgated in terms of the Environment Conservation Act, 1989 in 1997. The most recent regulations came into place on 18 June 2010 and, therefore, all application must be made in terms of these NEMA regulations. The purpose of this process is to determine the possible negative and positive impacts of the proposed development on the surrounding environment and to provide measures for the mitigation of negative impacts and to maximise positive impacts.

Notice No. R 982 to 985, specifically 983, 984 and 985 as amended by Notice No. R 324 to 327 list activities that must be considered in the process to be followed. The Activities listed in Notice No. R 984 as amended by 325 requires that the Scoping and EIA process be followed. However, the draft guidelines document supplied by DEAT states that if any activity being applied for is made up of more than one listed activity and the scoping and EIA process is required for one or more of these activities, the full EIA process must be followed for the whole application.

The proposed development includes a number of listed activities and therefore it will be necessary to follow a full EIA process (as an independent process) in terms of NEMA. The applicant is therefore applying for the following listed activities. Note the sections of the listed activities that are applicable to the proposed development have been marked as bold

Table 1: Listed Activities to be applied for

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant or notice):	Describe each listed activity:
<p>GN. R 983 8 December 2014</p> <p>as amended by</p> <p>GN. R 327 7 April 2017</p>	<p>Listing Notice 1 Activity 12</p>	<p>The development of –</p> <p>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</p>
<p>GN. R 983 8 December 2014</p> <p>as amended by</p>	<p>Listing Notice 1 Activity 19</p>	<p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from (a) watercourse;</p>

Indicate the number and date of the relevant notice:

Activity No (s) (in terms of the relevant or notice):

Describe each listed activity:

GN. R 327 7 April 2017		
GN. R 983 8 December 2014 as amended by GN. R 327 7 April 2017	Listing Notice 1 Activity 26	Residential, retail, recreational, tourism, commercial or institutional developments of 1 000 square metres or more, on land previously used for mining or heavy industrial purposes;
GN. R 984 8 December 2014 as amended by GN. R 327 7 April 2017	Listing Notice 2 Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation.
GN. R 985 8 December 2014 as amended by GN. R 325 7 April 2017	Listing Notice 3 Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. c. Gauteng iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans.
GN. R 985 8 December 2014 as amended by GN. R 325, 7 April 2017	Listing Notice 3 Activity 12	The clearance of an area of 300 square metres or more of indigenous Vegetation. c. Gauteng (ii) Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans.
GN. R 985 8 December 2014 as amended by GN. R 324, 7 April 2017	Listing Notice 3 Activity 14	The development of – (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant or notice):	Describe each listed activity:
		<p>a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</p> <p>c. Gauteng</p> <p>Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans.</p>

8.0 DESCRIPTION OF THE INSTITUTIONAL ENVIRONMENT

The land development proposal of the proposed development site is influenced by the varying scales of institutional environments. The institutional context that is considered and reflected upon ranges from that of international, national, provincial and local / municipal, while each institutional arena as it decreases in scale, requires development planning that is more detailed and responsive to the proposed development site and the surrounding environment.

The following institutional framework documents are relevant to the proposed township and development site.

8.1 INTERNATIONAL CONTEXT

Relevant International Conventions to which South Africa is part of and which should influence the proposed site development:

Table 2: International context

CONVENTION	RESPONSE
<ul style="list-style-type: none"> ■ Ramsar Convention on Wetlands, 1971 ■ Framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. 	<p>The site is part of the Quaternary catchment C22C</p> <ul style="list-style-type: none"> ■ Development to occur outside of the 1:100-year floodline and the 32-meter buffer of the wetland ■ Rehabilitation of the wetland and drainage line on the site should be implemented as far as possible. <p>Development and particularly storm water management, to be responsive to surrounding hydrological systems. The implementation of attenuation and dissipation measures to minimise the velocity and quantity of storm water and therefore minimising environmental impacts is essential.</p>

	Please refer to the Environmental Management Programme (EMPr) – Annexure P for further information in this regard.
<ul style="list-style-type: none"> ■ Agenda 21 adopted at the United Nations Conference on Environment and Development (UNCED) in 1992 ■ Action plan and blueprint for sustainable development. 	<p>The proposed development is to be planned, constructed and operated with sustainability as a key prerequisite and baseline standard.</p> <p>Please refer to Annexure P –EMPr for practical steps in achieving best practice methodologies.</p>
<ul style="list-style-type: none"> ■ Convention on Biological Diversity, 1995 ■ Provided and added stimulus for a re-examining and harmonization of its activities relating to biodiversity conservation. 	An ecological specialist completed an assessment of the proposed development site to determine the biodiversity and habitat value. This assessment is to inform the planning and design phases as far as possible.

8.2 NATIONAL CONTEXT

The following national legislature is to be considered and applied to the development proposal during the environmental process:

Table 3: National Context

LEGISLATURE	RESPONSE
8.2.1 Spatial Planning Land Use Management (SPLUMA) Act No. 16 of 2013	
The Spatial Planning Land Use Management (SPLUMA) Act intends to provide a uniform framework for spatial planning and land use management in the republic. It seeks to promote consistency and uniformity in procedures and decision-making in spatial planning. The objectives of the Act are:	SPLUMA, has great importance with respect to good planning and development and are therefore to be aligned to as far as possible.
Provide for a uniform, effective and comprehensive system of spatial planning and land use management for the Republic.	The developer has identified this strategically located, inactive land parcel to develop an inclusionary mixed land use development, which will cater for a variety of income groups. The proposed development will offer various bonded housing typologies and inclusionary housing addressing the distorted spatial space in City of Ekurhuleni.

LEGISLATURE	RESPONSE
	<p>The development will improve ownership for previously disadvantaged individuals.</p> <p>The proposal of a township establishment will provide for a cohesive social and economic environment, meeting basic needs of local residents as well as addressing past spatial imbalance. The proposed development will improve access and employment opportunities for previously excluded/disadvantaged groups, ensuring a development that is integrated, functional and environmentally sustainable human settlement.</p>
<p>Ensure that the system of spatial planning and land use management promotes social and economic inclusion;</p>	<p>The mixed-use development establishment process and the environmental impact assessments are transparent and offer the opportunity for interested and affected parties to participate / comment on the proposed development.</p> <p>The processes have been designed to ensure that people's rights in respect of a healthy and economically viable environment are protected.</p> <p>All these aspects are taken into account during the environmental process to ensure a sustainable development.</p>
<p>Provide for the sustainable and efficient use of land.</p>	<p>Diverse land use is key to the success of this proposal as a mixed-use township nodal development.</p>
<p>Discourage urban sprawl and promote a compact city</p>	<p>The proposed development site is strategically located along accessible transport corridors and urban amenities.</p> <p>In many instances, the legacy of Apartheid planning practices has resulted in sprawling urban areas characterized as being uneconomical and offering one-dimensional opportunities to residents. The proposed development is partly classified as infill development in terms of the Gauteng Spatial Development Framework on vacant land within the urban environment (Provincial Economic Core). The proposed development therefore will contribute to the re-engineering of the existing urban form, the establishment of a more compact city and also contribute to the optimization of the use of existing infrastructure such as bulk sewer lines, bulk roads and water.</p>

LEGISLATURE	RESPONSE
<p>Redress the imbalances of the past and to ensure that there is equity.</p>	<p>The proposed development will provide for inclusionary housing to those who were previously not able to own/buy property in competitive residential market. Inclusionary Housing is considered the central theme of the development and the proposed development will promote the above principle by making provision for previously disadvantage persons to participate in the property market.</p>
<p>Ensure that special consideration is given to the protection of prime and unique agricultural land.</p>	<p>The land presents undeveloped and underutilised land within an urban setting. Surrounding agricultural areas will not be negatively affected by this proposed township. Furthermore, no natural features like streams and wetlands will be destroyed by the development to the detriment of rural areas. The proposed development strives for the optimum utilization of this site delivering much needed housing and employment opportunities, while increasing the land value.</p>
<p>Uphold consistency of land use measures in accordance with environmental management instruments</p>	<p>The proposed development is structured in a manner that is in accordance with the environmental framework of the City of Ekurhuleni Metropolitan Municipality and Gauteng Department of Agriculture and Rural Development (GDARD), which aims at managing the city’s scarce environmental resources to achieve sustainable development. The application has taken into consideration the existing natural environment and how best to develop the land with minimal impact.</p> <p>The development is aimed at providing a high-quality interface between urban elements and the natural environment in a controlled manner to ensure that these elements benefit from one another. The natural landscape will act as a green strip flowing through the entire development and linking up with the open space in surrounding developments.</p>
<p>8.2.2 National Environmental Management Act (NEMA), 1998 (Act No 107 of 1998) and the Environmental Impact Assessment Regulations</p>	
<p>NEMA aims to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by</p>	<p>NEMA principles are to be adhered to, with specific reference to development that promotes integrated environmental management, while being socially, environmentally and economically sustainable.</p> <p>The proposed development layout must reflect NEMA principles, such as protection of the environment for present and future generations by preventing pollution and</p>

LEGISLATURE	RESPONSE
<p>organs of state and to provide for matters connected therewith. The Act recognises that many inhabitants of South Africa live in an environment that is harmful to their health and wellbeing and focuses on the following:</p>	<p>ecological degradation, promoting conservation and securing ecologically sustainable development and utilisation of natural resources.</p>
<p>Everyone has the right to an environment that is not harmful to his or her health or well-being</p>	<p>Please refer to the EMPr (Annexure P) which discusses health and safety issues during the construction phase.</p>
<p>The State must respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities</p>	<p>This development will provide employment opportunities (construction and operational phase therefore forming an inclusive environment with employment opportunities in close proximity to accommodation.</p>
<p>Inequality in the distribution of wealth and resources, and the resultant poverty, are among the important causes as well as the results of environmentally harmful practices;</p>	<p>Good integration is ensured due to the mixed land use character of the proposed development, as well as its location within the urban realm along public and private transport corridors. A number of communities and individuals will be able to access and invest in the proposed development.</p>
<p>Sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations.</p>	<p>Social and environmental aspects are taken into consideration during the environmental impact assessment process, along with appropriate market feasibility research, to ensure that the project is viable and sustainable. The proposed development responds to the Regional Spatial Development Framework of the local municipality.</p>
<p>Everyone has the right to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that:</p> <ul style="list-style-type: none"> ■ prevent pollution and ecological degradation ■ promote conservation ■ secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development 	<p>The proposed development plan ensures that areas of cultural and ecological value are maintained. Also, please refer to the EMPr (Annexure P) which thoroughly discusses aspects that are related to ecological preservation, conservation and sustainable development.</p>
<p>The environment is a functional area of concurrent national and provincial legislative competence, and all spheres</p>	<p>Applicable national, provincial and municipal legislation is taken into account and aligned to during the environmental impact assessment process</p>

LEGISLATURE	RESPONSE
<p>of government and all organs of state must co-operate with, consult and support one another</p>	
<p>Furthermore, this act develops a framework for integrating good environmental management into all development activities, while establishing principles guiding the exercise of functions affecting the environment.</p> <p>Integrated Environmental Management (IEM) is designed to ensure that the environmental consequences of development proposals are understood and adequately considered in the planning, implementation and management of all developments. It is intended to guide, rather than impede the development process by providing an approach to gathering and analysing information and ensuring that it can be easily understood by all interested and affected parties in the development.</p> <p>The purpose of IEM is to resolve or lessen any negative environmental impacts and to enhance positive aspects of development proposals.</p>	<p>A thorough impact assessment process has been undertaken – derived from:</p> <ul style="list-style-type: none"> ▪ Public Participation ▪ Specialist studies ▪ Map assessments ▪ Institutional and legal assessment <p>This process allows for adequate planning and mitigation. Please refer to the section of this report which provides information on the assessment process.</p>
<p>8.2.3 The National Water Act, 1998 (Act No 36 of 1998)</p>	
<p>The National Water Act:</p> <ul style="list-style-type: none"> ▪ Recognizes that water is a scarce and unevenly distributed national resource which occurs in many different forms which are all part of a unitary, inter-dependent cycle ▪ Recognizes that while water is a natural resource that belongs to all people, the discriminatory laws and practices of the past have prevented equal access to water, and use of water resources ▪ Acknowledges the National Government’s overall responsibility for and authority 	<p>In essence, the proposed development should align to the purpose of this Act, therefore ensuring that the nation’s water resources are protected, utilised, developed, conserved, managed and controlled in ways that take the following into account:</p> <ul style="list-style-type: none"> ▪ Meeting basic human needs of present and future generations ▪ Promoting equitable access to water ▪ Promoting efficient, sustainable and beneficial use of water in the public interest ▪ Reducing and preventing pollution and degradation of water resources ▪ Facilitating social and economic development ▪ Providing for the growing demand for water use

LEGISLATURE	RESPONSE
<p>over the nation’s water resources and their use, including the equitable allocation of water for beneficial use, the redistribution of water, and international water matters</p> <ul style="list-style-type: none"> ■ Recognizes that the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users ■ Recognizes that the protection of the quality of water resources is necessary to ensure sustainability of the nation’s water resources in the interests of all water users ■ Recognizes the need for the integrated management of all aspects of water resources and, where appropriate, the delegation of management functions to a regional or catchment level so as to enable everyone to participate 	<p>The Act requires that (where applicable) the 1:50 and 1:100-year flood line be indicated on all the development drawings that are being submitted for approval. These flood lines have been indicated, the proposed development is situated outside the 1:50 and 1:100-year floodlines. Where services infrastructure is required to cross the wetland and stream and an application for a Water Use Licence will be submitted to the Department of Water and Sanitation.</p> <p>Please refer to Figure 25 – Combined Sensitivity map .</p>
<p>8.2.4 National Environmental Management: Biodiversity Act, (Act No 10 of 2004)</p>	
<p>The National Environmental Management: Biodiversity Act aims to provide for the management and conservation of South Africa’s biodiversity within the framework of the National Environmental Management Act1, 1998; including the –</p> <ul style="list-style-type: none"> ■ Protection of species and ecosystems that warrant national protection ■ The sustainable use of indigenous biological resources ■ The fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources ■ The establishment and functioning of a South African National Biodiversity Institute; and for matters connected therewith 	<p>An ecological specialist was appointed to undertake the biodiversity assessment, with specific attention to Red Data Listed species, habitats and biodiversity. The specialist study is aligned to requirements of this act. The proposed development aligns to the purpose of this Act and the above-mentioned specialist report. The sustainable utilisation of indigenous biological resources, i.e. indigenous vegetation species will be reintroduced to the newly created urban open spaces as far as possible, thereby resulting in an ecological urban regeneration strategy. Please refer to Annexure P – EMPr for additional information.</p>

LEGISLATURE	RESPONSE
<p>8.2.5 The National Heritage Resources Act, 1999 (Act No 25 of 1999) (NHRA)</p>	
<p>The NHRA focuses on the following, that have reference to the development of land:</p> <ul style="list-style-type: none"> ■ To introduce an integrated and interactive system for the management of the national heritage resources ■ To promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations ■ To lay down general principles for governing heritage resources management throughout the Republic ■ To introduce an integrated system for the identification, assessment and management of the heritage resources of South Africa ■ To establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources at national level ■ To set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance ■ To provide for the protection and management of conservation-worthy places and areas by local authorities; and to provide for matters connected therewith 	<p>The proposed development should respond to the requirements of the National Heritage Resources Act as well as that of the South African Heritage Resources Agency (SAHRA). Section 38 of the NHRA makes provision for application by developers for permits before any heritage resources may be damaged or destroyed. A specialist in the field was appointed to conduct a Cultural Heritage Resources Impact Assessment.</p> <p>The cultural landscape qualities of the region is made up of a pre-colonial element consisting of very limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which eventually gave rise to an urban component.</p> <p>Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.</p>
<p>This legislation aims to promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so</p>	<p>The importance of cultural heritage and its related preservation is discussed within the EMPr (Annexure P).</p>

LEGISLATURE	RESPONSE
<p>that it may be bequeathed to future generations. It recognises that our heritage is unique and precious, and it cannot be renewed as it –</p> <ul style="list-style-type: none"> ■ Helps us to define our cultural identity and therefore lies at the heart of our spiritual well-being and has the power to build our nation ■ Has the potential to affirm our diverse cultures, and in so doing shape our national character ■ Celebrates our achievements and contributes to redressing past inequities ■ Educates and deepens our understanding of society and encourages us to empathise with the experience of others ■ Facilitates healing and material and symbolic restitution and it promotes new and previously neglected research into our rich oral traditions and customs 	<p>The EMPr places focus on the education of people regarding places of heritage value and artefacts, should they come across them during their work activities.</p>

8.3 PROVINCIAL CONTEXT

Please note that the below section only highlights some of the most prudent issues in this regard.

Table 4: Provincial context

DOCUMENT	RESPONSE
<p>8.3.1 Gauteng Planning and Development Act (Act No 3 of 2003) (GPDA)</p>	
<p>The GPDA states that Policy, administrative practice and law in the Province shall promote development and land use which:</p>	
<p>Promotes the more compact development of urban areas and the limitation of urban sprawl and the protection of agricultural resources;</p>	<p>The proposal addresses this requirement via its position within the urban realm adjacent to existing and proposed transport corridors, existing and proposed development and adjacent to urban amenities. Also, the mixed-use character caters for higher densities which will minimise the necessity for urban development on the outskirts of urban areas.</p>

DOCUMENT	RESPONSE
<p>Supports the correction of historically distorted spatial patterns of settlement in Gauteng;</p>	<p>To be addressed as far as possible with regard to the provision of more affordable high-density accommodation as well as lower density housing therefore catering for a greater socio-economic spectrum.</p>
<p>Promotes integrated land development in rural and urban areas in support of each other;</p>	<p>This proposal forms part of a greater planning framework for the area and integration is ensured via appropriate service and infrastructure provision, the provision of linking transport corridors and the continuity of ecological corridors.</p>
<p>Results in the use and development of land that optimises the use of existing resources such as engineering services and social facilities; and</p>	<p>Existing bulk services are to be utilised as far as possible with appropriate upgrades where necessary.</p>
<p>Owens positive development qualities, particularly with regard to public environments.</p>	<p>The urban design framework and planning methodologies cater for inclusive design at a pedestrian scale, incorporating public open spaces and positive streetscapes.</p>
<p>Policy, administrative practice and law in the Province shall with due regard to the principles of the National Environmental Management Act, 1998 (Act 107 of 1998) promote sustainable development that:</p> <ul style="list-style-type: none"> ■ Is within the fiscal, institutional and administrative means of the Province ■ Meets the basic needs of all citizens in an affordable way ■ Establishes viable communities with convenient access to economic opportunities, infrastructure and social services ■ Optimises the balanced use of existing resources, including resources relating to agriculture, land, water, minerals, services infrastructure, transportation and social facilities ■ Balances environmental considerations of preserving natural resources for future generations with economic development practices and processes ■ Ensures the safe utilisation of land by taking into consideration its biophysical 	<p>Sustainable principles are to be incorporated as far as possible within the planning, design, construction and operational phases therefore ensuring an appropriate balance between social, economic and environmental contexts.</p> <p>The environmental impact assessment process ensures that sound land development practices are implemented, creating a balance between environmental, social and economic requirements.</p>

DOCUMENT	RESPONSE
factors such as geology and undermined or hazardous areas	
8.3.2 Gauteng Spatial Development Framework (GSDF)	
<p>The purpose of the Gauteng Spatial Development Framework (GSDF) is to communicate a shared future spatial vision and structure for the Province. The GSDF is clear and unambiguous about the fact that growth and development within the province should be strategically guided and directed and not purely just a consequence of spontaneous and organic growth. The GSDF provides an overarching spatial vision for the Province and hence provides guidance and influences the City of Ekurhuleni Metropolitan Spatial Development Framework with specific regards to the location and nature of the physical development.</p> <p>The following key considerations contained within the GSDF are identified and highlighted due to its importance and relevance in as far as the application is concerned:</p> <ul style="list-style-type: none"> • Urban growth should be contained; • Resource based economic development (resulting in the identification of the economic core); • Re-direction of urban growth (stabilise/limit growth in economically non-viable areas, achieve growth on the land within the economic growth sphere); • Protection of rural areas and enhancement of tourism and agricultural related activities; • Increased access and mobility. <p>The primary structuring elements identified within the GSDF are those of:</p>	<p>The proposed Helderwyk complies to the principles of the Gauteng Spatial Development Framework in light of the fact that the development concept aims to move away from the typical low-density development concepts characteristic of the surrounding area. Through the increase in development density the concept promotes a higher intensity development proposal whilst still acknowledging the importance of the sensitive environment within which the development is located and also preventing urban sprawl.</p> <p>Ample private open space is provided as part of the proposed development ensuring that sensitive areas are protecting and also providing recreational areas.</p>

DOCUMENT	RESPONSE
<ul style="list-style-type: none"> • Urban mixed-use activity nodes; • Open space and green system; • Public transit and movement routes; • Urban corridors and activity spines. <p>In addition to the above the GSDF sets out to guide and structure growth, in a balanced manner, towards the notion of a “sustainable city”. Within the GSDF the notion of a “sustainable city” is explained as the focus on achieving a life-enhancing urban environment for all individuals, in which acceptable standards of living are met without compromising the ecological, cultural, social, economic, security or legal pre-conditions necessary for continued viability.</p> <p>In order for South African cities to achieve the status of a “sustainable city” a number of development principles need to be achieved, which include:</p> <ul style="list-style-type: none"> • A more compact urban form that discourages dispersed low-density urban sprawl; • The promotion of a diverse combination of land-uses that enables a greater intensity of mixed-use development; • A more complex urban system that spawns opportunity through diversity of activity patterns and brings associated economic and employment opportunities through integrated development; • The integration of the historically marginalised areas into the mainstream of urban life by correcting the spatial patterns of the urban environment; • Optimising the utilisation of existing service infrastructure and social amenities particularly where space capacity exists; 	

DOCUMENT	RESPONSE
<ul style="list-style-type: none"> • Enabling accessibility to affordable and efficient means of public and private transportation; • Furthering the development of employment opportunities and residential areas in close proximity to or integrated with each other; • Promoting physical development based on ecological sound principles that bring the natural environment and the urban system into a mutually reinforcing and integrated relationship; and • Understanding the open space system of a city-region as an integral part of the city-region’s morphology, economic makeup and a defining element of urban quality. 	
<p>8.3.3 The Gauteng Draft Red Data Policy</p>	
<p>The primary purpose of the Draft Red Data Policy is to protect red data plant species in Gauteng Province. The Red Data plant policy is based on the following basic principles: Species endemic to the province of Gauteng must be afforded the utmost protection, as they occur nowhere else in the world. As the relevant provincial agency, this Department's responsibility towards Gauteng endemics is absolute;</p> <p>Conservation of only one population essentially ignores the lowest level of biodiversity that is genetic diversity. It is therefore imperative that all populations of Red Data plant species are protected; In situ conservation is preferable to ex situ conservation. Removing a population from its natural habitat and placing it under artificial conditions results in the erosion of the inherent genetic diversity and characteristics of that species;</p>	<p>An ecological specialist was appointed to assess the proposed development sites fauna and flora biodiversity, with specific attention to Red Data Listed species.</p> <p>The study area consists of various wetland sections that are mostly seasonally wet. A large slimes dam occurs in the northern part of the site with the largest part of the study area consisting of the wetland and drainage areas and the large mostly natural grassland area. The area is open and easily accessible with sections of the grassland being degraded due to various human-induced activities (grazing by cattle, frequent fires, poor conservation practices etc.).</p> <p>The area received low rainfall prior to the visit resulting in a low growth rate of the plants. Other than the presence of a number of populations of the Orange listed geophyte <i>Hypoxis hemerocallidea</i>, no other red data plants were observed within the grassland section and close to the artificial pans. Marginal habitat exists for three other species, though it is mostly around the natural pan areas.</p>

DOCUMENT	RESPONSE
<p>In order to ensure the persistence of a population, it is imperative that the ecological processes maintaining that population persist; In order to ensure the persistence of a plant population, it is vital that pollinators are conserved. To conserve pollinators, the habitat must be managed to provide appropriate nest sites for pollinators and a seasonal succession of suitable forage and host plants. Pollinators must be protected from herbicide and pesticide application and soil disturbance must be prevented; Translocation of Red Data species is an unacceptable conservation measure since the translocated species may have undesirable ecological effects; Rural parts of the province should be protected from insensitive developments and urban sprawl/encroachment should be discouraged. Policy guiding developments should therefore be less lenient in rural areas; Red Data plant species historically recorded on a site, but not located during searches within species flowering seasons may be dormant (as a seed bank or subterranean structures such as bulbs/tubers/etc.) due to unfavourable environmental conditions; Suitable habitat adjacent to known populations of Red Data plant species has a high probability of being colonized; In order to protect a plant population that occurs in a fragmented landscape from edge effects, it is necessary to protect it with a buffer zone that extends from the edge of the population; and The transformation of natural vegetation to crops is considered as permanent as urbanization and may cause the extinction of Red Data plant populations and their pollinators.</p>	<p>These species have a low-medium probability to be present on the site.</p> <p>Please refer to Annexures E to I – Wetland, Ecological Impact Surveys, African Grass Owl Habitat, Giant Bullfrog and Invertebrate Impact Assessment.</p> <p>Please refer to Figure 25 – Combined sensitivity Map</p>

DOCUMENT	RESPONSE
<p>8.3.4 The Gauteng Draft Ridges Policy</p>	
<p>The quartzite ridges of Gauteng are one of the most important natural assets in the northern provinces of South Africa. This is because these ridges, and the area immediately surrounding the ridges, provide habitat for a wide variety of fauna and flora, some of which are Red List, rare or endemic species or, in the case of certain of the plant species, are found nowhere else in South Africa or the world. The ridges also fulfil functions that are necessary for the sustainability of ecosystems such as the recharging of groundwater, wetlands and rivers, wildlife dispersal and providing essential habitat for pollinators. Ridges also have a socio-cultural role in that they provide aesthetically pleasing environments that are valued by residents, tourists and recreational users. Human activities such as urbanization, mining and the planting of alien vegetation may undermine the contribution that ridges make to the environment.</p> <p>The conservation of ridges falls within the ambit of the environmental right and this policy comprises one of the measures that GDARD has taken to give effect to the environmental right in respect of ridges, therefore ensuring that:</p> <ul style="list-style-type: none"> ■ The use of ridges is sustainable; ■ Members of the public are able to make informed decisions regarding proposals for development on ridges and the use of ridges; ■ Officials make consistent decisions in respect of planning and environmental applications that involve negative impacts on ridges; and ■ The Department’s responsibility in respect of the protection of the environment is carried out in an efficient and considered manner. 	<p>The GDARD Conservation Plan (Version 3) has indicated that there are no ridge areas on the proposed site.</p> <p>No ridge areas were encountered during the site assessment conducted by the Ecology Specialists. Please refer to Figure 4, 5, 6 ,7 and 8 – GDARD Policies</p>

DOCUMENT	RESPONSE
<p>8.3.1 GDARD Conservation Plan, Version 3</p>	
<p>A comprehensive Provincial Conservation Plan (C-Plan) was launched as a decision support tool in September 2005 to protect the province’s ecosystems and associated biodiversity and to act as an information tool for the conservation of sensitive areas. The C-Plan was an outcome of the Gauteng Biodiversity Gap Analysis Project (BGAP).</p> <p>The C-Plan system maps important biodiversity areas in Gauteng and provides information to protect important and sensitive areas within the province. This information is used by government as a decision-making tool with regard to EIA approvals.</p> <p>The second version (C-Plan version 2) indicated that 25 percent of Gauteng needs to be conserved to meet the Province’s biodiversity targets. The C-Plan includes protected areas, irreplaceable and important sites due to the presence of Red Data species, endemic species and potential habitat for these species to occur.</p>	<p>According to CPlan 3 the proposed development site is not affected by irreplaceable or protected areas.</p> <p>Sections of the site are classified as important and ecological support areas on the site.</p> <p>Please refer to Figure 4, 5 & 6– GDARD Policies and Figure 6 – GAPA. Figure 8: Buffer areas</p> <p>Please refer to Annexure E to I2 – Wetland, Giant Bullfrog and Ecological Impact Surveys.</p>
<p>8.3.1 Protection of Agricultural Land in Gauteng Revised Policy (June 2006)</p>	
<p>The purpose of this policy is to protect land that has been identified as high agricultural potential from development, for the exclusive use of agricultural production to:</p> <ul style="list-style-type: none"> ■ Feed the nation; ■ Provide upcoming farmers with access to productive land; and ■ Meet national targets set in this regard. <p>Land with high agricultural potential is a scarce non-renewable resource and the need to protect it is a high priority for GDARD. GDARD applies a risk averse and cautious approach when development of such land for</p>	<p>The proposed development site, according to the Gauteng Agricultural Potential Atlas (GAPA Version 3), is not situated within a region delineated as an Agricultural Hub; however, the GAPA information indicates that the site contains land classified as having built up to low agriculture potential.</p> <p>Please refer to Figure 6 – GAPA</p>

DOCUMENT	RESPONSE
<p>purposes other than agricultural production is proposed. The risk averse and cautious approach should be the basis of decision-making on the transformation of high potential agricultural land and land deemed as irreplaceable in terms of meeting Agri-BBEE and national food security targets and thus legally protected from transformation. GDARD is not in support of development on high potential agricultural land that resides outside the urban edge. Seven agricultural hubs have been identified in the Gauteng Province. All the hubs are located outside the urban edge. The hubs are regarded as areas with a large amount of high agricultural potential land that should be preserved for agricultural use and will accordingly be planned and managed as a holistic agricultural unit. Each of the hubs will be developed to align with its agricultural potential and preferred land use and will be supported by current economic indicators.</p>	

8.4 LOCAL CONTEXT

Please note that the below section only highlights some of the most prudent issues in this regard.

Table 5: Local Context

DOCUMENT	RESPONSE
8.4.1 Ekurhuleni Metropolitan Municipality Spatial Development Framework (SDF)	
<p>The vision of the Ekurhuleni Metropolitan Municipality is to be The Smart, Creative and Developmental City. Based on the vision the mission statement that was developed for the EMM reads as follows: Ekurhuleni provides sustainable and people centred development services that are affordable, appropriate and of a high quality. We are focussed on social, environmental and economic regeneration of our city and communities, as guided by the principles</p>	<p>All these aspects have been responded to as per the urban design framework and the town planning application.</p> <p>The proposed site falls within an area classified as an urban development zone. According to the draft RSDF “urban development” essentially means residential development inclusive of all social and community facilities as well as business land uses as required for sustainable</p>

DOCUMENT	RESPONSE
<p>of Batho Pele and through the commitment of a motivated and dedicated team.</p> <p>The Ekurhuleni spatial objectives have been identified as follows:</p> <ul style="list-style-type: none"> • Create a single, uniform identity for EMM; • Develop a well-defined system of activity nodes; • Promote the development of a sustainable compact urban structure; • Create a sustainable and functional open space network; • Optimise job creation capacity of the formal economy; • Integrate the disadvantaged communities into the urban fabric; • Actively promote sustainable public transport; Promote access to social and municipal services through CCAs; • Identify the spatial impact of climate change; • Promote sustainable livelihoods development; • Promote sustainable development; and □ Optimise the comparative advantages of EMM. <p>The conceptualisation of the Spatial Development Framework is guided by the vision of the EMM and the spatial concept developed for the Ekurhuleni Metropolitan Municipality. The purpose of the concept is not only to guide the future development of the Metropolitan area, but also to ensure integration of Regions A – F.</p> <p>The draft concept developed in order to provide guidance to spatial development promotes amongst others a compact urban development footprint.</p> <p>The MSDF provides a clear indication of the broad land use pattern to be developed in Ekurhuleni to achieve sustainable spatial</p>	<p>urban life (i.e. limited retail, consulting rooms, etc) as per the tertiary nodes.</p> <p>The site of application is located within close proximity to a tertiary node as well as a public transport route</p>

DOCUMENT	RESPONSE
<p>development and to thus overcome the spatial imbalances of the past. The plan is at a level of detail, which clearly provides spatial development guidance at the macro level and yet provides sufficient flexibility for urban planning at the regional and local levels, which will be reflective of the needs of the relevant era.</p>	
<p>8.4.1 Ekurhuleni Metropolitan Open Space Framework (EBOSS)</p>	
<p>The metropolitan open space system is conceptually based on the Gauteng Open Space Policy – Phase 2, the Ekurhuleni Environmental Management Framework and the Ekurhuleni Biodiversity and Open Space Strategy (EBOSS). Essentially this open space system, which includes a primary and secondary open space system, is designed around the sensitive areas (i.e. the drainage systems, the ridges and the pans), parks, the sport/recreation grounds and other large open spaces (i.e. golf courses, office parks/industrial, etc. An important principle is that open space conservation and planning followed a “Holistic and Integrated Planning” approach. This ensures that all the environmental considerations (social, economic, ecological and institutional) are effectively integrated into all spatial and economic activity. Integrated development planning is not only limited to ecological damage, but also to ensure environmental sustainability, for example flood-attenuation.</p>	<p>All these aspects have been responded to as per the urban design framework and town planning application.</p>



Figure 4 : C-Plan 3 (Source: GDARD policies)

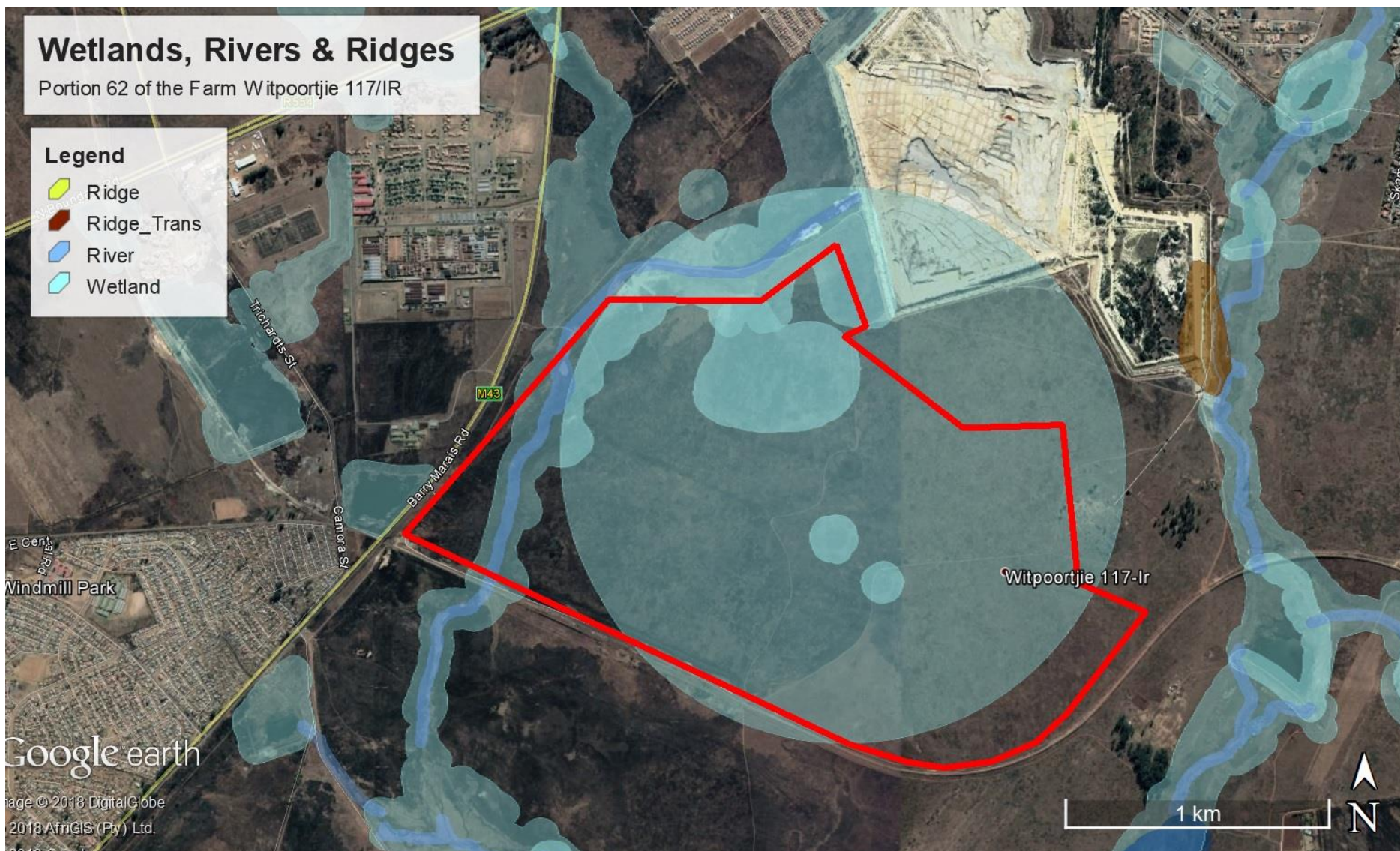


Figure 5 : Rivers, wetlands and Ridges according to GDARD's C-plan 3

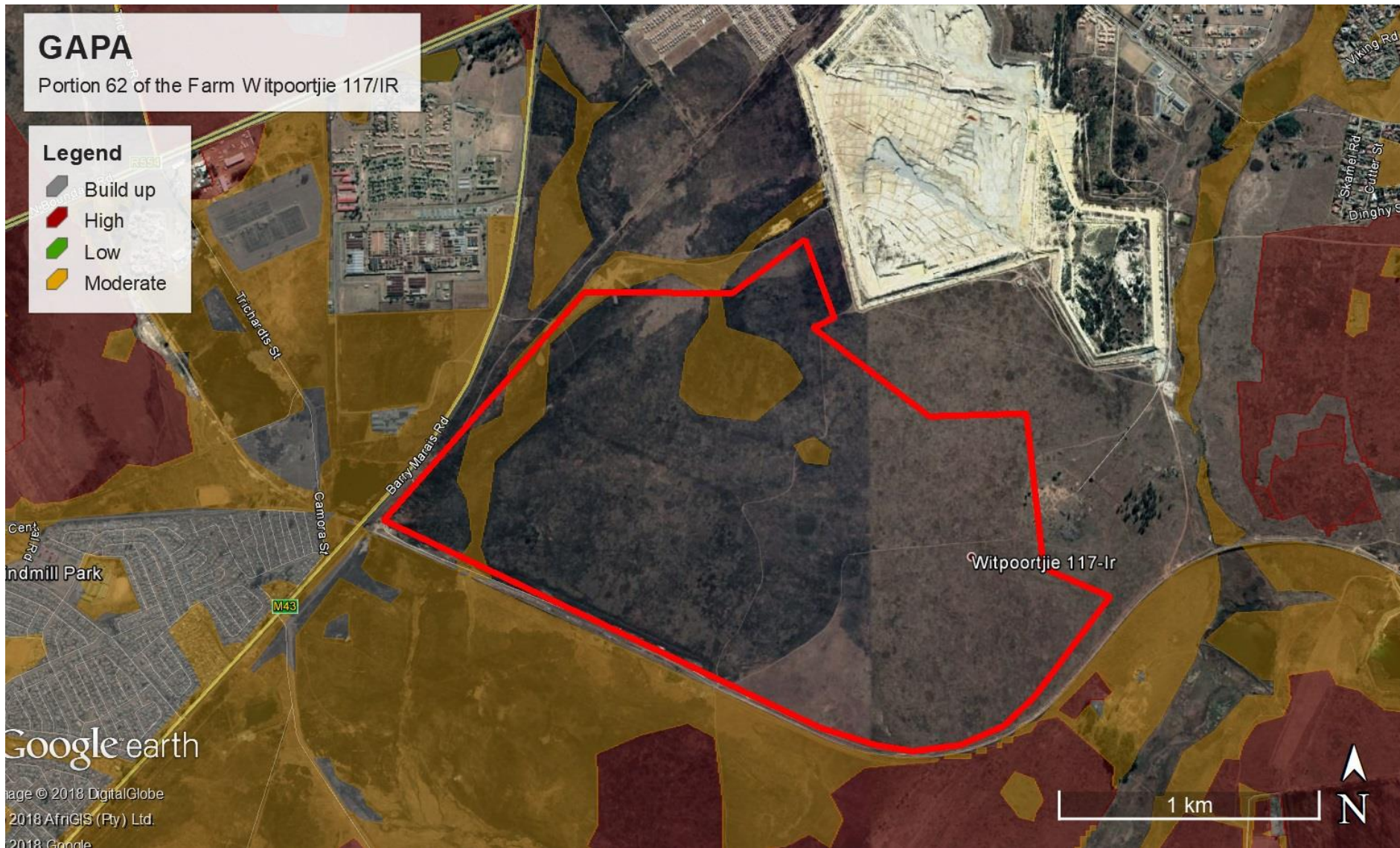


Figure 6: Gauteng Agricultural Potential Atlas (GAPA) (Source GDARD)

