Appendix G6:

Wetland Delineation and Risk Assessment Report

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Landscape Architects & Environmental Consultants CC

Wetland Delineation and Risk Assessment Report

Proposed Kroon's Gourmet Chickens Hatchery

Situated on Portions 322, 33, 128 and 107 of the Farm Hartebeesfontein 445 JQ, Madibeng Local Municipality

March 2019

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Declaration of Independence

I, **Lizette Delport**, in my capacity as a specialist consultant, hereby declare that I -

- Act as an independent specialist and will perform the study in an objective manner free of influence and prejudice, even if the resultant findings are unfavourable to the applicant;
- Have the relevant expertise in conducting the report relevant to this application;
- Will comply with all regulations, Acts and other applicable guidelines that are applicable to the activity;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended);
- Do not have any conflicting interests in the preparation of this report;
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision taken with respect to the application by the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended);
- As a registered member of the South African Council for Natural Scientific Professions (SACNASP), will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member; and
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgment.

This report has been prepared according to the requirements of Appendix 6 of the Environmental Impact Assessments Regulations, 2014 as amended.

Lizette Delport (*Cand.Sci.Nat.*)

Wetland specialist

SACNASP Reg. No. 100144/15

Indemnity

This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as information available at the time of study. Therefore, the author reserves the right to modify aspects of the report, including the recommendations, if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

Although the author exercised due care and diligence in rendering services and preparing documents, she accepts no liability, and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of this document.

Disclaimer

This report is aimed at evaluating site specific conditions as determined in context of relevant legislation and guidelines and to ensure the conservation and management of the water resources found on the site. However, the intention of this study is not to function as one of several attempts made by the proponent in order to gain favourable outcomes for the application. Rather, this report functions as an independent study and not as a comparative study between wetland specialists.

This report may be submitted directly to the competent authority should a prolonged correspondence occur between specialists and the applicant due to delineation comparisons.

Specialists	
Field work, data analysis and report writing	Lizette Delport MSc (Aquatic Health) BSc Hons (Environmental Management) Environmental Scientist / Wetland Specialist SACNASP Reg. No. 100144/15
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1. INTRODUCTION

Bokamoso Landscape Architects and Environmental Consultants CC, Specialist Division was appointed by Kroon's Gourmet Chickens (Pty) Ltd to conduct a wetland delineation and impact assessment for the proposed locations for the new Kroon's Gourmet Chickens hatchery, that is to be situated on either Portion 322, 33, 128 or 107 of the Farm Hartebeesfontein 445 JQ, Madibeng Local Municipality.

The site visit was conducted on 15 February 2019.

1.1 Terms of Reference

The focus of the investigation is to:

- Delineate the wetlands according to standardised and accepted methods;
- Classify the wetland units found on each site according to the national wetlands inventory;
- Undertake the ecological functional assessment (Present Ecological Status (PES), Ecological Importance and Sensitivity (EIS) of wetland areas within the area assessed;
- Recommend suitable buffer zones;
- Determine potential impacts from the project and discuss mitigation and management procedures relevant to conserving wetland areas on the site;
- Identify the potential risks associated with each of the proposed sites;
- Perform a comparative assessment of the proposed sites to determine the preferred site for the development from a wetland perspective; and
- Undertake a Risk Assessment through the Risk Assessment Matrix of Department of Water and Sanitation (DWS) to determine if the project requires a Water Use Licence Application (WULA) or general Authorisation (GA).

1.2 Assumptions and Limitations

- The wetland assessment is confined to the proposed sites and a 500m radius outside the boundary of the study sites.
- The GPS used for wetland and riparian delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters in any direction. It is therefore suggested to measure and peg boundary areas in the field for higher accuracy.

- The on-site assessment of wetlands is based on environmental indicators such as vegetation that are subjected to seasonal variation as well as factors such as fire and drought. Wherever available, background information was gathered to aid in analysis of the site characteristics. Information provided within this report is based on observations made during the site survey on the specified date.
- Wetlands form transitional areas where vegetation species change from terrestrial to wetland species. Within this transition zone, some variation of opinion on the wetland boundary may occur, although all assessors should obtain relatively similar results when using the DWS methodology.

1.3 Definitions and Legal Framework

The National Water Act, 1998 (Act No. 36 of 1998, as amended) [NWA] defines a wetland as "*land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil*." In addition to water at or near the surface, other distinguishing indicators of wetlands include hydromorphic soils and vegetation adapted to or tolerant of saturated soils (DWA, 2005).

Riparian habitat is described as "*the physical structure and associated vegetation of the areas associated with a watercourse, which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas"*. Riparian habitats often perform important ecological and hydrological functions, some similar to those performed by wetlands (DWA, 2005). Riparian habitat is also the accepted indicator used to delineate the extent of a river's footprint (DWAF, 2005).

This document was prepared according to the Gauteng Department of Agriculture and Rural Development (GDARD) Requirements for Biodiversity Assessments Version 3, February 2014, as well as key legislative requirements and guiding principles of the wetland study and the Water Use Authorisation process. The proponent must also comply with the provisions of all relevant national legislation, conventions and regulations applicable to wetlands and riparian zones, including but not limited to:

- The National Water Act, 1998 (Act No. 36 of 1998, as amended) [NWA] and applicable regulations and guidelines
- Convention on Wetlands of International Importance - the Ramsar Convention and the South African Wetlands Conservation Programme (SAWCP)
- National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended) [NEMA]
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
- National Environment Management: Protected Areas Act, 2003 (Act No. 57 of 2003, as amended)
- Environmental Impact Assessment (EIA) Regulations promulgated under NEMA
- Conservation of Agriculture Resources Act, 1983 (Act No. 43 of 1983)
- South African Water Quality Guidelines under the NWA

Water uses for which authorisation must be obtained from the DWS, are indicated in Section 21 of the NWA. Section 21 (c) and (i) Water Uses are applicable to any activity related to a wetland:
Section 21(c) Water Use: Impeding or diverting the flow of water in a watercourse; and
Section 21(i) Water Use: Altering the bed, banks, course or characteristics of a watercourse.

Authorisations related to wetlands are regulated by Government Notices R.267 of 24 March 2017. GN R.267 of 2017 grants General Authorisation (GA) for the above water uses on certain conditions:

- Any activity in a wetland for the rehabilitation of a wetland for conservation purposes; or
- Any activity more than 500m from the boundary of a wetland.

Wetlands situated within 500m of proposed activities should be regarded as sensitive features potentially affected by the proposed development (GN 509, 2016). Such an activity requires a Water Use Licence (WUL) from the relevant authority. The regulation of wetlands is normally based on a water use licence, although a general authorisation can be applied for under GN 509. General Authorisation does not apply:
(a) to the use of water in terms of Section 21(c) or (i) of the Act for the rehabilitation of a wetland as contemplated in General Authorisation 1198 published in Government Gazette 32805 dated 18 December 2009;
(b) to the use of water in terms of Section 21(c) or (i) of the Act within the regulated area of a watercourse where the Risk Class is Medium or High as determined by the Risk Matrix.

This Risk Matrix must be completed by a suitably qualified SACNASP professional member:

(c) in instances where an application must be made for a water use licence for the authorisation of any other water use as defined in Section 21 of the Act that may be associated with a new activity;

(d) where storage of water results from the impeding or diverting of flow or altering the bed, banks, course or characteristics of a watercourse; and

(e) to any water use in terms of Section 21(c) or (i) of the Act associated with construction, installation or maintenance of any sewerage pipelines, pipelines carrying hazardous materials and to raw water and wastewater treatment works.

2. METHODOLOGY

This report has been compiled in accordance with the Wetland Delineation Report requirements in GN509 of the NWA (2016). An initial desktop study was conducted in order to gather background information on the site. The use of maps, aerial photographs and digital satellite imagery were consulted in order to assess the site conditions. GIS data was used to create maps describing the receiving environment, such as locality, soils, vegetation, critical biodiversity areas and hydrology.

A hand held GPS was used to capture co-ordinates in the field and a hand held camera for photographs. 1:50 000 cadastral maps and available GIS data were used as reference material for the mapping of the preliminary watercourse boundaries. These were converted to digital images containing delineation lines and buffers according to the field data received.

The delineation method documented by the Department of Water Affairs and Forestry (DWAF, now known as DWS) in their document “Updated manual for the identification and delineation of wetlands and riparian areas” (DWAF, 2008), and the Minimum Requirements for Biodiversity Assessments (GDARD, 2014) as well as the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (SANBI, 2013) was followed throughout the field survey. These guidelines describe the use of indicators to determine the outer edge of the wetland and riparian areas.

2.1 Wetland and Riparian Classification and Delineation

2.1.1 Wetland indicators

Wetlands are delineated by means of the Department of Water Affairs and Forestry guideline named 'A practical field procedure for identification and delineation of wetlands and riparian areas' (DWAF, 2008).

Wetlands are identified based on one or more of the following characteristic indicators (Figures 1 and 2):

- ***The Terrain Unit Indicator*** helps to identify those parts of the landscape where wetlands are more likely to occur. These include valley bottoms as well as slopes where groundwater discharge may occur.
- ***The Vegetation Indicator*** for the presence of plants adapted to saturated soils (hydrophytes). Vegetation growth helps in identifying the outer boundaries of a wetland since species composition changes dramatically between zones. Emphasis is placed on the group of species that dominate the plant community, and not on individual indicator species.
- ***The Soil Form Indicator*** identifies hydromorphic soils that display characteristics resulting from prolonged and frequent saturation and which are indicative of permanent, seasonal and temporary wetland zones. Gleyed soil has a grey, green or blue colour due to iron being dissolved out of the soil during anaerobic conditions. Seasonal or temporary wetlands generally have a fluctuating water table which creates alternating aerobic and anaerobic conditions in the soil. This causes iron to deposit over decades as yellow or orange patches, called mottles.
- ***The Soil Wetness Indicator*** to identify morphological changes due to anaerobic conditions developing in the first 50cm of the soil surface as a result of saturation. Specific soil colours and the presence of mottles are indicative of permanent or temporary saturation. The higher the frequency and duration, the greyer the soil matrix becomes. Hydromorphic soils that are permanently saturated generally do not show mottles.

According to the NWA, vegetation is the primary indicator, which must be present under normal circumstances. However, in practice the soil wetness indicator is used as the primary indicator since it shows long term morphological changes from saturation, whereas vegetation is seasonal and responds quickly to changes in soil moisture, human activities and climate. All other indicators are used to confirm the presence of a wetland. Soils were not described according to soil form as the specialist is not a soil scientist.

The boundary of the wetland is defined as the outer edge of the temporary zone of wetness, which is characterised by:

• A minimal grey matrix (<10%)

• Few mottles

• Short periods of saturation of less than 3 months per annum

2.1.2 Wetland Classification

The classification system developed for the National Wetlands Inventory is based on the principles of the hydro-geomorphic (HGM) approach to wetland classification as described by SANBI, 2009 (Figure 4). In general HGM units encompass three key elements (Semeniuk & Semeniuk, 1995; Finlayson *et al*., 2002; Ellery et al., 2008; Kotze *et al*., 2008, Kotze *et al.,* 2005), namely:

- Geomorphic setting - This refers to the landform characteristics and processes.
- Water source - Precipitation, groundwater flow, stream flow, etc.
- Hydrodynamics – The presence and movement of water through the wetland.

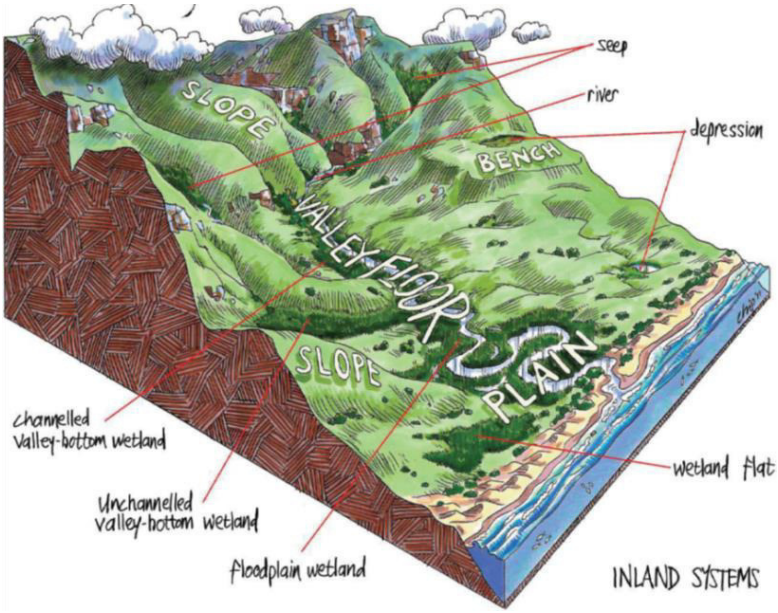


Figure 1: Wetland Units based on hydrogeomorphic types (Ollis et al., 2013)

2.2 Buffer Zones

A buffer zone is defined as *"a strip of land surrounding a wetland or riparian area in which activities are controlled or restricted"* (DWAF, 2005). A development has several impacts on the surrounding environment and on a wetland. The development changes habitats, the ecological environment, infiltration rate, amount of runoff and runoff intensity of the site, and therefore the water regime of the entire site. An increased volume of stormwater runoff, peak discharges, and frequency and severity of flooding is therefore often characteristic of transformed catchments. The buffer zone serves to highlight an ecologically sensitive area in which activities should be conducted with this sensitivity in mind.

Despite limitations, buffer zones are well suited to perform functions such as sediment trapping, erosion control and nutrient retention which can significantly reduce the impact of activities taking place adjacent to water resources. Buffer zones are therefore proposed as a standard mitigation measure to reduce impacts of land uses / activities planned adjacent to water resources. These must however be considered in conjunction with other mitigation measures.

Local government policies require that protective buffer zones be calculated from the outer edge of the temporary zone of a wetland (KZN DAEA, 2002; CoCT, 2008; GDARD, 2012), although research is underway to provide further guidance on appropriate defensible and scientific buffer zones.

Wetland buffer requirements:

- 30 meters from the temporary zone for wetlands occurring inside the urban edge;
- 50 meters from the temporary zone for wetlands occurring outside the urban edge; and
- Larger buffer areas for wetlands supporting sensitive faunal or floral species.

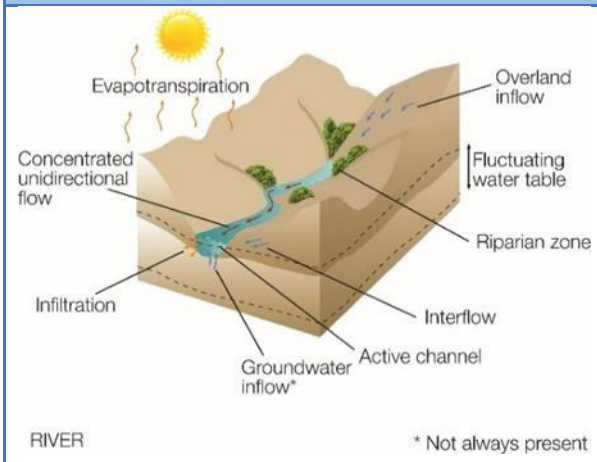
Rivers (non-perennial/perennial) buffer requirements:

- A 100 meter buffer zone from the edge of the temporary zone outside the urban edge;
- A 32 meter buffer zone from the edge of the temporary zone inside the urban edge; and
- Larger buffer areas for aquatic ecosystems supporting sensitive species.

The DWS Buffer Guideline (McFarlane et al, 2013) is used to determine the scientific buffer requirements which may be more or less than the generic values.

The Classification of watercourse areas found during the study (adapted from SANBI, 2009) is as follows:

Table 1: Wetland Hydro-Geomorphic types and descriptions for the activity

River and Riparian Zone	
	Linear fluvial, eroded landforms which carry channelized flow on a permanent, seasonal or ephemeral/episodic basis. The river channel flows within a confined valley (gorge) or within an incised macro-channel. The "river" includes both the active channel (the portion which carries the water) as well as the riparian zone.

2.3 Wetland Functionality, Status and Sensitivity

Wetland functionality is defined as "a measure of the deviation of wetland structure and function from its natural reference condition." The natural reference condition is based on a theoretical undisturbed state extrapolated from an understanding of undisturbed regional vegetation and hydrological conditions. The hydrological, geomorphological and vegetation integrity are assessed for the wetland units associated with the study site, to provide a Present Ecological Status (PES) score (Macfarlane *et al.*, 2007) and an Environmental Importance and Sensitivity category (EIS) (DWAF, 1999).

In the current study the wetland was assessed using WET-Health and WET-Ecoservices (Macfarlane *et al.*, 2007) and EIS (DWAF, 1999).

2.3.1 Present Ecological Status (PES) – WET-Health

A summary of the three components of the WET-Health method namely Hydrological, Geomorphological and Vegetation Health assessment for the wetlands found on site is described in Table 2.

Table 2: Health categories used by WET-Health for describing the integrity of wetlands (Macfarlane *et al*, 2007)

Description	Impact Score Range	PES Score	Summary
Unmodified, natural.	>0.9	**A**	**Very High**
Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1 - 1.9	**B**	**High**
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	2 - 3.9	**C**	**Moderate**
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4 - 5.9	**D**	**Moderate**
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6 - 7.9	**E**	**Low**
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 - 10	**F**	**Very Low**

A summary of the change class, description and symbols used to evaluate wetland health are summarised in Table 3.

Table 3: Trajectory class, change scores and symbols used to evaluate Trajectory of Change to wetland health (Macfarlane *et al*, 2007)

Change Class	Description	Symbol
Improve	Condition is likely to improve over the over the next 5 years	**(↑)**
Remain stable	Condition is likely to remain stable over the next 5 years	**(→)**
Slowly deteriorate	Condition is likely to deteriorate slightly over the next 5 years	**(↓)**
Rapidly deteriorate	Substantial deterioration of condition is expected over the next 5 years	**(↓↓)**

2.3.2 Ecological Importance and Sensitivity (EIS)

Ecological importance is an expression of a wetland's importance to the maintenance of ecological diversity and functioning on local and wider spatial scales. Ecological sensitivity refers to the system's ability to tolerate disturbance and its capacity to recover from disturbance once it has occurred (DWAF, 1999). Explanations of the scores are given in Table 4.