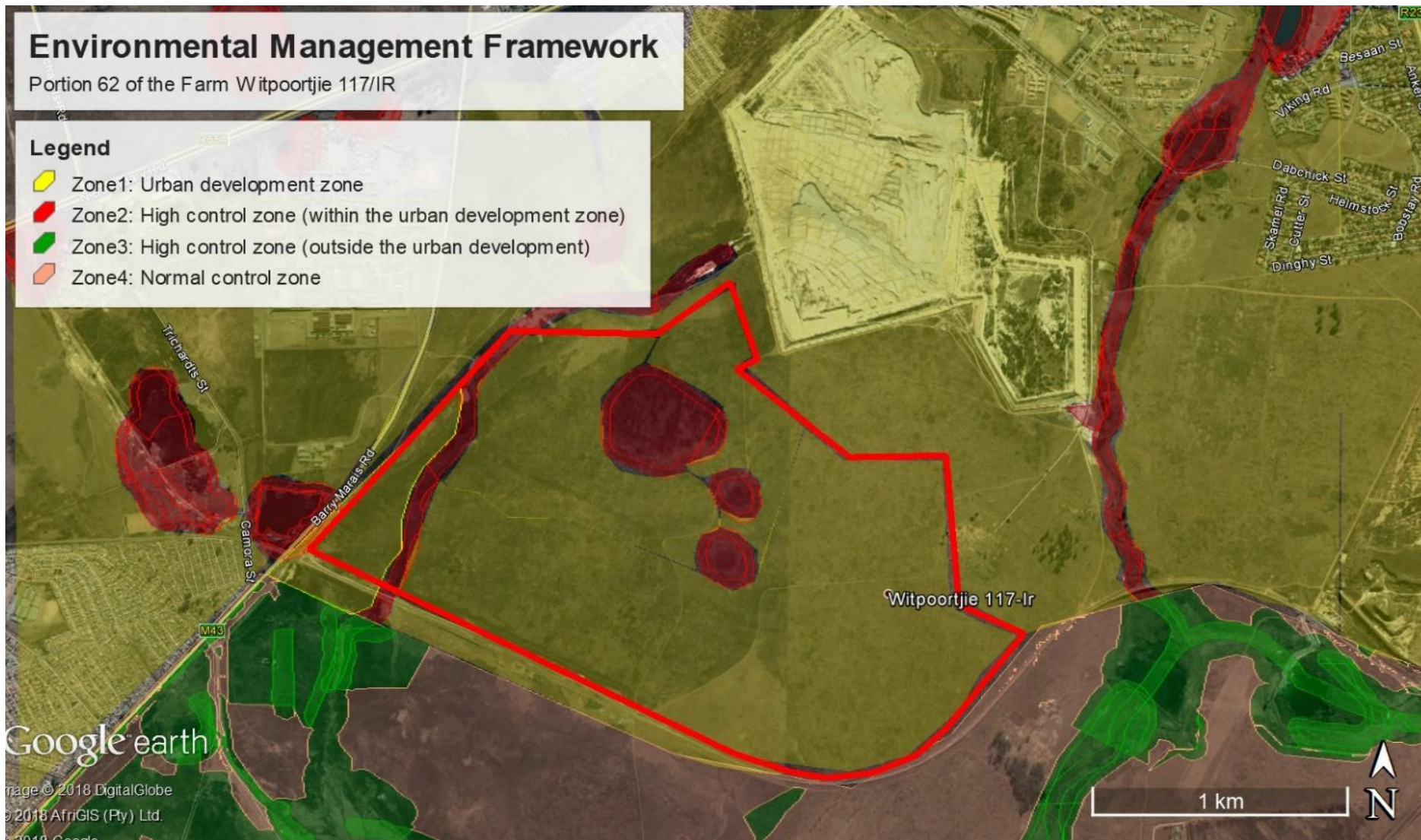


Figure 7: GDARD's Gauteng Environmental Management Framework above indicates that most of the site is located in Zone 1



Figure 8: 500-meter Buffer of the slime dams

9.0 DESCRIPTION OF THE BIO-PHYSICAL ENVIRONMENT

9.1 CURRENT LAND USE, ZONING AND SITE CHARACTER

The major part of the farm portion of zoned “Agricultural” in terms of the Brakpan Town Planning Scheme. The site is currently vacant, and no agricultural activities are taking place.

9.2 SURROUNDING LAND USE, ZONING AND CHARACTER

Refer to **Figure 9** for an indication of the surrounding land uses.

The proposed development site falls within an area which is zoned Agricultural Holdings, however no agricultural activities are taking place on the site at present. This area is also characterised by residential, economic and industrial land uses as the various residential townships, industrial parks and commercial functions provides witness.

The existing development adjacent to the subject property includes:

- North: Slimes dam
- South: Railway line and vacant land
- East: Vacant land
- West: Barry Marais Road, Boksburg Correctional Services, vacant land.

Several land use applications surround the site. In the north and north west, the township of Salberg as well as HelderwykX8 have been approved by GDARD in recent years. To the east is a proposed Township HelderwykX3&7.

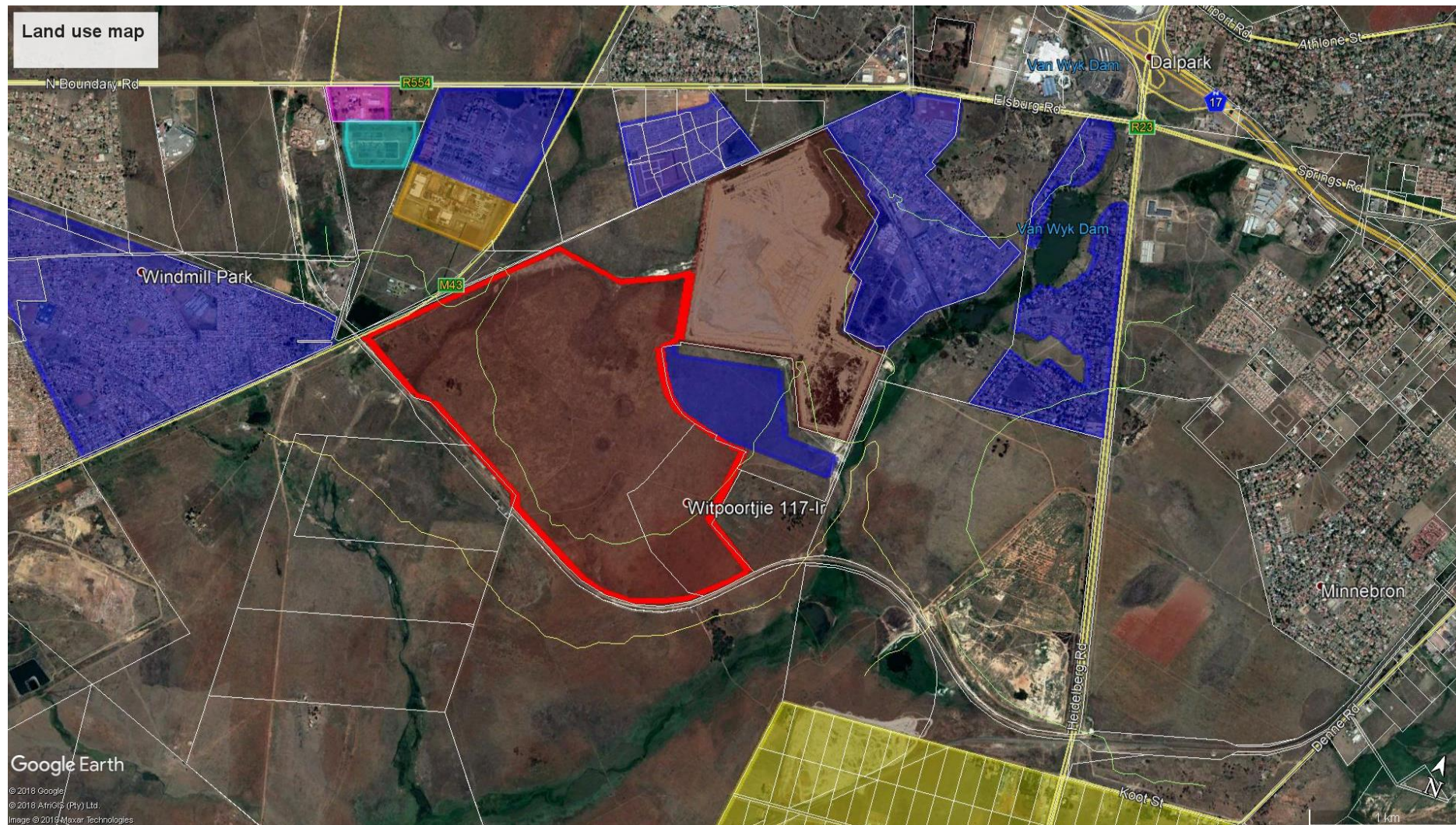


Figure 9: Approximate site boundary on aerial photograph depicting surrounding land uses

9.3 TOPOGRAPHY & HYDROLOGY

Refer to **Figure 10** for an indication of the topography.

The predominant topography of the site is that of a gentle undulating nature with open grassland being the predominant feature. Areas of limited woody cover are encountered on the subject site. A slimes dam occurs on the north eastern boundary of the site

The most elevated point on the proposed development site is situated on the southern portion of the site at 1606 masl. The site then gently slopes down towards the non-perennial stream that is present towards the south west. this stream is likely to be a tributary of the Rietspruit which is located approximately 500m south of the subject site.

The average slope of the site is approximately 3%, and no rocky outcrops or ridges occur on site.

Four (4) Wetlands were identified on the subject site. Wetland 1 consist of an extensive unchanneled valley bottom wetland and is highly modified. Wetland 2 and 3 has been altered by the slimes dam and severe sedimentation was observed in the stream to the west of the tailings dam. Wetland 4 (pans) has been significantly affected by alien encroachment.

Implications:

The topographical character of the site will not result in major implications for slope stability on the proposed development.

Effective stormwater management should be a priority during both construction and operational phase. This should be monitored as part of the EMP. High energy stormwater input into the watercourses should be prevented at all cost. Changes to natural flow of water (surface water as well as water flowing within the soil profile) on the site above the river area resulting from the proposed road upgrade should be taken into account.

Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse.



Figure 10: Contour map

9.4 CLIMATIC CONDITIONS

The site is located within the Highveld Climatic Zone which experiences cool to cold winters and warm and wet summers. Summers precipitation occurs in the form of convectional thundershowers and ranges from 680mm to 750mm per year (Low & Rebello, 1996). Most of the rain falls in the summer months of November, December and January. The winter months of July and August usually receive on average less than 9mm of rain (Environmental Potential Atlas for Gauteng)

Average daily temperatures range from a maximum of 23.7°C to a minimum of 9.8°C. Summer temperatures reach a maximum of 27.0°C in January. The average winter minimum is 2.7°C in June and July. The prevailing wind direction is North West.

Extreme weather conditions include thundershowers, hail and fog. Snowfall is rare.

Construction should take place during the dryer periods to limit disturbance due to the inclement weather. This will also minimize possible erosion and contamination of surface water during the construction phase. Provision must be made for positive storm water runoff especially in the flatter areas.

Implications:

No specific development implications have been identified.

9.5 GEOTECHNICAL INVESTIGATION

AMB Engineering Geologist was been appointed to conduct a Geotechnical Investigation for the proposed development. The project's objectives, the scope of work for the Geotechnical Investigation is outlined in the following list.

9.5.1 Methodology

These investigations have involved the review and analysis of the available data as follows:

- Identifying the underlying rock formation and reporting on the distribution of soil and rock in terms of its suitability for structural (residential) development.
- Sub-dividing the site into material zones, with its typical soil profile.
- Classifying each material zone based on the NHBRC classification system for structural development.
- Determine the possible use available soil material on site for roadworks and /or other earthworks.
- Providing recommendations for structural development, mainly in terms of the anticipated residential.

9.5.2 Geology and typical soil profiles

Partridge, Maud and Associates compiled a geotechnical map of the site in March 2009. This follows from investigations into the site in November 1974 (Report No. 5-8/74) and in June 1975 (Report No. 1-

3/75). These investigations found that the site was suitable for township establishment and indicated that no dolomite occurs on the site and the site does not include an underground cavern or cave.

The PWV 15 is located on the watershed centrally on the site running north to south. The west portion drains to the northwest and west to various wetlands. The east portion drains to a natural water course to the east. The site has a slope to the north west and to the south east of 2 to 5%.

The site is classified as Zone C1/C2 and H1/H2 as per NHBRC classification. A localized depression is noted on the northern and western boundary of the proposed development that would concentrate storm water runoff and is the possible start of the wetlands.

In 2013, Geo Buro undertook additional investigations of the geology of the site in order to ascertain the Dolomite Stability of the area. This follows from a requirement from EMM as records suggested the site may be at risk due to dolomite. Six (6) boreholes drilled across the site all represented suitable conditions from an ingress scenario for the proposed land uses. No dolomite was encountered in the western portion of the site, and quartzite was encountered at depth, which indicates that this portion of the site must be considered as non-dolomitic.

The preliminary investigations seem to suggest that the eastern portions of the site may be underlain by dolomite at a depth of less than 30m. Borehole HW1 might represent a high risk (IHC6) from a dewatering perspective, since dolomite residuum with rapid penetration rates were encountered below groundwater level. The borehole might not be suitable for residential type developments, but commercial development types might be considered in this area. For this reason, the consultant recommended that the entire development area be considered as dolomitic until proven otherwise. This would include additional drilling to test areas earmarked for development.

- **Implications**

The site is considered suitable for the proposed developments. No dolomite or other soluble rocks are present at the site, and no dolomite stability investigation is therefore required.

10.0 AIR QUALITY MONITORING ASSESSMENT

Airshed Planning Professionals (Pty) Ltd (Airshed) was appointed to conduct an air quality monitoring assessment for the proposed Helderwyk development in April 2016. Airshed was commissioned to undertake a one-month sampling campaign for dustfall and thoracic particles (particles with an aerodynamic diameter of less than 10 µm (PM10)). In addition, data from two existing dustfall networks around the site operated by ERGO and ERPM were made available for inclusion in the assessment.

The main objective of this study is to determine the potential risk from ambient dust– fallout and concentrations impacting on the immediate environment and human health. The main concern is for windblown dust from the adjacent slimes storage facility on the proposed development. Ambient measurements and monitoring can serve to meet various objectives, including:

- Compliance monitoring;
- Spatial and temporal trend analysis;

- Use as input for health risk assessment;
- Source quantification and apportionment; and
- Tracking of progress made by control and management measures

The main pollutants of concern, from an air quality perspective, associated with the site are particulates, both PM₁₀ which is associated with potential health impacts and dustfall (Total Suspended Particulates (TSP)) which is of concern due to its nuisance effects. The concern is specifically for health and nuisance impacts on the proposed development within a 2 km radius from the slimes storage facility.

Sampling was done for dustfall and PM₁₀. Dustfall is measured through the collection of dust in buckets and reported on as a mass per area per time (mg/m²/day) over a period of 30-days (one month). PM₁₀ is sampled onto filters over 24-hours and the results reported on as a concentration per volume (µg/m³).

The ambient air quality monitoring network erected by Airshed comprised of three single dustfall units according to the American Society for Testing and Materials (ASTM) standard method for collection and analysis of dustfall (ASTM D1739-98). PM₁₀ was sampled using one gravimetric sampler i.e. 'MiniVol', which captures air particulates on a pre-weighed filter, typically exposed for 24-hours. No on-site weather station was installed to record hourly average wind speed, wind direction and temperatures; however, the South African Weather Service (SAWS) OR Tambo data was considered reflective of the local weather conditions on-site.

The Airshed monitoring network was operational during March 2016, with every third daily exchanges of the PM₁₀ filters and monthly exchanges of the dust fallout units. The PM₁₀ filters were sent to the Biograde Laboratory for analysis. Gravimetric analysis of the dust fallout results are undertaken at Airshed's laboratory.

This report covers the results for the period October 2015 to March 2016 for the ERPM and ERGO networks and for the month of March 2016 for the Airshed network.

The following sampling sites are of interest for this study:

- Airshed network:
 - a. Dust Bucket 1
 - b. Dust Bucket 2
 - c. Dust Bucket 3
 - d. PM₁₀ Minivol sampler

- ERPM network:
 - a. Helderwyk Estate 1
 - b. Helderwyk Estate 2
 - c. 5L29 South
 - d. 5L29 East
 - e. 5L29 West

- ERGO network:
 - a. Nursery
 - b. Dalpark Ext 1



Figure 11: Locations for the Airshed dustfall and PM₁₀ sampling network

10.1.1 Background information

10.1.1.1 *Current Land Use and Potential Sensitive Receptors in the Area*

The current slimes storage facility is located near Helderwyk Estate in the Gauteng Province of South Africa. The study area has many sensitive receptor areas (residential areas). The nearest residential areas and individual sensitive receptors (schools and hospitals) were identified as air quality sensitive receptors (AQSRs). In **Figure 11** the study area is shown by the red polygon.

10.1.1.2 *Atmospheric Dispersion Potential*

In the assessment of the possible impacts from air pollutants on the surrounding environment and human health, a good understanding of the regional climate and local air dispersion potential of a site is essential. Meteorological characteristics of a site govern the dispersion, transformation and eventual removal of pollutants from the atmosphere (Pasquill & Smith, 1983), (Godish, 1990). The extent to which pollution will accumulate or disperse in the atmosphere is dependent on the degree of thermal and mechanical turbulence within the earth's boundary layer. Dispersion comprises vertical and horizontal components of motion. The vertical component is defined by the stability of the atmosphere and the depth of the surface mixing layer. The horizontal dispersion of pollution in the boundary layer is primarily

a function of the wind field. The wind speed determines both the distance of downwind transport and the rate of dilution as a result of plume ‘stretching’. The generation of mechanical turbulence is similarly a function of the wind speed, in combination with the surface roughness. The wind direction and the variability in wind direction, determine the general path pollutants will follow, and the extent of cross-wind spreading (Shaw & Munn, 1971), (Pasquill & Smith, 1983), (Oke, 1990).

Pollution concentration levels fluctuate in response to changes in atmospheric stability, to concurrent variations in the mixing depth, and to shifts in the wind field. Spatial variations, and diurnal and seasonal changes, in the wind field and stability regime are functions of atmospheric processes operating at various temporal and spatial scales (Goldreich & Tyson, 1988). Atmospheric processes at macro- and meso-scales need therefore be taken into account in order to accurately parameterise the atmospheric dispersion potential of a particular area.

Meteorological data was obtained from the SAWS OR Tambo weather station which is approximately 15 km from the slimes storage facility. The meteorological analysis was retrieved from the SGS dust deposition monitoring reports (SGS, 2015), (SGS, 2016a), (SGS, 2016b), (SGS, 2016c).

10.1.1.3 *Local wind field*

Monthly wind roses and the predominant winds during each month were as follows:

- October 2015 - north-north-easterly, northerly and north-north-westerly
- November and December 2015 – northerly, north-north-westerly and north-westerly
- January 2016 – northerly and east-north-easterly
- February 2016 - northerly and north-westerly
- March 2016 - north-westerly

October and November 2015 also tend to have higher wind speeds than other months.

10.1.1.4 *Precipitation*

Precipitation represents an effective removal mechanism of atmospheric pollutants. Precipitation reduces wind erosion potential by increasing the moisture content of materials. The total rainfall for each month is:

- October 2015 – 17.6 mm
- November 2015 – 63 mm
- December 2015 – 62.4 mm
- January 2016 – 123.22 mm
- February 2016 – 65.2 mm
- March 2016 – 137 mm

The rainfall for October 2015 to March 2016. The month with the lowest rainfall (17.6 mm) was October 2015. The month with the greatest rainfall (137 mm) was March 2016.

10.1.2 Dustfall results

10.1.2.1 Airshed Network

Dustfall rates for the period March 2016 are presented in Table 6 and illustrated in **Figure 12**. The collected deposition rates (Table 6 and Figure 13) are compared to acceptable dustfall limits provided in section 2 (Table 2). The dust fallout locations are provided in Figure 1.

Dustfall rates were low for the sampling period and well within the acceptable dustfall limit of 600 mg/m²/day (NDCR limit for residential areas). Dust Bucket 1 collected the highest dust fallout, followed by dust bucket 2. Dust bucket 3 collected the lowest dust fallout.

Table 6: Monthly dustfall deposition rate per sampling location (March 2016)

Bucket ID	Dust Deposition rates (mg/m ² /day)
	March 2016
Dust Basket 1	185
Dust Basket 2	161
Dust Basket 3	68

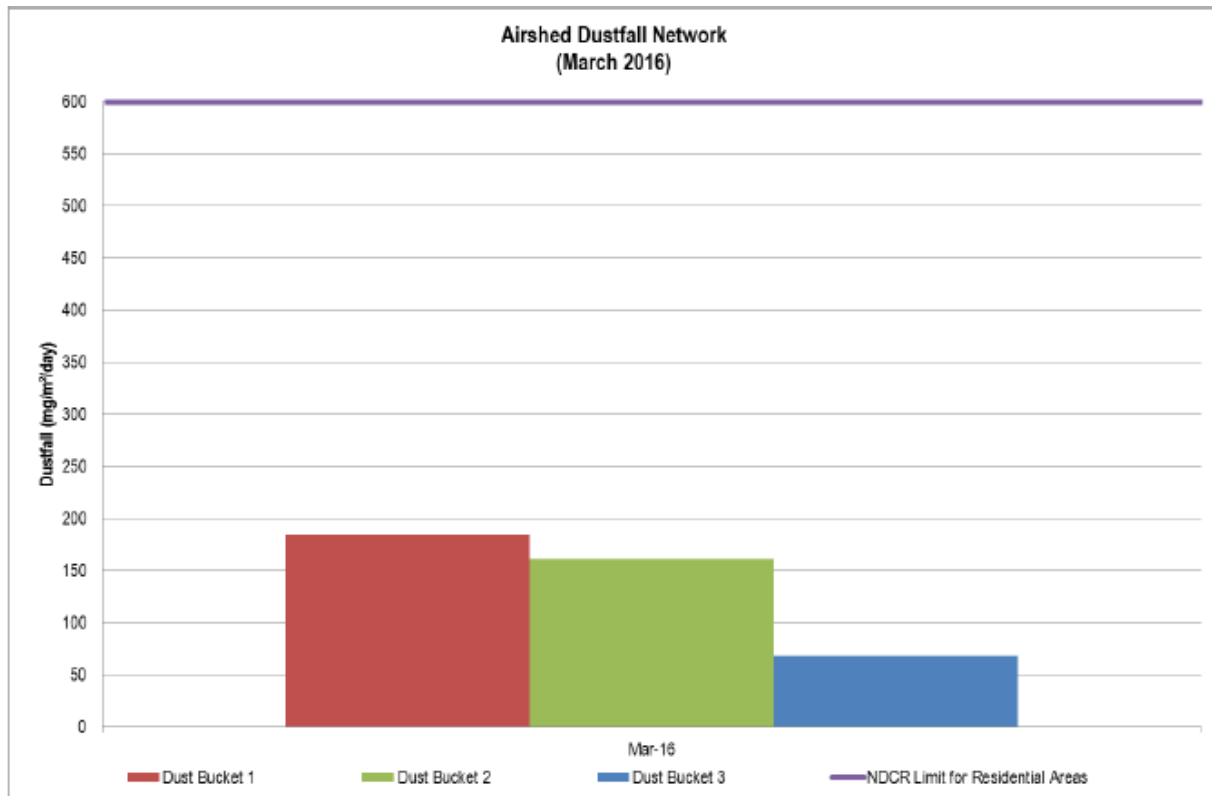


Figure 12: Monthly dustfall deposition rate per sampling location (March 2016)

10.1.2.2 ERP Network

Dustfall rates for the period January 2016 to March 2016 are presented in Table 7 and illustrated in Figure 13. The collected deposition rates (Table 4 and Figure 8) are compared to acceptable dustfall limits provided in section 2.

Dustfall rates are low for the sampling period and well within the acceptable dustfall limit of 600 mg/m²/day (NDCR limit for residential areas). The site with the highest dustfall is 5L29 West (99 mg/m²/day), located downwind of the slimes storage facility during January 2016, when the east-north-easterly winds prevailed. In February 2016 5L29 South had the highest dust fallout, most likely because the northerly and north-westerly winds blowing dust over the slimes storage facility. Dust fallout rates were the lowest during March 2016 except for at 5L29 South; located downwind of the largest portion of the slimes storage facility.

Table 7: Monthly dustfall deposition rate per sampling location (January 2016 to March 2016)

Bucket ID	Dust Deposition rates (mg/m ² /day)		
	January 2016	February 2016	March 2016
Helderwyk Estate 1	59	40	15
Helderwyk Estate 2	41	77	29
5L29 South	16	116	72
5L29 East	55	41	20
5L29 West	99	39	18

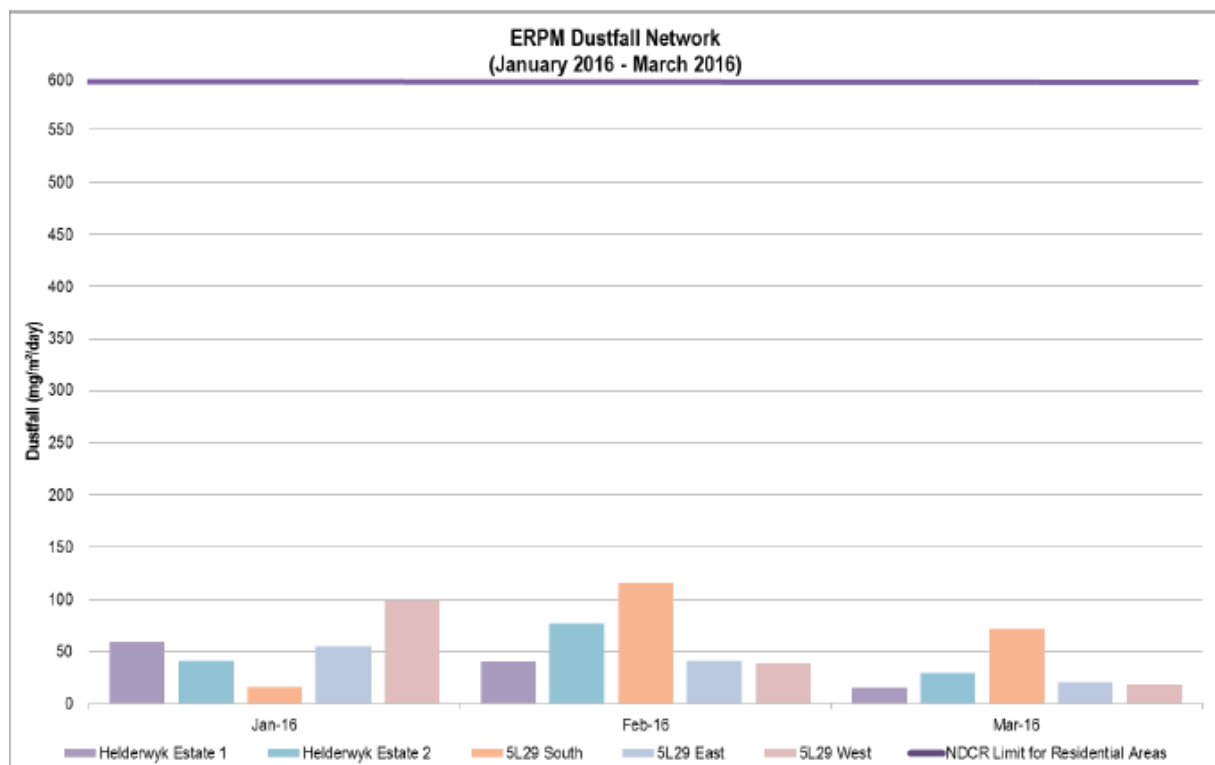


Figure 13: Monthly dustfall deposition rate per sampling location (January 2016 to March 2016)

10.1.2.3 ERGO Network

Dustfall rates for the period October to December 2015 are presented in Table 8 and illustrated in Figure 14. The collected deposition rates (Table 6 and Figure 12) are compared to acceptable dustfall limits provided in section 2.

Dustfall rates were low for the sampling period and well within the acceptable dustfall limit of 600 mg/m²/day (NDCR limit for residential areas). During October 2015, when the winds were from the north-north-easterly, northerly and north-north-westerly, the site with the highest dustfall was Nursery located south of the slimes storage facility. During November and December 2015, with prevailing northerly, north-north-westerly and north-westerly winds, Dalpark Ext 1 had the highest dust fallout. This was most likely from other dust sources in the region since Dalpark Ext 1 is located upwind from the slimes storage facility.

Table 8: Monthly dustfall deposition rate per sampling location (October 2015 to December 2015)

Bucket ID	Dust Deposition rates (mg /m ² /day)		
	October 2015	November 2015	December 2015
Nursery	78	80	58
Dalpark Ext 1	49	84	178

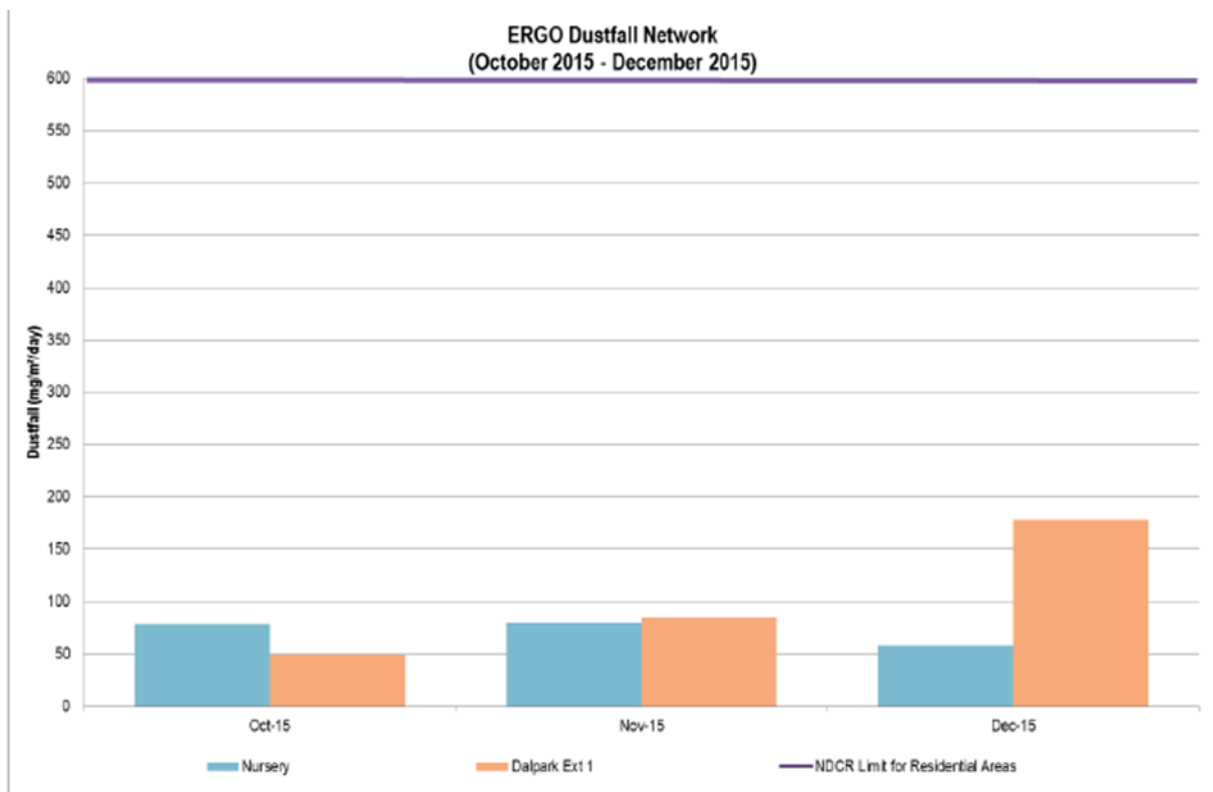


Figure 14: Monthly dustfall deposition rate per sampling location (October 2015 to December 2015)

10.1.2.4 PM10 Results

Daily PM10 results from the particulate monitors for the period 2 March to 9 March 2016 are depicted in Figure 15. Sampling was done every 3rd day, resulting in a total of 10 days of sampling over the one-month period. According to the laboratory one filter had a negative measurement which would suggest that this filter was damaged. The resulting data availability is 90%.

The PM10 NAAQ daily limit of 75 µg/m³ was not exceeded during the sampling period, equating to 0% exceedances. The highest concentration sampled (59.72 µg/m³) occurred on the 8th of March 2016. The next highest concentration sampled (51.39 µg/m³) occurred on the 23rd of March 2016.

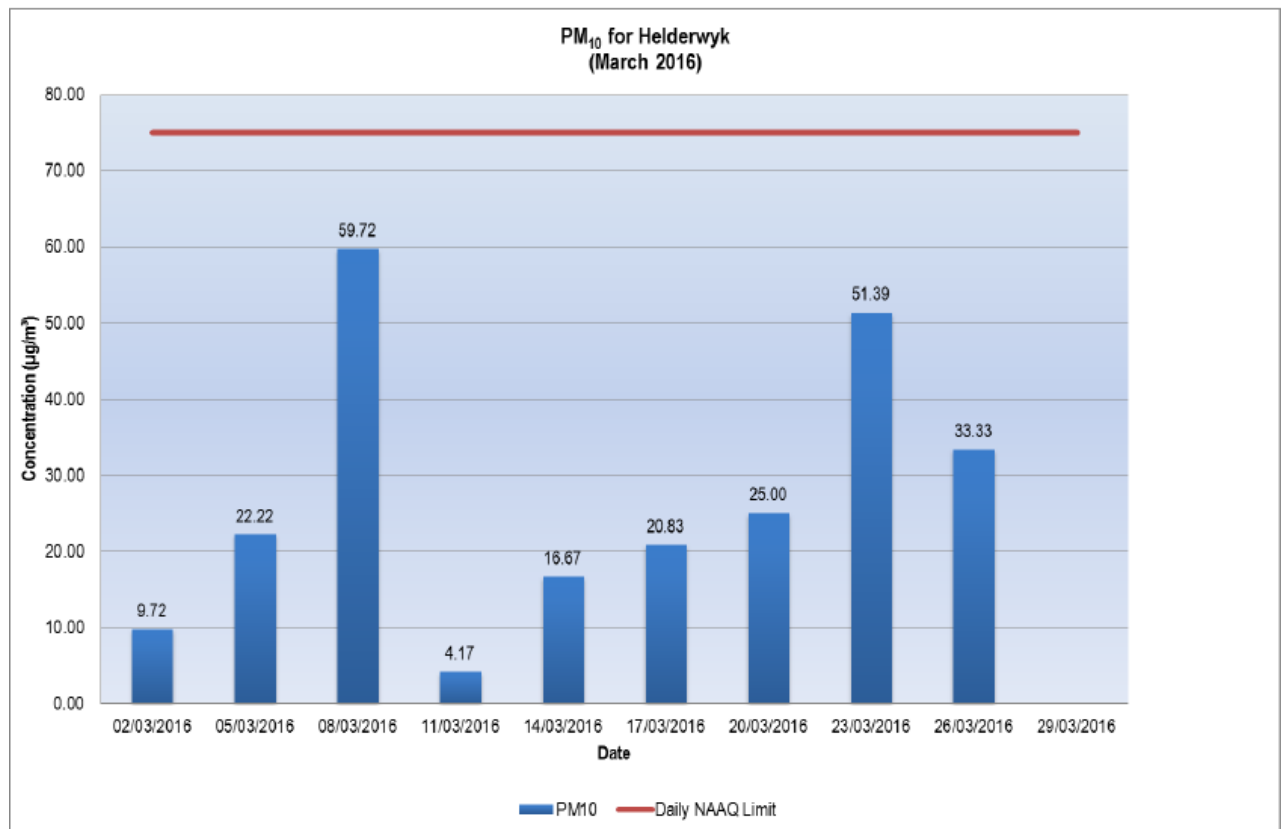


Figure 15: PM10 concentrations (March 2016)

10.1.3 Main Findings and Conclusion

10.1.3.1 Main findings

The prevailing wind field is from the north-east, north and north-west with infrequent winds from the south with slight variations between the months of October 2015 to March 2016. The wind speeds were similar; ranging between 2.1 and 8.8 m/s. The months of October and November 2015 had slightly higher wind speeds. The months with the lowest and highest rainfall were October 2015 (17.6 mm) and March 2016 (137 mm), respectively.