This classification of water resources allows for an appropriate management class to be allocated to the water resource and includes the following:

- Ecological Importance in terms of ecosystems and biodiversity;
- Ecological functions including groundwater recharge, provision of specialised habitat and dispersal corridors; and
- Basic human needs including subsistence farming and water use.

Table 4: Environmental Importance and Sensitivity rating scale used for the estimation of EIS scores (DWAF, 1999)

Ecological Importance and Sensitivity Categories	Rating	Recommended Ecological Management Class
Very High Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water in major rivers.	>3 and <=4	**A**
High Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <=3	**B**
Moderate Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water in major rivers.	>1 and <=2	**C**
Low/Marginal Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water in major rivers.	>0 and <=1	**D**

2.3.3 Riparian Vegetation Response Assessment Index (VEGRAI)

VEGRAI is a practical and rapid approach used to assess the changes in riparian vegetation from the reference condition (natural condition in the absence of impacts), by means of a spread sheet model. The model considers the condition of the different vegetation zones separately but allows the integration of zone scores to provide an overall index value for the riparian vegetation zone as a unit.

Level 3 assessments are intended for use by the River Health Programme (RHP) and Ecological Reserve determination at the rapid level and require a simplification of the vegetation zones. Two zones only are defined and assessed: the marginal and non-marginal zone.

The vegetation is assessed based on woody and non-woody components in the respective zones and according to the different vegetation characteristics which include:

- Cover

- Abundance

- Species composition

The health categories defined by WET-Health can be used to discuss the condition of the riparian zone.

2.4 Risk Assessment

The environmental risk assessment report will form a component of the environmental management programme to be submitted in terms of section 24N of the Act and the Environmental Impact Assessment Regulations, 2014 and will be subjected to the same requirements of the environmental management programme with regards to opportunities for stakeholder review and comment as well as auditing.

The authorisation process must recognise the risk the activity poses to the wetland based on the relevant reports submitted to the regulator, including method statements and the master layout plan that shows very clearly all water use activities in relation to:

- all wetlands;
- riparian areas and the 1:100 year flood line;
- the 500m radius from the boundary of a wetland, where applicable;
- environmental management programme and environmental impact assessment; and

- wetland delineation and assessment (PES & EIS) report and rehabilitation plan.

The risk-based management approach developed by the DWS is required to be undertaken to determine if a Water Use Licence Application (WULA) is required. The approach is used to assess potential impacts on wetland habitats and takes into consideration control / mitigation measures when scoring the significance of the potential impact (i.e. post mitigation). The model outcome of the impacts is then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with the NEMA in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted. Risks/Impacts are assessed for all stages of the project cycle including:

- Planning;
- Construction;
- Operation; and
- Rehabilitation.

The following section is taken verbatim from the Section 21(c) and (i) Risk-based Assessment and Authorisation document (hereafter referred to as DWS, 2015).

In terms of section 22 of the National Water Act (Act No. 36 of 1998, as amended) [NWA] a person may only use water if it is permissible under Schedule 1, a continuation of an ELU, a GA, a licence or the requirement for a licence has been dispensed with under section 22(3). There are 11 different types of water uses contemplated in section 21, but the purpose of this Risk- Based Water Use Authorisation Guideline is to deal with section 21(c) and (i) water uses only.

Water use in terms of section 21(c) and (i) of the NWA is:

- (c) impeding or diverting the flow of water in a watercourse; and
- (i) altering the bed, banks, course or characteristics of a watercourse.

However, unlike some water uses referred to in section 21, e.g. (a) and (b) which are consumptive and whose impacts are usually clearly evident, easier to manage and quantifiable, section 21(c) and (i) water uses are non-consumptive and their impacts more difficult to detect and manage. They are also generally

difficult to clearly quantify. However, if left undetected these impacts can significantly change various attributes and characteristics of a watercourse, and water resources, especially if left unmanaged and uncontrolled. Thus, the risks posed by section 21(c) and (i) water uses on watercourses and water resources are an important consideration during the authorisation of these water uses.

Risk-based management has value in providing an indication of the potential for delegating certain categories of water use "risks" to DWS regional offices (RO) or Catchment Management Agencies (CMA). Risk categories obtained through this assessment serve as a guideline to establish the appropriate channel of authorisation of these water uses. The DWS has therefore developed a risk assessment matrix to assist in quantifying expected impacts. The scores obtained in this assessment are useful in evaluating how the proposed activities should be authorised.

The formula used to derive a risk score is as follows:

RISK = CONSEQUENCE x LIKELIHOOD

CONSEQUENCE = SEVERITY + SPATIAL SCALE + DURATION

LIKELIHOOD = FREQUENCY OF THE ACTIVITY + FREQUENCY OF THE IMPACT + LEGAL ISSUES + DETECTION

"RISK ASSESSMENT KEY" is based on the DWS 2015 publication: Section 21 (c) and (i) water use Risk Assessment Protocol. An explanation of the key is shown below in table 1-8. The assessment presented in this document is completed by means of the Risk Assessment Toolkit discussed in DWS (2015).

Table 5: Severity

How severe does the aspects impact on the resource quality (flow regime, water quality, geomorphology, biota, and habitat)?	
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5

Where "or wetland(s) are involved" it means that the activity is located within the delineated boundary of any wetland. The score of 5 is only compulsory for the significance rating.	

Table 6: Spatial Scale

How big is the area that the aspect is impacting on?	
Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighbouring areas (downstream within quaternary catchment)	3
National (impacting beyond secondary catchment or provinces)	4
Global (impacting beyond SA boundary)	5

Table 7: Duration

How long does the aspect impact on the resource quality?	
One day to one month, PES, EIS and/or REC not impacted	1
One month to one year, PES, EIS and/or REC impacted but no change in status	2
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation	3
Life of the activity, PES, EIS and/or REC permanently lowered	4
More than life of the organisation/facility, PES and EIS scores, a E or F	5
PES and EIS (sensitivity) must be considered.	

Table 8: Frequency of the activity

How often do you do the specific activity?	
Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

Table 9: Frequency of the impact

How often does the activity impact on the resource quality?

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

Table 10: Legal Issues

How is the activity governed by legislation?	
No legislation	1
Fully covered by legislation (wetlands are legally governed)	5
Located within the regulated areas	

Table 11: Detection

How quickly/easily can the impacts/risks of the activity be observed on the resource quality, people and property?	
Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

Table 12 below provides a description of the classes into which scores are sorted, and their implication for authorisation.

Table 12: Risk Classes

RATING	CLASS	Authorisation	MANAGEMENT DESCRIPTION
1 – 55	(L) Low Risk	**GA**	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated.
56 – 169	M) Moderate Risk	**WUL**	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
170 – 300	(H) High Risk	**WUL**	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.

3. RESULTS

3.1 Locality of the study site

There are three sites being considered for the proposed new hatchery that are all located on the Farm Hartebeesfontein 445 JQ, all within close proximity of each other in Ana Agricultural Holdings, Hartebeespoort. ***Refer to Figure 2 and 3.*** The portions of the Farm Hartebeesfontein 455 JQ that are applicable to this report are as follows:

1) Portion 322

   The site is situated 300m to the east of the R511. And is approximately 13 hectares in extent.

2) Portion 107

   The eastern border of the site is situated along the R511, and the site is 9.52 hectares in extent.

3) Portion 33 and 168

The site is bordered by the Bushveld View Estate to the south, S-89 gravel road to the north, and is south-west of the Multi Plant Seedling Nursery. The site is 7.03 hectares in extent.

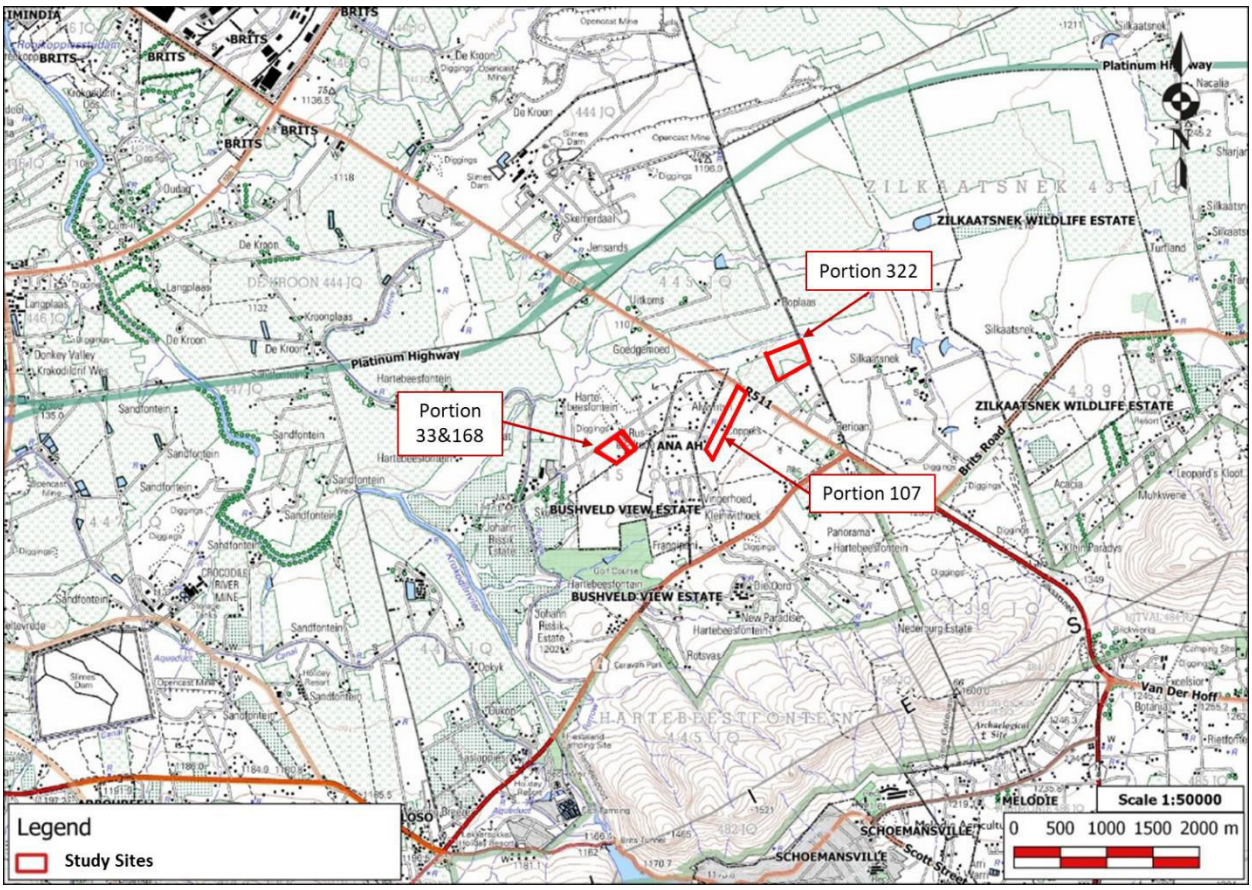


Figure 2: Locality Map

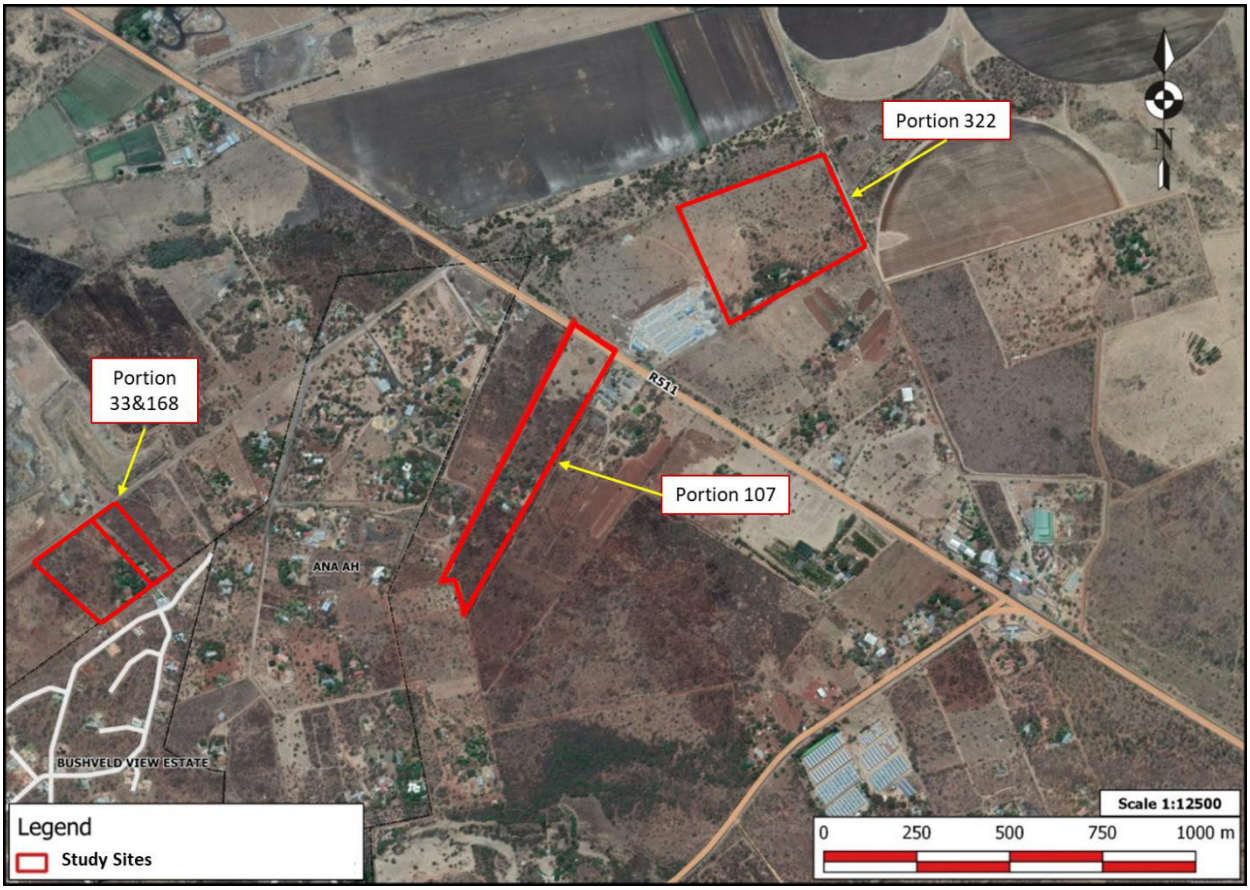


Figure 3: Aerial Map

3.2 Description of the Receiving Environment

3.2.1 Land Use

The surrounding areas are characterised by irrigated farmlands, smallholdings and small businesses such as restaurants, and bed and breakfast accommodation.

3.2.2 Hydrology

The site is situated within quaternary catchment A21J of the Limpopo Water Management Area (WMA). The majority of the water in this catchment is used for irrigation and mining while the remainder is used for rural areas and power generation (River Health Program, 2005). Water use in the catchment is substantially higher than available resources and therefore water is imported form the Vaal WMA. ***Refer to Figure 4.***

The Crocodile River has its source in the Witwatersrand mountain range at a height of 1 700 masl. The areas surrounding the Hartebeespoort Dam fall within the Upper Crocodile sub-area. The Portion of the Crocodile exiting the Hartebeespoort Dam has an ecostatus of marginal/low.

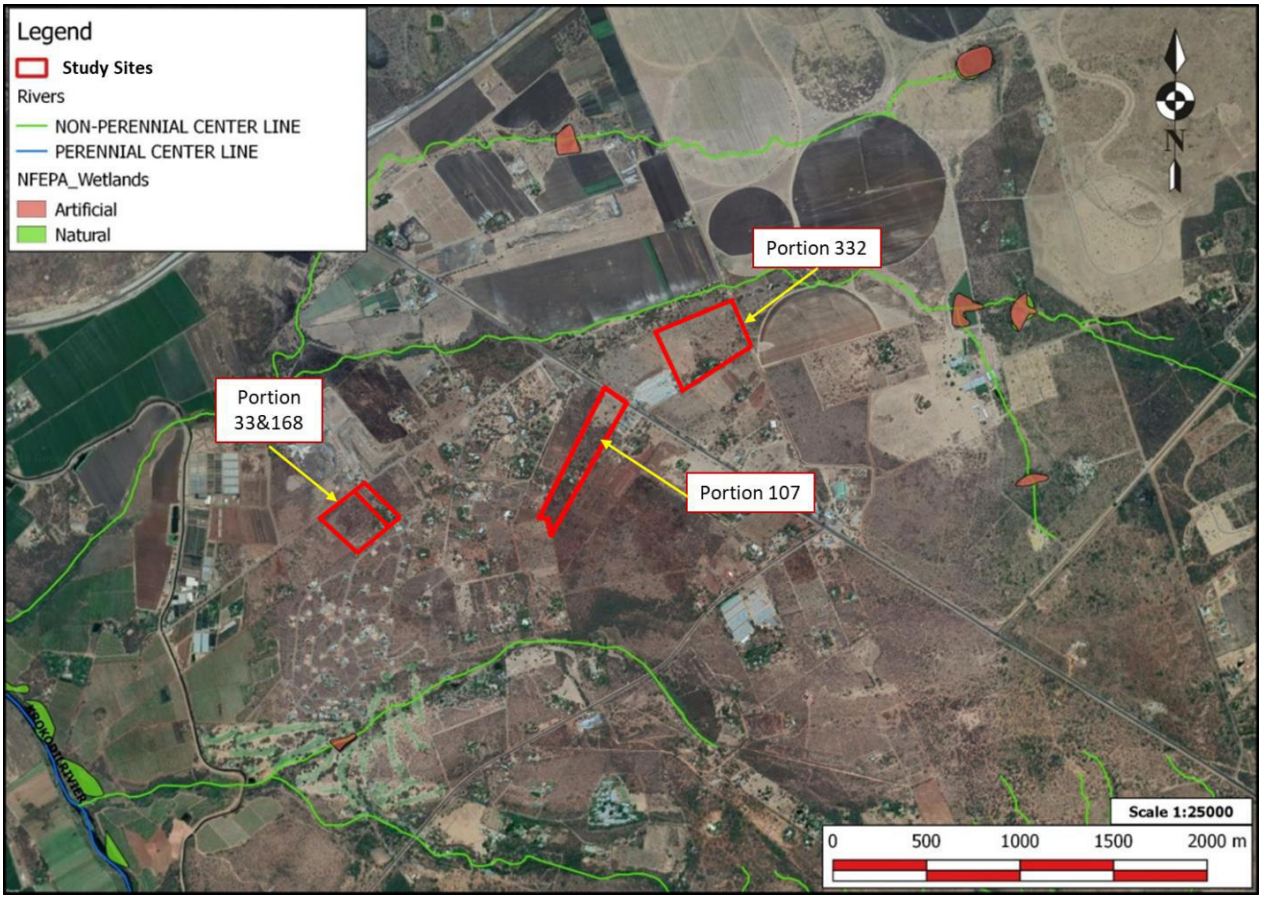


Figure 4: Hydrology map

3.2.3 Regional vegetation

The study site is situated in the Marikana Thornveld and Moot Plains Bushveld of the Central Bushveld Bioregion in the Savanna Biome (Mucina and Rutherford, 2010). ***Refer to Figure 5.***