Dustfall deposition rates from the Airshed network for the month of March 2016 were low and well within the NDCR limit for residential areas. Similarly, dustfall deposition rates from the ERPM network (January

to March 2016) and from the ERGO network (October to December 2015) were low and well below the NDCR limit for residential areas.

Daily PM10 concentrations did not exceed the daily NAAQ limit of 75 µg/m³ during the sampling period 2 March to 29 March 2016, with the highest concentration sampled of 59.72 µg/m.

10.1.3.2 Conclusion

The six months' (October 2015 to March 2016) dust fallout results in the vicinity of the slimes storage facility indicate low dust fall rates. The one month's (March 2016) PM10 concentrations indicate acceptable concentrations in comparison to the NAAQ limit.

The air quality results suggest low impact significance on the proposed Helderwyk development within the 2 km radius from the slimes storage facility.

10.2 AGRICULTURAL POTENTIAL

According to the Gauteng Agricultural Potential Atlas (GAPA) the majority of the site has build-up with small pitches of moderate Agricultural potential refer to **Figure 6** above, however the site is situated within an urban area with development occurring on all sides and therefore it would not be viable to retain the site for Agricultural use.

In conclusion, the property is not a viable farming unit and no impacts in respect of the proposed development are anticipated with regards to the loss of land with high agricultural potential are expected

10.3 ECOLOGICAL ASSESSMENT

Refer to **Figure 4** for an indication of the ecological significance of the site as per the GDARD policies.

Please refer to the **Ecological Impact Survey Assessment** as completed by *EnviroGuard* and is attached hereto under **Annexure E**. Summary of the Ecological Impact Assessment is presented below.

10.3.1 Methods

Prior to the site visit a desktop study was conducted on the development history as well as the topography of the study area, while literature on the area was consulted.

The site was visited on 18 November 2018. Very little rain has fallen, though some grasses have started growing. The area was traversed on foot and by vehicle and notes made on the presence or not of sensitive ecosystems and red data plants and habitat.

An investigation was also carried out on rare and protected plants that might possibly occur in the region. For this investigation the National Red List of Threatened Plants of South Africa, Lesotho & Swaziland, compiled by the Threatened Species Programme, South African National Biodiversity Institute (SANBI) was used while a list of potential Red data plants for the QDG and near the vicinity of

the study site, was obtained from GDARD. Internet sources were also consulted on the distribution of these species in the area.

Other information used included:

- The IUCN conservation status categories on which the Threatened Species Programme, Red List of South African Plants (2013) is based, was also obtained.

The presence of rare and protected species or suitable habitat was recorded during the field visit.

10.3.2 General Description of the study area

The site is an open grassland area with a slimes dam that is located between the R23 Road and the M43, which are located towards the east and west respectively. Elsburg Road is located North of the site.

The slimes dam is located in the north-eastern part of the site comprising approximately 144 ha. The open grassland section is approximately 299 ha in size and comprises the largest section of the property. A water pipeline and railway line are located along the entire southern boundary of the property.

10.3.2.1 Existing Impacts

Existing impacts on the site include:

- Various two-spoor roads traversing the area
- Dumping of rubble and litter in some areas
- Leaking of the water pipeline along the southern boundary
- An existing model airplane airfield on the site
- Cattle grazing on the site
- Land uses around the site include residential area, mining zones, a prison and open land in the south.

10.3.2.2 Elevation profile

The site is mostly level though has a slight western slope with undulating terrain. The highest point is 1610 m.a.s.l. with the lowest point 1599 m.a.s.l. This equates to an average elevation loss ranging between 16.6-34.4 m with an average slope ranging between 1.0% - 1.9%. The undulating terrain results in some depression areas where water collects during rainfall events that has led to various seasonally wet pan systems establishing on the site.

10.3.3 Vegetation type and floral Results

The ecological assessment was conducted by Enviroguard. The vegetation of the study site is classified as mostly natural grassland belonging to the endangered Tsakane Clay Grassland (Gm9) vegetation

type (Mucina & Rutherford, 2006). This vegetation type occurs on flat to undulating terrain and is characterized by the dominance of the grasses *Brachiaria serrata*, *Cynodon dactylon*, *Cynodon hirsutus*, *Eragrostis chloromelas*, *Eragrostis patentipilosa*, *Eragrostis plana*, *Heteropogon contortus*, *Setaria sphacelata*, *Themeda triandra*, *Trachypogon spicatus* and *Elionurus muticus*.

Three natural depression pan systems located towards the centre of the open grassland section was noted as well as two artificial pans (dug by humans for soil excavation purposes) that seem to be fed by water during rainfall events as well as the water pipes that leak. A larger wetland/drainage system is present in the northern parts of the site, fed by water from the slimes dam, and extends along the western boundary of the site (**Figure 16**).



Figure 16: Approximate locations of wetland areas noted on the study area (1=large drainage/wetland system; 2=natural pans; 3=artificial pans) (Source: Google Maps)

10.3.3.1 Broad Vegetation Units

The site comprises a large terrestrial grassland section with some wetland areas.

- **Wetland areas**

This large drainage/pan system is located in the northern and extends along the western boundary where it is mostly degraded. The area has a few roads traversing it, but it is assumed that during the rainfall season that the road becomes unusable. The northern area leads to a channel-like section in the west where the reed *Phragmites australis* and the forb *Typha capensis* are present. The open, more pan-like section is characterised by short grasses such as *Cynodon dactylon* and various *Cyperus* spp.

White sandy deposit from the slimes dam is found in large parts of this system and do influence the vegetation and therefore habitat negatively by smothering vegetation and also changing the soil nutrient status.

- **Natural pan systems**

The pan systems are characterised by short grass and forb species including the grasses *Brachiaria serrata*, *Imperata cylindrica* and the forbs *Monopsis decipens*, *Schoenoplectus spp.*, *Conyza podocephala*, *Fuirena pubescens* and *Cyperus spp.* The vegetation is short and in some of the pans large quartzite rocks have been dumped in the past with pioneer species such as *Tagetes minuta*, *Bidens pilosa* and *Conyza bonariensis* establishing.

- **Artificial pans**

The artificial pans are characterised by standing water and the vegetation include the grasses *Paspalum dilatatum*, *Agrostis lachnantha*, *Leersia hexandra*, *Imperata cylindrica* and the forbs *Schoenoplectus corymbosus*, *Juncus spp.*, *Verbena bonariensis* and *Verbena brasiliensis*. The alien invasive grass *Pennisetum clandestinum* is also prominent in some areas. These systems seem to periodically receive water from the water pipeline whilst the clay soil assists in the area being permanently wet resulting in wetland vegetation establishing.

- **Natural grassland area**

The natural grassland area comprises the largest section of the study area. The vegetation in the central parts are mostly natural, though the sections along the western and southern boundaries are somewhat degraded. Common species include the grasses *Themeda triandra*, *Cymbopogon caesius*, *Hyparrhenia hirta*, *Heteropogon contortus*, *Brachiaria serrata*, *Tristachya leucothrix*, *Eragrostis curvula*, *Eragrostis chloromelas*, *Cynodon dactylon*, and the forbs *Vernonia oligocephala*, *Senecio inornatus*, *Epaltes gariepina*, *Albuca cf. setosa*, *Felicia muricata*, *Conyza podocephala*, *Dianthus mooiensis* and *Helichrysum chionosphaerum*.

In some areas, sections dominated by the declared alien invasive tree *Eucalyptus camaldulensis* occur. The vegetation of these areas is degraded and most of the natural species have been displaced with only pioneer weedy species present.

10.3.3.2 **Red Data Species**

Several the Orange listed geophyte *Hypoxis hemerocallidea* populations were found throughout the grassland. No other red data species or species of concern were noted during the field survey.

The following Red/Orange List plant taxa have been recorded from the farm on which the study site is situated / within 5km of the study site.

- *Argyrolobium campicola*
- *Lithops lesliei* subsp. *lesliei*

The grassland area provides marginal habitat for the forb *Argyrolobium campicola*, though no suitable habitat is present for the forb *Lithops lesliei subsp. lesliei*.

10.3.3.3 Conclusion

The study area consists of various wetland sections that are mostly seasonally wet. A large slimes dam occurs in the northern part of the site with the largest part of the study area consisting of the wetland and drainage areas and the large mostly natural grassland area. The area is open and easily accessible with sections of the grassland being degraded due to various human-induced activities (grazing by cattle, frequent fires, poor conservation practices etc.).

No detailed vegetation survey was conducted, though the study area was traversed to determine the presence or not of red data species or suitable habitat to be able to verify the findings of the previous red data report conducted by Eco Assessments in 2011. The area received low rainfall prior to the visit resulting in a low growth rate of the plants. Other than the presence of a number of populations of the Orange listed geophyte *Hypoxis hemerocallidea*, no other red data plants were observed within the grassland section and close to the artificial pans. Marginal habitat exists for three other species, though it is mostly around the natural pan areas. These species have a low-medium probability to be present on the site.

Since the most sensitive habitats are in and around the natural pans, it is important that suitable buffer zones are implemented around these wetland systems to ensure protection of the habitat close to and around the wetlands. It is also important that connectivity between the three natural pans be ensured to maintain their ecological functioning.

10.4 AFRICAN GRASS OWL HABITAT ASSESSMENT

Please refer to the African Grass Owl habitat assessment as completed by Enviroguard in November 2018 and is attached hereto under **Annexure F**.

○ Scope of study

- A preliminary field assessment conducted on and around the proposed site recording sightings and/or evidence of African Grass Owls.
- An assessment of the ecological habitats occurring on the site using dominant vegetation, evaluating conservation importance and significance of the site with special emphasis on African Grass Owls.
- Literature investigations, previous surveys as well as personal species lists with which to augment field data were necessary.
- Documentation of the findings of the study in a report.

○ Constraints or limitations to the survey included

- Limitation to a base-line ecological survey for only 4 hours during the summer months (November). No comprehensive avifaunal surveys were conducted but merely a habitat assessment for African Grass Owls.

- Inadequate rainfall had resulted in no surface water as well as emergence of hygrophilous and hydrophilic vegetation within the wetlands on the site.
 - Large proportions of suitable habitat for African Grass Owls occur to the south and east of the site on private properties with little or no access especially during nocturnal surveys (high risk areas).
 - The majority of threatened faunal species especially the African Grass Owl and Giant Bullfrog are extremely secretive and difficult to observe even during intensive field surveys conducted over several seasons.
 - The presence of threatened species on site is assessed mainly on habitat availability and suitability, desk top research (literature, personal records, previous surveys conducted in the Benoni-Brakpan areas between 1999-2018) as well as actual observations of any threatened faunal species.
- **Gaps in the baseline data**
 - Little long-term, verified data of faunal species distribution on micro-habitat level in the Brakpan outlying areas.
 - Limitation of historic data and available databases. Insufficient knowledge on the specific habitat requirements (migratory, foraging and breeding) of the majority of threatened species. Limited surveys for the actual site and immediately adjacent areas.
 - Little long-term, verified data on impacts of previous gold mining as well as current residential developments to the west and north of the study area on fauna as well as water quality within the seasonally inundated wetlands due to leachate from slimes dams/mine dumps.

10.4.1 Results of Specialist Habitat Assessment

African Grass Owls are found exclusively in rank grass, typically, although not only, at fair altitudes. African Grass Owls are secretive and nomadic breeding in permanent and seasonal vleis or valley bottom wetlands which it vacates while hunting or post-breeding, although it will breed in any area of long grass and it is not necessarily associated with wetlands.

The species can also be found in shorter grass (40-50cm) in association with hydrophilic or hygrophilous sedges (*Juncus sp.*, *Scirpus sp* and *Cyperus sp.*) and grasses (*Imperata cylindrica*) which forms impenetrable thickets which provide enough substrate for the owls' characteristic "tunnel" nests as well as favourable roosting habitat (pers.obs). The conditions described above are normally associated with pristine, well managed grasslands usually in close proximity of water, hence the threatened status of the species, as these grasslands are extremely rare in South Africa. However, the species is proving itself to be adaptable to such an extent that viable populations can exist in areas which are completely transformed, provided basic food and shelter requirements are met.

In marshlands it is usually outnumbered by the more common Marsh Owl (*Asio capensis*) 10:1 (Tarboton et al. 1987). African Grass Owls nest on the ground within a system of tunnels constructed in mostly tall grass; peak-breeding activity (February-April) tends to coincide with maximum grass cover (Steyn 1982). African Grass Owls specialise in large rodent prey, particularly *Otomys* vlei rats, although a wide range of rodent prey species, including *Rhabdomys*, *Praomys*, *Mus*, and *Suncus*, are taken (Earle 1978). Some local and nomadic movements in response to fluctuating food supplies, fire and the availability of suitable habitat can be expected (Steyn 1982). The ecological requirements of this species make it

susceptible to many land-use changes impacting contemporary South Africa. The Grass Owl appears to have undergone local population reductions because of habitat loss and fragmentation resulting from several factors. Agricultural transformation and intensive grazing have diminished its scarce and specialised habitats. Intense use of the grasslands in Gauteng and frequent burning (e.g. Ranger 1965), typically in densely settled areas, reduces rank cover for this species. It does not seem to adapt to transformation of its preferred rank grassland habitat into short grasslands, crop or grazing land. Its habit of nesting on the ground may make it susceptible to disturbances by people and livestock. The possibility that excessive accumulations of pesticide residues depress reproductive outputs should not be ignored (Brookes 1984).

African Grass Owls were recorded in 201 grid squares within South Africa (including Lesotho and Swaziland) during the South African Bird Atlas Project (Mendelsohn 1997), 21 of which occur fully or partially within Gauteng. This is roughly equivalent to 18 complete squares or 9% of the total range of this species in South Africa.

It would therefore appear that reporting rates do not give a realistic estimate of the relative abundance of African Grass Owls. Under reporting is probably largely attributable to the preference of African Grass Owls for tall, dense grass, their nocturnal habits and the difficulties of obtaining access to remaining pockets of suitable habitat largely on private farmland (Whittington-Jones 2003).

The main threats to this species within Gauteng relate to habitat destruction and transformation, nest disturbance and road mortalities. The African Grass Owl Project of the Raptor Conservation Group of the Endangered Wildlife Trust are currently exploring solutions to the road related mortalities, but additional work is required to ensure protection and appropriate management of remaining areas of suitable habitat (Whittington-Jones 2003).

Mendelsohn (1989) estimated an average home range of one African Grass Owl per 314ha on the Springbok Flats, while Tarboton (2002) suggested 50-100ha per pair as an extremely rough guesstimate in excellent African Grass Owl habitat. The study by Ansara near Nigel in Eastern Gauteng is a classic example of how tenacious the species is. She discovered a locally abundant population of African Grass-Owls nesting in a drainage ditch of only 1.5 hectares in size, which was the only suitable habitat in the vicinity. Vegetation in the ditch is highly degraded with an abundance of weeds, it is located within 200m of the N17 toll road and within 20m of farm roads. Within this very small area six active nests were recorded and an additional 13 roosting sites. Active nests were recorded an average of 40 metres apart.

This proves that the bird can persist and even flourish in highly transformed habitats, provided patches of suitable habitat remains and a ready food supply is available in the surrounding area. For the purposes of the initial target setting exercise, an estimate of 100ha per pair was adopted by GDARD (Whittington-Jones 2003).

No African Grass Owls or Marsh Owls were flushed in the rank grass vegetation (*Imperata cylindrica*) occurring within the western portion adjacent to the poorly defined, mainly unchanneled valley bottom wetland. No evidence of any recent nesting, roosting sites or pellets were observed within the *Imperta cylindrica* areas as well as around the seasonal pans. Three Marsh Owls (*Asio capensis*) were

previously flushed from site as well as a confirmed nesting site was recorded during a previous avifaunal habitat assessment (Lockwood 2008).

The valley bottom wetland and seasonally inundated depressions or pans and associated rank (*Themeda triandra- Imperata cylindrica*, *Carex sp.* *Juncus sp.*, *Schoenoplectus sp.*) grassland and hygrophilous vegetation offers favourable roosting and possible nesting habitat for Marsh Owls as well as possibly African Grass Owls. The surrounding open Tsakane Clay grasslands offer foraging areas especially adjacent to the valley bottom wetland where large colonies of burrowing rodents were observed. The trampling by cattle, disturbances by off-road vehicles and quad bikes and presence of dogs are immediate threats to African Grass Owls due to their ground nesting breeding strategy. Road fatalities on the M43 cannot be eliminated.

More intensive surveys conducted over extended periods during the peak breeding period between February and April are required to ascertain the current population size of African Grass Owls on the site and immediate adjacent area.

10.4.1.1 **Recommendation of African Grass Owl Management**

- The grass density must be critical to shield nesting (and roosting) birds from the elements and potential predators. The owls always select the densest vegetation for nesting and roosting.
- The height of the grass must be at least 750mm or higher in order to hide nests and roosting birds from aerial predators.
- The habitat must not be regularly burnt or grazed, preferably rested for at least two years at a time to allow dense grass cover to develop.

In order to conserve suitable habitat for African Grass Owls on the site and immediate surrounding area it is imperative that sufficient rank grassland (*Imperata cylindrica*) habitat is conserved with the remaining sedge patches (*Carex spp.* *Scirpus spp.*) along the western valley bottom and eastern seasonal pans for nesting/roosting activities. The removal of the cattle will prevent possible trampling of the nests. It is also critical that sufficient areas of open shorter Tsakane Clay grassland is maintained and conserved for foraging purposes as well as a sufficient grassland to the east and south of the site. Several disturbed areas along the valley bottom wetland and around the site are covered by dense stands of *Hyparrhenia hirta*. These areas offer limited suitable habitat for fauna and with correct management (cutting, slashing or natural fire regime) the natural species composition should return to the site. Bird, amphibian, reptiles and mammal abundance and species richness increased with foliage height diversity and the proportion of native grass cover.

The hygrophytic /hydrophilic sedge and grass dominated vegetation of the seepage areas (*Imperata cylindrica*) adjacent to the western valley bottom wetland as well as rank hygrophilous vegetation around the eulittoral zones of the pans offer favourable roosting and possible nesting habitat for Marsh and African Grass Owls as well as suitable foraging areas in the adjacent open Tsakane Clay Grassland.

Activities within the remaining primary Tsakane Clay grassland and palustrine wetland habitats must be severely restricted especially during the operational phase of the project. Large sections of the valley bottom especially along the western portion and the seasonal pans on the eastern boundary should be

maintained as exclusion areas to prevent the possible disturbance of nesting Marsh Owls as well as possible African Grass Owls. No vehicles or even footpaths should be allowed through the wetland habitats. Existing livestock paths should be utilised as walkways outside the wetland boundaries.

New paths could potentially result in increased predation of any Marsh or African Grass Owl chicks. An educational programme must be implemented for future property owners regarding the use of rat poison or rodenticides in order to minimise the potential impacts of poisoning the remaining owls (contact EWT Owl poisoning programme). Speed control measure must be implemented on all access roads within the property.

The entire private open space consisting of the valley bottom and eastern seasonal pans and 50m grassland buffer zone from the edge of the outer edge of the temporary wetland zones as well as any primary Tsakane Clay Grassland must be fenced off prior to construction activities (see vegetation, wetland and Giant Bullfrog sensitivity maps). The grassland vegetation on the site must be assessed by a suitably qualified vegetation specialist. The wetland specialist needs to delineate the palustrine wetlands including the valley bottom wetland, *Imperata cylindrica* mosaic and seasonal pans. The wetland specialist should ideally demarcate the boundaries and buffer zones using red painted pegs. The private open space must be fenced and remain fenced throughout all stages of the development including construction and operational phase. This will prevent possible further disturbances and damage to the Tsakane grasslands, seasonal pans and valley bottom wetland.

During the construction phase, workers must be limited to areas under construction and access to neighbouring undeveloped areas especially along the open grasslands, seasonal pans and valley bottom must be strictly regulated, preventing illegal dumping, uncontrolled hunting and poaching and gathering of firewood and medicinal plants. In this regard it is recommended that the open natural areas are fenced off prior to construction and maintained as “no-go areas”.

Construction should be limited, where practical, to the daylight hours preventing disturbances to the nocturnal activities of certain species and nearby human populations. As the site is situated adjacent to old weed invaded (*Tagetes minuta*, *Helichrysum acutatum*, *Datura strumarium*, *Campuloclinium macrocephalum*) agricultural lands it is imperative that an effective alien vegetation programme is implemented throughout the earth moving and construction phase. Weeds and invasive vegetation should be removed prior to construction activities preventing spreading into newly disturbed areas or areas cleared of vegetation. Alien vegetation removal will continue through all phases of the development especially in the conserved open space.

All temporary stockpile areas, litter and rubble piles must be removed on completion of construction. All dumped material must be taken to an approved dump site in the area. No illegal dumping must be permitted in the private open space. Heavy fines must be implemented as well as the rehabilitation of the dumped areas.

Future soil stockpiling areas must follow environmentally sensitive practices and be situated a sufficient distance away from any drainage areas towards the valley bottom wetland as well as seasonal pans. The careful position of soil piles, and runoff control, during all phases of development, and planting of

some vegetative cover after completion (indigenous groundcover, grasses etc.) will limit the extent of erosion occurring on the site. Vegetation plays a critical role in the hydrological cycle by influencing both the quantity and quality of surface run-off. It influences the quantity of run-off by intercepting rainfall, promoting infiltration and thus decreasing run-off. Vegetation can influence water quality in two ways: by binding soils thus protecting the surface layer, and by intercepting surface run-off thus buffering the valley bottom wetland against suspended and dissolved substances. When the speed of the run-off is reduced, suspended particles can settle out and dissolve substances, such as nutrients, can be assimilated by plants. The vegetation has a filtering effect.

10.5 GIANT BULLFROG HABITAT ASSESSMENT

Please refer to the Giant Bullfrog Habitat Assessment as completed by Enviroguard in November 2018 and is attached hereto under **Annexure G**.

- **Objectives of the specialist habitat assessment**
 - To provide a description of the prevailing environmental condition of the site with special emphasis on the current status of Giant Bullfrog populations on the site and immediate surrounding areas.
 - To determine potential impacts of the development on the immediate environment of the proposed site.
 - To provide management recommendations to mitigate negative and enhance positive impacts.
- **Scope of study**
 - A preliminary habitat assessment; focusing on the available or suitable habitat for Giant Bullfrogs on the site and immediate surrounding areas.
 - An assessment of the ecological habitats, evaluating conservation importance and significance with special emphasis on the Giant Bullfrogs.
 - Literature investigations, personal records and previous surveys conducted in similar habitat and the surrounding areas; with which to augment field data were necessary.
 - Identification of potential ecological impacts that could occur as a result of the development and assess the significance of these, where possible.
 - Investigate feasible and practical management recommendations that should be implemented to reduce or minimise the impacts on threatened species and sensitive habitats, should the project be approved.
 - Documentation of the findings of the study in a report as well as a sensitivity map.

10.5.1 RESULTS OF SPECIALIST GIANT BULLFROG HABITAT ASSESSMENT

Rainfall in Gauteng is extremely variable and concentrated between October and March. Rain falls most frequently in the form of heavy diurnal thunderstorms. Rainfall is important for amphibians in that it initiates activity and reproduction. Levels of amphibian activity are influenced by the intensity and duration of rainfall as well as temperature and humidity. Inadequate rainfall due to on-going El Nino weather system resulted in no amphibian breeding activity during site visit on the 17th of November 2018. No surface water within the western valley bottom wetland as well as seasonal pans on the eastern portion of the site.

The well-defined life history pattern and specific habitat requirements of *P. adspersus* allows for easy identification of critical environmental requirements necessary to sustain populations. The following are critical habitat components for the species:

10.5.1.1 *Temporary pools or pans that are large enough to hold water for approximately a month:*

Wetlands including seasonally inundated grassland, pans or depressions should be shallow, at least in part, because the adult males require a water depth of approximately 5 to 10 cm for calling and for territorial defence. Giant Bullfrogs have external fertilisation and therefore the water must be shallow enough to permit the considerably smaller females to lift her abdomen and cloaca out of the water (2-5cm). Wetlands should ideally be temporary, as permanent water attracts permanent predators and also prohibits the territorial male frogs from burrowing into the wetland's substrate for aestivation. Ideally, wetlands should hold water for about 30-35 days a year and filling of wetlands must be associated with heavy downpours. The seasonal pans on the eastern boundary should contain adequate surface water for more the 30 days required for tadpole development. It must be noted that the pans may be temporary in nature only filling during good rainfall years. Bullfrogs breed after the early heavy summer downpours when the pan collects surface rainwater as well as possible groundwater seepage.

10.5.1.2 *Breeding pans must be accessible to frogs:*

At least a portion of the wetland or pan edge must be devoid of reed-beds and other bullfrog barriers. (e.g. *Phragmites australis*, *Arundo donax** and *Typha capensis* reed-beds can act as an impenetrable barrier, prohibiting *P. adspersus* gaining access to the water.) All of the ephemeral pans on and surrounding the site are easily accessible for Giant Bullfrogs and are surrounded by open Tsakane Clay grassland areas (to the east and south). The M43 to the west, R554 to the north and R23 to the east restricts the natural migratory movements of remaining Giant Bullfrogs to the east, west and the north. These roads with high vehicular traffic result in major road fatalities.

10.5.1.3 *The substrate must be suitable for aestivation:*

Adult as well as juvenile *P. adspersus* spend most of their time below ground in a torpid state. They dig their own burrows or utilise other animal burrows such as crabs or gerbils. Burrow depth varies according to soil type and may measure between 30cm to a metre in depth. Bullfrogs often bury themselves in the soft sand soils adjacent to secondary roads making them extremely vulnerable to scraping activities. The soils on the site are sandy to sandy loams with varying levels of moisture retention. These sandy soils are particularly suited for burrowing by Giant Bullfrogs for underground hibernation-aestivation during the dry, non-breeding season. Burrowing generally takes place some distance away from the breeding site with females travelling further to burrow. Certain larger territorial males may burrow within the clay soils within pan basins. The high clay content retards water loss from the cocooned frogs. Several animal burrows including Highveld Gerbils colonies of Natal Multimammate Mouse were observed on and surrounding the site. Burrowing generally takes place some distance away from the breeding site with females travelling further to burrow. Adult males and females show strong philopatric tendencies, i.e. they return to the same burrow throughout their lifetime unless they are physically prevented from doing so. This has important implications for conservation management (Yetman 2006).

10.5.1.4 Frogs must have sufficient foraging areas:

Bullfrogs require large open grassland habitats in which they actively move in search of potential prey items. Bullfrogs may either actively search for food in surrounding grasslands or remain motionless and ambush prey. Adults are often found several kilometres (up to 2 km pers. obs.) from suitable breeding habitat migrating through open habitat searching for potential food. Bullfrogs are opportunistic predators and will consume insects, arachnids, reptiles, amphibians (cannibalistic, feeding on smaller Bullfrogs), birds and mammals. Generally, open grassland with termite mounds is the preferred habitat for foraging, and ideally, this should be adjacent to the breeding habitat. The remaining open Tsakane Clay grasslands offer suitable foraging areas for Giant Bullfrogs. The pans on the eastern boundary of the site contain high densities of termite mounds. The number of termite mounds increase outside the temporary wet zones of the pans.

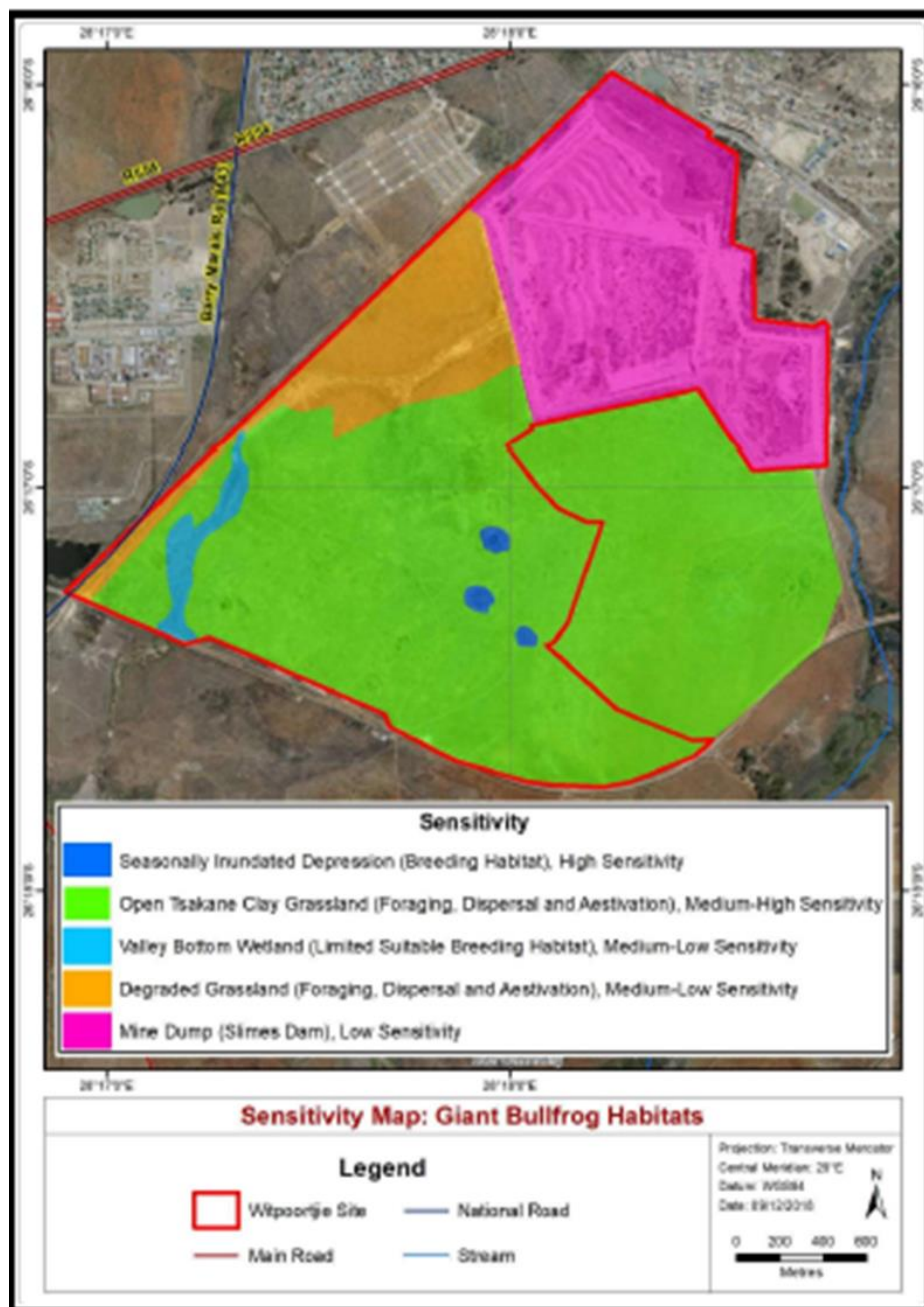


Figure 17: Giant Bullfrog Habitats Sensitivity Map

10.6 INVERTEBRATE IMPACT STUDY

Please refer to the **Invertebrate Impact Study** as completed in November 2018 and is attached hereto under **Annexure H**.

○ **Materials & Methods**

Invertebrates were sampled using active and passive methods. Active methods entail collection by an individual using various kinds of equipment, while passive methods involve specialised types of traps at specific sites in the field, which are visited at given time intervals.

- **Passive collection**
- **Pitfall traps**

Ten pitfall traps were placed ten meters apart, in a single transect. The pitfall traps were unbaited. The plastic buckets used for traps had a 1000 mL capacity and were 11 cm in diameter and 12 cm deep. All the traps were sunk into the ground so that the buckets' rims were level with the soil surface. Buckets were filled to about one fifth their volumes with a solution of liquid soap and water to immobilise trapped invertebrates. Trap contents were collected 24 hours after the traps had been set. Only insects and arachnids were collected from the traps. Specimens were preserved in absolute ethanol and transported to the laboratory for identification. Morphospecies were identified to order level and family level where possible.

- **Active collection**
- **Sweepnetting**

Sweepnetting was carried out during all site visits whilst transect netting was carried out on the 22nd November 2018. An insect net with a diameter of 40 cm was used for collecting insects and arachnids. Three transects were swept on the site and for the sake of standardisation, 20 sweeps of 180° constituted one transect (and thus one sample). Insects and arachnids from the samples were preserved in absolute ethanol and transported to the laboratory for identification. Morphospecies were identified to order level and family level where possible.

Beating

Due to the absence of indigenous trees on the site and the unlikelihood of catching any invertebrates of conservation concern by beating, this method was not employed.

Physical searches

Physical ground and rock searches were undertaken in order to identify threatened arachnids, scorpions and various insects which take refuge underground in burrows or under rocks. The site is not rocky in nature and lifting of the few rocks and building rubble present did not reveal any invertebrates of conservation interest.

Data recorded and red data species

A list of all identifiable insects and arachnids caught or seen on the site was compiled and is included in the results section.

10.6.1 Results of Invertebrate

It is usually not feasible to sample invertebrate diversity adequately over a relatively short period of time. There are several selective factors that control certain associations in invertebrate communities. These factors include the nature of the soil substrate, fauna and flora of the specific region, rainfall and temperature. The widespread use of pesticides in an area, as well as the level of pollution, might lead to a decrease in the population sizes of invertebrates. Maximum insect activity is usually correlated with the onset of the rainy season.

Conditions for maximum insect activity were optimal during initial site visits. Maximum temperatures were constantly above 25°C for some period of time and much rain had yet been recorded for the locality (10 – 12 mm of rain is usually regarded as sufficient to stimulate peak insect activity). Different species emerge at different times of a season, often depending on the weather. Thus, the availability of invertebrates for trapping will depend on the weather and on their abundance.

Furthermore, the temporal development of the various species that constitute communities may make individuals available for capture for only a short time. Most sampling devices or techniques target only a single stage of the life cycle. The adult stages of most invertebrates are usually more conspicuous and easier to collect than when individuals are present in egg, juvenile (nymphal or larval), pupal or sub-adult stages. However, some adult insects live for a very short time and when emergence of a population is synchronised; adults may only be present in the field for a week or less. Due to time constraints, certain sampling methods were not employed. One such method is light trapping, thus excluding various nocturnal species that were not collected from the pitfall traps.

It is preferable to identify specimens to the species level, because for nearly all objectives it is better to have specific information on carefully chosen groups than family-level information on many. However, securing reliable identification to the species-level is the greatest single difficulty in invertebrate biodiversity. Except in some of the best known groups, expert knowledge is required to ensure that identifications are accurate. Such expertise is often both extremely limited and in great demand for a great many activities.

During site visits, no invertebrates of conservation concern were located. It must however be mentioned that whilst employing the Rapid Biodiversity Assessment (RBA) method, there does exist the possibility that certain other rare invertebrate species may not have been encountered.

Four invertebrate species of conservation concern are known to occur in the vicinity of the survey area. These include three species of butterfly and one species of cetonid beetle. None of these species were encountered during the survey. This, however, does not imply that one is unlikely to encounter any of these species in the study area as they may have been missed by sampling due to multiple factors.

Lepidochrysops praeterita, commonly known as the Highveld Blue, is rare and localized on highveld grassland between Potchefstroom in North West Province, Sasolburg in the Free State Province and Walkerville in Gauteng Province. This butterfly frequents hillsides on which *Becium grandiflorum* grows, flying fast and close to the ground from September to November. A small population has been detected

in the Walkerville area which is located more than 50km to the east of the survey area. No specimens were observed during the survey. Due to the absence of suitable habitat (highveld grassland with trees) as well as its larval food plant, the species can be considered absent from the survey area.

Chrysothrix aureus, commonly known as the Heidelberg Copper Butterfly, is a monophagous, myrmecophilous butterfly species, known from a handful of localities on the Heidelberg- Balfour-Greylingstad ridge system. It is not immediately apparent what the habitat of this species is, ie what factors determine suitable habitat. The known records represent colonies of this butterfly which occur around rock faces inhabited by the host ant species and where the host plant also occurs. Colonies are made up several tens of individuals which are active over an area of about 100m² in the vicinity of the ant colonies. The butterflies do not occur in areas where the host plant grows larger than about 1m in height. It has been speculated that the species only occurs at the highest altitudes on the ridge system, but there are some colonies found lower than the proposed suitable altitudinal range. It has also been speculated that it only occurs in 'rain shadow' areas on the ridge, usually on SE facing slopes, where the resultant water stress inhibits the production of allelochemicals in the host plant, but this has not been tested. Fire has been demonstrated to be important for the species in that it keeps the vegetation structure open (Terblanche et al 2003). Specimens of this species were not observed during the survey, nor does suitable habitat occur on the site.

Aloeides dentatis dentatis is a butterfly species known to be threatened by urban development in Gauteng. This species is known from three colonies in Gauteng, namely the Witpoortjie colony, the Glenvista colony and the Suikerbosrand colony. The latter colony is protected in the Suikerbosrand Nature Reserve and its larval foodplant is *Lotononis eriathrina*.

This plant was not found to be present on the site. The Witpoortjie colony is protected in the Ruimsig Entomological Reserve and its larval food plant is either *Hermannia depressa* or *Hermannia jacobaeifolia*.

A concerted effort was made to locate either the species itself, any of its three larval foodplants or its associated ant species *Lepisiota capensis*. Despite extensive searching, none of the three larval foodplants were observed on the site. It can therefore be confidently stated that *Aloeides dentatis* is absent from the site.

Ichnestoma stobbiai is a cetonid beetle of immense scientific interest and conservation concern. Females are flightless and adults emerge for only 2 - 4 days, thereby severely restricting this species in terms of gene flow and dispersal ability. *I. stobbiai* was previously thought to be extremely habitat specific and reside almost exclusively under tufts of the grass species *Eragrostis micrantha*. The location of new populations of this species in caravan parks and exotic gardens suggest that the species is more robust than previously thought. Apart from one population near Hartbeespoort dam, this species is found only in Gauteng and is severely threatened due its poor dispersal ability. There are currently eleven confirmed populations of this beetle in Gauteng, none of which occur in close vicinity of the survey area.