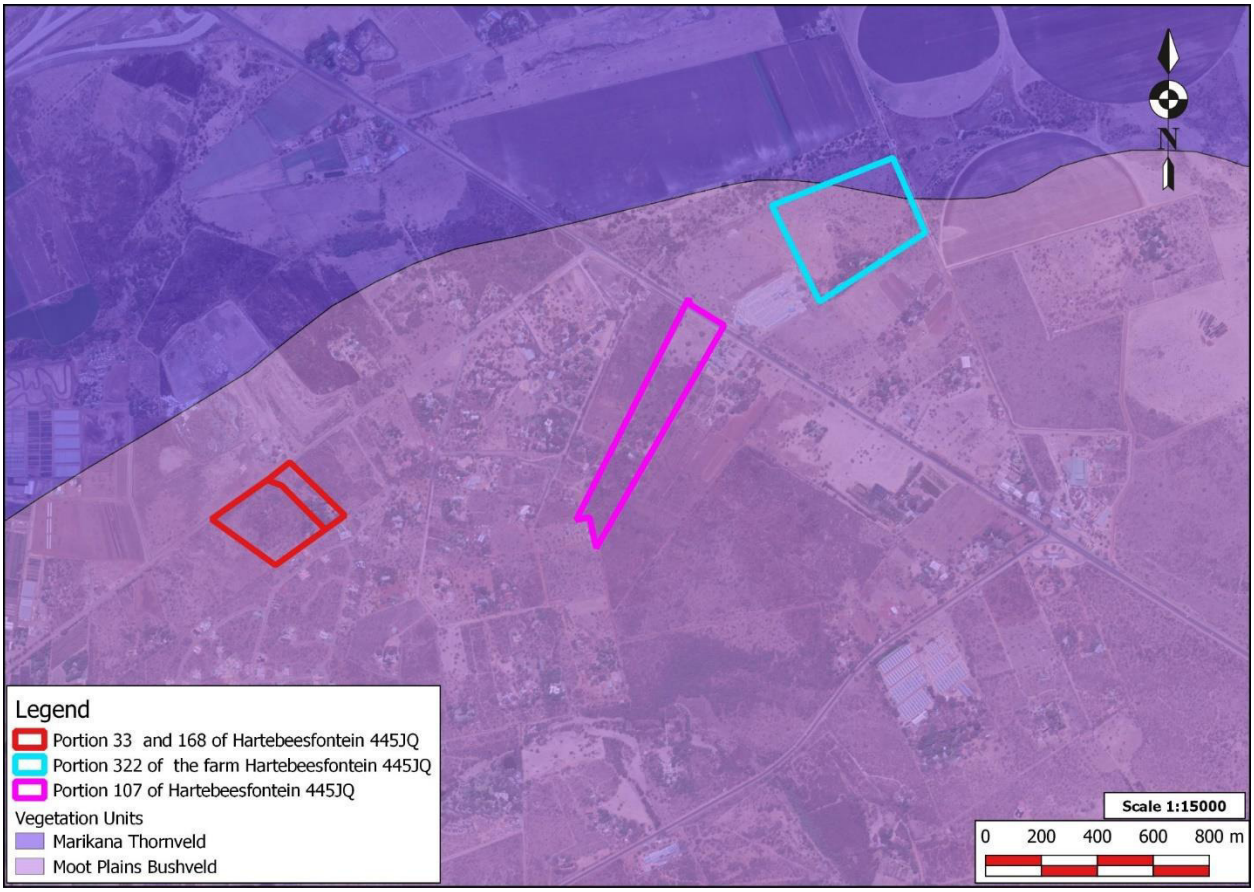


Figure 5: Vegetation map

Marikana Thornveld

The vegetation unit is characterised by *Acacia karroo* (*Vachellia karroo*) woodland with dense shrub growth along drainage lines (Mucina and Rutherford, 2010). The unit is classified as endangered with less than 1% conserved out of a total target of 19%. Nearly half of the vegetation has been impacted by cultivation and urbanisation.

Moot Plains Bushveld

The unit is characterised by small thorny trees and tall shrubs of mostly *Acacia* species while the herbaceous groundcover is dominated by grasses (Mucina and Rutherford, 2010). The dominant grass species include *Heteropogon contortis, Setaria sphacelata, Themeda trinadra, Aristida congesta, Chloris virgata* and *Cynodon dactylon*. The vegetation unit is listed as Vulnerable, with 13% conserved out of a target of 19%. Cultivation, alien species and urbanisation have transformed 28% of the vegetation. Erosion potential of the soils is low.

3.2.4 Geology and Soils

The study site is underlain by various geological types (pyroxinite, harzburgite, norite) and undifferentiated vertic and melanic soils. The northern parts of the study site area are underlain by a plinthic catena with eutrophic red soils. ***Refer to Figure 6 and 7.***

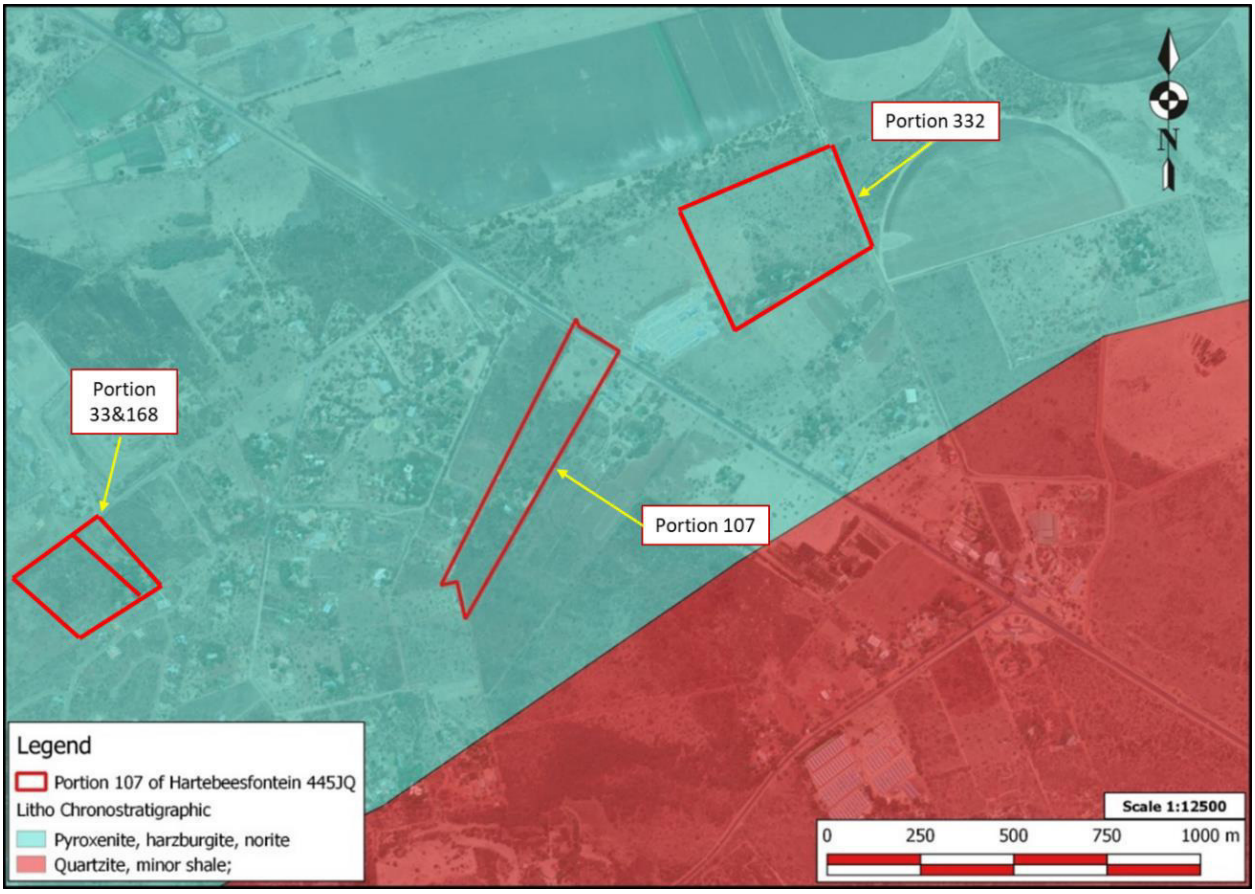


Figure 6: Underlying geology of the study area

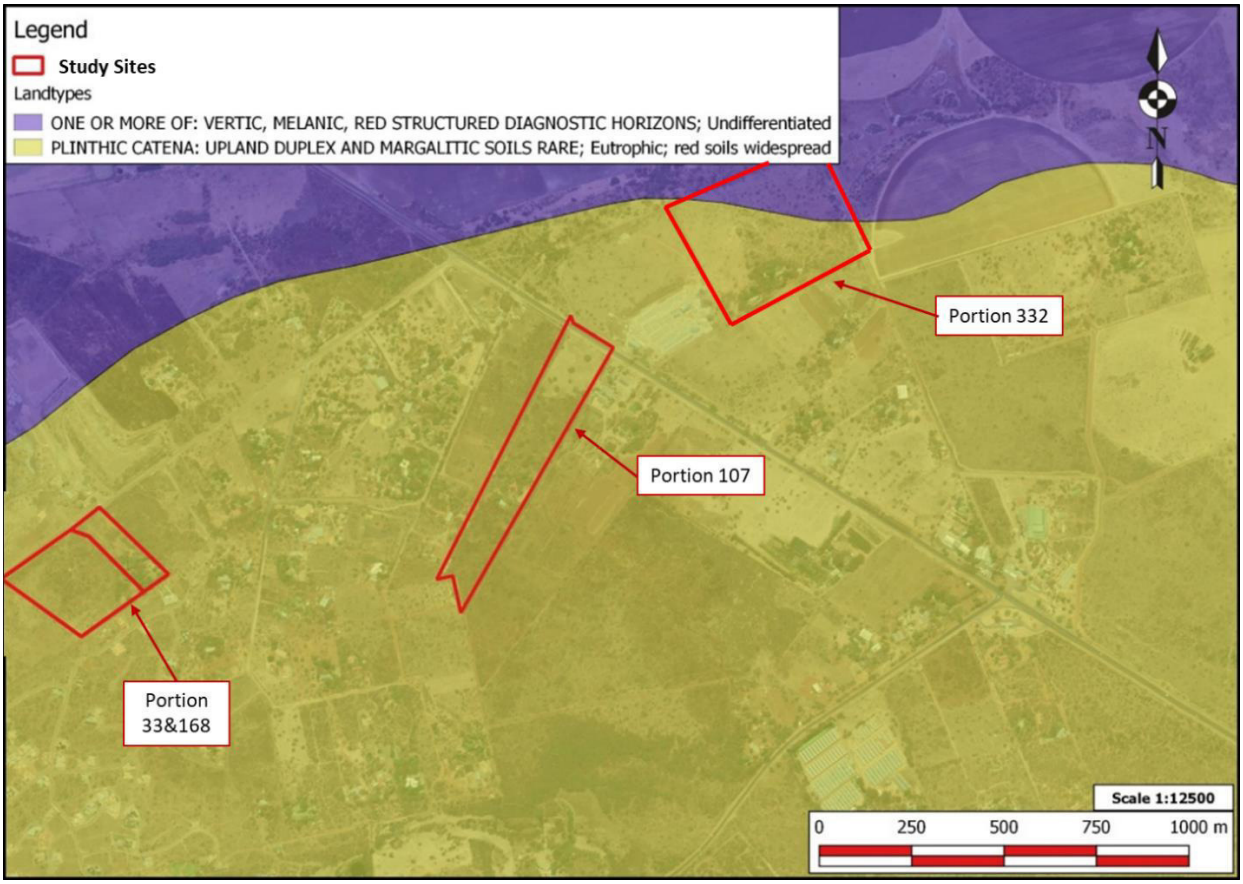


Figure 7: Soils of the study area

3.2.5 Diversity

According to the North West Rural, Environment and Agriculture Department (READ), the proposed study sites are located within an area known to have a high diversity of species and habitats, although the open spaces and undisturbed areas are scattered around various other land uses. ***Refer to Figure 8.***

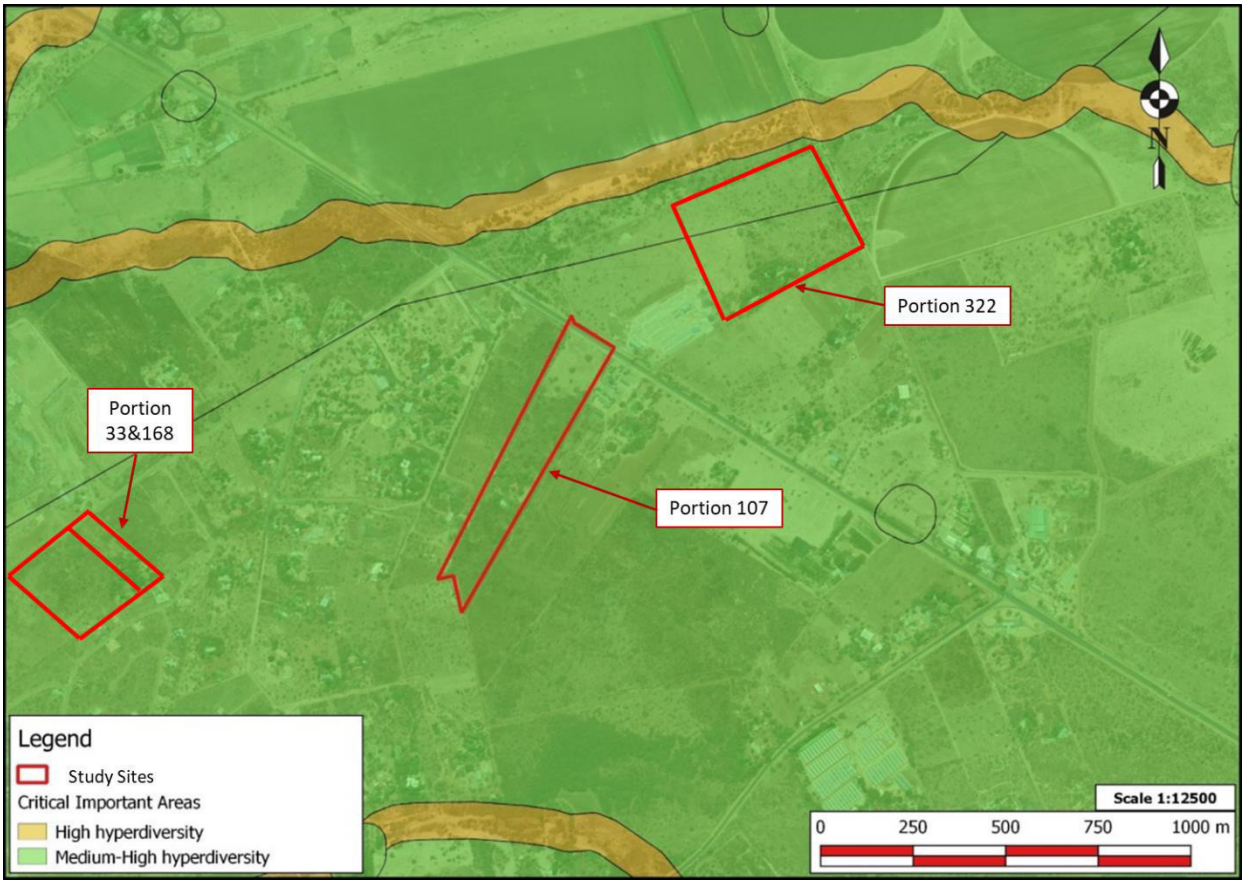


Figure 8: Diversity map (North West READ, 2008))

3.3 Wetland Classification and Delineation

1) Portion 33 and 168 of the Farm Hartebeesfontein 445 JQ

No wetlands or watercourses were found on site.

2) Portion 107 of the Farm Hartebeesfontein 445 JQ

No wetlands or watercourses were found on site.

3) Portion 322 of the Farm Hartebeesfontein 445 JQ

A non-perennial watercourse and riparian area is situated 30-40m north of the site, however, no wetlands were found. Soils were loam to loam clay and dark brown in colour. Mottling was present within the first 30cm of the watercourse base. ***Refer to Figure 9*** for photographs of the site characteristics.

Figure 9: Characteristics of the watercourse north of Portion 322

a-b) Dark clay type soils, c-f) Vegetation characteristics. Thick growth of trees and bushes along the riparian zone is noticeable as well as the dominant stands of *C. sexangularis*.

Table 13: Dominant vegetation for the watercourse on Portion 322 of the Farm Hartebeesfontein 445 JQ

Species	Characteristics
Bank and riparian vegetation	
Setaria sphacelata	This grass prefers fertile black clay soils and grows within wetland and on river banks.
Themeda triandra	Common in open veld in undisturbed areas. Prefers fertile soil. Small patches are present along the riparian outer edge.
Dominant hydrophitic vegetation	
Cyperaceae sexangularis	Thick stands of the species present within the channel of the watercourse.