10.7 WETLAND / RIPARIAN DELINEATION AND FUNCTIONAL ASSESSMENT

Refer to **Figure 18** for the Wetland delineation area.

Please refer to the **Wetland Delineation Report** as completed by *Scientific Aquatic Service* in October 2018 and is attached hereto under **Annexure I1 & I2**.

10.7.1 Scoping of Work

Specific outcomes in terms of this report are outlined below:

- A background study of relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA] 2011 database; the Department of Water and Sanitation Research Quality Information Services [DWS RQIS PES/EIS], 2014 database and the Gauteng Conservation Plan V3.3 (2011) was undertaken to aid in defining the PES and EIS of the freshwater resources;
- A site visit was undertaken to verify the presence of watercourses within 500m of the proposed development;
- All freshwater resources identified within 500m of the study area were delineated in fulfilment of Regulation Government Notice (GN) 509 of the NWA using desktop methods;
- The wetland classification assessment was undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis et al., 2013);
- The EIS of the freshwater resources were determined according to the method described by Rountree & Kotze, (2013);
- The PES of the freshwater resources was assessed according to the resource directed measures guideline as advocated by Macfarlane et al., (2008);
- Freshwater resources were mapped according to the ecological sensitivity of each hydrogeomorphic unit in relation to the study area. In addition to the freshwater resource boundaries, the appropriate provincial recommended buffers and legislated zones of regulation were depicted where applicable;
- The DWS Risk Assessment Matrix was applied to identify potential impacts that may affect the freshwater resources as a result of the proposed development, and to aim to quantify the significance thereof; and
- To present management and mitigation measures which should be implemented during the various development phases to assist in minimising the impact on the receiving environment.

10.7.2 ASSESSMENT APPROACH

10.7.3 Background

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater resource verification of a previous assessment (SAS, 2009) for the proposed mixed-use development on the remainder of Portion 62 of the Farm Witpoortjie 117 IR, located in Brakpan, hereafter referred to as the study area in order to ensure the results obtained in the initial assessment are still valid. Both the initial and verification report have been included in **Annexure I1 & I2**.

10.7.4 Initial Report

Scientific Aquatic Services (Pty) Ltd was appointed to undertake an assessment of the extent of the wetlands that are present on the proposed development site. The Initial site assessment took place in December 2008 and January 2009.

The site lies within the C22C quaternary catchment and forms part of the headwaters of the Rietspruit. This catchment therefore forms part of the Vaal River Water Management Area.

10.7.4.1 **Wetland Assessment**

Four (4) wetland areas were identified in the delineation although wetland 2 (in the north) does not form part of the proposed development area (**Figure 18**).

- Wetland 1 – This consists of an extensive unchannelled valley bottom wetland which becomes channelled in some sections towards the south.
- Wetland 3 – This is the remains of a historical stream found in an area originating from tailings seepage. The channel probably only contains water following heavy downpour. The vegetation in this wetland is not typical nor pristine but in fact dominated by exotic species such as *Verbena bonariensis* and *Pseudognaphalium luteo-album*. The dominant grass, *Cynodon dactylon* is also indicative of disturbance. The presence of such species can mostly be attributed to increased wetness from seepage from the tailings dam, rather than a natural wetland system that may have historically been found there. Some impact on the vegetation due to impacts on soil chemistry is also deemed likely.
- Further south west of the slimes dam the channel is found. Although no water was observed in the channel, indigenous water loving grass species, eg. *Setaria sphacelata* and *Andropogon appendiculatus*, and herbaceous species, eg. *Nidorella anomala*, were abundant. Overall there was a low diversity of indigenous species as well as an abundance of exotic species. This area can be considered to have suffered a large loss of natural habitat, biota and basic ecosystem functions.
- Wetland 4 – Three (3) endorheic pans are located at the centre of the site. These pans have generally been significantly affected by alien encroachment, with special mention of *Verbena bonariensis* and *Bidens formosa*. Other significant impacts observed included disturbance of the pan substrate, as well as frequent veld fires impacting on the vegetation.
- The presence of the tailings dam has altered the integrity of wetland 3. Severe sedimentation is observed in the river to the east of the tailings dam. The tailings dam has also severely degraded the terrain at wetland 3.

10.7.4.2 **Rietspruit River Status**

A water quality assessment of the river course indicates significantly elevated dissolved salt concentrations (326.8 mS/m) that is likely to lead to significant impairment of the aquatic community both from osmotic stress, as well as impacts from particular toxicants at excessively high levels, low pH as a result of Acid mine Drainage from the adjacent tailings complex and impact on dissolved oxygen levels is evident. These impacts combined are likely to negatively affect the aquatic community.

10.7.4.3 *Wetland Functionality & Habitat Integrity*

SAS Environmental made use of the Intermediate Habitat Integrity Assessment (IHIA) method to assess the severity of impact of modifications on the riparian and in stream habitats. This serves as a useful measure of the Present Ecological State (PES).

The results of the assessment showed that there is a significant impact on the in stream habitat. Overall, the site achieved a 40% score for in stream integrity and a 71% score for riparian zone integrity. The site obtained an IHIA rating of 56%, which indicates largely modified (Class D conditions).

The most significant in stream impacts were bed and channel modification, along with impacts on water quality. Smaller impacts from flow modification and inundation were also observed.

Riparian impacts were again most significantly expressed as flow channel and water quality modification. Some impact from exotic vegetation encroachment and inundation were also noted.

10.7.5 *Freshwater Resource Field Verification*

Prior to the field survey, the previous assessment conducted by SAS (2009) was reviewed, in addition to digital satellite imagery (current and historical) to identify representative points of interest at which the current conditions of the freshwater resources could be accurately assessed, and the accuracy of the delineation verified.

10.7.5.1 *Field Verification Results*

Following the field investigation undertaken in September 2018, it was concluded that the freshwater resource delineations presented in SAS (2009) remain unchanged and are valid. No additional freshwater resources or wetland features were identified within the study area. However, current legislation requires the application of GN509 of 2016 as it relates to the NWA to identify all potential freshwater resources that may potentially be impacted by the proposed development. Therefore, the freshwater resources identified within 500m of the study area were delineated in fulfilment of GN509 of the NWA using desktop methods but were however not assessed further.

The freshwater resources within the study area have been historically altered through mining activities (northern section of the study area), residential developments (in the broader catchment) and through the construction of road and railway infrastructure in the system.

During the field assessment, freshwater resources, comprising four hydrogeomorphic (HGM) types, were identified within the investigation area. The freshwater resources were classified according to the classification system (Ollis, et al., 2013) as inland systems, falling within the Highveld Aquatic Ecoregion and the Mesic Highveld Grassland Group 2 wetland vegetation (WetVeg) group.

An unchannelled valley bottom (UCVB) wetland, two hillslope seep wetlands and three pans were identified in the study area. The natural extent of both the UCVB wetland and hillslope seeps has been augmented by seepage from the gold Tailings Storage Facility located north of the study area entering

these systems. This has resulted in saline soil and surface water conditions leading to a change in the natural wetland vegetation community. Additional anthropogenic activities impacting on the wetlands within the study area include the deposition of sediment, earthworks, proliferation of alien vegetation and the disposal of rubble and rocks.

The reclamation of the tailings storage facility (TSF) located to the north of the study area will result in the loss of hydraulic head and possibly redirect the recharge of the wetland to the catchment to the east of the catchment feeding this wetland. This change in the landscape will lead to the removal of the primary hydrological driver of the hillslope seep wetland adjacent to the TSF (hillslope seep 1). Thus, the need for future conservation of this wetland is questionable considering the long-term viability of the system functioning in the landscape.

An unnamed tributary of the Rietspruit River passes through the eastern portion of the investigation area in a southerly direction. This tributary of the Rietspruit River was defined as a river within a channelled valley bottom wetland, thus, for the purposes of this investigation, the definition of a wetland was taken as per that in the National Water Act (1998) (see Section 2.1). Runoff from the eastern third portion of the proposed development will drain towards this wetland. However, the railway line located along the south-eastern boundary of the study area acts as a barrier and will limit runoff from the proposed development into the system.

An artificial depression was identified in the western portion of the investigation area. This freshwater resource is best described as an area of artificial ponding formed due to altered topography as a result of the surrounding road and railway infrastructure.

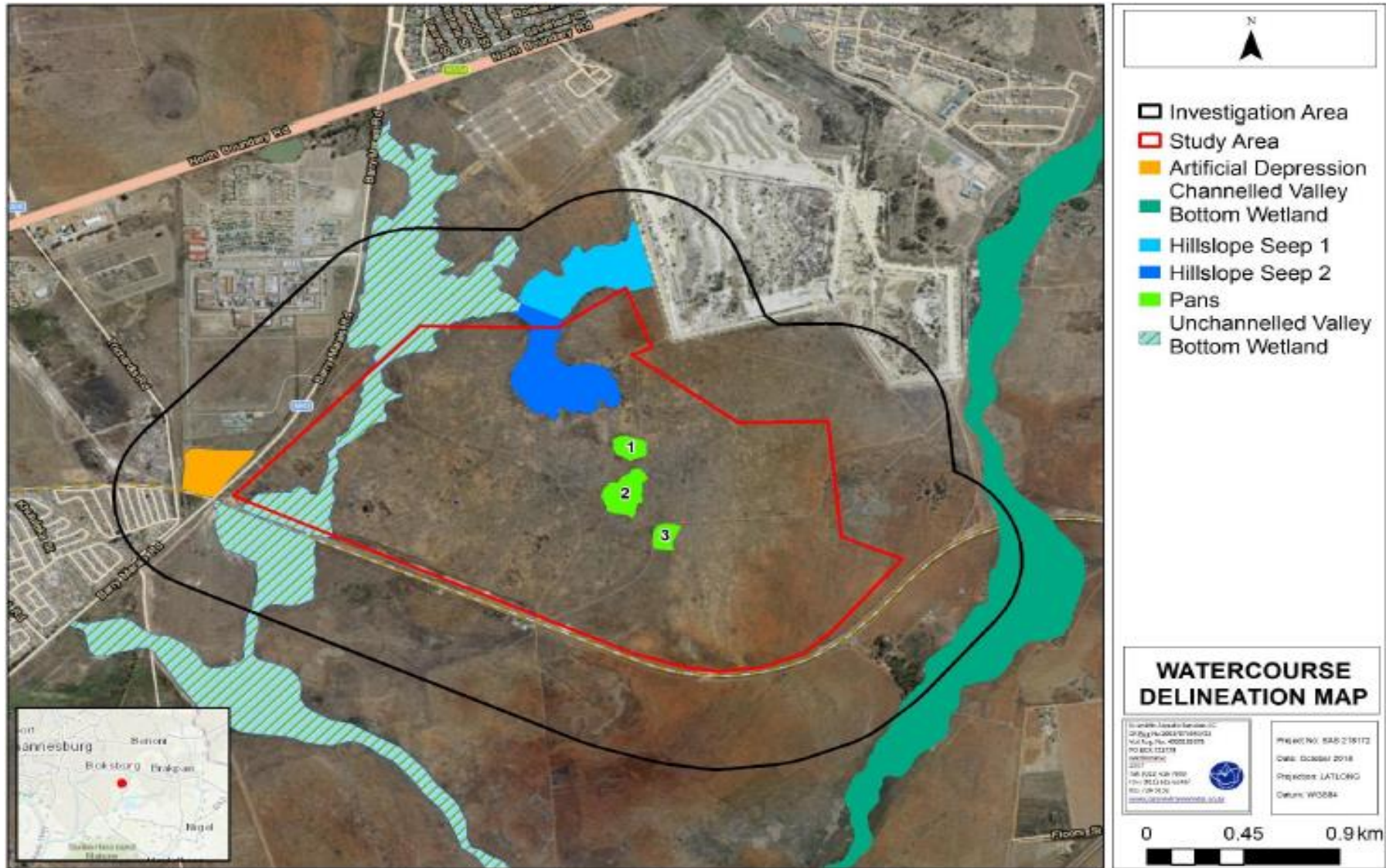


Figure 18: The location of the freshwater resources associated with the study area and regulated area.

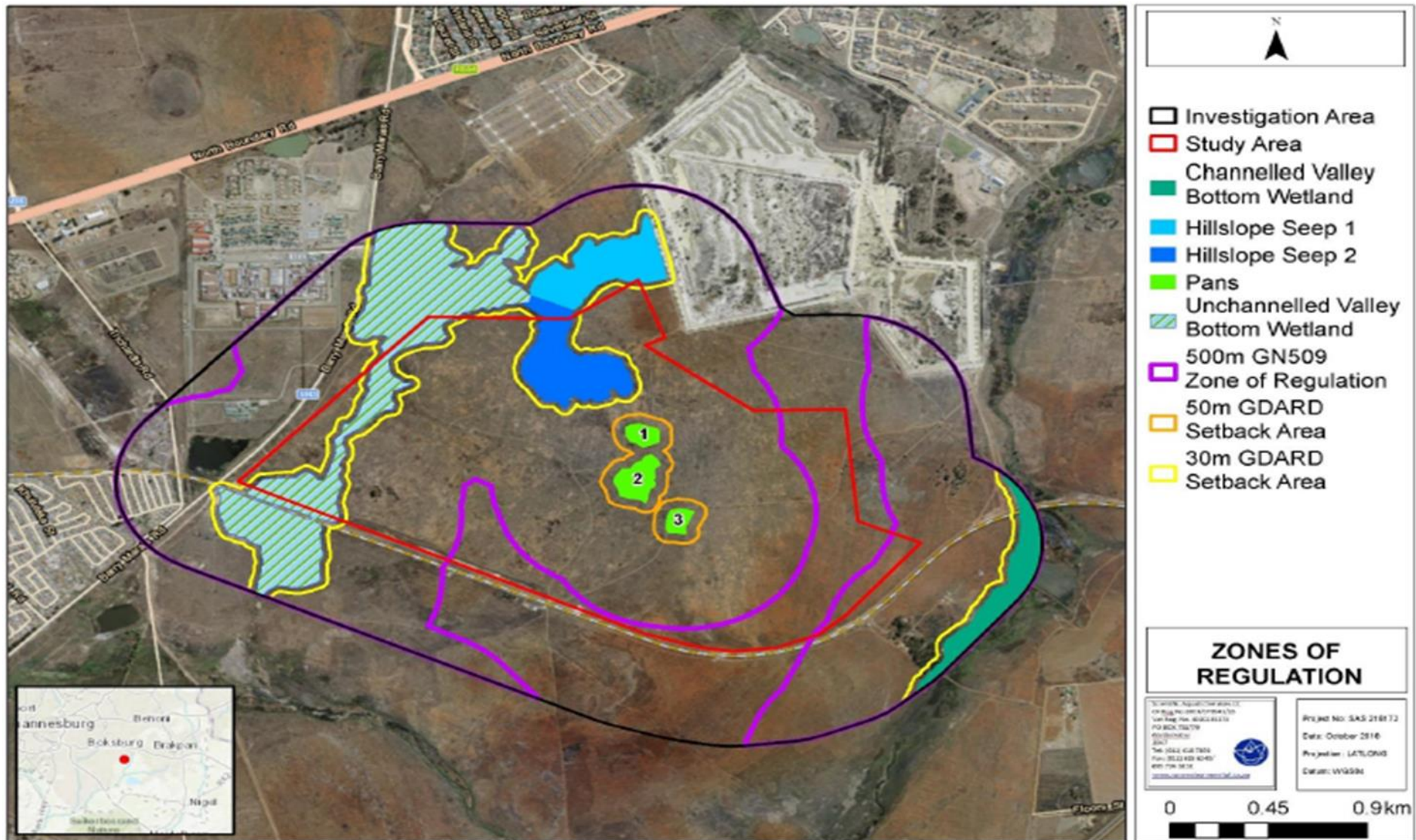


Figure 19: Conceptual presentation of the GDARD Setback areas and the zone of regulation in terms GN509 of 2016 as it relates to the NWA, in relation to the delineated wetlands.

11.0 DESCRIPTION OF SOCIO-ECONOMIC ENVIRONMENT

11.1 CULTURAL HERITAGE ASSESSMENT

For further information, please refer to **Annexure J** for the **Cultural Heritage Resources Impact Assessment** as completed by HCAC – Heritage Consultant CC as well as the approval letter from the Provincial Heritage Resources Authority.

11.1.1 Methodology

○ Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

○ Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the field work phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

○ Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any BAR process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process involved:

- Placement of advertisements and site notices
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation
- The compilation of a Basic Assessment Report (BAR). Interviews

○ Site Investigation

Conduct a field study to: a) systematically survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources recorded in the project area.

11.1.2 History of land use

Some details regarding early mining and other developments in the study area could be found at the National Archives and Records Service of South Africa (NARSSA). This will now be discussed.

An early application was found at NARSSA for prospecting licences on Witpoortje by one Godfrey Levyne. In 1906 he applied for a licence for 50 claims on this farm. This request was however denied, as no prospecting licence could be issued for Witpoortje by the District Registrar of Mining Rights.

By 1906 a Mining Lease (Mynpacht 523 of Witpoortje 162) had been registered in the name of Van Dyk Proprietary Mines Limited. The lease was extended for several years after that. In 1909 Van Dyk Mines applied for water rights on Mynpacht 523, Witpoortje 162.

The company's request was granted in 1910, though the application was made with the idea of protecting their own interest by obtaining unassailable title thereto, rather than commencing the construction of the dam wall immediately. The Acting Secretary for Mines believed that it would be a considerable time before the dam was built.

In 1910 Van Dyk Mines applied for Bezitrecht over the water rights attached to their mining lease. It is not known whether this right was granted or not.

By 1913 one Mr Kapp Senior was cultivating about two and a half square miles of proclaimed ground (not open for pegging) on Witpoortje 12. The owners of the farm, including this section, was Van Dyk Proprietary Mines Ltd. Mr Kapp was paying rent for the land and had erected a large kraal and outbuildings at the spot marked x on the map below (on Mynpacht 523), also owned by Van Dyk Mines.

By December 1936 an area of land on the farm Witpoortje 2, owned by Van Dyk Mines, had been set apart as a trading site by the Mining Commissioner of Johannesburg. This area had to be surveyed by the Beacon Inspector. A survey was done in 1937, but no map is provided.

On 21 August 1941, it was recommended by the office of the Prime Minister that Van Dyk Consolidated Mines Ltd. would be permitted to use the surface of an area of proclaimed land, held under mining title, situate on the farm Witpoortje 2 for the purpose of a cemetery with fencing. The same recommendation was made again on 14 November 1949. It is not known if this was for two separate cemeteries or for the same cemetery.

By November 1970 the Remaining Extent of Portion 62 of Witpoortje was registered in the name of Moria Mynbou (Edms) Bpk. This portion measured 789.6586 morgen. This land was being leased and was used exclusively for farming purposes.

By 1970, Portion 62 (RE) of Witpoortje 117 IR was approximately 790 morgen in extent, of which 180 morgen was taken up by a slimes dam. Application was being made to establish a township on this portion, and it would consist of nearly 3000 residential erven varying in size between 800 and 1000 square metres and would include business and general residential development. This township was the first of five that would cover some 670 hectares of ground within the Brakpan Municipal area. Other townships in the works were Libradene, Parkrand, Finaal and Van Dyk Park, as well as Dalpark Extension 1 and 2.

11.1.3 Findings

Although the area has been extensively disturbed, mostly by cultivation in the 1970's, 11 features including Stone tools and historical industrial artefacts as well as a large cemetery and stone cairns (that could mark informal graves) were identified (**Figure 20 & Table 9**). Sites numbers were given the prefix Witp as an abbreviation of Witpoortjie.

Table 9: Identified sites in study area

Site No.	Description	Longitude	Latitude
Witp 1	Small Dry pan with Stone Age Artefacts	28° 17' 19.1579" E	26° 16' 55.3691" S
Witp 2	Two circular features with sandstone blocks, carved sandstone, slag, metal and blowpipe elements.	28° 17' 15.8209" E	26° 16' 56.5103" S
Witp 3	More circular sandstone features containing metal, slag and blowpipe features. Linear sandstone wall foundations.	28° 17' 06.7633" E	26° 17' 07.2671" S
Witp 4	Thicket of eucalyptus trees containing more carved sandstone blocks, blowpipe elements, slag and metal artefacts.	28° 17' 17.4552" E	26° 17' 15.4933" S
Witp 5	Large dry pan towards the centre of the survey area with multiple locations where stone cores, tools and flakes were identified.	28° 17' 38.0507" E	26° 16' 56.9243" S
Witp 6	Stone tools found near the side of a gravel road on the edge of a smaller pan.	28° 17' 58.3189" E	26° 17' 05.7659" S
Witp 7	Graveyard containing 50+ graves	28° 17' 44.4553" E	26° 16' 28.8083" S
Witp 8	Rock outcrop with LSA	28° 18' 06.3973" E	26° 17' 40.1027" S
Witp 9	Stone cairns X3	28° 18' 03.4993" E	26° 17' 39.1344" S
Witp 10	Ruin	28° 18' 08.9063" E	26° 17' 41.9208" S
Witp 11	Stone Cairns X 5	28° 18' 14.6809" E	26° 17' 43.3607" S

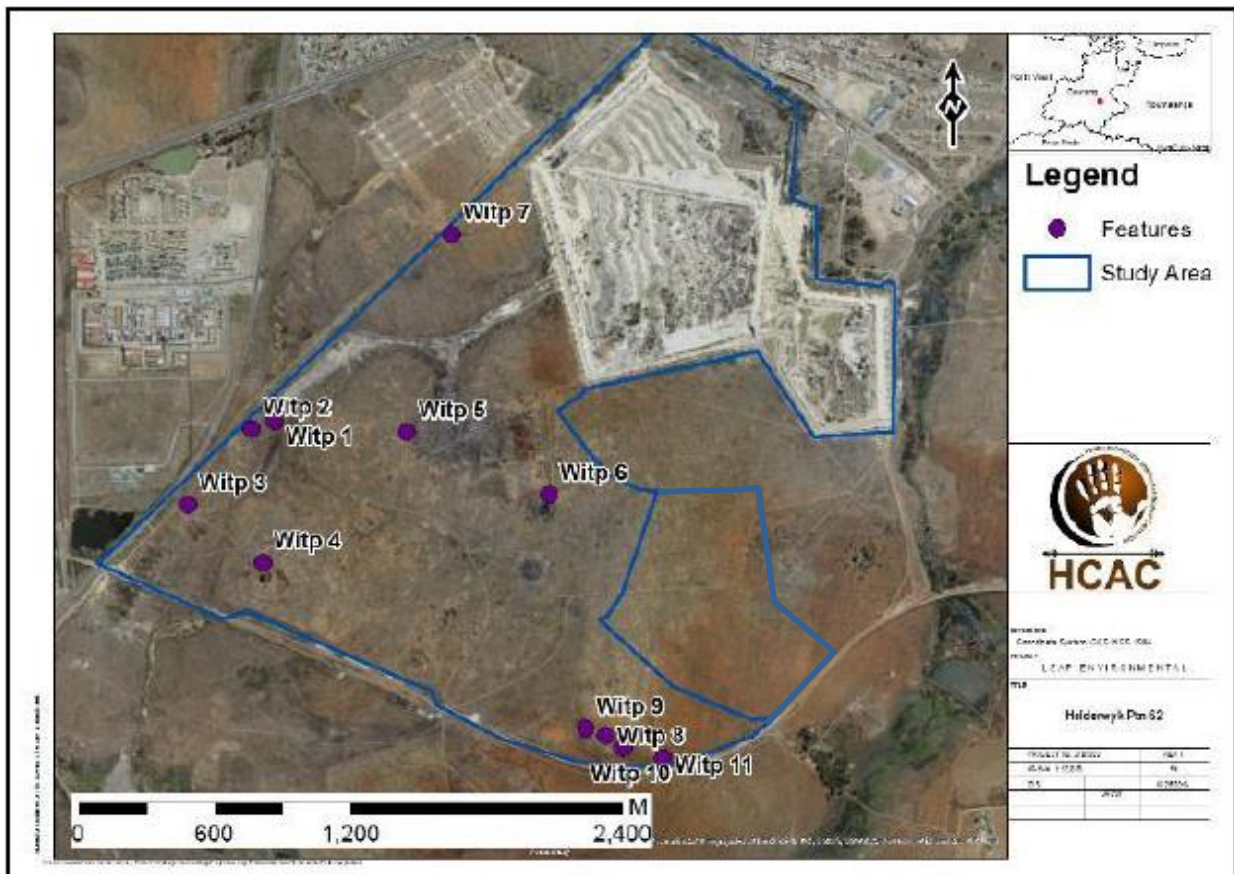


Figure 20: Identified Heritage sites on the proposed development

○ **Built Environment (Section 34 of the NHRA)**

Three separate areas were identified (Witp 2,3,4) comprising circular or dumped features containing high amounts of sandstone blocks, carved sandstone features, slag, metal fragments that seem melted as well as some elements of blowpipes used in a smelting process. Although not directly relating to the built environment these features are historical in nature and is included here due to the sandstone features that relate to structures.

Feature 2 is only two circular features close to the NW edge of the survey area and is marked by waypoint 080. These features seem to have been outlined with sandstone blocks. These are visible on google earth. The soil inside the features seem burnt and contain high numbers of slag, metal and blowpipe artefacts. There are very few glass and plastic remains within this feature.

Witp 3 contains similar artefacts to Witp 2 but is spread out over a larger area to the SW of Witp 2. This site seems more like a trash dump however still contains a high number of carved sandstones, slag, metal and blowpipe artefacts.

Witp 4 is situated in a thicket of eucalyptus trees ESE of Witp 3. This site contains scattered sandstone blocks and carved sandstone features along with slag, metal and blowpipe artefacts similar to Witp 2 and 3.

This area was owned by the Van Dyk Mines and has a mining history dating to 1910 and these artefacts are most probably related to historic mining activities. Therefore, the features are most probably older than 60 years and protected by the NHRA.

The foundations of a single rectangular stone-built structure were recorded as Site Witp 10. The foundations measures 10 meters long by 5 meters wide. No other artefacts were recorded here. This feature is according to the historical maps not older than 60 years. It should be noted that sites like these could contain unmarked graves.

○ **Archaeological and palaeontological resources (Section 35 of the NHRA)**

A large pan (Witp 5) is situated towards the centre of the survey area, where irregular and blade cores, together with flakes were identified in and around the outer edges of the pan. The pan covers an area of about 33 hectares where outcrops of small stones and pebbles contain a scatter of artefacts (artefact ratio 2 per m²) mostly on Crypto Crystalline Silica (CCS) and quartz. Two other smaller pans (Witp 1 and 6) also yielded artefact scatters along the edge of the pan on the same raw material. Miscellaneous flakes and cores were also recorded at a rocky outcrop at Witp 8. These artefacts are mostly micro lithic and therefore ascribed to the Later Stone Age.

In terms of the paleontological aspect of Section 35 of the NHRA the study area is of moderate to very high paleontological significance and additional studies will be required.

● **Burial Grounds and Graves (Section 36 of the NHRA)**

A large graveyard containing 50 + graves (Witp 7) was identified on the NW edge of the survey area about 400m from the corner of the slimes dam. These graves are all orientated E to W and marked by stone packed grave dressings. Only one gravestone was identified however it had no visible markings.

At Witp 9 and 11 respectively 3 and 5 elongated stone cairns were recorded. It is not certain what the purpose of these stone cairns are and could be the result of clearing of agricultural fields but could also mark informal graves.

● **Cultural Landscapes, Intangible and Living Heritage**

Long term impact on the cultural landscape is considered to be low as the surrounding area is marked by mining activities and residential developments. Visual impacts to scenic routes and sense of place are also considered to be low as the development is in line with the residential character of the area.

● **Battlefields and Concentration Camps**

There are no battlefields or concentration camp sites in the study area.

Implications

The impact of the proposed project on heritage resources is considered low and no further pre-construction mitigation in terms of archaeological resources is required based on approval from SAHRA. Furthermore, the socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures (i.e. chance find procedure) are implemented for the project.

From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the proposed mitigation measures. Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

11.2 SOCIO – ECONOMIC IMPACT

The subject property is situated in Ward 97. Ekurhuleni houses 6% of the country’s population and 26% of Gauteng’s population. It has a resident population of approximately 3 178 470 million people and 1 015 645 million households¹. The municipality has an average annual population growth rate of 2.47%. Between 2001 and 2011, the number of households in Ekurhuleni increased by 36.1%, a figure which was above the average national growth of 35.7%. This growth in population holds serious service delivery implications since it translates into increased demand for municipal services. Figure 21 below shows the composition and size of the different population groups in Ekurhuleni. The municipality is home to 79% Africans, 16% Whites, 3% Coloureds and 2% Indians. While Ekurhuleni aims to deliver services consistently to all those who need it, the sheer size and growth of the black section of the population over the years implies that most service delivery efforts will be expended on this group.

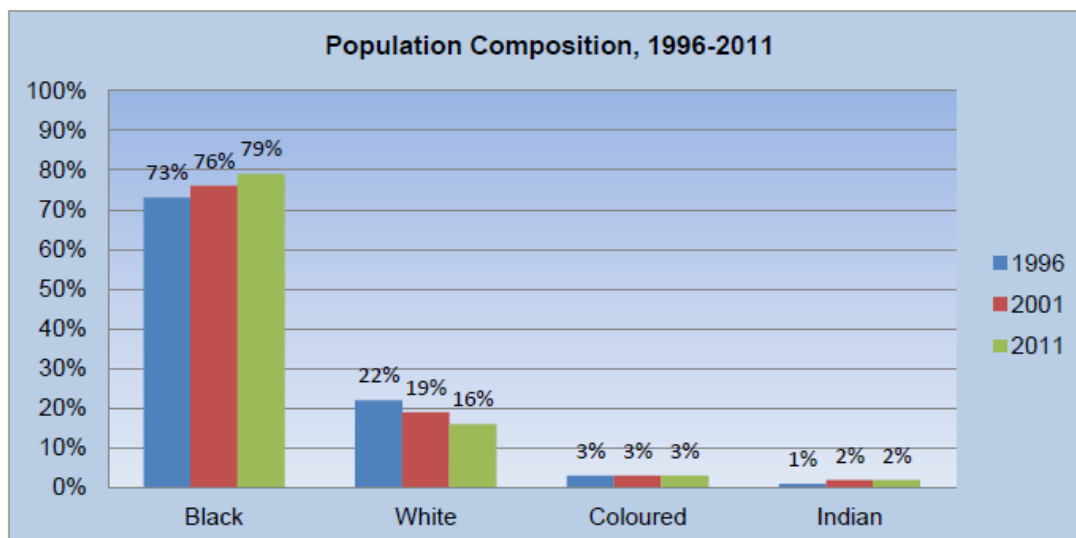


Figure 21: The composition and size of the different population groups in Ekurhuleni

Assuming steady population growth, **Figure 22** below shows comparative projections of population growth among Gauteng metros up to the year 2017. Ekurhuleni is the second biggest metro in Gauteng and accounts for 26%² of its population. It is expected to have a population of 3 485 697 at the end of the current term (2011-2016). Other projections based on the 2011 census data indicate that by 2019 Ekurhuleni’s population will reach 3 875 681 and increase by 451 000 people. Germiston and Boksburg are among the fastest growing towns in Ekurhuleni. City of Ekurhuleni’s general population increase is attributed to migration by those in search of work opportunities. In terms of city hourly population growth rate, Ekurhuleni adds 10 more people to its population every hour compared to Johannesburg which adds 53.

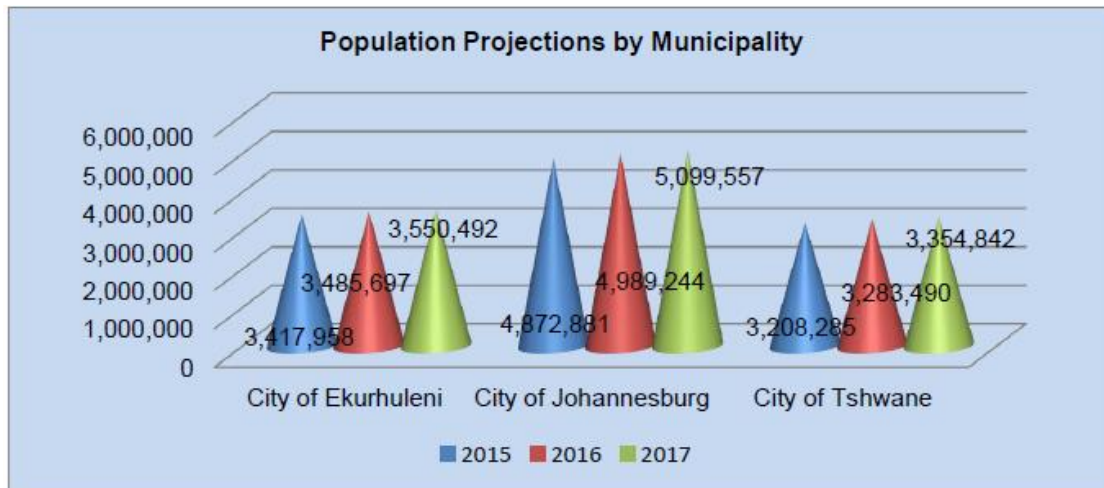


Figure 22: Population projections in Ekurhuleni

As can be observed in **figure 23** below, the pyramid shows an almost even distribution of genders with males at 51% and females slightly trailing behind at 49%. The predominance by males is probably as a result of migration where a typical migrant worker is, more often than not, a male. A large section of the population falls within the 15 to 39 years age group. With such a large population of young people, the metro is necessarily forced to implement programmes aimed at addressing the needs of this group. Consequently, Ekurhuleni has prioritized increased capacitation of youth and adults across the development continuum among its programmes.

Among these is the appointment of young people in various roles and their training through the youth development programme. Figure 23 also shows that EMM has a sizeable section of the population falling in the 0 to 4 years age group which calls for more early childhood development facilities. The implementation of programmes such as the increased participation of children aged 3 to 6 years in accredited early childhood programmes reflects City of Ekurhuleni’s keen awareness of this reality. Implementation of this programme also includes the construction of early childhood development centres in formerly disadvantaged communities such as Tsakane and Vosloorus to improve access. In addition, the quality of early childhood development services is also being improved through the training of practitioners in this field in both accredited and non-accredited courses. Between 2011 and 2014, a total of 5 332 early childhood practitioners have been trained on various courses in Ekurhuleni.

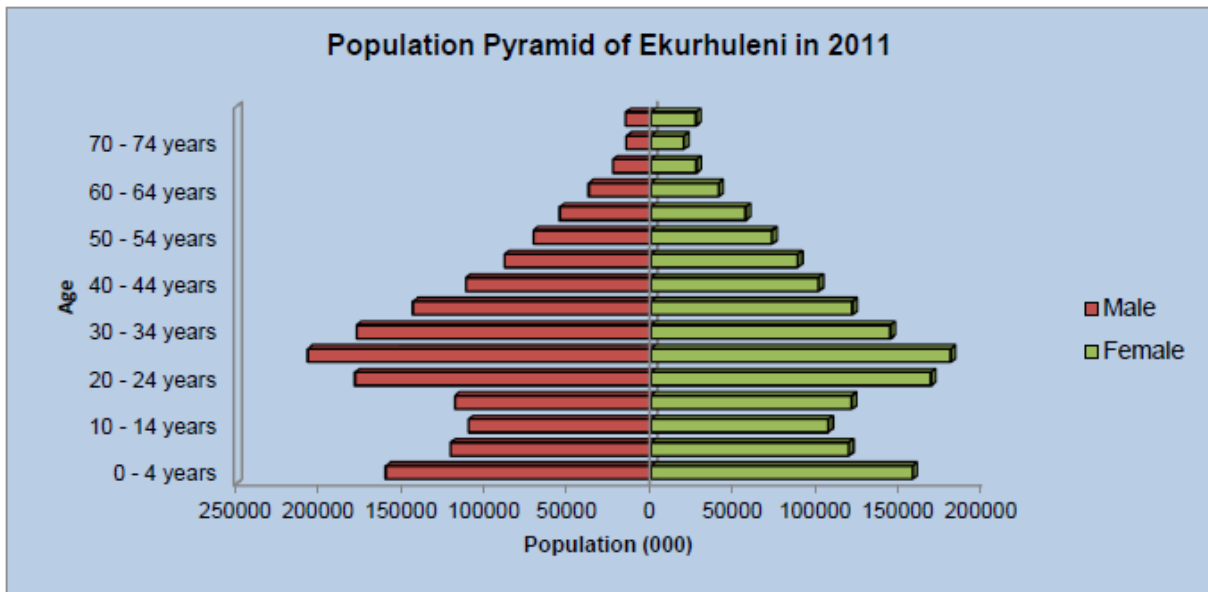


Figure 23: Population Pyramid

Figure 24 below shows that Ekurhuleni has improved its education levels, there are more people committed to completing their matric which is a basis for attaining higher qualification. Also, worth noting is the figure of those not schooling, which has decreased drastically by 6.3%. Town centres such as Kempton Park and Boksburg boast a high concentration of residents with tertiary education while townships such as Tembisa have experienced a strong middle-income growth through the attainment of high levels of education by residents. More than 47% of Tembisa’s population has a matric or higher education degree. This translates to more than 27 000 persons.

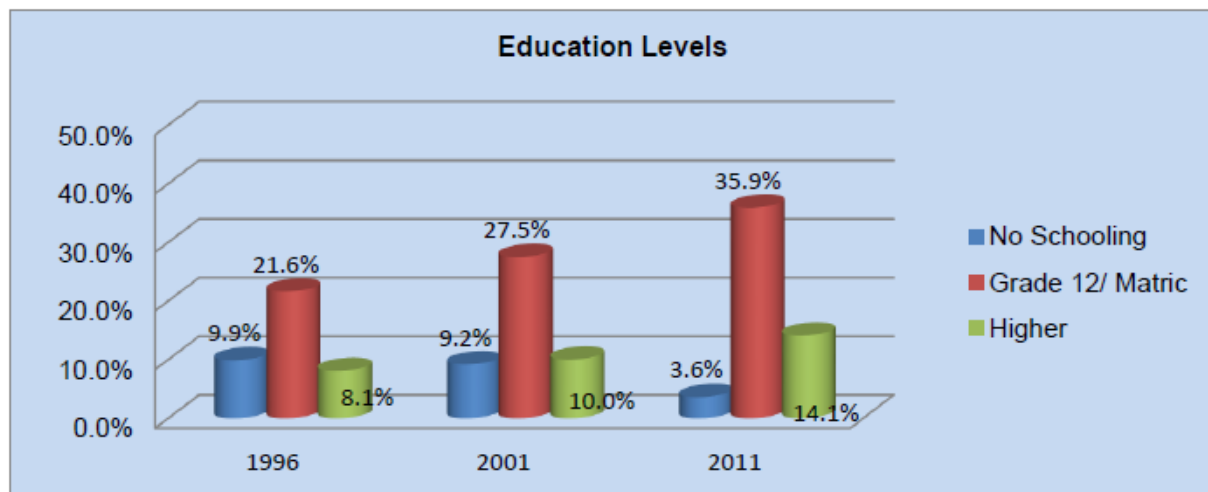


Figure 24: Education Levels

An improved education profile is a positive development as it implies that the metro has a literate workforce that is readily available to drive its economy. Be that as it may, the municipality still faces a major challenge when it comes to the full utilization of its available human capital especially the deployment of individuals with much-needed skills to drive its economy. Consequently, EMM has prioritised the acquisition of relevant skills by individuals through partnerships with institutions of higher learning such as the Vaal University of Technology (VUT). The municipality also has a Bursary Scheme

for qualifying individuals in different priority fields to ensure there is constant supply of the needed critical skills in Ekurhuleni.

11.2.1 Social and Economic Environment in relation to the proposed development

The need for more affordable housing in the Brakpan and Helderwyk area need no confirmation. The establishment of the residential township on the site is likely to positively impact on the socio-economic foundation in terms of job creation, especially during the construction phase and to a lesser extent during the operational phase.

The Boksburg Correctional Services prison is located approximately 700m west of the proposed development site opposite Barry Marais Road.

Van Dyk Park Primary School is located opposite North Boundary Road, approximately 1km north of the subject site. The NG Church Van Dyk Park is situated approximately 1.2km north of the proposed development site. These institutions cater for the surrounding communities. Van Dyk Park Hospital is sited approximately 1.4 km from the proposed development site in a northern direction across North Boundary Road.

Carnival City Casino is located approximately 2.5km north east of the subject site just off the N17 freeway. This centre provides a broad spectrum of services ranging from retail facilities, restaurants, recreational facilities and shops to the public living in the surrounding area. Sunward Junction is located at approximately 2.6km north west of the proposed development site.

Various sport stadiums and recreational facilities are located in close proximity to the proposed development site. An example of such a stadium is the Dalcrest Indoor Sports Centre which is located 2.6km north east of the proposed development site. Boksburg City stadium is located approximately 4.3km north west of the subject site.

Sunward Park Hospital is located approximately 4km north west of the proposed development site.

11.3 VISUAL INTEGRITY OF THE AREA

Due to the topography and location of the study area, the proposed development will have some visual impact. However, it could have a positive impact if the development is planned well and integrated into the surroundings.

The following visual criteria were used to determine what possible visual impact the proposed development could have on the surrounding environment:

Table 10: Visual Impact Analysis

PREDICTED IMPACT			
Visual criteria	Low	Medium	High
Quality of the area	The site or surrounding environment has little or no natural quality	The site or surrounding environment has some natural quality	The site or surrounding environment has a definite natural quality
Compatibility with surrounding environment	The development will blend in / compliment the surrounding environment completely	The surrounding environment will be able to accommodate the development without looking out of context	The surrounding environment will not be able to accommodate the development. Development will look abnormal in setting
Viewing distance	Continuous viewing distance to site is less than 500m	Continuous viewing distance to site is between 500 m and 1 km	Continuous viewing distance to site is more than 1 km
Visual acceptance capability	The environment can visually accept the type of development, due to its location adjacent to the existing CBD	The environment can moderately accept the type of development, due to its varied vegetation and land-uses	The environment cannot visually accept the type of development, due to its unvarying vegetation and land-uses

The visual assessment shows that the visual quality of the development can fit into the surrounding areas due to the similar scale and texture of the proposed residential units.

However, the views from the residential areas towards the site will be different than currently experienced. Although large areas of the natural lands will be retained, the residents will not be able to see it directly from their houses as it is currently perceived.

Implications

It can be deduced that the proposed development will be able to blend in with the surrounding environment and will not look out of place due to its location within the developing realm. However, the views from the surrounding areas will largely be changed to be a developed area rather than natural areas.

The architectural and landscape architectural guidelines for the proposed development will be developed to allow for a positive aesthetic influence on the surrounding environment. The guidelines will include placing of buildings, aspects of finishes, lights pollution, colours to blend into the surrounding colours, heights of buildings, and roof finishes. Aesthetics and contextual appropriateness is to be a major aspect of these guidelines.

12.0 ENVIRONMENTAL COMPOSITE MAP

An Environmental Composite Map was configured to clearly understand the various environmental characteristics and areas of significance that could be taken into consideration. This map indicates the following in relation to the proposed development site:

- Geotechnical Zones
- 1:100 year floodline delineation
- Contours
- High, medium and low ecological sensitivity
- Red data species with buffer areas.
- Riparian areas with buffers

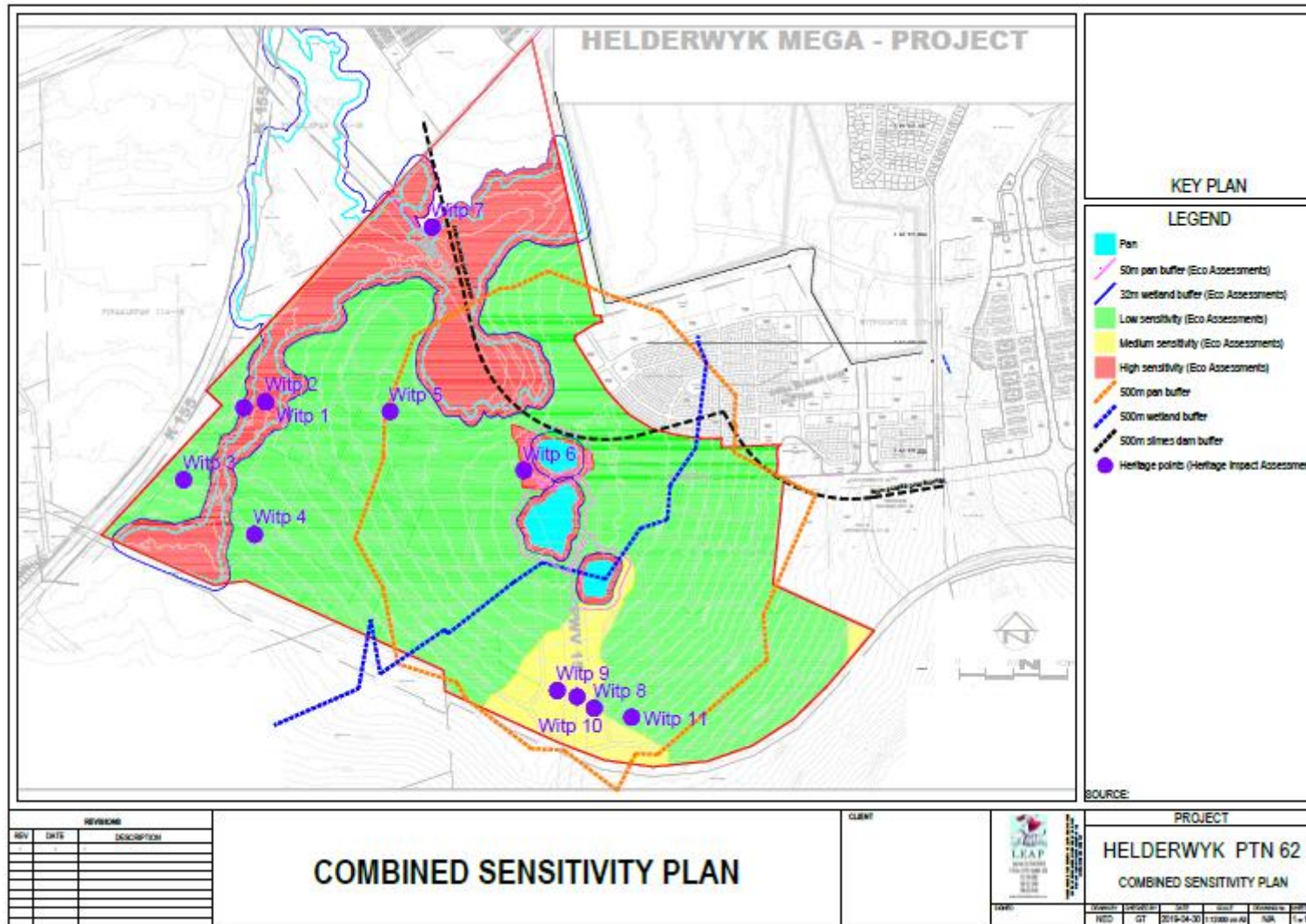


Figure 25: Combined Sensitivity Map over layout (Refer to Figure 3 for most recent layout)

13.0 INFRASTRUCTURE AND SERVICES

13.1 TRAFFIC AND ACCESS ROUTES

Please refer to **Annexure L** for a **Traffic Impact Assessment Report** as completed by *Tech IQ* for the proposed Mixed development.

13.1.1 Background to the Existing Transportation System

Rail – The closest operational rail station to the site is the Dunswart station in the Boksburg / Benoni Industrial Area. The Voelfontein Station on the rail corridor between Roodekop in the west and Brakpan / Springs in the east is not currently in operation. The Passenger Rail Agency for South Africa (PRASA) has confirmed that this corridor forms part of the long term rail proposal for the Kwatsaduza north-south link covering Kwathema, Tsakane and Dudiza that will link to the existing Springs and Boksburg east-west commuter rail corridor.

Road Based Public Transport – The Helderwyk area is primarily served by the minibus taxi mode of public transport. This trend can be expected to continue, and it is proposed to utilize some of the land earmarked for community facilities.

Provincial Roads – The application site is affected by a number of provincial roads, either directly or indirectly, where access will be obtained via adjoining properties. In all three cases the preliminary designs have been accepted and an assessment of the regulatory measures of Sections 7 and 9 of the Gauteng Transport Infrastructure Act (GTIA) indicates that no further measures are required to comply with the requirements of the GTIA.

These roads include:

- **Provincial Road PWV15**

The PWV 15 is planned provincial freeway that traverses the application property from south to north. No direct access may be obtained from the freeway, but provision has been made for an interchange where the east-west arterial through the township intersects with the PWV15.

The PWV15 was included in the list of roads where the preliminary design had been accepted (Government Notice 2626, Provincial Gazette No. 331 of 20 August 2003) in terms of the Gauteng Transport Infrastructure Act. The road reserve of the PWV 15 has been excluded from the township and no further regulatory measures have to be taken into consideration in the TIA.

- **Provincial Road K155 (Barry Marais Road)**

The K155 is also regulated in terms of the Gauteng Transport Infrastructure Act and is included in Notice 2626. The road reserve has been proclaimed although the route does not directly affect the application property.

Two approved access points on the K155 can serve the application. The northern intersection is an existing T Junction that provides access to the prison. A public transport lay by has been constructed at the junction, but no right turn lane has been provided. The intersection will be upgraded as part of the proposed township.

The access at the southern intersection has been closed. This intersection is the position where the proposed east-west arterial through the proposed township joins Barry Marais Drive (K155).

The 750m spacing requirement of the GP DR&T prevent that an additional intersection be provided north of the Railway Line and south of the existing southern access point.

- **Provincial Road K132 (North Boundary Road)**

This road includes a divided 4 lane road that runs more than a kilometre north of the application site. North Boundary Road will provide access to the site via the adjoining properties.

The K132 crosses the K155 at a bridge (road over road) and the Council intends constructing a quarter link connection to accommodate traffic between the respective roads.

Metropolitan Road Network – Figures 5.1 and 5.2 of the TIA illustrate the planned major road network that will integrate with the provincial road network (this follows from discussions between HS Joubert and Dudley Garner of Ekurhuleni Council in August 2011). The planning provides for the following access points to Helderwyk Estate:

- Access from East/West via a Class 2/3 Arterial that links with the K109 in the east
- Future access across railway line to the south by means
- Interchange on PWV15 at east-west arterial
- Two full access intersections on K155
- Access from north boundary road via a Class 3 road that will cross south boundary road
- Several other north-south roads that serve the areas to the north and east of Helderwyk Estate.

Local Road Network – The local road network has been designed to distribute traffic within the township and provides access to each property with due consideration to the needs of private cars, delivery vehicles, public transport and pedestrians. It is important to note that the local road network has been developed within the framework of the major road planning of both the Gauteng Province and the Ekurhuleni Metropolitan Municipality.

The Amendment of the land use rights and the removal of some road links across environmentally sensitive areas (so as to reduce the impact on the wetlands), necessitated a revision of the access and transportation plan to serve the proposed development. This traffic analysis considers how the traffic flows and access is likely to change across three scenarios over time as the nature and extent of the Helderwyk Development progresses per phase.

13.1.2 These scenarios consider the following aspects –

i. Vehicle ownership - Initially it can be assumed that the area will be occupied by residents in the very low vehicle ownership category. However, in time vehicle ownership can be expected to increase and in the final evaluation it is assumed that vehicle ownership will eventually be in the low vehicle ownership category.

ii. Business development - The township layout provides for business development in the area surrounding the planned interchange on the PWV15 freeway. These properties are not expected to develop before construction of the PWV15 and business is expected to initially focus primarily on the local community. In the long term, when traffic will be able to make use of the PWV15 interchange, business development will increase in response to exposure to external traffic. The analysis only includes primary trips, because pass-by and diverted trips do not affect the external road network.

iii. Commercial development - Similar to the business development, the commercial part of the township will only fully develop in the long term.

iv. Public transport - Helderwyk Estate is bordered by a railway line with a planned station along the southern boundary of the property. A public transport terminus is an essential element of the Helderwyk Estate development and initially 50% of the recommended TMH17 adjustment factor in respect of public transport nodes and corridors will be applied. In the long term it can be expected that road-based public transport services will be improved and the commuter rail may also be introduced. In the long term scenario, the full adjustment has been applied.

v. Road network - In the initial phase, the township will only be served by the intersection of the east-west arterial on Barry Maris Road (K155). In the medium term it is assumed that a partial intersection will be introduced. This intersection will, inter alia, provide improved access to the commuter rail station from the south along K155.

The final analysis also includes the PWV15 and an interchange with the east-west corridor and 25% of the Helderwyk Estate trip generation has been assigned to the interchange. The interchange will obviously also serve a wider area and will lead to an increase in the traffic demand from the east via the east-west arterial.

13.1.3 The capacity analysis of the three traffic scenarios indicates the following:

- I. In the initial period when vehicle ownership is expected to be very low and businesses are expected to primarily serve local residents, a single intersection on K155 with the necessary turning lanes will be adequate to accommodate the projected traffic demand.
- II. With traffic growth as a result of an increase in vehicle ownership, as well as some increase in business development, the capacity of a single full intersection on K155 is not enough to efficiently and effectively accommodate the expected traffic demand. If the capacity of the

intersection is complemented by a partial intersection that can divert right turn volumes from the south along K155 away from the intersection of the east-west arterial on K155, acceptable traffic conditions can be achieved.

- III. In the longer term, vehicle ownership levels can be expected to increase, which will lead to an increase in traffic volumes. It is assumed that PWV15 will be constructed at this stage and that the external traffic on K155 will not exceed Scenario 2. The further development of the road network is therefore expected to accommodate the long term increase in traffic demand.

Based on the Traffic Report (Tech IQ Project No J011/613/1, March 2012), the “*Application for access to the provincial road network: Helderwyk Estate: Remainder of the farm Witpoortjie 117 IR, December 2013*”, the response of the Gauteng Department of Roads and Transport (e-mail, 24 January 2014) and the comments received from Gauteng Department of Agriculture and Rural Development regarding the environmentally sensitive area traversed by the access roads to Helderwyk Estate, the traffic analysis was revised to assess the impact of the loss of two access roads, as well as to take the proposed increase in the number of dwelling units in Helderwyk Estate into account. The analysis is based on three scenarios, namely:

- i. Very low vehicle ownership (VLVO) scenario in the short to medium term. This scenario is based on a single access on K155 / Barry Marais Road and the analysis confirmed that efficient and effective traffic operations can be expected with practical and feasible improvements to Barry Marais Road. Only limited business and commercial developments are assumed in this scenario, based primarily on local needs for goods and services.
- ii. “*Transitional*” scenario in which the vehicle ownership is a 50:50 combination of low vehicle ownership (LVO) and very low vehicle ownership (VLVO) and an increase in business and commercial development.

This scenario requires additional upgrading of the access on Barry Marais Road, particularly to accommodate the high right turn ingress and egress manoeuvres, as well as a partial intersection on Barry Marais Road south of the primary access.

The function of the partial intersection could also be provided by a second full intersection opposite the T-junction that provides access to the prison west of Barry Marais Road, but the partial intersection is preferred because it will have minimal additional environmental impact. A full motivation will be submitted to Gautrans in terms of its 14 criteria policy regarding partial intersections.

- iii. “*Low vehicle ownership*” (LVO) scenario that assumes that in the long run vehicle ownership levels will increase and also assumes improved public transport corridors and that the PWV15 freeway plus the planned interchange in the centre of Helderwyk Estate will be in place. Business and commercial developments are further expanded, based on the accessibility to a wider catchment area created by the new interchange.

It is assumed that 25% of external traffic will make use of the PWV15.

The railway line along the southern boundary of Helderwyk Estate, including a planned Voëlfontein station, has the potential to significantly reduce road traffic volumes in the long term.

It is concluded that the planned provincial and metropolitan road network provides a transportation framework for the sustainable development of Helderwyk Estate.

1. From a traffic engineering perspective it is recommended that authorisation be granted for the township development to proceed.
2. From a road network development point of view it is recommended that a phased implementation programme be followed, including the following:

i. Initial development phase

An incremental implementation programme should be followed, including the following:

- Construct the first carriageway of the east-west arterial as first phase to provide access to the development. The road can be constructed incrementally in sections as required by the development
- Construct the intersection of the east-west arterial on Barry Marais Road (K155) with the necessary turning lanes
- Install traffic signals at the intersection of Barry Marais Road (K155) and the east-west arterial once warranted in terms of the SARTSM
- Construct internal road network as part of the implementation of the development
- Upgrade the east-west arterial and its intersection on Barry Marais Road (K155) as required by the growing traffic demand of Helderwyk Estate
- The Gauteng Provincial Department of Roads and Transport and the Municipality should co-operate to construct the quarter link between K155 and K132 (North Boundary Road / P58-1) to replace the current connection via Keurboom Street, to provide for the expected high turning volumes between K132 and K155.

This phase of the development will eventually require the following:

- Two lanes per direction plus auxiliary turning lanes and traffic signal control on the east-west arterial
- Traffic signal control at the intersection of Barry Marais Road (K155) and the east-west arterial with the following lane configuration at the intersection:

South (K155)	Straight: one lane Right turn: two lanes
East (arterial)	Left turn: one lane Right turn: two lanes
North (K155)	Left turn: two lanes Straight: two lanes

- Quarter link between K155 and K132 with two traffic lanes per direction and at least the following turning lanes at its intersections with the respective K-roads:

Intersection of the Quarter Link and K155	
South	Right turn: two lanes
East	Left turn: two lanes

Intersection of the Quarter Link and K132	
South	Left turn: one lane Right turn: two lanes
East	Left turn: one lane
West	Right turn: one lane

ii. Transition scenario

The transition scenario excludes any diversion of traffic to PWV15 and is therefore the critical scenario as far as Helderwyk Estate is concerned and no further upgrades are anticipated for the ultimate development.

- Barry Marais Road requires three lanes per direction between the access and the quarter link. It would therefore be necessary to construct K155 (Barry Marais Road) as a dual carriageway road, i.e. the second carriageway will be required along this section of Barry Marais Road
- The intersection of the east-west arterial and Barry Marais Road (K155) should be upgraded to the following lane configuration:

Intersection of the Quarter Link and K155	
South	Straight: two lanes Right turn: two lanes
East	Left turn: two lanes Right turn: three lanes
North	Left turn: two lanes Straight: two lanes

- The east-west arterial will require additional capacity upgrades to three westbound lanes on the approach to K155
- Quarter link. Intersection of the quarter link at K132 and K155 will require upgrading to at least the following turning lanes:

Intersection of the Quarter Link and K155	
South	Right turn: two lanes
East	Left turn: two lanes

Intersection of the Quarter Link and K132	
South	Left turn: one lane Right turn: two lanes
East	Left turn: two lanes
West	Right turn: two lanes

The traffic assessment for the proposed establishment of a partial intersection along the K155 and south of the proposed East/West arterial (parts of the area affected by this intersection fall outside the scope of this authorisation and hence a separate NEMA application may be required to authorise the construction of the partial intersection). This intersection was originally considered as an optional additional access, but has now become essential to accommodate the traffic demand that can no longer make use of the access routes that had to be abandoned owing to the environmental concerns raised by GDARD.

The assessment of the proposed partial intersection on K155 (Barry Marais Road), on the section south of the T-junction of K155 and the proposed new east-west arterial between K155 and K109, indicates that the proposed partial intersection complies with all 14 criteria listed in the *Draft Partial Access and Marginal Access Policy* of Gautrans, dated 13 March 2009.

It is recommended that the partial intersection be approved in principle and that geometric design drawings and a way leave application be submitted to Gautrans for approval prior to construction.

As part of the Environmental Impact Assessment process, Gautrans is requested to confirm that against the background of the planned provincial major road network, the development of Helderwyk Estate is sustainable from a transportation point of view.

A Traffic Impact Study has been submitted to the Municipality and Gautrans as part of the township application process to determine the extent of the upgrading of the road network that will be necessary to accommodate the impact of the proposed Helderwyk Estate township. (Once known and where applicable, a NEMA application will be lodged for the construction of the Partial Intersection).

13.1.4 CONCLUSION AND RECOMMENDATION

Based on a good knowledge of the transportation system in the vicinity of the proposed Helderwyk Estate, previous traffic impact assessment (Salfin Extension 1, 2 and 3 as well as Badenhorst Estate), consultation with the Municipality, other developers and the Gauteng Department of Roads and Transport, consultation with the Passenger Rail Agency of South Africa (PRASA), an evaluation of the provincial road network as required in terms of the Gauteng Transport infrastructure Act (Act 8, 2011), a traffic analysis for the 2021 horizon year and a capacity analysis of all significant intersection in the study area for two land uses scenarios, it is concluded that:

- The proposed provincial and metropolitan major road networks can accommodate the projected future traffic demand, including Helderwyk Estate, as well as other known township applications in the area.

- Traffic signals have to be installed at the intersection of Keurboom Street and P58-1 (K132). The developer of Salfin X1 and X2 has accepted the responsibility to install traffic signals at this intersection.
- Barry Marais Road (K155) will have to be doubled within the 10-years planning period, without the traffic generated by Helderwyk Estate (or the approved and planned townships in the area).
- Local network improvements can be implemented on a phased basis as the development progresses.
- Public transport will play a major role to accommodate the expected future traffic demand and provision must be made for public transport facilities.
- Walking is an important mode of transport and provision must be made for paved pedestrian walkways along all arterial roads, as well as residential collector streets.
- A rail commuter station can be expected in the medium to long term and the township layout and road network should enable efficient and convenient access to the station area.

At the meeting between developers, the Municipality and the Gauteng Department of Roads and Transport, it was agreed that although the planning by the Municipality provides a good basis for the planning of the area, it may be necessary to amend the proposals of the Municipality to mitigate the impact of these proposals on adjoining developments. After consultation with the affected land owners, it has been concluded that it is technically feasible to amend the road network to reduce its impact on adjoining properties and that such changes will not have a significant impact on traffic patterns on the major road network. It would therefore not be necessary to amend the 'traffic demand estimate or the capacity analysis and that the proposed network would be able to accommodate both Helderwyk Estate and the other developments in the area.

Based on the traffic assessment it is recommended from a traffic engineering point of view that:

- The major road network proposed by the City of Ekurhuleni should be acceptable in principle, including the intersection of the new proposed metropolitan arterial road on the proposed quarter link that connects K155 (Barry Marais Road) and K132 (P58-1 North Boundary Road).
- The township establishment application for Helderwyk Estate be granted.
- A record of decision that will enable the development of the township be issued.
- The township layout should take pedestrians and public transport into consideration, particularly the planned commuter rail station.
- Road design should include provision for pedestrians and public transport lay-bys.
- Provision be made for a public transport modal transfer facility as part of the land earmarked for community facilities.
- The applicant should contribute to the upgrading of the external road network according to the engineering services contribution policy of the City of Ekurhuleni.

Road infrastructure be provided in phases as the proclamation of portions of Helderwyk Estate progresses and the extent of roads and road improvements must be specified in the Engineering Services Agreement between the Municipality and the applicant.

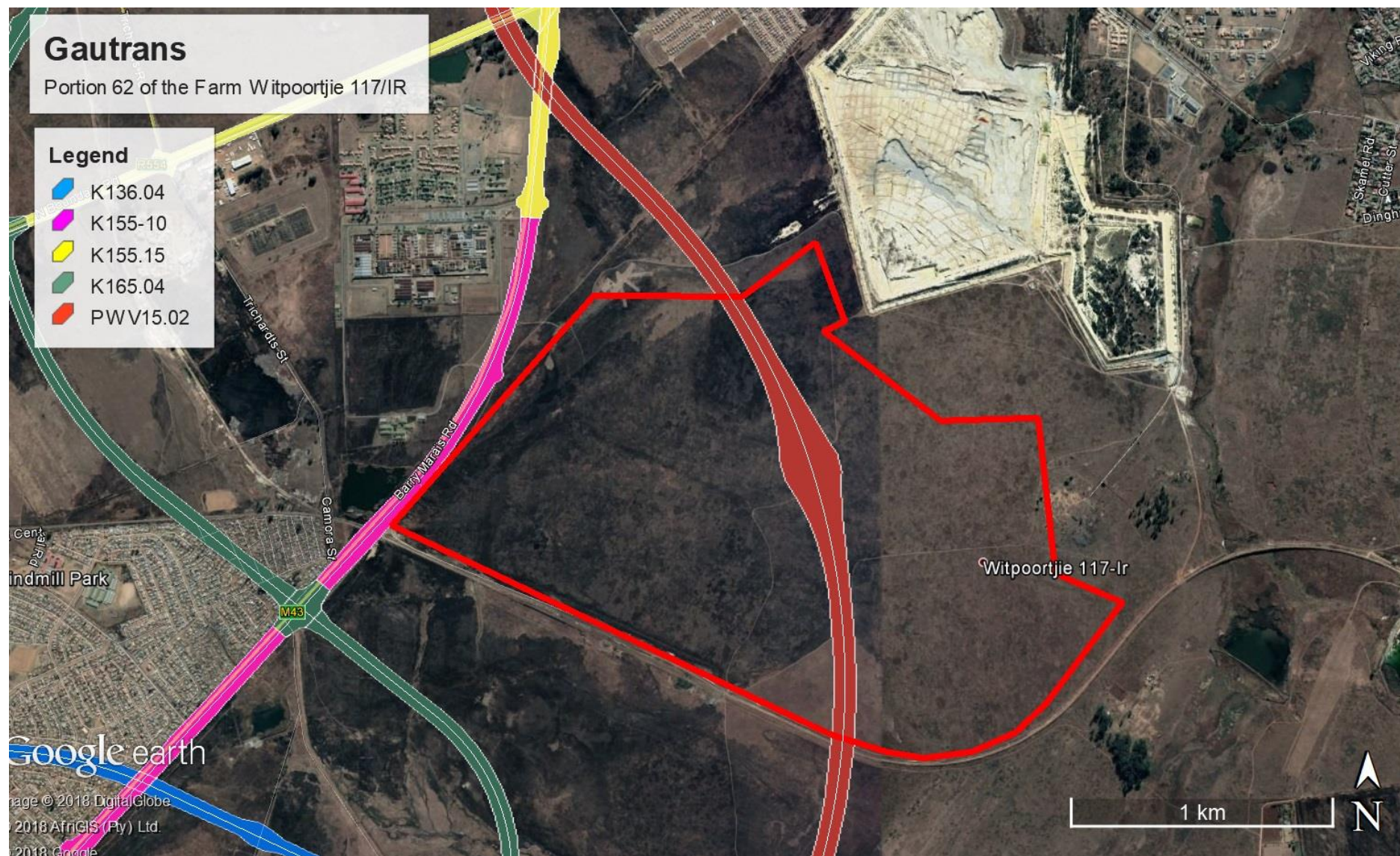


Figure 26: Gautrans roads

13.2 CIVIL SERVICES

Please refer to **Annexure M – Civil Engineering Services Outline Scheme Report** as completed by *De Reuck & Associates Consulting Engineers (PTY) Ltd.*

13.2.1 Water Capacity and Supply

13.2.1.1 Existing:

The City of Ekurhuleni has applied for a connection from the existing 2100mm diameter Rand Water Line as a temporary supply to the development and an ultimate dedicated connection from the future reservoir to be constructed to the north of the proposed development, as a permanent supply.

A 400mm diameter bulk water main supply to the development has been allowed for to service Helderwyk Extensions.

13.2.1.2 Proposed:

The proposed link to the existing Rand Water line and internal reticulation will consist of uPVC Class 12 pipes (Z lock type) in 400mm, 200mm, 160mm and 110mm diameter pipes with designed concrete restraint blocks.

All fire hydrants will be positioned to meet the requirements of the Emergency Services and Ekurhuleni Water Department.

The estimated average daily peak demand of the water is in the order of 22 756 kl/day, with a peak factor of 4.0 and an average demand of 2300 litres/500m²/day for sectional title and 1200liters/day per stand. This is a flow rate of 263.4 litres per second.

Currently an EIA is under way for the expansion of the Rand Water Line from the South to the Rynfield Water Reservoir.

13.2.2 Sewerage Capacity & Outfall

13.2.2.1 Existing:

An existing 375mm diameter outfall sewer reticulation is available in the road reserve of South Boundary Road into Barry Marais Road, to the west of the development, to which the west portion of the development will drain.

The east portion of the development will drain to the existing 750mm diameter outfall sewer that drains southwards along the watercourse. This system belongs to ERWAT and the total development drains to the Vlakplaats WWTW. It has been indicated that there is sufficient capacity in both systems to accommodate the development.

13.2.2.2 **Proposed:**

The proposed sewer reticulation will consist of 200mm and 160mm diameter uPVC Class 34 or Maincor Class 400 sewer pipes. All manholes will be 1050mm diameter precast rings, with concrete covers and frames with sealed joints. A maximum spacing of 80m between manholes will be designed for. House connections will be provided for as either long or short connections, 1.0m within the stand boundary and a maximum depth of 2.5m. The design flow is as follows:

Discharge per 500m ² /day	2000litres
Peak Factor	2.3
Extraneous Flow	15%
Peak wet Weather design flow	12 579.6 Kl/day (145.6 litres/sec)

13.2.3 **Stormwater Management**

The total area of the development is 322 ha draining to both the south eastern water course and to the north and west wetlands. Stormwater generated by the proposed development will be piped and discharged into individual attenuation structures and then into low lying wetland areas to the west, and to the existing water course in the east.

The internal discharge for each residential 3 stand would be collected in attenuation dams sized to attenuate both the 5 year and 25 year post developed runoff to the pre-develop run off. The attenuation dams will be sized on an average size of 360m³ per hectare.

No attenuation will be located within the 1:100 year floodline and appropriate discharge structures will be constructed to include riffle beds and headwalls that prevent erosion at outlet points. These are envisaged to extend an area of 20m x 10m and serve as anti-erosion measures downslope of the attenuation ponds.

The minor storm will be calculated on a 1:5 year recurrence period, and the major storm would discharge to the existing water course. The anticipated discharge from the free hold stands will be collected on site in order to be used for watering of gardens and possible flushing of toilets and the excess will be discharged into a piped system varying from 450mm to 900mm diameter pipes. The remaining stands will discharge to the existing wetlands and area drainage system.

It is proposed that where roadways cross the wetlands, that these crossings be constructed as culvert sections (eg. 2.0 x 2.0 m sections) in order to allow for the build-up of stormwater discharge to flow freely throughout the wetland area, and also allow for safe movement of animals (Fig 14). There are three proposed crossings and the crossing widths vary from 10m to 40m. These are not suited for bridge construction.

13.3 ELECTRICAL SUPPLY

Nortje & Associates was appointed for the design of the electrical supply. The following is an extract of the pertinent issues of concern and the recommendations are:

13.3.1 Electrical Capacity & Supply

Nortje & Associates was appointed by New Canada Developments CC as consultants for the design of the electrical engineering services for the proposed development (**Appendix K**).

13.3.1.1 *Existing:*

Currently, inadequate capacity exists at the Fortmann Substation or Van Eck Substation to meet the electrical demand of the proposed development or surrounding developments.

As a number of developments are proposed in proximity to each other and lie on the border of Boksburg and Brakpan Service Delivery Centres, it is suggested that a holistic approach be taken to find possible solutions to meeting the demand of the relevant developments.

13.3.1.2 *Proposed:*

A load forecast shows that the proposed development is likely to require approximately 16.8 MVA and that the total demand needed for the area is in the order of 40 MVA.

A phased approach to catering for the demand includes the following –

Stage 1 – Install two 120mm² PILC Cu cables from the Fortmann substation to a new 11kV switching station. This switching station will be designed and positioned such that it will become part of the 88/11kV substation. A third 120mm² PILC Cu cable can be installed at a later stage from the Formann substation to secure the capacity. This will provide the load requirements up to February 2014.

Stage 2 – Build a new 88 kV line from Eskom Brenner distribution station to a new 88/11kV Helderwyk substation. The substation will provide for 3 x 40 MVA, 88/11kV transformers to provide for the estimated load as well as cater for future developments. This station will also be diverted to the Van Eck station in order to alleviate the current load demand on the Van Eck substation.

Both Eskom and the City of Ekurhuleni confirmed that this solution is acceptable. Eskom has confirmed that sufficient capacity is available at Brenner distribution station. City of Ekurhuleni has already requested a cost estimate from Eskom for the supply point at Brenner distribution station.

The electrical engineers therefore confirm that electrical capacity for the proposed development can be made available, subject to City of Ekurhuleni conditions and requirements.

City of Ekurhuleni is currently in a process to implement the proposed electrical master plan that was accepted as a method of providing electrical power and supply to the area within which the site is located.

City of Ekurhuleni will be responsible to install and construct all relevant bulk electrical services and this will include obtaining relevant environmental authorisations and/or water use license applications for relevant sites and activities.