3.4 Wetland Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)

No wetlands were found on any of the study site alternatives and therefore the PES was not calculated. The VEGRAI scores for the non-perennial watercourse and riparian zone was calculated for the area evaluated only. Therefore, changes to upstream or downstream parts of the watercourse outside of the study areas, have not been evaluated. The EIS was calculated for the watercourse to the north of Portion 322. ***Refer to Figure 10.***

Table 14: The VEGRAI assessment for the non-perennial watercourse and riparian area

METRIC GROUP	CALCULATED RATING	WEIGHTED RATING	CONFIDENCE	RANK	% WEIGHT
MARGINAL	73.3	36.7	3.3	1.0	10
NON MARGINAL	57.5	28.8	2.8	2.0	10
					20
LEVEL 3 VEGRAI (%)				65.4	
VEGRAI EC (Ecological Category)				**C**	
AVERAGE CONFIDENCE				2.9	
CHANGE IN MARGINAL ZONE CONDITION				26.7	
CHANGE IN NON-MARGINAL ZONE CONDITION				42.5	

Table 15: The Ecological Importance and Sensitivity (EIS) of the non-perennial watercourse

ECOLOGICAL IMPORTANCE AND SENSITIVITY		
	Importance	***Confidence***
PORTION 322 WATERCOURSE		
Ecological Importance & Sensitivity	1.4	*4.2*
Hydrological/Functional Importance;	0.9	*4.5*
Direct Human Benefits	0.2	*5.0*

According to the VEGRAI score, the watercourse associated with Portion 322 has an **EC of C** - **moderately modified**. Although some loss and change of the natural habitat and biota have occurred, the basic ecological processes (flood attenuation, habitat creation, and sediment control) are predominantly intact. The EIS rating indicates a watercourse with moderate importance due to the high vegetation cover which permits for habitat creation, sediment trapping, pollutant control and flood attenuation. Although some of the riparian vegetation could be used as firewood, no obvious signs of harvesting was noted. Therefore, the human benefits are low. No instream habitat or water quality could be evaluated and therefore the EC is based on the VEGRAI score only.

3.5 Buffer recommendation

A 32m buffer is required for watercourses within the urban edge, however, the proposed sites are located outside of the urban edge and therefore a 100m buffer for the non-perennial watercourse is applicable at the Kroon's Gourmet Chickens Portion 322 study site. The buffer tool (Macfarlane et al, 2014) determined a buffer of 15m for the construction and operational phase of the chicken hatchery. Based on the evaluation of site conditions and the risks of impacts from the proposed development, the **100m buffer is preferred** for the site as connectivity still exists upstream and dowstream of the watercourse.

3.6 Risks, Impacts and Mitigation

Risks associated with poultry production are relatively high if strict waste management controls are not followed. Environmental pollution can result from storage and/or dumping of the following:

- Egg shells;
- Infertile eggs;
- Dead embryos and chicks;
- Manure; and
- Waste water used to wash facilities containing the above.

If waste is not managed efficiently, groundwater and surface water pollution can result from runoff of effluent. Fertilising soils with agricultural waste can cause an overload of nutrients that can seep into groundwater and enter surface water systems, leading to increasing concentration of nitrates and phosphates in drinking water.

The following specific mitigation measures must be followed for the proposed hatchery:

- Compile a Waste Management Plan which includes management of all types of waste created throughout the facility processes and include mitigation measures to prevent pollution in the case of equipment failure or spillages.
- During construction all site camps, storage areas, stockpiles, and vehicle parking and repair bays must be situated outside of the 100m buffer.
- A Waste Management Plan must be compiled that incorporates effective management measures to prevent environmental pollution throughout the operational phase.
- Where possible, recycling of waste must be practiced, i.e.: crushing eggshells to sell for fertilizers, biogas energy generation, composting of manure for sale.
- No runoff of wastewater into the environment must be permitted.
- No fertilising of areas near the watercourse must occur unless regular soil testing for nutrient content is performed and fertilising regimes adjusted accordingly.
- Waste storage areas must be located as far from the watercourse and buffer as possible in bunded areas with impermeable surfaces.
- Regular water quality tests of the watercourse should be performed at regular intervals (as required by DWS) during the operational phase to ensure no pollution of surface water has occurred.

The Risk Matrix is calculated for impacts provided that the above-mentioned mitigation measures are followed and that all activities and structures will be located outside of the 100m buffer.

The Risk Matrix determined that risks and impacts on the watercourse are low for the proposed development and in terms of Section 22 of the National Water Act (Act No.36 of 1998, as amended), a Section 21 (c) and (i) General Authorisation may be applied for, provided that the above-mentioned recommendations measures are followed. It is recommended that a Waste Management Plan be developed and discussed with DWS to confirm if the measures described in the plan are acceptable and if DWS will accept a GA.

Table 16: Risk matrix for the watercourse north of Portion 322

Phases	Activity	Aspects	Impacts	Severity							Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	PES and EIS of Watercourse
				Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph +Vegetation)	Biota	Severity	Spatial scale	Duration											
C	Construction of the hatchery and associated infrastructure	Vegetation clearing	Loss of habitat, erosion of banks, water pollution and sedimentation	1	1	2	1	1,25	1	1	3,25	1	1	1	1	4	13	L	95	Earthmoving and vehicle access must not occur within the watercourse. Spillages must be contained. Vehicles are to be parked and serviced in a bermed area away from the buffer. Demarcated and secure storage facilities must be used for the storage and handling of lubricants, oils, paint, and material such as cement. Hay bales and/or sand bags must be used for areas close to the watercourse to contain sediment and prevent it from entering the watercourse. Topsoil must be stockpiled separately. Once construction is complete, the topsoil must be added to the areas to be rehabilitated.	PES = C
		Clearance for site camps, parking areas and stockpile areas		1	1	2	1	1,25	1	1	3,25	1	1	1	1	4	13		95		
		Excavation of soils for foundations		1	1	2	1	1,25	1	2	4,25	1	1	1	1	4	17	L	95		
C	Clearing of vegetation in close proximity to a watercourse	Vegetation clearing for maintenance of gardens and landscaping around the camps	Loss of biodiversity and habitat. Erosion and sedimentation of the watercourse.	1	1	2	1	1,25	2	2	5,25	1	2	1	1	5	26,25	L	80	Limit vegetation clearing to necessary areas only and for short periods to prevent erosion and sedimentation of the watercourse. Boundaries of the watercourse and buffer should be fenced off and no landscaping permitted in the area. Indigenous vegetation should not be removed where possible and any further landscaping should only contain indigenous vegetation.	
R	Rehabilitation	Replacement of topsoil and revegetation of cleared areas	Sedimentation of watercourse. Soil erosion. Invasion of exotic vegetation species.	1	1	2	2	1	1	1	3	1	1	1	2	5	15	L	95	Exotic and invasive species must be removed before rehabilitation commences. Disturbed and compacted soils must be ripped to 10cm for seeding. Indigenous grass seeds thjat were removed during construction must be retained and used wherever possible for revegetation. Topsoil must be replaced on all bare areas. Reseeding/ revegeation must be done immediately after construction has been completed to avoid long exposure of bare soils. A vegetation cover of 80% is required before the rehabilitation can be considered as successful.	
O	Waste management	Storage of hatchery waste	Pollution of soils and surface water from leaking containers. Destruction of habitat and invasion of pests (rats, mice, flies etc.).	1	2	2	2	1,75	1	4	6,75	5	1	1	1	8	54	L	95	A site specific Waste Managment Plan to be developed and approved by DWS. All unusable waste to be stored in tightly sealed containers in an enclosed, bunded area. The sealed surface for the bins must prevent pollution of soils from waste spillages. Sealed bins with waste to be removed from the site regularly. As far as possible, waste should be re-used. Waste water is to be re-used in the facilitywherever possible. Unused waste water is not to enter the watercourse. Waste water disposal methods should ensure no pollution of the environmenta by runoff or spillages.	
		Runoff of hatchery waste	Pollution of soils and surface water. Destruction of habitat and invasion of pests (rats, mice, flies etc.).	1	2	2	2	1,75	1	4	6,75	5	1	1	1	8	54	L	80		
																	37,3	L			