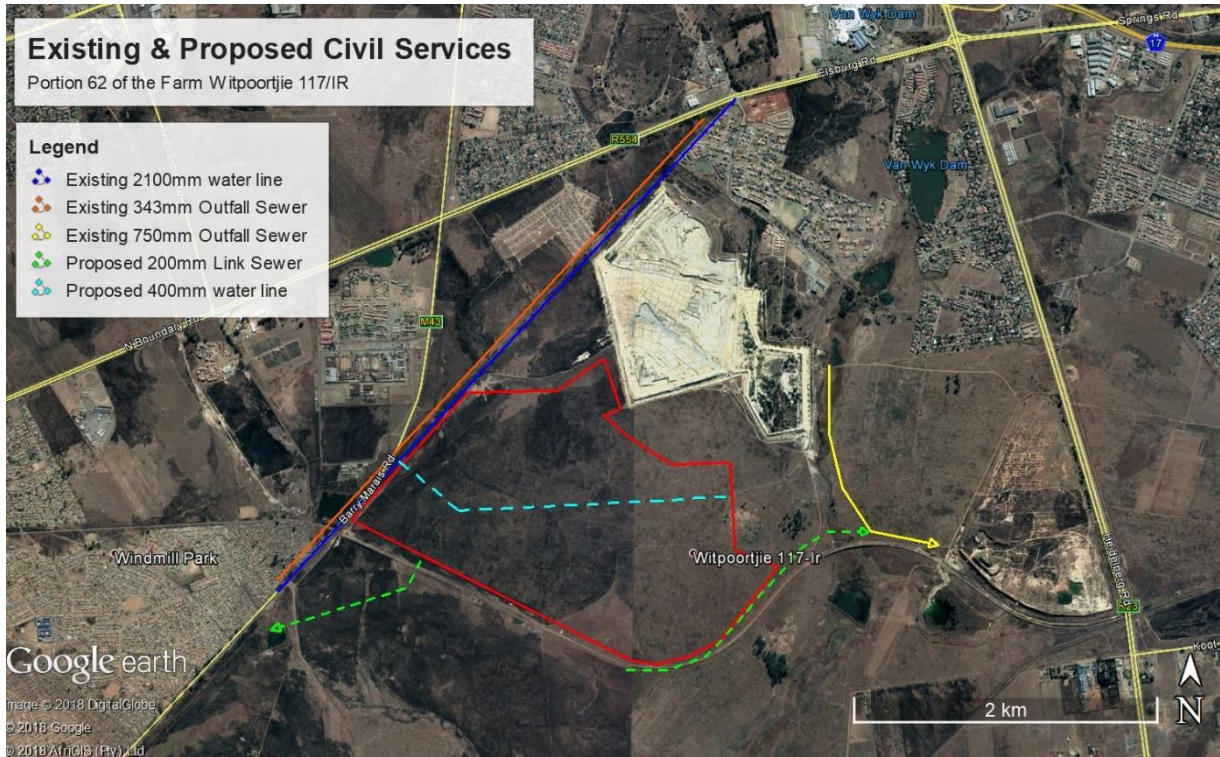


Figure 27: Existing and proposed bulk services

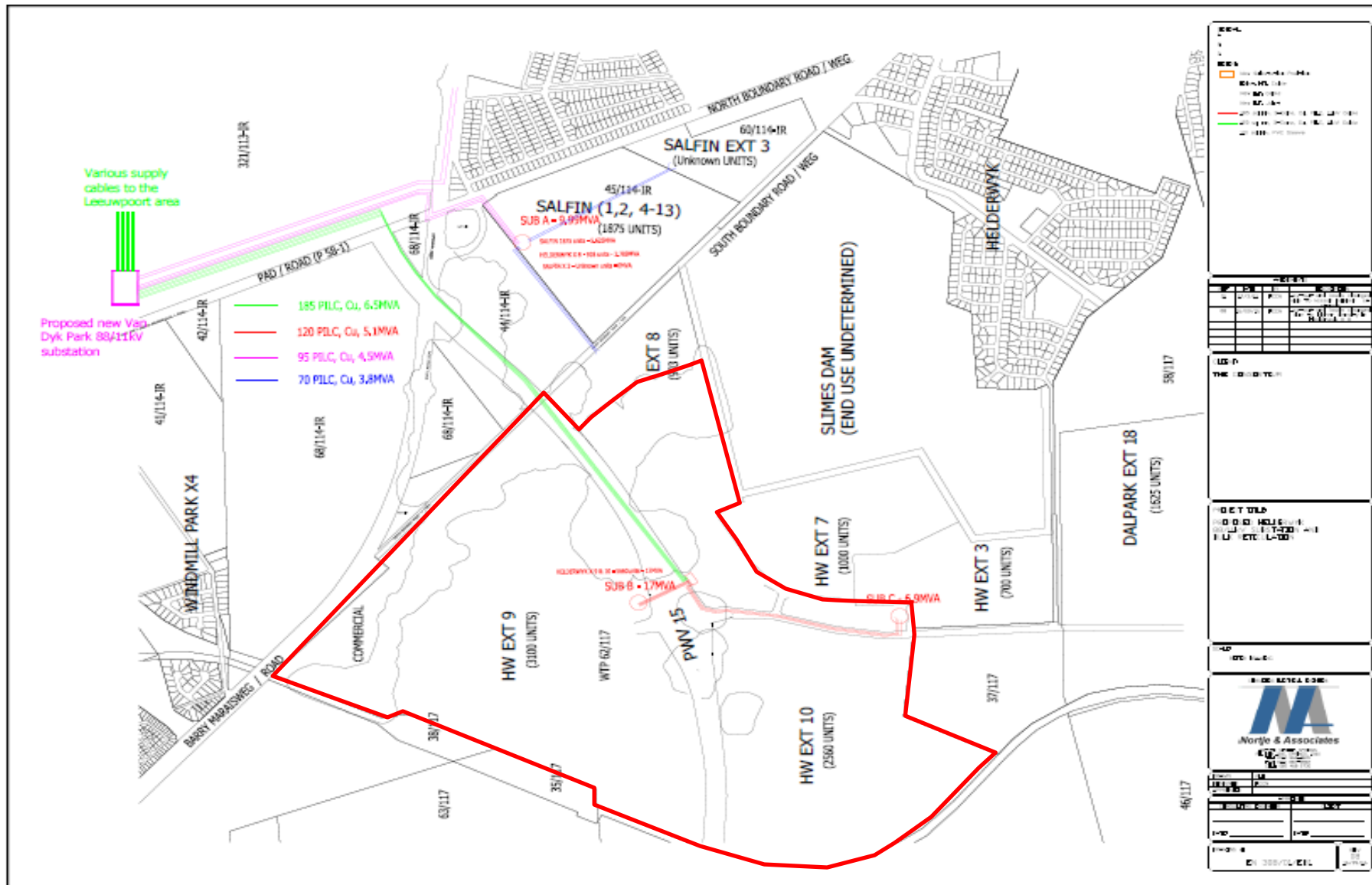


Figure 28: Proposed 88/11kv Substation

14.0 PUBLIC PARTICIPATION

Please refer to **Annexure O for the Public Participation Report.**

The Public Participation Process is being conducted as an essential component of the Environmental Impact Assessment Process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2006 (Version 1).

14.1 NOTIFICATION OF INTERESTED AND AFFECTED PARTIES

Interested and Affected Parties were notified of the public participation process for the proposed development in the following ways:

- A newspaper advertisement was placed in the Citizen Newspaper on Thursday, 28 June 2018.
- Detailed site notices were prepared in accordance with the requirements of the Regulations and were erected at the main entrance to the property, as well as other visible points, on the 5th July 2018.
- A Background Information Document (BID) was posted, faxed, emailed or hand delivered to adjacent landowners. Written acknowledgement has been gathered from each of these landowners. The BID document provides information concerning the proposed development. Interested and affected parties were invited to submit written comments concerning the proposed development and become part of the environmental process
- The Ward Councillor for the area Councillor Ella Pretorius was informed regarding the proposed development via e-mail notification
- Local authority officials were contacted by the relevant consultants

14.2 PUBLIC MEETING

If required, a public meeting will be arranged with adjacent land owners and other stakeholders that has been identified after the Draft Environmental Impact Assessment has been completed, to ensure that available information can be provided to Interested and Affected Parties.

14.3 ISSUES AND CONCERNS

Written correspondence received from I&APs by LEAP has been collected and a list of all issues and concerns compiled. These are referred to the appropriate specialists for addressing. A list of issues and concerns was drawn up from the following sources:

- Written correspondence received from I&APs
- Issues identified by specialist studies
- Comments from Ward Councillor
- Comments from municipal officers
- Field observations

The Environmental Impact Assessment aims to address these issues & concerns from the public, and those identified during all the other methods of impact identification. All issues and concerns received throughout the entire environmental assessment process will be addressed in the Final Environmental Impact Assessment. Issues and concerns are addressed in this report.

14.4 PUBLIC INSIGHT

The Final Scoping Report was made available to I&AP's for review and comment from the 23rd of October 2018 until the 23rd of November 2018. Comments that were received was included and addressed in the Comments and response report

The Final Environmental Impact Assessment Report will be made available for public insight from of the beginning of May 2019 to beginning of June 2019 in electronic format. The expected impacts, as issued by the I&APs are included in the issues and response register as attached to this report, also **Table 10** below.

Comments received on the Draft EIA have been included within the Comments and Response Report (Appendix 6) of the Public Participation Report (**Annexure O**).

14.5 ISSUES AND RESPONSE REGISTER

Table 6: Comments and response register

REGISTER OF COMMENTS

INTERESTED AND AFFECTED PARTIES (I&AP's)

Helderwyk Ptn 62

Comments on REF 002/18-19/E2238

	NAME	DATE RECEIVED	COMMENT	RESPONSE
1.	Khalid Peer	22.11.2018	<p>Hi,</p> <p>I had responded to the Scoping report last year on the 25 June 2017, see the chain of emails. Mark from eco assessments had responded to my mail that was sent to him and stated that we would be listed, but I do not see that we are in the public participation or in the final report. And now, when we received the final scoping report in October 2018, a whole year and a bit later, I see that the objections that we had raised in June 2017, are either not noted neither are they even listed or commented upon. Furthermore, does it take an entire year to incorporate and respond to comments and objections - wow, this is really slow!</p> <p>I find this very disrespectful. What's worse is that we are not even listed as an Interested and affected parties in the public participation lists. I looked at all</p>	<p>The NEMA Process recommences after the GDARD rejected the previous applications and it was decided by the applicant to start fresh under the current legislation and regulations.</p> <p>Because the process started anew, the I&APs must register again, but the registration was received and the aspects are being addressed.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>the annexures and appendecis and I dont see us or our names over there or our objections.</p> <p>Please find the same attached objections which were raised in June 2017 and I demand that we be listed and incorporated into the final scoping report.</p> <p>For the members of the DA which are copied in the email, please note that you are our ward councillors for this area and that if the environamental tasks which were outsourceed to this company cannot be done properly by capturing all the objections from the interested and affected parties, I have no faith in the process going forward. This is our democratic right as well as the rules from pieces of legislation. If the process is flawed now, what would happen when construction begins?</p> <p>For the Ekurhuleni and Gauteng Government Officials, please go back to the environmental companies and ensure that all comments are captured correctly and that they are properly responded to. Failure to do so, will result in a court interdict, as we now have proof from the fact that our correspondence was not even captured, and I am pretty sure that this oversight or negligence or incompetence will result in</p>	<p>The names of all the I&APs, as they were obtained from the original EPA, were received after this request was made, and such list reflects those persons who were contacted in any way during the previous process.</p> <p>The list of aspects is addressed and included in the Final BAR .</p> <p>The Ward Councilor whose name was received from the City EMM data base was contacted and information received.</p> <p>The process is conducted according to the NEMA requirements for public participation.</p> <p>It is the responsibility of the EAP to provide the GDARD and City of EMM with the list of comments and adequate replies as herewith provided.</p>

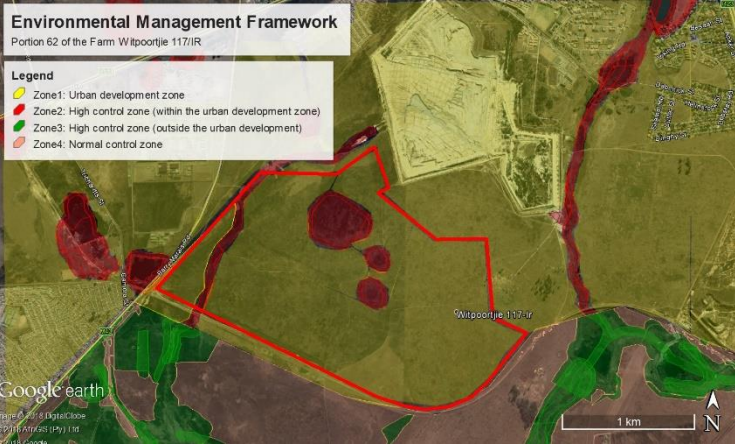
	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>the courts agreeing with us. Go now and rectify the situation, please. I am sure that your promises of giving people housing does not want to be held up by sloppy documentation workmanship and document control, least not so early in the process.</p> <p>I look forward to hearing back from you soon, but at this current rate of work progress, I think its safe to assume that the final-final scoping report will be sent out for comments in November -December 2019? Hopefully its corrected by then.</p> <p>As representative of the affected community from Dalpark Extension 1 Brakpan, The Chairperson of the Home Owners and Residents Association, Regards, Khalid Peer, Pr Eng, PMP, IWE 0848120992</p> <p>Dalpark 1 Residence Association Mr Bart Zaayman – Council Ms Stefani Uckermann – Ward Councillor 25-06-2017</p> <p><u>Attention to:</u> Brakpan Town Council Ekurhuleni Metropolitan Municipality City Planning Departments Finance Departments Social Housing Departments</p>	<p>Kevin Noonan was identified as the Ward Councillor, and correspondence was sent to him on 2 August 2018.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>Environmental Departments Legal Departments mark@ecoassessments.co.za Mark Custers 0828578480 info@ecoassessments.co.za Boksburg.lib@ekurhuleni.gov.za Jolene or Noka <u>Re: Objections Raised for Environmental Impact Assessments for the Proposed Development of Helderwyk Extensions aka the Remainder of the Portion 62 of the Farm Witpoortjie 1171R – Brakpan Ekurhuleni</u> After reviewing the Environmental Impact Assessment reports from Mark Custers at Ecoassessments, reference 911/08 EIA for the development of Helderwyk Extensions 9 through 12. As members of the community and as our constitutional rights we object to this proposal based on the following reasons:</p> <ol style="list-style-type: none"> 1. When this EIA is taken together with Dalpark Ext 18 and 25, Van Dyke Park extensions and now the Helderwyk extensions, all of these EIA are in isolation and do not consider a holistic view. When taken together or individually, they do not cater for the following: <ol style="list-style-type: none"> a. Any fire fighting services b. A magistrates court c. Public Libraries 	<p>The comments are out dated, but as far as possible will be addressed in terms of the 2018 2019 information.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>d. Health Clinics or a hospital</p> <p>e. Police Station</p> <p>f. Sports facilities</p> <p>g. Primary Schools are only planned in Dalpark Extension 25. We need another dual or tri-medium high schools as well as creches and preschools.</p> <p>h. The wetlands along Dalpark Extension 1 do not cater for increased effluent, sewage and the impact of the COMBINED development.</p> <p>i. There are no planned proper taxis and bus stops. This is in violation of the Gauteng road infrastructure plans.</p> <p>j. The combined impact of Helderwyk extensions, Van Dyke Extensions and Dalpark Extensions onto the roads. The traffic reports HAVE to do a combined traffic assessment.</p> <p>k. The cost to purchase the land (it is still privately held) is too expensive and will deplete the council's annual budget. There is other municipal land owned that could be utilised for this.</p> <p>l. The size of erf is too small and the density of houses are too high (Both Dalpark Ext 18 and 25 have small to medium size plots 500 square meters and smaller). Why is the council not making land available for larger and more affluent LSM's? This is going to decrease the land and home valuations of both Helderwyk and Dalpark 1.</p>	<p>Social services are the responsibility of the Local Municipality, which is responsible for consideration of all such services and making provision for them</p> <p>Items a to g are the Municipal responsibility and will be addressed in the town planning application.</p> <p>h. The wetlands aren't meant to treat the effluent. It is directed to the sewer treatment works at the?</p> <p>i. Provision of taxi stands is addressed by the traffic impact assessment, according to municipal guidelines.</p> <p>j. The traffic impact assessment must address all existing traffic, and anticipated traffic, taking into account the contemplated development.</p> <p>k. It is not appropriate to comment on the cost and ownership of the land.</p> <p>l. The sizes of the erven are regulated by the municipality and national policy for the provision of housing, focus being on the</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>m. The impact of construction onto the flora and fauna.</p> <p>n. The control of the construction project.</p> <p>o. The date the project is planned for?</p> <p>p. The traffic assessments on the R554, N17 and the R23.</p> <p>q. The impact on the PWV 15 new highway and this highways combined impact onto the existing areas.</p> <p>r. The need for Gautrain buses or train lines.</p> <p>s. The need to internet connections – we need to include telecommunications towers and fibre optic cables – this is not included in the cost estimates.</p> <p>t. The need for bus rapid transport routes.</p> <p>2. The solutions that we wish to see in our objections are as follows:</p> <p>a. Provision of a fire station</p> <p>b. Provision of a magistrates court</p> <p>c. Provision of a police station</p> <p>d. Provision of a public library</p> <p>e. Provision of a health clinic or hospital</p> <p>f. Provision of a creche and a tri medium high school</p> <p>g. Provision of a sports facility</p> <p>h. Multi aspect Justification on the budget for purchasing the property.</p> <p>i. An increase in the size of the erfs to larger plots.</p>	<p>less fortunate and those that do not have access to formal housing.</p> <p>m. An ecological assessment was done to find any Red Data species. This assessment is not contentious and favours the development. Th land is earmarked for development by both the provincial government as well as the municipality.</p> <p>n. Impacts are addressed and mitigated with the Environmental management Plan EMPr as attached in Annexure P of this submission.</p> <p>o. Commencement of construction depends on the availability of funding, the completion of the township application and the availability of services.</p> <p>p,q,r,s,t The traffic assessments are conducted according to the minimum requirements of the City of EMM and address external and well as internal traffic generation. It also addresses the national and provincial road network and the time frames for the road improvements.</p> <p>Response to 2:</p> <p>a, b, c, d, e, f, g, h, i, and j: The township application makes provision for all necessary and appropriate facilities, taking account of the wider municipal area of which the township will form a part. Such application has been and will be professionally assessed by all competent authorities, to ensure that all appropriate concerns as mentioned are dealt with. Insofar as his concerned, this is a private development, the</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>j. Increase the size of the erfs</p> <p>k. Provide a combined traffic assessment and no implement the actions of the said assessment into the development.</p> <p>l. Provide telecommunications towers and to include fiber optic cables in all the areas.</p> <p>m. Provide and estimated start and completion date of the project</p> <p>n. Show the impact of the planned highway on the sound assessment and the traffic assessments and what measure the plan would be modified to accommodate these effects.</p> <p>o. How would the house be built on a lime, dolomite and underground mining areas? The development also has to consider the impact of illegal mining.</p> <p>3. Finally, we welcome the fact that human settlements has considered our area for growth, we only ask for the above objections to be answered and adhered to in going forward.</p> <p>Regards Town Planning and Development Reviewer and a member of Dalpark 1 Residence Association for and on behalf of the local stakeholders Mr. Khalid Peer Pr. Eng, PMP, IWE 0848120992</p>	<p>purchase of which did not impinge on any budget for public funds.</p> <p>k. A full traffic impact assessment has been carried out, and all requirements of all competent authorities will be complied with.</p> <p>l, and m: Telecommunications and fibre optic is dependant upon demand from residents, and will be governed by private initiatives. The start date is dependant upon the approval process. Completion is dependant upon take up demand.</p> <p>n. The traffic assessment takes into account the planned highway, as does the township layout.</p> <p>o. A dolomite assessment will be done, and no building will take place that does not comply with appropriate and legislated restrictions in respect of any dolomite The existing assessment is that the land is not affected, or is only marginally affected by dolomitic conditions. All mining under the land has been at great depth. There is no illegal mining on the land that the developer is aware of.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
2.	Mr. Steven Mukhola	07.02.2019	<p>Dear Madam</p> <p>COMMENTS-DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT: PROPOSED MIXED USE DEVELOPMENT AND ASSOCIATED INFRASTRUCTURE TO BE ESTABLISHED ON THE REMAINDER OF PORTION 62 OF THE FARM WITPOORTJIE 117 IR, CITY OF EKURHULENI METROPOLITAN MUNICIPALITY.</p> <p>The Draft Environmental Impact Assessment regarding the above-mentioned development received by this Department on 18 December 2018 has reference.</p> <p>The proposal entails the establishment of a mixed use residential township which will comprise of medium to high-density residential 2, 3 as well as Residential 4, commercial uses, community facilities, public and private open spaces (wetlands) and roads. Pre-Primary, Primary and Secondary Schools will also form part of the proposed development. The proposed site measures 311 hectares in extent.</p> <p>The Department would like to comment as follows:</p> <p style="text-align: center;">A. Alignment of the activity with applicable legislations and policies</p> <p>The Applicant applied for GN R. 327: Activity 12, 19 and 26 of Listing Notice 1 and GN R. 324: Activity 15</p>	 <p>Figure 1: EMP designations on the site.</p> <p>A. Although it is acknowledged that the GEMF identifies the site as being both in Zone 1 and Zone 2, the extent of these designations are important. Most of the site is located in Zone 1.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>of Listing Notice 2 and Activity 4, 12 and 14 of Listing Notice 3 of the Environmental Impact Assessment Regulations, 2014 as amended in 2017.</p> <p>The Gauteng Environmental Management Framework, 2015 (GEMF, 2015) identifies the proposed site as Environmental Management Zone 1 dominated by urban development activities and Zone 2. Zone 2 is sensitive to development activities, only conservation types of activities should be allowed in this zone or related tourism and recreation activities.</p> <p>B. GDARD Guidelines and Requirements The Gauteng Conservation Plan Version 3.3 depicts parts of the site to be within Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Primary Vegetation, Pan, River, Wetland and as a habitat for Orange Listed Plants. The proposed development is near fully functional wetlands, which is of a great concern. The Department emphasize that the wetland and a protective buffer zone of 30m, beginning of the outer edge of the wetland temporary zone must be kept as stipulated in the GDARD Minimum Requirements for Biodiversity Assessments.</p> <p>In the responses to the acceptance of the Scoping Report (point number 13 of response), the Applicant</p>	<p>The areas of Zone 2 falls within the wetland areas on site that were identified in specialist report. That these areas and the associated 30m buffer will not be developed. There are one or two small crossings planned for the wetland area that cannot be avoided. Please refer to the master layoff drawing as attached to the Draft EIA.</p> <p>B. GDARD Guidelines and Requirements The specialist studies that have been completed for the project take into account the biodiversity areas and addresses these as part of the specialist reports. The development plan further recognizes the wetlands and has completely stayed clear of these features. As indicated in the specialist reports, that the largest wetland is a seepage area that originates from the mine dump.</p> <p>The application recognises that the wetland and a protective buffer zone of 30m, beginning of the outer edge of the wetland temporary zone must be kept as stipulated in the GDARD Minimum Requirements for Biodiversity Assessments.</p> <p>The 500m buffer is indicated on the layout and any development within that zone is indicated as undetermined.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>indicated that the development Layout Plan is overlaid and exclude the proposed development outside the 500-meter buffer as per the Department pollution buffer zones guidelines (2017). The attached Township Layout (Annexure B) still shows residential units inside the 500-meter buffer zone.</p> <p>The particulate and Dust Fall Sampling Report for the proposed Helderwyk development by Airshed dated April 2016, indicate that the dust fallout results near the slimes storage facility indicate low dust fall rates and the one month's PM10 concentrations indicate acceptable concentrations in comparison to the NAAQ limit. The study by Airshed further conclude that the air quality results suggest low impact significance on the proposed Helderwyk development within the 2-km radius from the slimes storage facility. The question is whether the 100-meter buffer suggested on the Layout Plan is based on any scientific conclusions?</p> <p>Department of Mineral Resources buffer suggested some years back was not necessarily based on health issues. The Applicant must source current updated comments from the Department of Mineral Resources that refers to impacts of slime storage facilities on the proposed activities.</p>	<p>The attached Township Layout (Annexure B) has been amended to show an Undetermined land use inside the 500-meter buffer zone. Such land use means that the area in question may not be developed without approval from all competent authorities.</p> <p>The application has amended the requirement of 100m buffer as indicated on the layout plan and will abide by the 500 m of requirements of GDARD buffer policy. The 500mm buffer will be maintained until such time as the landfill site has been fully rehabilitated and no longer poses a threat to the potential residents.</p> <p>GDARD will be consulted and a Part 2 Amendment conducted prior to any development in this area.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>According to the Gauteng Pollution Buffer Zones Guideline (2017), Slime dams are used to dispose final materials containing chemicals used in the mining process that pose a major air pollution and health problems. Drying out of slimes dams with age increases the risk of fine dust fallout. Although Airshed study proposes results show low reading within the 2-km radius, there is still some level of dust particles emitted because of the slimes dam. The best-case scenario of a buffer is 1000 m, because beyond this distance dust levels can no longer be distinguished from the ambient dust pollution. Dust levels are generally acceptable at 500 m with adequate mitigation as a worst-case scenario. Therefore, this Department will emphasize that a 500-m buffer must be kept outside the proposed development from the edge of the slimes dam as indicated in Figure 9 of the Draft report.</p> <p style="text-align: center;">C. Locality map and layout plans or facility illustrations</p> <p>The proposed Layout Plan is noted, wetland delineation, township layout and a combined sensitivity map overlaid by a Layout Plan. These must be included in the Final EIA Report with the revised</p>	<p>Airshed's study has been taken into account, and the 500m buffer will be maintained.</p> <p>The applicant acknowledges that the Department requires that a 500-m buffer must be kept outside the proposed development from the edge of the slimes dam as indicated in Figure 9 of the Draft report.</p> <p>The 500 m buffer is indicated on the layout plan and will be included in the Final EIAR.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>Layout Plan indicate the minimum 500-meter buffer mentioned above explicitly indicated on an A3 page. The Applicant must again note that the proposed township Layout Plan must not encroach into the wetland and rivers buffers.</p> <p style="text-align: center;">D. Environmental Management Programme (EMPr)</p> <p>The Environmental Assessment Practitioner must ensure that all significant impacts identified during the impact assessment as well as issues raised by Registered Interested and Affected Parties have been addressed in the EMPr. The impacts identified or to be identified as well as mitigation measures as per the assessment must form part of the Final EIA Report. The Draft EMPr must be submitted as Final taking into consideration comments raised in this letter.</p>	<p>The development does not encroach into the wetlands for buffers. Please note that the PWV 15 is not part of this application. The east west link road alignment has been amended to pass through the buffer areas of the two pans. Although the alignment of the PWV 50 has been provided for in the applicant's layout, the road and the interchange will not be constructed until a full EIA process has been completed by the provincial roads authority.</p> <p>All significant impacts identified by the Environmental Assessment Practitioner have been addressed in the EMPr , as well as those raised by interested and affected parties.</p> <p>The impacts identified or to be identified as well as mitigation measures as per the assessment will form part of the Final EIA Report. The Draft EMPr will be submitted as Final taking into consideration relevant comments raised.</p> <p>The public participation process has been undertaken and complies with Environmental Impact Assessment (EIA) Regulations, 2014 (as amended in 2017). City of Ekurhuleni Metropolitan Municipality comments as well as those from</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>E. Public Participation process The Public Participation Process (PPP) undertaken is noted on Annexure O. It must be undertaken and comply with Environmental Impact Assessment (EIA) Regulations, 2014 (as amended in 2017). A copy of the Registered Interested and Affected Parties (I&AP's) list is attached as Appendix 9, comments from all relevant stakeholders including City of Ekurhuleni Metropolitan Municipality must be adequately addressed and attached to the Final EIA Report. Proof of written site notices is noted; however, the site photos must be included and labelled to correspond and indicate the direction in which the site photos were taken. A question can be raised whether the Boksburg Correctional Services was consulted, given that they are in close proximity to the proposed development and proof of such consultation must be attached to the report.</p> <p>F. Any other issues noted</p> <ul style="list-style-type: none"> • There are objections raised by Dalpark 1 Residence Association on page 698. These objections must be responded to and a copy of response with solutions must be attached to the Final EIA Report. 	<p>other relevant stakeholders are be adequately addressed and are attached to the Final EIA Report in this CRR.</p> <p>Boksburg Correctional Services were contacted, and their details and proof of contact is included in the I&AP list.</p> <p>The feedback to the Dalpark 1 Residence Association on page 698 is provided in this CRR.</p> <p>Feedback from the Dept of Roads and Transport is provided in this PRR. They indicated that they have no objection to the development.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<ul style="list-style-type: none"> • Recommendations or a response from Department of Roads and Transport in support of the road network upgrades must be attached in the Final EIA Report, as the Traffic Study was conducted in 2012 (Annexure L). • Page 12 of the report stipulate that Passenger Rail Agency of South Africa (PRASA) is a Project Applicant, however, on the application form details refer to Purple Moss 19 (Pty) Ltd as well as signed Declaration on Addendum 2, can this be clarified. • The response regarding the need of application for Water Use Licence is noted. • The report must also discuss waste generated during construction and operational phase for the proposed development, how it must be managed in accordance with the hierarchy of waste management principles, including the fact that waste will be separated at source and disposal at an authorised landfill site will be the last option. • Energy savings technologies (such as compact fluorescents, light emitting diodes lights, passive infra reds switches to switch off lighting when areas are unoccupied) and water savings technologies (such as rain water harvesting) must be discussed in the report on how the proposed development will 	<p>The PRASA is listed as an applicant on another application. The text indicated that they have an application in the vicinity of the Helderwyk x62 application.</p> <p>The Water Use License is under application. The client link onto the DWS electronic system was done in 2018. The applicant decided to break the Water Use licence application into smaller areas due to the level of detail engineering design that is required for the WULA. A pre-application meeting will be held with the DWS as soon as the developer has identified the first township phases. At this time the detail designs will commence and engagement with the DWS will be meaningful.</p> <p>The applicant is committed to appropriate technology as it becomes available in the development market.</p> <p>Noted and we appreciate your consideration.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>contribute in reducing the impact of climate change.</p> <p>Notwithstanding the above, your attention is drawn to the fact that the success of the application may be prejudiced by failure to provide relevant information as requested above.</p> <p>If you have any queries regarding the contents of this letter, please contact the official of the Department at the number or email address indicated above.</p> <p>Yours faithfully Mr. Steven Mukhola Director: Impact Management</p>	
3.	Ms F Mabindisa (City of Ekurhuleni)	15/02/2019	<p>Dear Madam</p> <p>COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT OF THE PROPOSED MIXED USE DEVELOPMENT ON THE REMAINDER OF PORTION 62 OF THE FARM WITPOORTJIE 117-IR WITHIN THE CITY OF EKURHULENI</p> <p>Your Draft Environmental Impact Report received 19 December 2018 refers.</p> <p>The City acknowledge your responses to comments provided in the DSR, dated August 2018.</p> <p>Herewith kindly find comments by the City of Ekurhuleni.</p>	

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>Comments from Environmental Resource and Waste Management Department – Legislative Compliance Division:</p> <ol style="list-style-type: none"> 1. The Environmental Resource Management Department in rendering its comments assessed the environmental parameters/constraints of the property against the following environmental management tools: <ol style="list-style-type: none"> 1.1 Provincial Environmental Management Framework, 2015 1.2 Ekurhuleni Biodiversity and Open Space Strategy (EBOSS), 2008 1.3 Grand Open Space Plan, 2013 1.4 The Ekurhuleni Bioregional Plan, 2012 1.5 Applicable Environmental Legislation 2. Based on the above tools and the information contained in the application, the department support to the proposed development and comment as follows. <ol style="list-style-type: none"> 2.1 The City acknowledge the insertion of the 500m buffer on Figure 7 of the FSR in accordance to the Approved Gauteng Pollution Buffer Zone Guideline, 2017. However, the layout needs to be amended to incorporate the buffer in the overall layout of the proposed development. 	<ol style="list-style-type: none"> 1. The documents referenced by CoEMM is acknowledges and has been included in the review during the Draft EIA. 2. The support from the City of EMM is acknowledged and appreciated. <ol style="list-style-type: none"> 2.1 The 500m buffer will be included in the township layout. 2.2 The development plan acknowledges the GEMF and no development will take place in the Zone 2 areas that are made up of the wetlands and buffers.

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>2.2 The Gauteng EMF indicate that the proposed development area falls within the following zone:</p> <p>2.2.1 Zone 1, Urban Development Zone; and</p> <p>2.2.2 Zone 2, High control zone (within the urban development zone).</p> <p>2.3 The City of Ekurhuleni Regional Spatial Development Framework and the Municipal Spatial Development Framework indicate the property for “Urban Development”.</p> <p>2.4 The property in question is zoned “Mining”. The necessary closure certificates must be obtained and copies included in the report.</p> <p>2.5 All areas identified as sensitive areas i.e. wetlands, must be incorporated into the greater township development as private open space. A management plan must be available for management of such areas during the operational phase of the development.</p> <p>2.6 The report indicate that water use licenses must be obtained from “DWARF”, this statement must be amended to indicate the correct competent authority as “Department of Water and Sanitation (DWS)”</p>	<p>2.3 The urban development is in line with the City of Ekurhuleni Spatial Development Framework</p> <p>2.4 Comment has been received from DMR (see Annexure Q). The land is not mining land, apart from the slimes dam area, which does not form part of this application. Attached as Annexures K are certain relevant approvals under the 1965 Town Planning Ordinance, designating the area for residential development.</p> <p>2.4 All areas identified as sensitive areas i.e. wetlands, are incorporated into the greater township development as private open space. A management plan will be available for management of such areas during the operational phase of the development.</p> <p>2.6.The report has been corrected to reflect the “Department of Water and Sanitation (DWS)”</p> <p>2.7 The report has been corrected to reflect City of Ekurhuleni</p> <p>2.8 the recommendation from the geotechnical report will be implemented.</p>

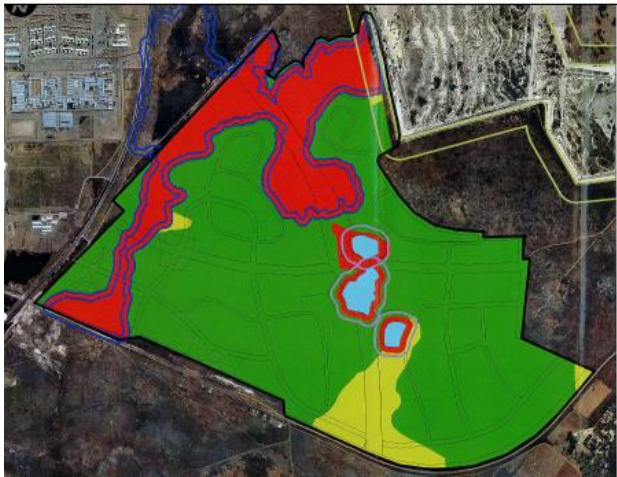
	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>2.7 The report indicates the local authority as “Ekurhuleni Metropolitan Municipality (EMM)”. This statement must be amended to correctly reflect the local authority as the “City OF Ekurhuleni”.</p> <p>2.8 The mitigation measure indicated in the geotechnical report, dated March 2009, activities within drainage lines must be avoided/limited in order to avoid the possible mobilization of heavy metals that’s was found in these areas, must be implemented on site.</p> <p>2.9 A copy of the dolomitic stability study must be submitted to the relevant City OF Ekurhuleni Department for comment.</p> <p>2.10 All recommendations in the following specialist studies/reports must be implemented on site: 2.10.1 Geotechnical Reports” 2.10.1.1 Partridge, Maud and Associated, 10 March 2009</p>	<p>2.9 A very small part of the site might be underlain by dolomite. A letter from the Council for Geoscience has been obtained and is included under Annexure C. since geological conditions don’t change significantly in 5 years, the letter of 2013 is still valid . When the development commences further geotechnical investigations will be conducted to ensure all structural designs meet the requirements. Also the City building office as well as NHBRC review the buildings plans at the time of construction and will ensure compliance with national provincial and local requirements.</p> <p>2.10. Recommendation from specialist studies will be implemented on sites.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>2.10.1.2Wetland Consulting Services, 14 October 2010;</p> <p>2.10.1.3Geo Buro, 01 November 2013; and</p> <p>2.10.1.4Council for Geoscience, 5 November 2013</p> <p>2.10.2 Air Quality Assessment, Airshed Planning Professionals, April 2016;</p> <p>2.10.3 Red Data Plant Species Verification, Enviroguard Ecological Services CC, December 2018;</p> <p>2.10.4 African Grass Owl Habitat Assessment, Mr C.L. Cook, 10 December 2018;</p> <p>2.10.5 Giant Bullfrog Habitat Assessment, Mr C.L. Cook, 10 December 2018;</p> <p>2.10.6 Invertebrate Study, V.C. van der Merwe, December 2018;</p> <p>2.10.7 Aquatic Ecological Assessment and Wetland Delineation, Scientific Aquatic Services, January 2009;</p> <p>2.10.8 Freshwater Resource Verification report, Scientific Aquatic Services, October 2018;</p> <p>2.10.9 Heritage Impact Assessment, HCAC, October 2018;</p> <p>2.10.10 Traffic Impact Assessment, Tech IQ, March 2012; and</p> <p>2.10.11 Environmental Management Program, LEAP, December 2018;</p>	<p>3. It is acknowledged that the City of EMM support the development of a compact city.</p> <p>4. Detail comments is awaited from Spatial Planning Division at the time of the town planning application.</p>

	NAME	DATE RECEIVED	COMMENT	RESPONSE
			<p>Comments from City Planning Department – Spatial Planning Division:</p> <p>3. The proposal is, in principle, supported as the RSDF promotes ‘urban development’ on this land parcel which will allow infill development and support a more compact city.</p> <p>4. The Spatial Planning Division will provide more detailed comments on the land use plan and layout plan when this is circulated to us in due course, to test it against the requirements and objectives of the RSDF, which may result in changes to the layout plan to ensure compliance.</p> <p>5. It is critical that all environmental, mining related aspects and provincial road alignments are adequately addressed in the report.</p> <p>All activities to be undertaken on the said property must be in accordance with all applicable by-laws, policies and requirements of the Ekurhuleni Metropolitan Municipality.</p> <p>It should be noted that, in terms of Section 24F of the NEMA, Act No 107 of 1998, as amended, no listed activity may commence prior to an environmental authorization being granted by the competent authority.</p>	<p>5. Environmental aspects are addressed</p> <p>Mining related aspects are addressed in terms of the town planning application and the PWV 15 cannot be constructed without a full EIA. In accordance with the Gauteng Infrastructure Act the alignment has been secured and is protected, but the road cannot be built without an EIA being conducted.</p>

Comments on REF 002/19-20/E2403

	NAME	DATE RECEIVED	COMMENT	RESPONSE
	Ms. F. Mabindisa (City of Ekurhuleni)	06/06/2019	<p>Dear Madam</p> <p>Subject: COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT OF THE PROPOSED HELDERWYK MIXED USE DEVELOPMENT ON THE REMAINDER OF PORTION 62 OF THE FARM WITPOORTJIE 117-JR WITHIN THE CITY OF EKURHULENI</p> <p>Your Draft Environmental Impact Report received 15 May 2019 refers.</p> <p>Herewith kindly find comments by the City of Ekurhuleni. Based on the applicable tools and the information contained in the application, the City OBJECTS to the proposed development and comment as follows.</p> <p>Comments from Environmental Resource and Waste Management Department – Legislative Compliance Division</p> <p>Comments from Environmental Resource and Waste Management Department – Biodiversity Specialist:</p>	<p>Comments from Environmental Resource and Waste Management Department – Legislative Compliance Division were answered in the comments received from City of Ekurhuleni on 15 February 2019. Refer to comments in this table under REF 002/18-19/E2238.</p> <p>Please note that the CoE commented in February positively, but then in June CoE changed its opinion on the same information to object against the development.</p> <p>After discussion with the Environmental Resource unit it is understood that the Biodiversity Unit of COE did not previously comment on the application.</p>

		<p>1. The site falls within the Critical Biodiversity Area and Ecological Support Area; it is therefore required to meet biodiversity targets for ecosystems, species and ecological processes. The area is an important greenbelt of the City of Ekurhuleni and it need to be protected from any development.</p> <p>2. The African Grass-Owl (<i>Tyto capensis</i>) is a species that is currently under threat due to a loss of habitat caused by increasing urbanisation. These secretive owls depend on a specific type of wetland habitat to</p>	<p>The replies herewith thus address the concerns of the Biodiversity unit.</p> <p>1. Remainder of Portion 62 of the farm Witpoortje 117-IR is currently owned by Purple Moss 19 (Pty) Ltd, and although there are areas that are ecologically significant, large areas of the site can be developed. To establish where the sensitive areas are located, a detailed ecological assessment was completed, and the layout was amended to avoid these areas. Refer to the combined sensitivity map that shows the areas to be excluded from development. (Included below)</p>  <p>2. The avifaunal and particularly the Grass Owl study conducted in February 2019 indicated that: <i>No African Grass Owls or Marsh Owls were flushed in the rank grass vegetation (Imperata cylindrica) occurring within the</i></p>
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		<p>live and breed as well as sufficient open grassland in which to hunt. The CoE will not be responsible if the species status will keep on declining.</p> <p>3. The infestation of Alien Invasive Species cannot be a reason for development as the species mentioned can be eradicated.</p> <p>4. <i>Hypoxis hemerocallidea</i> is not listed as a threatened plant, however the natural grasslands in the urban metropolitan areas are under extreme pressure because of urban sprawl. Many plants, including related species, are also dug up due to their popularity as a medicinal remedy. Since the plants do not re-seed easily, the demand for the tubers may cause the plants in the wild to decline. It is our responsibility to protect the plant.</p> <p>Comments from City Planning Department – Spatial Planning Division:</p> <p>5. The proposal is, in principle, supported as the RSDf promotes ‘urban development’ on this land parcel which will allow infill development and support a more compact city.</p>	<p><i>western portion adjacent to the poorly defined, mainly un-channelled valley bottom wetland. No evidence of any recent nesting, roosting sites or pellets were observed within the <i>Imperta cylindrica</i> areas as well as around the seasonal pans.</i></p> <p>The wetlands and buffers areas are excluded from development to accommodate any species in the area.</p> <p>3. In order to include the removal of alien species into the development budgets, as the development takes place and per extension, the alien vegetation will be eradicated as required by the CARA.</p> <p>4. The <i>Hypoxis hemerocallidea</i> will not be destroyed, but will be removed prior to development and will be relocated as required by GDARD biodiversity guidelines. The replanting of the plants is very successful where it has been done in other parts of the province.</p>
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			<p>6. The Spatial Planning Division will provide more detailed comments on the land use plan and layout plan when this is circulated to us in due course, to test it against the requirements and objectives of the RSDF, which may result in changes to the layout plan to ensure compliance.</p> <p>7. It is critical that all environmental, mining related aspects and provincial road alignments are adequately addressed in the report.</p> <p>Comments from the Department Human Settlements:</p> <p>8. The property descriptions contained on page 15 in the DEIR must be amended to exclude properties owned by the City of Ekurhuleni, i.e. Helderwyk Extension 3.</p> <p>9. Helderwyk Extension 3 and Helderwyk Extension 7 was purchased by the CoE, and are now known as Dalpark Extension 25.</p> <p>All activities to be undertaken on the said property must be in accordance with all applicable By-Laws, policies and requirements of the Ekurhuleni Metropolitan Municipality.</p>	<p>Comments under items 5 to 7 is the same as provided in February 2019. Refer to the comments in this table under the previous application number.</p> <p>8. The EIA shows that Helderwyk Extension 3 and Helderwyk Extension 7 was purchased by the CoE, and are now known as Dalpark Extension 25. These townships do not form part of the development proposal.</p> <p>9. Acknowledged.</p>
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			<p>It should be noted that, in terms of Section 24F of the NEMA, Act No 107 of 1998, as amended, no listed activity may commence prior to an environmental authorization being granted by the competent authority.</p> <p>Regards, MS F MABINDISA HEAD OF THE DEPARTMENT</p>	<p>All activities to be undertaken on the said property will be in accordance with all applicable By-Laws, policies and requirements of the Ekurhuleni Metropolitan Municipality. In this regard the Conditions of establishment will be issued by CoE prior to the commencement of the development.</p> <p>No listed activity will commence prior to an environmental authorization being granted by the competent authority.</p>
7.	Mr. Steven Mukhola (Director: Impact Management - GDARD)	17/07/2019	<p>Dear Madam</p> <p>COMMENTS-DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT: PROPOSED MIXED USE DEVELOPMENT AND ASSOCIATED INFRASTRUCTURE TO BE ESTABLISHED ON THE REMAINDER OF PORTION 62 OF THE FARM WITPOORTJIE 117 IR, CITY OF EKURHULENI METROPOLITAN MUNICIPALITY.</p> <p>The Draft Environmental Impact Assessment regarding the above-mentioned development received by this Department on 13 June 2019 has reference.</p> <p>The proposal entails the establishment of a mixed use residential township which will comprise of medium to high-density residential 2, 3 as well as Residential 4, commercial uses, community facilities, public and private open spaces (wetlands) and roads. Pre-Primary, Primary and Secondary Schools will also form part of the proposed development. The proposed site measures 311 hectares in extent.</p>	<p>Acknowledged. These listed activities are included in the application form as lodged with GDARD.</p>

The Department would like to comment as follows:

A. Alignment of the activity with applicable legislations and policies

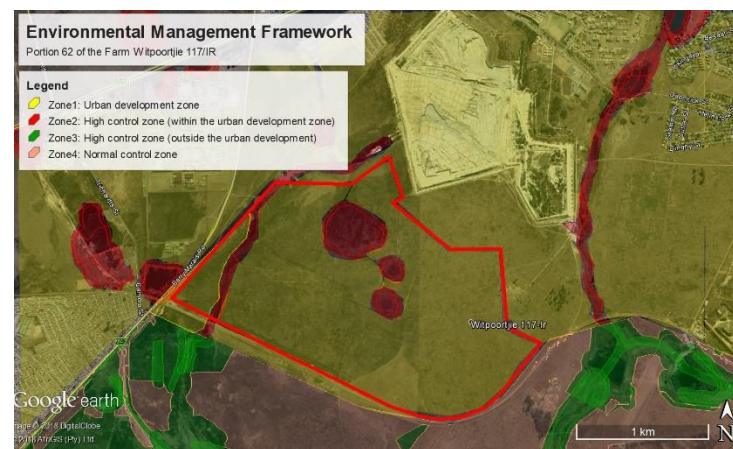
The Applicant applied for GN R. 327: Activity 12, 19 and 26 of Listing Notice 1 and GN R. 324: Activity 15 of Listing Notice 2 and Activity 4, 12 and 14 of Listing Notice 3 of the Environmental Impact Assessment Regulations, 2014 as amended in 2017.

The Gauteng Environmental Management Framework, 2015 (GEMF, 2015) identifies the proposed site as Environmental Management Zone 1 dominated by urban development activities and Zone 2 is sensitive to development activities, only conservation types of activities should be allowed in this zone or related tourism and recreation activities.

B. GDARD Guidelines and Requirements

The Gauteng Conservation Plan Version 3.3 depicts parts of the site to be within Critical Biodiversity Areas

A. Although it is acknowledged that the GPEMF identifies the site as being both in Zone 1 and Zone 2, the extent of these designations is important. Most of the site is in Zone 1.



The areas of Zone 2 falls within the wetland areas on site that were identified in the specialist report. That these areas and the associated 32m buffer will not be developed. There are one or two small crossings planned for the wetland area that cannot be avoided. Please refer to the master layoff drawing as attached to the Draft EIA.

B. GDARD Guidelines and Requirements

		<p>(CBAs), Ecological Support Areas (ESAs), Primary Vegetation, Pan, River, Wetland and as a habitat for Orange Listed Plants. The proposed development is in the vicinity wetland and a protective buffer zone of 30 m, beginning from the outer edge of the wetland temporary zone must be kept as stipulated in the GDARD Minimum Requirements for Biodiversity Assessments. With regards to the proposed access roads that crosses the watercourse, a bridge structure that span entire width of the watercourse is recommended.</p> <p>In the responses to the acceptance of the Scoping Report (point number 13 of response), the Applicant indicated that the development Layout Plan is overlaid and exclude the proposed development outside the 500-meter buffer as per the Department pollution buffer zones guidelines (2017). The revised Layout Plan on Page 34 still shows residential units inside the buffer zone.</p> <p>The Particulate and Dust Fall Sampling Report for the proposed Helderwyk development by Airshed dated April 2016, indicate that the dust fallout results near the slimes storage facility indicate low dust fall rates and the one month’s PM10 concentrations indicated acceptable concentrations in comparison to the NAAQ limit. The study by Airshed further conclude that the air</p>	<p>The required specialist studies have been completed for the project, acknowledge the biodiversity areas and address the ecologically significant areas in accordance with the recommendations contained in the specialist reports. The development plan further recognizes the wetlands and has completely stayed clear of these features. As indicated in the relevant specialist report, the largest wetland is a seepage area that originates from the mine dump. Nevertheless, this area is also excluded from the development.</p> <p>The application recognises that the wetland and a protective buffer zone of 30m, beginning at the outer edge of the wetland temporary zone must be kept as stipulated in the GDARD Minimum Requirements for Biodiversity Assessments. The layout plans comply with this requirement.</p> <p>The 500m buffer is indicated on the layout and any development within that zone is indicated as “Undetermined” as specified in the town planning application. GDARD will be consulted and a Part 2 Amendment will be conducted prior to any activity within the 500m buffer areas.</p> <p>The layout plan has been amended to exclude residential units from the buffer zone.</p> <p>The attached Township Layout (Annexure B) has been amended to show an “Undetermined” land use inside the 500-meter buffer zone.</p>
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		<p>quality results suggest low impact significance on the proposed Helderwyk development within the 2-km radius from the slimes storage facility. The question is to whether the 100-meter buffer suggested on the Layout Plan is based on any scientific conclusions? Department of Mineral Resources buffer suggested some years back was not necessary based on health issues. The Applicant must source current updated comments from the Department of Mineral Resources that refers to impacts of slimes storage facilities on the proposed activities.</p> <p>According to the Gauteng Pollution Buffer Zones Guidelines (2017), Slimes dams are used to dispose final materials containing chemicals used in the mining process that pose a major air pollution and health problems. Drying out of slimes dams with age increases the risk of fine dust fallout. Although Airshed study proposed results show low reading within the 2-km radius, there is still some level of dust particles emitted because of the slimes dam. The best-case scenario of a buffer is 1000m, because beyond this distance dust levels can no longer be distinguished from the ambient dust pollution. Dust levels are generally acceptable at 500 m with adequate mitigation as a worst-case scenario. Therefore, this Department still emphasize that a 500-m buffer must be kept</p>	<p>The indication of 100m is not applicable. The layout plan and will abide by the 500 m of requirements of GDARD buffer policy. The 500 m buffer will be maintained until such time as the tailings site has been fully rehabilitated and no longer poses any hazard.</p> <p>The Local Municipality is the mandated authority and requirements from the CoE will be adhered to.</p> <p>Airshed's study has been taken into account, and the 500m buffer will be maintained.</p> <p>The applicant acknowledges that the Department requires that a 500-m buffer must be kept outside the proposed development from the edge of the slimes dam.</p> <p>The 500 m buffer is indicated on the layout plan and included in the Final EIAR.</p>
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		<p>outside the proposed development from the edge of the slimes dam.</p> <p>C. Locality map and layout plans or facility illustrations</p> <p>The proposed Layout Plan is noted, wetland delineation, township layout and a combined sensitivity plan overlaid by a Layout Plan. There is a revised A4 Layout Plan on page 34 with unclear indices and minute display. Could this be amended to an A3 page and explicitly indicating a 500-meter buffer. It does not seem the issue of 500 meter buffer is taken seriously when looking at Figure 3 of the layout plan. The Applicant must note that the proposed township Layout Plan must not encroach into the wetland and river buffers of the catchment.</p> <p>D. Environmental Management Programme (EMPr)</p> <p>The Environmental Assessment Practitioner must ensure that all significant impacts identified during the impact assessment as well as issues raised by Registered Interested and Affected Parties are addressed in the EMPr. The impacts identified or to be identified as well as mitigation measures as per the assessment must form part of the Final EIA Report. The Draft EMPr must be submitted as Final EMPr taking into consideration comments raised in this letter.</p>	<p>Furthermore, the development does not encroach into the wetlands for buffers. Please note that the PWV 15 is not part of its application. Although the alignment of the PWV 50 has been secured, the road and the interchange will not be constructed until a full EIA process has been completed.</p> <p>Significant impacts identified during the impact assessment as well as issues raised by Registered Interested and Affected Parties have been addressed in the EMPr.</p> <p>The impacts identified or to be identified as well as mitigation measures as per the assessment will form part of the Final EIA Report. The Final EMPr included the requirements.</p> <p>The public participation process has been undertaken and complies with Environmental Impact Assessment (EIA) Regulations, 2014 (as amended in 2017). City of Ekurhuleni Metropolitan Municipality comments are adequately addressed and is attached to the Final EIA Report in this CRR.</p>
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			<p>E. Public Participation Process</p> <p>The Public Participation Process (PPP) undertaken is noted on Annexure O. It must be undertaken and comply with the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended in 2017). A copy of the registered Interested and Affected Parties (I&AP's) list is attached as Appendix 9, comments from all relevant stakeholders including City of Ekurhuleni Metropolitan Municipality must be adequately addressed and attached in the Final EIA Report, Proof of Written site notices is noted; however, the site photos must be included and labelled to correspond and indicate the direction in which the site photos were taken. A question can be proximity of the prison to the proposed development and proof of such consultation must be attached to the report.</p> <p>F. Any other issues noted</p> <ul style="list-style-type: none"> • There are objections raised by Dalpark 1 Residence Association. These objections must be responded to and a copy of response with solutions be attached to the Final EIA Report. • Recommendations or a response from Department of Roads and Transport in support of the road network upgrades must be attached in 	<p>The feedback to the Dalpark 1 Residence Association, is provided in this CRR. Furthermore, Boksburg Correctional Services were contacted, and their details and proof of contact is included in the I&AP list.</p> <p>Feedback from the Dept of Roads and Transport is provided in this PRR. They indicated that they have no objection to the development.</p> <p>The term "Undetermined" is a town planning term. The final use for the land has not been determined. No development can be undertaken on land so designated without a Part 2 amendment. Accordingly, no development will take place within the 500 m buffer without further application to GDARD.</p> <p>The Water Use License is under application. The client link onto the DWS electronic system was done in 2018. The applicant decided to break the Water Use licence application into smaller areas due to the level of detail engineering design that is</p>
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			<p>the Final EIA Report, as the Traffic Study was conducted in 2012 (Annexure L).</p> <ul style="list-style-type: none"> • The revised Layout Plan has a Land use marked “Undetermined”, explanation must be given if whether this land will be used as an open space or be left as undeveloped? • The response regarding the need of an application for Water Use Licence is noted. • The report must also discuss waste generated during construction and operational phase, how it will be managed in accordance with the hierarchy of waste management principles, including the fact that waste must be separated at source and disposal at an authorised landfill site will be the last option. 	<p>required for the WULA. A pre-application meeting will be held with the DWS as soon as the developer has identified the first township phases. At this time the detail designs will commence and engagement with the DWS will be appropriate.</p> <p>The EMP is to be implemented in respect of each part regarding the operational phase of the development, in order to ensure environmental compliance on site in terms of waste management. The hierarchy of waste management will be.</p> <ul style="list-style-type: none"> • Prevention; • Minimisation; • Re-use; • Recycling; • Energy recovery; and • Disposal <p>The applicant is committed to appropriate technology as it becomes available in the development market.</p> <p>Noted and we appreciate your consideration.</p>
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		<ul style="list-style-type: none"> • Energy savings technologies (such as compact fluorescents, light emitting diodes lights, passive infra reds switches to switch off lighting when areas are unoccupied) and water savings technologies (such as rain water harvesting) must be discussed in the report on how the proposed development will contribute in reducing the impact on climate change. <p>Notwithstanding the above, your attention is drawn to the fact that the success of the application may be prejudiced by failure to provide relevant information as requested above.</p> <p>If you have any queries regarding the contents of this letter, please contact the official of the Department at the number or email address indicated above.</p> <p>Yours faithfully Mr. Steven Mukhola Director: Impact Management</p>	
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Implications:

Comments from the local authorities and registered Interested and Affected Parties have been addressed.

15.0 ALTERNATIVES IDENTIFIED & MOTIVATION FOR PROPOSED DEVELOPMENT

The concept of Integrated Environmental Management suggests that an Environmental Impact Assessment process, to determine the possible impact of the proposed activity, should incorporate the consideration of feasible alternatives. A reasonable number of possible proposals or alternatives, to achieve the same objective should be assessed. The identification, description, evaluation and comparison of alternatives are important for ensuring a sound environmental scoping process.

Alternatives should be considered as a norm within the Environmental Process. These should include, as applicable, the demand alternative, scheduling alternative, land use alternative (including the NO-GO option), location alternatives and service alternatives.

15.1 DEMAND ALTERNATIVES

The proposed development consists of mixture of residential 2,3 as well as Residential 4, Open Space (Wetlands), Business and Commercial land uses. Pre-primary, Primary and Secondary Schools will also form part of the proposed development.

The proposed development will comprise the following:

Zoning and Land uses	Ha	Percentage (%)	Number of Units
Future Roads & Main Roads	34.4	11.06	N/A
Possible Wetlands (Inclusive of Buffer Areas)	53.5	17.20	N/A
Residential (up to 60U/Ha)	177.3	57.01	8150
Mixed Use including Business, High density residential and Community Facilities	38	12.22	990
Commercial	7.8	2.51	N/A
Total	311ha	100%	9140

Please note that the PVW 15 is NOT included in this application

The area for the proposed development comprises approximately 311 hectares of which approximately 17.20% includes wetlands which will be delineated as open space (approximately 53.5 Hectares).

Of the total developable area, Future Roads and Residential Streets will occupy approximately 11.06% of the site. The Residential component of the proposed development will occupy the largest portion of land, with Residential 2 & 3 occupying approximately 57.01 % and Residential 3 & 4, 3. % respectively.

The business component, which will consist of a Central Business Node, Barry Marais Node and a Station Node, will occupy approximately 7. % of the total area of the site. Approximately 2% of the subject site will be allocated to commercial uses whilst Educational and Community facilities comprise 8. % and 12% of the site respectively.

The proposed development will be developed according to architectural Guidelines and will provide for an aesthetically pleasing development. the proposed development will be subdivided into different phases.

Initial soil quality test results for the Helderwyk application site show no Uranium or Radon residues as this was not used in the mining operation and processing.

The prevailing wind direction is North West which means that the majority of the site (which lies south west of the slimes dam) is not affected by dust fall.

The envisaged services infrastructure for the proposed development includes the following-

- Sewage infrastructure associated with the linkage into the bulk sewage reticulation system.
- Various Electrical Mini substation to distribute 11 KvA electricity across the site
- Storm water structures including attenuation ponds
- Potable water infrastructure
- Several Roads and Access points

Barry Marais Road will provide access to the site. Three class 2 roads will be constructed off Barry Marais Road which will lead into phase 1 & 2 of the proposed development. The construction of all three of these roads will require a water use license from DWS due to them crossing the wetland area. The future planned PWV 15 Route which transects the subject site from north-west to south will be connected to one of these Class 2 roads.

The aim of the proposed development is to assist with fulfilling the greater need for housing in the surrounding area. According to the Ekurhuleni Regional Spatial Framework (November 2003), the projected number of housing units that will be required up until 2020 is approximately 30000 units. This would require approximately 1835 ha of land. This development will provide land and units that will assist the Council with the overall requirements for housing as a result of the urbanization process.

The proposed project is in line with the Regional Spatial Development Framework. This plan demarcates the site as falling within an area earmarked for Residential Land Use. The development will also assist with the creation of necessary services in the area.

On a local scale, the proposed development will offer housing units to people residing in the area and its surrounds. The proximity of the site to Carnival City and the N17 Freeway allows for units to be suitable for a wide spectrum of society. The development will also assist with the creation of open space, management of storm water and will further serve as an economic centre for the area. This will lead to job creation (short and long term) as well as markets for service industries in Helderwyk and beyond.

Immediate benefits are likely to accrue to the staff of the Brakpan Correctional Services (which is located opposite the proposed development site) as well as to a variety of people who seeks housing in proximity to their area of work.

The local community in the surrounding area will be benefited through employment opportunities available in the proposed township. This will also include immediate opportunities for house construction, service provision and material suppliers. The long-term employment opportunities include domestic employment, service industries, employment in schools as well as employment in commercial centres and business nodes.

The proposed development will further support the envisaged establishment of the Railway Station to the south of the site. The proposed PWV 15, which is earmarked for development, will greatly increase the need and desire of the proposed township.

The balance of the site is intended to be retained by the open space.

15.2 PROCESS ALTERNATIVES

It would appear that the process relevant to the establishment of a development area can only be achieved by way of one of two alternatives, namely:

- An application in terms of the new Gauteng Planning and Development Act No 3 of 2003; alternatively;
- An application in terms of the Town Planning and Townships Ordinance, 1986 (Ordinance 15 of 1986) (preferred alternative).
- SPLUMA -

The end result in respect of either of the above-mentioned processes would be similar in that the development area will result in the transformation of a portion of land into a housing environment with commercial support services.

Although the Town Planning and Townships Ordinance process is being followed, the value of the new Gauteng Planning and Development Act No 3 of 2003 principles have been realised and responded to. The end result in respect of either of the above-mentioned processes would be similar in that the development area will result in the transformation of a portion of land into a Mixed-use urban complex.

Clearly, methods applied may involve more or less manual labour in certain circumstances. In the development proposal under consideration, manual labour will indeed be feasible having regard to the scale and extent of the development which, in turn, will enhance employment creation and should be preferred as the alternative construction method where practically possible.

15.3 SCHEDULING ALTERNATIVES

The development of a mix use development of the scale and nature proposed by the land development applicant is not specifically sensitive to weather patterns or cycles. There does not appear to be a more or less preferred time to undertake the physical development associated with a new urban complex in the form of road construction and the laying of infrastructure. Typically, the rainy season (spring and summer) may impact negatively on the construction related activities and may result in "down time". It

follows that, if possible, the construction periods should accord with the winter months to avoid down time related to rain.

Following this alternative, it may also result in less of an impact on the possibility of top soil erosion during flash thunderstorms and increased runoff where new trenches lie exposed to the elements for a restrictive period of time. However, suitable mitigation methods can be employed to curb washing of storm water into sensitive wetland areas.

15.4 LOCATION ALTERNATIVES

Location alternatives for the proposed development, which constitutes mix uses/residential development such as the preferred activity alternative, include the following:

15.4.1 Inner-city location

An inner-city location would be environmentally and socially feasible, however economically unviable, provided that the same area extent of land be found available for development as inner-city resources are very scarce.

15.4.2 Suburban location

Not socially, environmentally or economically feasible due to the following:

- Not situated adjacent to primary movement corridors
- Not accessible to a range of socio-economic population groups
- Isolated nature of development and therefore not inclusive
- Contrasting densities and heights with regard to the mixed-use nodal development
- Availability of land at an affordable cost minimal

15.4.3 Urban edge / rural location

Although land is available in this location at a lower economic cost, this location is socially and environmentally less feasible due to the following:

- Lack of proximity to social amenities, services and infrastructure
- Locating a nodal development far from other urban facilities
- Loss of land that is environmentally / ecologically valuable
- Creation of urban sprawl

15.4.4 Infill development location (preferred)

This is the most preferred location type due to the balance achievable between social, environmental and economic requirements:

- The land belongs to the Applicant
- Aligns to the prerequisites of the City Ekurhuleni of Metropolitan Municipality's SDF.
- Situated within the urban realm adjacent to existing and proposed urban infrastructure, service and amenities
- Socially inclusive due to its location to numerous communities and along public transport routes

15.5 LAND USE ALTERNATIVES

The following Land Use alternatives have been investigated

15.5.1 Alternative 1: No-go Option

This implies that the site be left as is and that no development or alteration be done. If this alternative is pursued, the existing habitat on the site will be retained as no development will take place. This option has the following drawbacks:

- The potential to provide additional mixed-use township, which appears to be in accord with the prevailing land use regime in the area and the thinking of the local municipality to the population, will be lost;
- A very viable opportunity to creating jobs and income for the local market will be negated;
- If not developed, the owner will derive no income from the property and will subsequently not be able to maintain the property. This will lead the site of fall into disrepair and the protection and appropriate management of potential conservation areas will be negated.
- Agriculture is not an economically viable option due to the location of the site. Virtually surrounded by current and future urban development and the natural location to develop further.
- Illegal squatters or vagrants may move through and inhabit the site. Severe pressure exists for housing in the lower income brackets. Due to the presence of extensive development throughout the greater area it is possible that undeveloped, un-managed land will continue be illegally settled.

Due to the pressure and demand for the provision of housing in the area and the very limited space available for this purpose; given the fact that the site will eventually degenerate if left unmanaged, and the fact that it is most likely unsuitable to be utilised for grazing or agricultural purposes due to its location, it is reasonable to state that the no-go option is less favourable than some of the other options presented.

15.5.2 Alternative 2: Single-use: Low density residential

This option will make provision for the subdivision into “Residential 1” erven only. The result of such a development will be a high-income exclusive development where no social responsibility or economic sustainability and job creation can be considered. Limited ecological land will remain as all the land will be taken up by roads or erf portions.

15.5.3 Preferred alternative: Mix use Development

The proposed development consists of mixture of residential 2,3 as well as Residential 4, Open Space (Wetlands), Business and Commercial land uses. Pre-primary, Primary and Secondary Schools will also form part of the proposed development.

The proposed development will comprise the following:

Zoning and Land uses	Ha	Percentage (%)	Number of Units
Future Roads & Main Roads	34.4	11.06	N/A
Possible Wetlands (Inclusive of Buffer Areas)	53.5	17.20	N/A
Residential (up to 60U/Ha)	177.3	57.01	8150
Mixed Use including Business, High density residential and Community Facilities	38	12.22	990
Commercial	7.8	2.51	N/A
Total	311ha	100%	9140

The site has been identified as being located in RSDF Region A.

Annexure K – Town Planning Motivation.

16.0 COMPARISON OF ALTERNATIVE LAND USES

Please refer to the Table 11 for comparison of alternatives below, a comparison of the four alternative activities for the proposed development site with regards to layout and densities, engineering and design alternatives, road access, storm water management, waste collection, sewer disposal, impact on the surrounding environment and visual impact. Within this comparison it may be assumed that mitigation measures have been adequately implemented. The impact rating is as follows:

- High - 5
- Medium - 3
- Low - 1
- Lowest score - 8
- Highest score - 40

Table 16: Comparison of alternatives

	Alternative 1: No-go	Consequence or Impact Rating	Alternative 2: Low Density Residential	Consequence or Impact Rating			Preferred Alternative: Mixed Use	Consequence or Impact Rating
Layout and densities	The site will remain as it currently exists. The potential for the site to fall into disrepair is high, along with inappropriate management / control and the potential for informal settlement invasion. The No-go option is not considered desirable.	Medium – 3 No improvements will be implemented.	A low-density layout is monotonous and unresponsive to the SDF and will not create a balance between social, economic and environmental requirements for the growing urban environment.	High – 5 Due to lack of diversity and vibrancy and responsive-ness to city requirements			A mix use development with a layout that is responsive to the City of Ekurhuleni Metropolitan Municipality's requirements creating a balance between environmental, social and economic requirements. Optimal utilisation of land to promote an accessible development.	Low – 1 Urban design framework that responds to city requirements

	Alternative 1: No-go	Consequence or Impact Rating	Alternative 2: Low Density Residential	Consequence or Impact Rating			Preferred Alternative: Mixed Use	Consequence or Impact Rating
Engineering and design	This alternative will not currently require upgrading of engineering services; however no upgrades will be implemented to the benefit of the surrounding area.	Med-low – 2 No improvements will be implemented	Structural and design aspects can be accommodated within this proposal. Positioning of services will be strategically planned according to the proposed layout to prevent further impacts on the environment.	Med-low – 2 The systems will be designed to function optimally, and measures can be implemented to ensure effective monitoring and maintenance			Structural and design aspects can be accommodated within this proposal. Positioning of services will be strategically planned according to the proposed layout to prevent further impacts on the environment.	Med-low – 2 The systems will be designed to function optimally and measures can be implemented to ensure effective monitoring and maintenance
Road access	To remain as existing. No upgrades will be required and implemented.	Medium - 3 No improvements will be implemented in an area that desperately requires road upgrades	Minimum upgrades to entrances and accesses according to the traffic engineering report. Limited public transport improvement and accessibility due to gated community.	High – 5 Due to gated community structure in an area that should be accessible			Upgrades of the intersections. Entrances and accesses as well as road upgrades according to the traffic engineering report.	Med-low – 2 Increase in traffic to be accommodated due to surrounding road upgrades
Stormwater management	The storm water is currently managed as sheet flow. The site drains naturally towards the streams, which border the flow. Better management options could be implemented to prevent erosion.	Medium - high– 4 No storm water management will be implemented, which could worsen erosion on the site and contribute to pollution of the watercourse situated on the eastern	Storm water management via a storm water drainage system composed of storm water inlets and pipes along internal roads which connecting to attenuation structures. No water will be released into	Medium – 3 Effective storm water management can be implemented			Storm water management via a storm water drainage system composed of stormwater inlets and pipes along internal roads which connecting to attenuation structures.	Med Low – 2 Effective storm water management can be implemented

	Alternative 1: No-go	Consequence or Impact Rating	Alternative 2: Low Density Residential	Consequence or Impact Rating			Preferred Alternative: Mixed Use	Consequence or Impact Rating
		boundary of the proposed site.	natural systems without retention and slowing down of the water. Accumulated storm water can be utilised for irrigation of open spaces.				No water will be released into natural systems without retention and slowing down of the water. Accumulated storm water can be utilised for irrigation of open spaces	
Waste collection	No waste management strategies are currently being implemented.	High – 5 No improvements will be implemented. Illegal dumping will continue	Refuse removal to be provided by the City of Ekurhuleni Municipality, however waste is to be minimised by the provision of waste transfer stations	Med-low – 2 Effective waste management due to structure and management by Body Corporate.			Refuse removal to be provided by the City of Ekurhuleni Metropolitan Municipality, however waste is to be minimised by the provision of waste transfer stations	Med-low – 2 Effective waste management due to structure and management by individual land parcels and the incorporation of a homeowners association, which duties will include but not be limited to supervision of waste management
Sewer disposal	No additional requirement.	Medium – 3 No improvement to system in the area	Improvement of municipal sewage reticulation system. Increase on load.	Medium – 3 Less time for expansion due to probably once-off roll out			Improvement of municipal sewage reticulation system. Increase on load	Medium – 3 Phased nature of development will ensure the correct and timeous planning associated with the potential requirements for upgrading of sewer system

	Alternative 1: No-go	Consequence or Impact Rating	Alternative 2: Low Density Residential	Consequence or Impact Rating			Preferred Alternative: Mixed Use	Consequence or Impact Rating
Impact on surrounding environment	No change expected other than the potential degradation that could be resultant of poor site management, illegal informal occupation, illegal hunting and illegal dumping	Med – 3 No change, however possibility of illegal squatters and illegal dumping	Impact on the environment is mitigated due to the provision of adequate open space for ecological connectivity and preservation. No surrounding community benefit as the development will most likely be gated and inaccessible with no economic and social facilities that are available for surrounding neighbourhoods.	High – 5 A definite change in land use, although strict access control with no surrounding community access			Impact on the ecological environment is mitigated due to the provision of adequate open space for ecological connectivity and preservation. The community will benefit due to the provision of various commercial enterprises, the improvement of bulk infrastructure as well as various job opportunities.	Med-low – 2 A definite change in land use, along with a mix of economic and social land uses that will benefit surrounding community Mitigation measures to prevent negative impacts in respect of ecologically sensitive areas will be implemented as part of the Environmental Management Plan.
Visual impact	Visual impact will not change.	Low – 1	Unilateral and monotonous mass of development. Lack of diversity and vibrancy	Med – 3 Can potentially be mitigated with greening			Vibrancy and diversity associated with mixed-use character under an umbrella of guidelines (materials, lighting, greening, forms, etc)	Med-low – 2 Architectural guidelines and aesthetic requirements
IMPACT SCORE		25		27				17

17.0 POTENTIAL IMPACTS

17.1 METHODS USED TO IDENTIFY POTENTIAL IMPACTS

A combination of the following methods was used to identify impacts during the Scoping and EIA Processes:

17.2 SPECIALIST STUDY FINDINGS

All the legally required specialist studies were conducted (as required by GDARD as per DEA guidelines). Often more than one study was conducted in the same discipline to verify or to supplement findings. The findings of such specialist studies highlighted potential impacts on protected or endangered species and/or environments. The following shows a list of the impacts according to specialist studies:

Table 17: Possible impacts according to specialist studies

SPECIALIST STUDY	IMPACT IDENTIFICATION
Agricultural Potential	<p>According to the Gauteng Agricultural Potential Atlas (GAPA) the site is classified as having build-up area with small pitches of moderate potential refer to Figure 6 above, however the site is situated within an urban area with high density developments occurring on all sides and therefore it would not be viable to retain the site for Agricultural use.</p> <p>Furthermore, due to the small size of the site any agricultural activities will be intensive and would thus lead to soil becoming fallow and unusable for Agricultural purposes.</p> <p>In conclusion, the property is not a viable farming unit and no impacts in respect of the proposed development are anticipated with regards to the loss of land with high agricultural potential are expected.</p>
Air Quality	<p>The prevailing wind field is from the north-east, north and north-west with infrequent winds from the south with slight variations between the months of October 2015 to March 2016. The wind speeds were similar; ranging between 2.1 and 8.8 m/s. The months of October and November 2015 had slightly higher wind speeds. The months with the lowest and highest rainfall were October 2015 (17.6 mm) and March 2016 (137 mm), respectively.</p> <p>Dustfall deposition rates from the Airshed network for the month of March 2016 were low and well within the NDCR limit for residential areas. Similarly, dustfall deposition rates from the ERPM network (January to March 2016) and from the ERGO network (October to December 2015) were low and well below the NDCR limit for residential areas.</p>

SPECIALIST STUDY	IMPACT IDENTIFICATION
	<p>Daily PM10 concentrations did not exceed the daily NAAQ limit of 75 µg/m³ during the sampling period 2 March to 29 March 2016, with the highest concentration sampled of 59.72 µg/m.</p>
<p>Flora & Fauna</p>	<ul style="list-style-type: none"> <p>• Vegetation</p> <p>The study area consists of various wetland sections that are mostly seasonally wet. A large slimes dam occurs in the northern part of the site with the largest part of the study area consisting of the wetland and drainage areas and the large mostly natural grassland area. The area is open and easily accessible with sections of the grassland being degraded due to various human-induced activities (grazing by cattle, frequent fires, poor conservation practices etc.).</p> <p>No detailed vegetation survey was conducted, though the study area was traversed to determine the presence or not of red data species or suitable habitat to be able to verify the findings of the previous red data report conducted by Eco Assessments in 2011. The area received low rainfall prior to the visit resulting in a low growth rate of the plants. Other than the presence of a number of populations of the Orange listed geophyte <i>Hypoxis hemerocallidea</i>, no other red data plants were observed within the grassland section and close to the artificial pans. Marginal habitat exists for three other species, though it is mostly around the natural pan areas. These species have a low-medium probability to be present on the site.</p> <p>Since the most sensitive habitats are located in and around the natural pans, it is important that suitable buffer zones are implemented around these wetland systems to ensure protection of the habitat close to and around the wetlands. It is also important that connectivity between the three natural pans be ensured to maintain their ecological functioning.</p> <p>• Invertebrate</p> <p>During site visits, no invertebrates of conservation concern were located. It must however be mentioned that whilst employing the Rapid Biodiversity Assessment (RBA) method, there does exist the possibility that certain other rare invertebrate species may not have been encountered.</p> <p>Four invertebrate species of conservation concern are known to occur in the vicinity of the survey area. These include three species of butterfly and one species of cetonid beetle. None of these species were encountered during the survey. This, however, does not imply that one is unlikely to encounter any of these species in the study area as they may have been missed by sampling due to multiple factors.</p> <p>Lepidochrysops praeterita, commonly known as the Highveld Blue, is rare and localized on highveld grassland between Potchefstroom in North West Province,</p>

SPECIALIST STUDY	IMPACT IDENTIFICATION
	<p>Sasolburg in the Free State Province and Walkerville in Gauteng Province. This butterfly frequents hillsides on which <i>Becium grandiflorum</i> grows, flying fast and close to the ground from September to November. A small population has been detected in the Walkerville area which is located more than 50km to the east of the survey area. No specimens were observed during the survey. Due to the absence of suitable habitat (highveld grassland with trees) as well as its larval food plant, the species can be considered absent from the survey area.</p> <p><i>Chrysothrix aureus</i>, commonly known as the Heidelberg Copper Butterfly, is a monophagous, myrmecophilous butterfly species, known from a handful of localities on the Heidelberg- Balfour-Greylingstad ridge system. It is not immediately apparent what the habitat of this species is, ie what factors determine suitable habitat. The known records represent colonies of this butterfly which occur around rock faces inhabited by the host ant species and where the host plant also occurs. Colonies are made up several tens of individuals which are active over an area of about 100m² in the vicinity of the ant colonies. The butterflies do not occur in areas where the host plant grows larger than about 1m in height. It has been speculated that the species only occurs at the highest altitudes on the ridge system, but there are some colonies found lower than the proposed suitable altitudinal range. It has also been speculated that it only occurs in 'rain shadow' areas on the ridge, usually on SE facing slopes, where the resultant water stress inhibits the production of allelochemicals in the host plant, but this has not been tested. Fire has been demonstrated to be important for the species in that it keeps the vegetation structure open (Terblanche et al 2003). Specimens of this species were not observed during the survey, nor does suitable habitat occur on the site.</p> <p><i>Aloeides dentatis dentatis</i> is a butterfly species known to be threatened by urban development in Gauteng. This species is known from three colonies in Gauteng, namely the Witpoortjie colony, the Glenvista colony and the Suikerbosrand colony. The latter colony is protected in the Suikerbosrand Nature Reserve and its larval foodplant is <i>Lotononis eriathrina</i>. This plant was not found to be present on the site. The Witpoortjie colony is protected in the Ruimsig Entomological Reserve and its larval foodplant is either <i>Hermannia depressa</i> or <i>Hermannia jacobaeifolia</i>. A concerted effort was made to locate either the species itself, any of its three larval foodplants or its associated ant species <i>Lepisiota capensis</i>. Despite extensive searching, none of the three larval foodplants were observed on the site. It can therefore be confidently stated that <i>Aloeides dentatis dentatis</i> is absent from the site.</p> <p><i>Ichneustoma stobbiai</i> is a cetonid beetle of immense scientific interest and conservation concern. Females are flightless, and adults emerge for only 2 - 4 days, thereby severely restricting this species in terms of gene flow and dispersal</p>

SPECIALIST STUDY	IMPACT IDENTIFICATION
	<p>ability. <i>I. stobbiai</i> was previously thought to be extremely habitat specific and reside almost exclusively under tufts of the grass species <i>Eragrostis micrantha</i>. The location of new populations of this species in caravan parks and exotic gardens suggest that the species is more robust than previously thought. Apart from one population near Hartbeespoort dam, this species is found only in Gauteng and is severely threatened due its poor dispersal ability. There are currently eleven confirmed populations of this beetle in Gauteng, none of which occur in close vicinity of the survey area.</p> <ul style="list-style-type: none"> <p>Grass Owl Habitat</p> <p>African Grass Owls are found exclusively in rank grass, typically, although not only, at fair altitudes. African Grass Owls are secretive and nomadic breeding in permanent and seasonal vleis or valley bottom wetlands which it vacates while hunting or post-breeding, although it will breed in any area of long grass and it is not necessarily associated with wetlands.</p> <p>The species can also be found in shorter grass (40-50cm) in association with hydrophilic or hygrophilous sedges (<i>Juncus</i> sp., <i>Scirpus</i> sp and <i>Cyperus</i> sp.) and grasses (<i>Imperata cylindrica</i>) which forms impenetrable thickets which provide enough substrate for the owls' characteristic "tunnel" nests as well as favourable roosting habitat (pers.obs). The conditions described above are normally associated with pristine, well managed grasslands usually in close proximity of water, hence the threatened status of the species, as these grasslands are extremely rare in South Africa. However, the species is proving itself to be adaptable to such an extent that viable populations can exist in areas which are completely transformed, provided basic food and shelter requirements are met.</p> <p>No African Grass Owls or Marsh Owls were flushed in the rank grass vegetation (<i>Imperata cylindrica</i>) occurring within the western portion adjacent to the poorly defined, mainly unchanneled valley bottom wetland. No evidence of any recent nesting, roosting sites or pellets were observed within the <i>Imperta cylindrica</i> areas as well as around the seasonal pans.</p> <p>Three Marsh Owls (<i>Asio capensis</i>) were previously flushed from site as well as a confirmed nesting site was recorded during a previous avifaunal habitat assessment (Lockwood 2008). The valley bottom wetland and seasonally inundated depressions or pans and associated rank (<i>Themeda triandra- Imperata cylindrica, Carex</i> sp. <i>Juncus</i> sp, <i>Schoenoplectus</i> sp.) grassland and hygrophilous vegetation offers favourable roosting and possible nesting habitat for Marsh Owls as well as possibly African Grass Owls. The surrounding open Tsakane Clay grasslands offer foraging areas especially adjacent to the valley bottom wetland where large colonies of burrowing rodents were observed. The trampling by cattle,</p>

SPECIALIST STUDY	IMPACT IDENTIFICATION
	<p>disturbances by off-road vehicles and quad bikes and presence of dogs are immediate threats to African Grass Owls due to their ground nesting breeding strategy. Road fatalities on the M43 cannot be eliminated.</p> <p>More intensive surveys conducted over extended periods during the peak breeding period between February and April are required to ascertain the current population size of African Grass Owls on the site and immediate adjacent area.</p> <ul style="list-style-type: none"> • Invertebrate During site visits, no invertebrates of conservation concern were located. It must however be mentioned that whilst employing the Rapid Biodiversity Assessment (RBA) method, there does exist the possibility that certain other rare invertebrate species may not have been encountered. <p>Four invertebrate species of conservation concern are known to occur in the vicinity of the survey area. These include three species of butterfly and one species of cetonid beetle. None of these species were encountered during the survey. This, however, does not imply that one is unlikely to encounter any of these species in the study area as they may have been missed by sampling due to multiple factors.</p>
<p>Wetlands and riparian areas</p>	<p>The site lies within the C22C quaternary catchment and forms part of the headwaters of the Rietspruit. This catchment therefore forms part of the Vaal River Water Management Area.</p> <p>Four (4) wetland areas were identified in the delineation although wetland 2 (in the north) does not form part of the proposed development area.</p> <ul style="list-style-type: none"> • Wetland 1 – This consists of an extensive unchannelled valley bottom wetland which becomes channelled in some sections towards the south. • Wetland 3 – This is the remains of a historical stream found in an area originating from tailings seepage. The channel probably only contains water following heavy downpour. The vegetation in this wetland is not typical nor pristine but in fact dominated by exotic species such as <i>Verbena bonariensis</i> and <i>Pseudognaphalium luteo-album</i>. The dominant grass, <i>Cynodon dactylon</i> is also indicative of disturbance. The presence of such species can mostly be attributed to increased wetness from seepage from the tailings dam, rather than a natural wetland system that may have historically been found there. Some impact on the vegetation due to impacts on soil chemistry is also deemed likely. • Further south west of the slimes dam the channel is found. Although no water was observed in the channel, indigenous water loving grass species, eg. <i>Setaria sphacelata</i> and <i>Andropogon appendiculatus</i>, and herbaceous species, eg. <i>Nidorella anomala</i>, were abundant. Overall there was a low diversity of

SPECIALIST STUDY	IMPACT IDENTIFICATION
	<p>indigenous species as well as an abundance of exotic species. This area can be considered to have suffered a large loss of natural habitat, biota and basic ecosystem functions.</p> <ul style="list-style-type: none"> • Wetland 4 – Three (3) endorheic pans are located at the centre of the site. These pans have generally been significantly affected by alien encroachment, with special mention of <i>Verbena bonariensis</i> and <i>Bidens formosa</i>. Other significant impacts observed included disturbance of the pan substrate, as well as frequent veld fires impacting on the vegetation. • The presence of the tailings dam has altered the integrity of wetland 3. Severe sedimentation is observed in the river to the east of the tailings dam. The tailings dam has also severely degraded the terrain at wetland 3. <p>Following the field investigation undertaken in September 2018, it was concluded that the freshwater resource delineations presented in SAS (2009) remain unchanged and are valid. No additional freshwater resources or wetland features were identified within the study area. However, current legislation requires the application of Government Notice (GN) 509 of 2016 as it relates to the National Water Act, 1998 (Act 36 of 1998) (NWA) to identify all potential freshwater resources that may potentially be impacted by the proposed development. Therefore, the freshwater resources identified within 500m of the study area were delineated in fulfilment of GN509 of the NWA using desktop methods.</p> <p>The freshwater resources within the study area have been historically altered through impacts from mining activities (northern section of the study area), residential developments (in the broader catchment) and through the construction of road and railway infrastructure traversing the system.</p> <p>The reclamation of the tailings storage facility (TSF) located to the north of the study area will result in the loss of hydraulic head and possibly redirect the recharge of the wetland to the catchment to the east of the catchment feeding this wetland. This change in the landscape will lead to the removal of the primary hydrological driver of the hillslope seep wetland adjacent to the TSF (hillslope seep 1). Thus, the need for future conservation of this wetland is questionable considering the long-term viability of the system functioning in the landscape.</p> <p>Recommendation</p> <ul style="list-style-type: none"> • The use of Sustainable Drainage Systems (SUDs) to manage stormwater is considered critical if roads and large paved parking areas are to be planned within close proximity to the freshwater environment, in order to prevent significant impacts on the hydrological functioning of the freshwater area, reduce the risk of flooding during high flow periods and reduce the risk of increased erosion. Furthermore, any discharge of runoff into the freshwater

SPECIALIST STUDY	IMPACT IDENTIFICATION
	<p>system must be done in such a way as to prevent erosion. In this regard, it is highly recommended that a suitably qualified engineer be consulted with regards to the use of SUDs. Examples of these which may be applicable to this development include permeable paving, rainwater harvesting, soakaways, swales and bio-retention facilities or attenuation ponds to ensure that post-development runoff does not exceed pre-development runoff volumes and lead to altered flood peaks.</p> <ul style="list-style-type: none"> • Areas which are to be cleared of vegetation, including contractor laydown areas, must remain as small as possible, particularly in the residential development areas, in order to reduce the risk of proliferation of alien vegetation, and in order to retain a level of protection to the freshwater resources during construction (e.g. sediment trapping, slowing of stormwater runoff etc.). Contractor laydown areas are to remain outside of the delineated wetland and riparian zones and their associated buffers, and as much as feasible no natural/indigenous wetland vegetation is to be cleared; • It is highly recommended that an alien vegetation management plan be compiled during the planning phase and implemented concurrently with the commencement of construction; • A soil management plan must be compiled during planning and implemented when construction commences. It is essential that the following be included in the soil management plan: • All exposed soils are to be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the freshwater resources. This is considered essential as the soils in the vicinity are highly dispersive; • No stockpiling of soils is to take place within the freshwater areas or the 50m Gauteng Department of Agriculture and Rural Development (GDARD) setback area, and stockpiles may not exceed 2m in height; • Any remaining soils following the completion of construction activities are to be levelled and re-seeded with indigenous flora species to minimise the risk of further sedimentation of the freshwater area, and to aid in the natural reclamation process; and • The residual impacts of the proposed development on the freshwater resources are to be offset. <p>It is the opinion of the specialist therefore that the proposed development, from a freshwater resource perspective, be considered favourably, with the proviso that strict adherence to mitigation measures is enforced, in order to ensure that the ecological integrity of the freshwater resources is not further compromised.</p>

SPECIALIST STUDY	IMPACT IDENTIFICATION
<p>Cultural Heritage</p>	<p>The study area was assessed both on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey to cover the extent of the Remainder of Portion 62 as development plans are not available at this stage.</p> <p>A large slime dam is situated inside the survey area and takes up about 25 % of the Northern part of the survey area. The study area is further disturbed by waterline servitudes and cultivation from the 1970's (Figure 9). Although these activities would have impacted on surface indications of heritage sites 11 features including Stone tools and historical industrial artefacts, a ruin as well as a large cemetery and stone cairns (that could mark informal graves) were identified.</p> <p>In terms of the built environment of the area (Section 34), no standing structures older than 60 years occur within the study areas.</p> <p>Stone Age artefacts were recorded during the survey. The features comprise dispersed scatters of a low density and are located on the edges of pans. Due to ecological reasons it is not expected that these areas will be developed, and this will ensure that the features are preserved. No further mitigation prior to construction is recommended in terms of the archaeological components of Section 35 for the proposed development to proceed. Based on the SAHRA sensitivity map the area is of very high significance and additional studies are required prior to development. In terms of Section 36 of the Act 1 cemetery and two areas with three and five stone cairns respectively were recorded.</p> <p>If any graves are located in future, they should ideally be preserved in-situ or alternatively relocated according to existing legislation. No public monuments are located within or close to the study area. The surrounding area has been developed and the proposed project is in line with the current land use and will not impact negatively on significant cultural landscapes or viewsapes. During the public participation process conducted for the project no heritage concerns was raised.</p> <p>Recommendation</p> <ul style="list-style-type: none"> ● Implementation of a chance find procedure. ● It is recommended that Site 2,3 and 4 should be assessed by an industrial archaeologist prior to construction. ● It should be confirmed whether the stone cairns identified represent graves. If the features are confirmed to be graves the graves should be retained in situ. If the features relate to clearing activities, they are of no importance and no further action is required. ● Graves should be retained in situ if this is not possible as a last resort the graves can be relocated adhering to legal requirements.

SPECIALIST STUDY	IMPACT IDENTIFICATION
	<ul style="list-style-type: none"> • Stone Age Sites – the sites are located on the edges of a pan and due to ecological reasons, it is not expected that the area will be developed. It is recommended that these sites should be retained in situ.
<p>Traffic Impact</p>	<p>Based on a good knowledge of the transportation system in the vicinity of the proposed Helderwyk Estate, previous traffic impact assessment (Salfin Extension 1, 2 and 3, as well as Badenhorst Estate), consultation with the Municipality, other developers and the Gauteng Department of Roads and Transport, consultation with the Passenger Rail Agency of South Africa (PRASA), an evaluation of the provincial road network as required in terms of the Gauteng Transport infrastructure Act (Act 8, 2011), a traffic analysis for the 2021 horizon year and a capacity analysis of all significant intersection in the study area for two land uses scenarios, it is concluded that:</p> <ul style="list-style-type: none"> ○ The proposed provincial and metropolitan major road networks can accommodate the projected future traffic demand, including Helderwyk Estate, as well as other known township applications in the area. ○ Traffic signals have to be installed at the intersection of Keurboom Street and P58-1 (K132). The developer of Salfin X1 and X2 has accepted the responsibility to install traffic signals at this intersection. ○ Barry Marais Road (K155) will have to be doubled within the 10-years planning period, without the traffic generated by Helderwyk Estate (or the approved and planned townships in the area). ○ Local network improvements can be implemented on a phased basis as the development progresses. ○ Public transport will play a major role to accommodate the expected future traffic demand and provision must be made for public transport facilities. ○ Walking is an important mode of transport and provision must be made for paved pedestrian walkways along all arterial roads, as well as residential collector streets. ○ A rail commuter station can be expected in the medium to long term and the township layout and road network should enable efficient and convenient access to the station area. <p>At the meeting between developers, the Municipality and the Gauteng Department of Roads and Transport, it was agreed that although the planning by the Municipality provides a good basis for the planning of the area, it may be necessary to amend the proposals of the Municipality to mitigate the impact of these proposals on adjoining developments. After consultation with the affected land owners, it has been concluded that it is technically feasible to amend the road network to reduce its impact on adjoining properties and that such changes will not have a significant impact on traffic patterns on the major road network. It would therefore not be necessary to amend the ‘traffic demand estimate or the capacity</p>

SPECIALIST STUDY	IMPACT IDENTIFICATION
	<p>analysis and that the proposed network would be able to accommodate both Helderwyk Estate and the other developments in the area.</p> <p>Based on the traffic assessment it is recommended from a traffic engineering point of view that:</p> <ul style="list-style-type: none"> ○ The major road network proposed by the Ekurhuleni Metropolitan Municipality should be acceptable in principle, including the intersection of the new proposed metropolitan arterial road on the proposed quarter link that connects K155 (Barry Marais Road) and K132 (P58-1 North Boundary Road). ○ The township establishment application for Helderwyk Estate be granted. ○ A record of decision that will enable the development of the township be issued. ○ The township layout should take pedestrians and public transport into consideration, particularly the planned commuter rail station. ○ Road design should include provision for pedestrians and public transport lay-bys. ○ Provision be made for a public transport modal transfer facility as part of the land earmarked for community facilities. ○ The applicant should contribute to the upgrading of the external road network according to the engineering services contribution policy of the Ekurhuleni Metropolitan Municipality. ○ Road infrastructure be provided in phases as the proclamation of portions of Helderwyk Estate progresses and the extent of roads and road improvements must be specified in the Engineering Services Agreement between the Municipality and the applicant.
<p>Services provision</p>	<p>Communication with the applicable municipal departments will be maintained to ensure adequate supply plans without hindering the supply to the surrounding areas.</p> <p>Bulk services are available or will be available along with required upgrades. The appropriate links will be installed to these services.</p> <p>No additional impact is expected with the implementation of the Environmental Management program.</p>

17.3 SITE INSPECTION

The environmental consultant and specialists conduct several site visits and identified potential sensitive environments. These areas are then red-flagged to be investigated further and excluded from development.

17.4 PUBLIC PARTICIPATION

Conducting public participation produces an issues list. Such a list needs to be screened for relevant impacts which then need to be addressed by specialist studies or identified for further investigation. A very comprehensive public participation process was followed, including a public meeting.

17.5 GDARD POLICIES, REVIEW / TERMS OF REFERENCE

GDARD C-Plan 3 as well as the policies provides the red flags that must be investigated by the specialists. Furthermore, the GDARD officials and the different sub-directorates within the department review the application and give comments to the relevant environmental officer. The issues identified are forwarded to the environmental consultant and these issues are addressed or translated as impacts.

17.6 IMPACT SUMMARY

Environmental impacts can be classified according to physical impacts, bio-physical impacts and socio-economic impacts and can occur during the construction and / or operational phases.

17.6.1 Physical Impacts

- Geological impacts
- Topographical impacts
- Air quality
- Soil and land capability
- Water quality and availability – surface and ground water

17.6.2 Biophysical

- Impacts on flora and flora habitats
- Sensitive landscapes (flood plains)

17.6.3 Socio-economic Impacts

- Cultural and historical significance
- Noise pollution
- Visual impact
- Sites of cultural significance
- Safety and security
- Impact on ambience of the area
- Traffic increase on roads
- Services being inadequate and malfunctioning (including electricity, waste management, water, sewage management systems)
- Runaway fires due to poor fire management and lack of capacity to fight fires.
- Improved tax base
- Bulk contributions which result in the improvement of infrastructure in the area

17.7 ASSESSMENT OF IMPACTS

17.7.1 Definition of terms

Construction Phase: All construction or related activities, from occupation by the contractor, until the contractor leaves the site.

Operational Phase: All activities related to and including the operation and maintenance of the proposed development.

Nature: The type of effect the specific activity will have on the environment

Probability: Degree of certainty of impacts

Duration: Lifetime of the impact

Scale: Spatial scale of the impact

Magnitude: Degree/severity of impact

17.7.2 Methodology

The significance of the identified impacts will be determined using the approach outlined below. This incorporates two aspects for assessing the potential significance of impacts (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998), namely occurrence and severity, which are further sub-divided as follows:

Table 20: Methodology to Assess Impacts

Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Magnitude (severity) of impact	Scale / extent of impact

To assess each of these factors for each impact, the following four ranking scales are used:

Probability	Duration
5 – Definite/don't know	5 – Permanent
4 – Highly probable	4 – Long-term
3 – Medium probability	3 –Medium-term (8-15 years)
2 – Low probability	2 – Short-term (0-7 years) (impact ceases after the operational life of the activity)
1 – Improbable	1 – Immediate
0 – None	
Scale	Magnitude
5 – International	10 – Very high/don't know
4 – National	8 – High
3 – Regional	6 – Moderate
2 – Local	4 – Low
1 – Site only	2 – Minor

0 – None	
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Once these factors are ranked for each impact, the significance of the two aspects, occurrence and severity, is assessed using the following formula:

SP (significance points) = (probability + duration + scale) x magnitude

The maximum value is 150 significance points (SP). The impact significance will then be rated as follows:

SP >75	Indicates high environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 – 75	Indicates moderate environmental significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated.
SP <30	Indicates low environmental significance	Impacts with little real effect and which should not have an influence on or require modification of the project design.

17.8 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Please refer to **Table 21** which indicates the quantification of impacts related to construction activities and **Table 22** which indicates the quantification of impacts related to the operational activities, as per the methodology identified above.

Also, please refer to **Annexure P** for the Draft Environmental Management Program (EMPr).

Legend:	M:	Magnitude of impact	High	>70	SBM: Significance Before Mitigation
	D:	Duration of impact	Mod.	30 -70	SAM: Significance After Mitigation
	S:	Scale of impact	Low	0 - 30	
	P:	Probability of unmitigated occurrence occurring			

17.8.1 Construction Phase

Table 21: Quantification of impacts related to construction activities

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures	
			P	D	S	M	Total	Rating			
17.8.1.1 Physical Impacts											
Geology	There is no expected construction related impacts on the geology of the proposed development site and surrounding areas										<ul style="list-style-type: none"> None, although geological monitoring should commence during the Construction Phase by the Geotechnical engineer
Topography	Construction activities including levelling of road and building surfaces	Erosion	4 3	2 2	2 1	6 4	48 24	SBM SAM	M L	<ul style="list-style-type: none"> Demolition and construction activities should preferably take place during the dry months All surface run-offs shall be managed in such a way so as to ensure erosion of soil does not occur All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed Where erosion may potentially occur, dissipaters such as gravel beds or straw bales must be installed to prevent erosion. 	
Air quality	Construction activities and vehicles on site.	Dust pollution that affects adjacent developments.	3 2	2 2	2 1	6 4	42 20	SBM SAM	M L	<ul style="list-style-type: none"> Dust to be minimised by spraying down (water truck) of construction site daily 	
Soils and land capability	Site clearance for road construction and construction of units and other structures	Compaction of topsoil	4 2	2 2	1 1	6 4	42 20	SBM SAM	M L	<ul style="list-style-type: none"> The top (200-300mm) layer (as applicable) of all areas to be excavated for the purposes of construction shall be stripped and stockpiled in areas where this material will not be damaged, removed or compacted. This stockpiled material shall be used for the rehabilitation of the site. Weeds appearing on the stockpiled topsoil shall be removed by hand before seeding. 	

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
	Site vehicles and storage of fuel on site	Contamination by fuel and lubricant spillages from vehicles	3 2	2 2	1 1	5 4	30 20	SBM SAM	M L	<ul style="list-style-type: none"> Provision of proper re-fueling and maintenance facilities and procedures will reduce the likelihood of soil contamination
Water quality and availability	Storage of fuel and re-fuelling of construction vehicles	Fuel or chemical spillage and pollution of surface and/or ground water	3 1	2 2	2 2	6 4	42 20	SBM SAM	M L	<ul style="list-style-type: none"> Good housekeeping by contractor Store new and used oils in bunded areas No co-handling of reactive liquids or solids should be allowed Create and monitor an inventory of chemicals held on site
	There will be no construction related impact on the quantity of groundwater available to surrounding borehole users									<ul style="list-style-type: none"> None, although groundwater monitoring should commence during the Construction Phase
Generation of Waste	The building rubble and solid construction waste (such as sand, gravel, concrete and waste material)		3 3	2 2	1 1	4 4	24 24	SBM SAM	L L	<ul style="list-style-type: none"> The building rubble and solid construction waste (such as sand, gravel, concrete and waste material) that cannot be used for filling and rehabilitation and other litter and waste generated during the construction phase will be removed from site and be disposed of safely and responsibly at a licensed landfill site, i.e. a landfill licensed in terms of Section 20 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989).
17.8.1.2 <i>Biophysical Impacts</i>										
Flora	Site clearing for construction activities	Loss of species diversity and habitat characteristics	5 4	2 2	1 1	10 8	80 56	SBM SAM	H M	<ul style="list-style-type: none"> Most of the site will be transformed due to the requirement to develop this site as a regional node The Environmental Control Officer (ECO) is to be trained to be able to identify any possible red data species Set up a planting list together with the ecologist from which all rehabilitation in the development must be done – only indigenous and non-invasive species Further information will be provided in the EMP which will be attached to the Environmental Impact Assessment Report.

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
Fauna	Site clearing for construction activities	Loss of species diversity and habitat characteristics	5 4	2 2	1 1	10 8	80 56	SBM SAM	H M	<ul style="list-style-type: none"> Most of the site will be transformed due to the requirement to develop this site as a regional node The wetland and riparian zones with associated floodlines to be retained The Environmental Control Officer (ECO) is to be trained to be able to identify any possible red data species
Sensitive landscapes	Construction activities – wetland and associated buffer areas	Loss of valuable landscape and habitat	4 2	3 3	1 1	8 4	64 24	SBM SAM	M L	<ul style="list-style-type: none"> The sensitive drainage line to the north and west of the site as well as the wetlands are to be fenced off from all construction activities
Conservation	Delineation of conservation area – wetland and riparian areas and associated buffers	Conservation and maintenance of valuable landscape and habitat – benefit to local and regional biodiversity by minimising fragmentation of ecological systems	3 4	2 2	2 3	4 6	28 42	SBM SAM	L M	<ul style="list-style-type: none"> Delineation of the conservation area prior to commencement of construction activities Education of construction workers regarding the value of the conservation area
17.8.1.3 Socio-economic Impacts										
Noise pollution	All construction activities	Nuisance to surrounding land owners	4 3	3 3	2 1	6 4	54 28	SBM SAM	M L	<ul style="list-style-type: none"> Locate noisy machines and equipment maintenance areas as far away from sensitive receptors as possible Adherence to acceptable working hours Adherence to Occupational Health and Safety Act Ear protection for workers that may be affected by noise

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
										<ul style="list-style-type: none"> Further information will be provided in the EMP which will be attached to the Environmental Impact Assessment Report.
Visual integrity	Construction activities	Visibility of dust and construction activities from surrounding roads, properties and tourist locations	3 2	3 3	2 2	6 4	48 28	SBM SAM	M L	<ul style="list-style-type: none"> Apply dust control measures diligently, especially on provincial roads Apply recommendations of specialist regarding colour and construction of site structures during the Construction Phase
Sites of cultural significance	The Heritage Impact Assessment is in the process of being undertaken.		4 3	4 4	2 2	8 4	80 36	SBM SAM	H M	<ul style="list-style-type: none"> Should any other potentially culturally significant artefacts or graves, etc be found during construction activities all activities should be stopped until an assessment by a Cultural Heritage practitioner has been completed
Safety and security	Construction workers in the area	Increase in crime in area and increase in squatters of vacant land	4 2	3 3	3 2	8 4	80 28	SBM SAM	H L	<ul style="list-style-type: none"> Proper management and planning No construction work will be allowed on Sundays A limited number of workers along with security guards will be allowed to sleep on site, however within a cordoned-off secure area All staff will carry identification, access control will be enforced and the site will be swept and a search will be done each night The development will have 24-hour access control and security A CLO (Community Liaison Officer) should be employed

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
	Construction works	Migration of job seekers into the area in search of employment	3 2	3 3	2 2	6 4	48 28	SBM SAM	M L	<ul style="list-style-type: none"> No on-site recruitment is to take place The CLO (Community Liaison Officer) to be consulted regarding employment of members of the surrounding communities.
		Increase in construction traffic	4 3	3 3	3 2	8 4	80 32	SBM SAM	H M	<ul style="list-style-type: none"> The access of large trucks will be investigated to provide a suitable access route that does not become a nuisance to existing residents Only a specified number of trucks at any one time will be allowed onto the property Construction vehicles and activities must aim to avoid peak hour traffic times (weekdays 7-8am and 5-6pm) Establish an all-weather site access and wheel wash or shake down to prevent soil and materials from being trekked onto the road
		Decrease in safety due to increased traffic	4 3	3 3	2 2	10 6	90 48	SBM SAM	H M	<ul style="list-style-type: none"> Security fencing and barriers Perimeter fence patrols
Local services	Construction activities that utilise local services	Inadequate service provision to adjacent properties and malfunctioning of services	2 1	3 3	2 2	4 2	28 12	SBM SAM	L L	<ul style="list-style-type: none"> The service systems are to be designed according to the minimum requirements of, and submitted to the Local authority for approval. No construction activities must commence on site prior to obtaining the necessary approval
Fire	Cooking fires by construction workers	Veld fires	3 1	3 3	3 2	6 4	54 24	SBM SAM	M L	<ul style="list-style-type: none"> A designated area shall be assigned for fire making by the construction workers, so as to ensure that run-away veld fires do not occur This will reduce air pollution by excessive smoke

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
Improved tax base for local municipality	Employment of construction workers	Decrease in unemployment and crimes related to unemployment	4	3	2	8	72	SBM	M	<ul style="list-style-type: none"> Local labour to used as far as possible for the installation of services and the construction of the retirement village and associated infrastructure Local training and capacity building programmes Construction timeframe could be lengthy due to the extent and phased nature of the proposed development
			5	3	2	8	80	SAM	H	
		BEE development opportunities	2	3	2	4	28	SBM	L	<ul style="list-style-type: none"> Contract requirements to involve and train BEE companies
			3	3	2	6	48	SAM	M	
	Local demand for goods and services	Decrease in unemployment and empowerment of local trade and industry	2	3	2	4	28	SBM	L	<ul style="list-style-type: none"> Local products, goods and services to be utilised as far as possible during the construction phase Local training and capacity building programmes
				3	3	2	6	48	SAM	

17.8.2 Operational Phase

Table 22: Quantification of impacts related to the operational phase

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures	
			P	D	S	M	Total	Rating			
17.8.2.1 Physical Impacts											
Geology	There are no expected operational related impacts on the geology of the proposed development site and surrounding areas										<ul style="list-style-type: none"> None, although geological monitoring should possibly commence during the Construction Phase by the Geotechnical engineer.
Topography	Construction activities including levelling of road and building surfaces continued during operational phase	Erosion	4 3	2 2	2 1	6 4	48 24	SBM SAM	M L	<ul style="list-style-type: none"> Demolition and construction activities should preferably take place during the dry months. All surface run-offs shall be managed in such a way so as to ensure erosion of soil does not occur. All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed. Where erosion may potentially occur, dissipaters such as gravel beds or straw bales must be installed to prevent erosion. 	
Air quality	Construction activities and vehicles on site continued during operational phase	Dust pollution that affects adjacent developments Dust from the slims dams	4 3	2 2	2 1	6 4	48 24	SBM SAM	M L	<ul style="list-style-type: none"> Roads will be paved and dust will thus be eliminated 	
Soils and land capability	There are no expected operational related impacts on soils and land capability of the proposed development site and surrounding areas									<ul style="list-style-type: none"> Weeds appearing on the area must be maintained and eradicated 	
Water quality and availability	General usage of water (household, business, irrigation, etc)	Water wastage	4 2	4 1	3 2	6 4	66 20	SBM SAM	M L	<ul style="list-style-type: none"> Waste water to be recycled and re-used as far as possible to ensure that minimum amounts are required for aspects like irrigation. Good monitoring and management measurements to be set in place by facilities managers 	

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
	There will be no operational activities that should impact on the quantity of groundwater available to surrounding borehole users									
Waste generated	General waste from human activities		2 2	2 2	1 1	2 2	10 10	SBM SBM	L L	<ul style="list-style-type: none"> Waste generated during operational phase will be managed in accordance with the hierarchy of waste management principles (reduce, reuse and recycle), waste will be separated at source and disposal at an authorised landfill site will be the last option.
17.8.2.2 Biophysical Impacts										
Flora	General human interference and impact	Loss of species diversity and habitat characteristics	4 2	4 1	1 1	6 4	54 16	SBM SAM	M L	<ul style="list-style-type: none"> Walkways throughout the open spaces and conservation zones will be strategically placed and users will be enforced to only use delineated walkway areas so as not to damage surrounding habitats Landscaping guidelines which include an allowable indigenous vegetation list that attracts fauna is to be formulated and made a condition of sale No exotic vegetation will be allowed
Fauna	General human interference and impact	Loss of species diversity and habitat characteristics	4 2	4 1	1 1	6 4	54 16	SBM SAM	M L	<ul style="list-style-type: none"> Walkways throughout the open spaces (drainage line area) will be strategically placed and users will be enforced to only use delineated walkway areas so as not to damage surrounding habitats Landscaping guidelines which include an allowable indigenous vegetation list that attracts fauna is to be formulated and made a condition of sale Minimal to no exotic vegetation will be allowed
Sensitive landscapes	General human interference and impact	Loss of valuable landscape and habitat associated to drainage line to	4 2	4 1	1 1	6 4	54 16	SBM SAM	M L	<ul style="list-style-type: none"> Walkways through sensitive landscapes will be strategically placed and users will be enforced to only use delineated walkway areas so as not to damage surrounding habitats

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures	
			P	D	S	M	Total	Rating			
		the west of the proposed development site									
Conservation	Delineation of conservation corridor associated to floodlines	Rehabilitation, conservation and maintenance of this landscape and habitat – benefit to local and regional biodiversity by minimising fragmentation of ecological systems	2 4	1 4	2 5	4 8	20 88	SBM SAM	L H	<ul style="list-style-type: none"> Conservation management to be done in collaboration with the local municipality 	
17.8.2.3 Socio-economic Impacts											
Noise pollution	As the site will be established no major impacts are expected, however, due to the phased nature of the project construction activities will continue for a lengthy period		4 3	4 4	2 2	8 4	80 36	SBM SAM	H M	<ul style="list-style-type: none"> Please refer to the noise mitigation measures during construction phase (Table 5) 	
Influx of undesirable person into the areas	The site will be used for a church of a Malawi denomination. The residents of the area are concerned about the presence of large number so foreigners in their community and that they are bussed in from other geographic areas		4 3	4 4	2 2	8 4	80 36	SBM SAM	H M	<ul style="list-style-type: none"> Security provided via passive surveillance The activity must provide security to the residents in the surrounding areas. All busses and vehicles must be accommodated on the premises and no busses or vehicles can use land in the common domain as waiting stations. Operating hours must be from 7 to 21h00 hours similar to all other church operations; 	

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
										<ul style="list-style-type: none"> No excessive noise may be generated at the premises and EMM noise bylaws must be adhered to.
Visual integrity	Higher density caused by development and change in land use	Change in sense of place of the specific site, however appropriate and good design will result in an improved urban character and will positively enhance the site and surrounding urban context potentially raising economic value of surrounding areas	4 3	4 4	2 2	8 4	80 36	SBM SAM	H M	<ul style="list-style-type: none"> Architectural guidelines (including aspects of roof and wall finishes, colours, heights of buildings, and lighting), as well as Landscape Architectural guidelines (screening, buffering, functioning, aesthetics etc) for the development will be developed to promote the enhancement of this urban area and therefore creating new and valuable places with a modified and positive urban mixed-use sense of place that is vibrant and diverse
Sites of cultural significance	The Heritage Impact Assessment is in the process of being undertaken		4 3	2 2	2 1	6 4	48 24	SBM SAM	M L	<ul style="list-style-type: none"> Should any potentially culturally significant artefacts or graves, etc be found during the operational phase, the development management is to be informed and a Cultural Heritage practitioner is to be contacted to decide on a way forward
Safety and security	Active operational phase with variety of functions and activities ranging from residential,	Decrease in crime due to the creation of a more secure environment and	2 4	2 4	1 2	4 8	20 80	SBM SAM	L H	<ul style="list-style-type: none"> Security provided via passive surveillance Appropriate environmental design to address safety and security issues (CSIR publication) Good accessibility for emergency and police services

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures	
			P	D	S	M	Total	Rating			
	business and commercial	minimising of vacant land									
Traffic increase	Increase of residents and users of the area	Additional vehicles on road	4 3	4 3	3 2	8 4	88 24	SBM SAM	H L	<ul style="list-style-type: none"> All requirements of local municipality to be adhered to All improvements to road infrastructure as recommended by traffic engineer to be adhered to 	
Local services	Operational activities not to influence the availability of services to surrounding land owners									<ul style="list-style-type: none"> The engineers compiling the services report and designing services are to ensure that adequate measures are in place to ensure adequate service delivery that does not influence surrounding areas All requirements by local municipality to be adhered to regarding service reticulation and delivery 	
Fire	There are no expected operational related occurrences other than normal urban activities that may result in site fires.									<ul style="list-style-type: none"> Adequate positioning of fire hydrants according to Municipality's standards. 	
Improved tax base for local municipality	Employment of workers during the operational phase – business sector, landscaping and maintenance, cleaning, medical staff, etc.	Decrease in unemployment and crimes related to unemployment	4 5	2 4	2 3	4 8	32 96	SBM SAM	M H	<ul style="list-style-type: none"> Local labour and employees to be made use of as far as possible for all aspects of the operational phase Local training and capacity building programmes 	

Environmental Component	Activity	Potential Impact	Environmental Significance Score							Mitigation Measures
			P	D	S	M	Total	Rating		
		BEE development opportunities	2 3	2 4	2 2	4 6	24 54	SBM SAM	L M	<ul style="list-style-type: none"> BEE companies to be trained and involved in during the operational phase of the development – e.g. Management of retail facilities, maintenance, landscaping, etc.
	Local demand for goods and services	Decrease in unemployment and empowerment of local trade and industry	2 3	2 4	2 2	4 6	24 54	SBM SAM	L M	<ul style="list-style-type: none"> Local products, goods and services to be utilised as far as possible during the operational phase – shops, craft centre, etc. Local training and capacity building programmes
	Increase in service delivery and number of erven	Increase in taxes raised on property								<ul style="list-style-type: none"> None required
Bulk Contributions	Improvement of infrastructure	Increased service provision, minimisation of traffic congestion								<ul style="list-style-type: none"> Should we well planned and strategically implemented in coordination with the Municipality and GAUTRANS

18.0 CONCLUSIONS

The development proposal has no fatal flaws in terms of the institutional, bio-physical or socio-economic environments. In fact, it is believed that the proposed development compliments the required and desired balance to be achieved between socio-economic and ecological / environmental factors.

The key issue possible impact is the destruction of sensitive / significant environments. The 1:100-year flood line and wetland buffer areas are mitigated to an acceptable level.

A 500m buffer from the tailings dams is included in the layout plan, although the tailings dams are currently being reduced. Consultation with the GDARD will be conducted and an appropriate application process will be followed prior to any development in this 500m buffer area.

The key issue related to land use has been addressed and the preferred alternative is recommended due to the balance that is retained between ecological and socio-economic factors, which align to the City of Ekurhuleni Regional Spatial Development Framework which mentions the proposed development as a future regional node.

Risks and potential impacts related to the construction and operational phases have been addressed within the quantification of impacts process. The Environmental Management Program (EMPr) should be strictly adhered to, therefore mitigating impacts as far as possible.

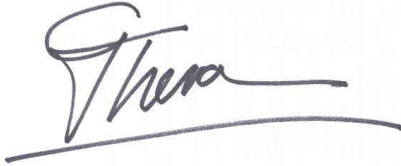
It is undeniable, that the proposed development has an optimal location within the urban realm adjacent to existing urban amenities, services and infrastructure and that it is a logical area for infill development, especially with regard to the environmental authorisations that have been obtained for all the areas surrounding the proposed development site. Should this site not be developed, it will remain as an isolated and unconnected land area that will be vulnerable to crime and potential illegal informal occupation.

19.0 RECOMMENDATIONS

It is recommended that the "Mixed Use Establishment" option which has been identified as the preferred alternative is used. It is further recommended that this application be approved with the following conditions:

- All requirements from the City of Ekurhuleni be adhered to.
- Engineering services report addressing provision of services must be approved by the CoE and implemented to the minimum standards of the CoE.
- Conditions and recommendations by the Engineering Geologists be adhered to.
- All other state departments' comments and input be adhered to, including but not limited to:
 - Department of Water and Sanitation.
 - South African Heritage Resource Agency.
- All mitigation measures as described in this report and specialist reports are adhered to by the developer (these measures are part of the Environmental Management Program (EMPr)).

- The conditions of the Record of Decision from the Gauteng Department of Agriculture and Rural Development (GDARD) be written into the Environmental Management Program (EMPr) and be implemented as such.
- The EMPr, as attached to this document, and as amended after the Environmental Authorisation is received, should be made part of the contractual documents of contractors. The project manager must also account for the cost of this document's implementation before construction takes place.
- An Environmental Control Officer (ECO) should be appointed to audit the Environmental Management Plan on a bi-weekly basis during construction phase.
- The Environmental Management Program (EMPr) must be issued to individual stand developers for implementation
- The surrounding community be kept up date through the Town Planning Application process and during Construction Phase of the project.

A handwritten signature in black ink, appearing to read 'Gwen Theron', with a long horizontal flourish underneath.

Reviewed by Dr Gwen Theron
PrLArch 97082

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