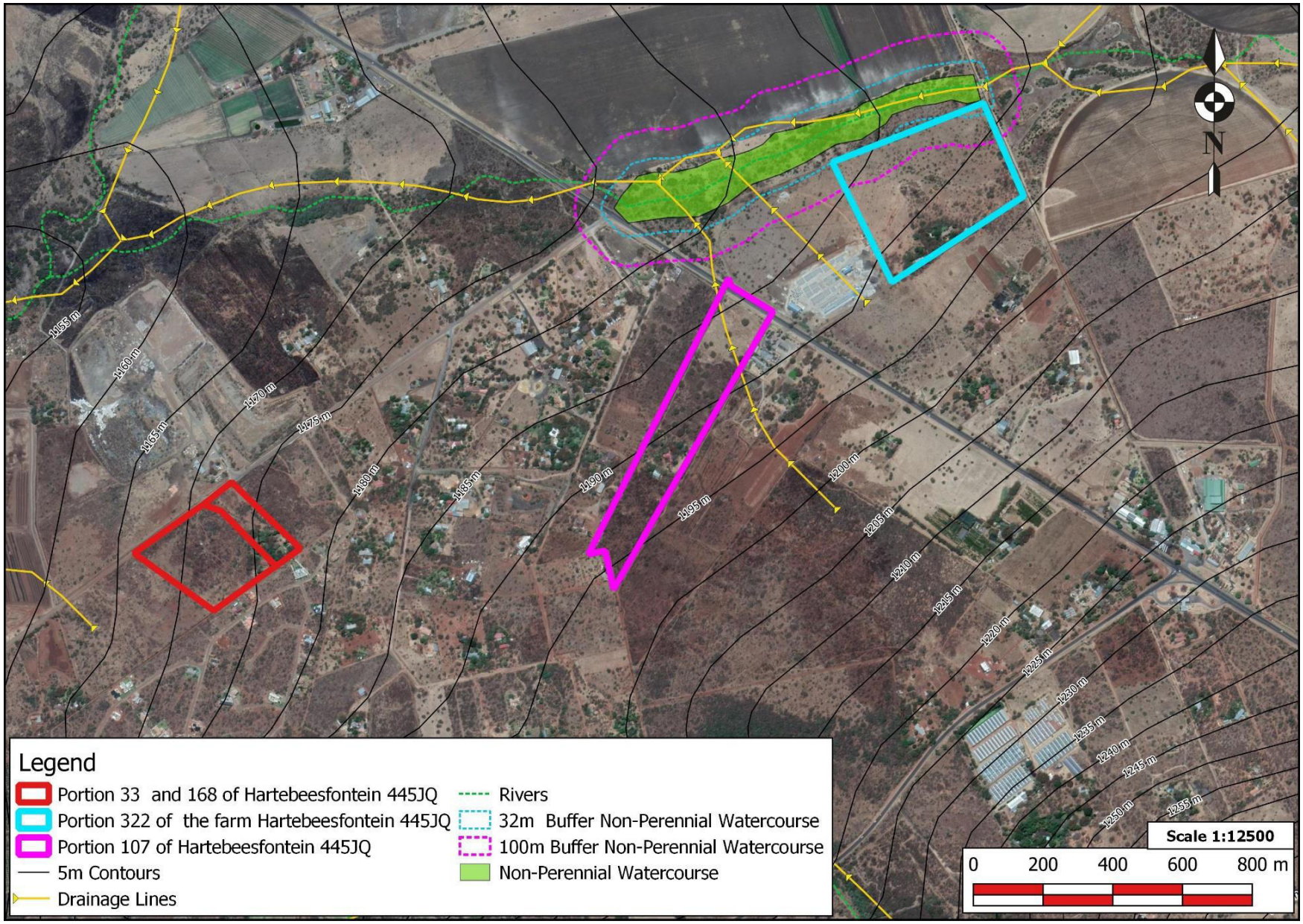


Figure 10: Watercourses associated with the study sites

4. CONCLUSION

No watercourses occur on Portion 33, 168 and 107 of the evaluated properties within the Farm Hartebeesfontein 445 JQ, and therefore these properties are considered as preferable (in terms of watercourses) for the location of the proposed Kroon's Gourmet Chickens hatchery. Portion 322 is not considered as the preferred option due to the occurrence of a non-perennial watercourse in close proximity to the site.

Should this site be the preferred option for the proposed hatchery based on evaluation of other environmental impacts (fauna, flora, heritage etc.), a 100m buffer must be applied around the non-perennial watercourse as the study site is located outside of the urban edge. No development should take place within this buffer and waste management measures must ensure that no pollution of the environment occurs during the operational phase of the development.

The Risk Matrix determined that risks and impacts on the watercourse are low for the proposed development and in terms of Section 22 of the National Water Act (Act No.36 of 1998, as amended), a Section 21 (c) and (i) General Authorisation may be applied for, provided that the above-mentioned recommendations measures are followed. It is recommended that a Waste Management Plan be developed and discussed with DWS to confirm if the measures described in the plan are acceptable and if DWS will accept a GA.

5. REFERENCES

Department of Water Affairs (2008): Updated Manual for the Identification and Delineation of Wetlands and Riparian areas.

Department of Water Affairs (2010). National Water Act, 1998 (Act No 36 of 1998) S21(c) & (i) Water Uses. Version: February 2010. Training Manual.

Ewart-Smith J., Ollis D., Day J. and Malan H. (2013). National Wetland Inventory: Development of a Wetland Classification System for South Africa. Water Research Council project number K8/652

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Macfarlane D.M., Kotze D.C., Ellery W.N., Walters D, Koopman V, Goodman P and Goge C. (2008). WET-Health: A technique for rapidly assessing wetland health. Water Research Commission, Pretoria. WRC Rport TT340/08 February 2008

Mucina L., & Rutherford M. C. (2006). Vegetation Map of South Africa, Lesotho and Swaziland, 1:1 000 000 scale sheet maps. South African National Biodiversity Institute., Pretoria.

River Health Programme (2005). State-of-Rivers Report: Monitoring and Managing the Ecological State of Rivers in the Crocodile (West) Marico Water Management Area. Department of Environmental Affairs and Tourism Pretoria.

APPENDIX A - SPECIALIST CV

Lizette Delport

lizettedelport@gmail.com
South African Wetland Society
SACNASP (Reg. No. 100144/15)

Work History

BOKAMOSO LANDSCAPE ARCHITECTS AND ENVIRONMENTAL CONSULTANST CC

2017 – Current

Environmental Assessment Practitioner (EAP), Wetland Specialist and Water Testing Supervisor

- Compilation of EIA and BA reports
- Wetland delineation, risk assessments, and rehabilitation plans
- Management of water testing laboratory
- Compilation of water sampling reports

DELTERRA CONSULTING AND LIMOSELLA CONSULTING

2014 - 2017

Environmental Consultant and Wetland Specialist

- Wetland delineation, risk and impact assessments
- Environmental desktop analysis
- Environmental compliance monitoring

WETREST

2015 - 2016

Research as part of MSc in Aquatic Health

"A Holocene Wetland: Hydrological Response to Rehabilitation at Colbyn Valley Wetland, Pretoria, Gauteng"

- Weekly groundwater level and pressure monitoring
- Isotope analysis
- Water quality monitoring
- Vegetation growth mapping

Education

MSC IN AQUATIC HEALTH – University of Johannesburg
BSC HONS IN ENVIRONMENTAL MANAGEMENT (CUM LAUDE) – UNISA
BSC AGRICULTURE – University of the Free State

Short Courses

FEB 2017	Taxonomy of wetland Plants (SANBI)
FEB 2016	Grass identification and veld management
NOV 2015	WRC/ ECO-PULSE Workshop in determination of buffers for rivers, wetlands and estuaries
APR 2015	Workshop on environmental compliance, enforcement and risk management
NOVEMBER 2018	Digby Wells and UFS – Wetland soils course

Projects

Wetland delineation, PES/EIS, functional assessment, Impacts and Mitigation, VEGRAI, QHI, Risk Assessments

Riverwalk Electrical

Lanseria x66 Mixed-use Development, Johannesburg

Lanseria x65 Filling Station, Johannesburg

TUT Ga-Rankuwa Expansion, Ga-Rankuwa, Gauteng. (in progress)

Waterfall Ridge Mixed-use Development, Johannesburg. (in progress)

Glen Vista Residential Development, Gauteng

Nkosi City Mixed-Use Development, Mpumalanga

Slovo Park/ Nancefield Residential Development, Gauteng

Kudube Unit 9 Sewer Outfall, Gauteng

Mooibosch Resort Development, Gauteng

Hartebeeshoek Mixed-use Development, Gauteng

Wheatlands Solar Farm, Gauteng

Thula Mall, Bushbuckridge, Mpumalanga

Mthatha – Bedford City Mixed-use Development, Mthatha, Eastern Cape

Expansion of Transnet Railway Loops at Thabazimbi, Ferrogate and Northam, Limpopo

Riverwalk Electrical Line, Pretoria

Ormonde Residential Development, Johannesburg

Coal mining rights application for Berenice, Limpopo Province.

Ekhuthuleni Roads and Stormwater Upgrades

Proposed Housing Development on the Farm Middbuilt Position 11 and 81 and Eloff Er 675, Delmas.

Kagisa and Environs Integrated Development and Housing Project, West Rand, Gauteng.

Witpoortjie Residential Development, Krugersdorp, Gauteng

Moretele Distribution Powerlines and Substations, Pretoria, Gauteng

Panfontein Access Road for Rand Water in Midvaal Local Municipality, Gauteng

Hawerklip Coal Siding at Brazen Algar, Delmas, Mpumalanga

Eskom Westgate - Ntshona Powerline, Gauteng Province

Ecological Importance and Sensitivity, and Present Ecological Status assessment for water use application for Soweto, Gauteng Province

Diepsloot East Powerline and Substation, Gauteng Province

Gem Valley Residential Development, Pretoria North

Amberfield Residential Development, Centurion

Wetland Rehabilitation Plans

Kameeldrift Feedlot, Cullinan

Thula Mall, Bushbuckridge, Mpumalanga

Farm Waterfval 5IR Wetland Rehabilitation and Action Plan, Gauteng

Eagle's Creek Flight Academy, Centurion

Risk Assessments

Hazeldean Bouleavrd Rd EIA and amended WUL, Pretoria

Kudube Unit 9 Sewer Pump Station, Shoshanguve

Thema Babelegi Sewer Pump Station and Pipeline, Shoshanguve

Kikuyu/Waterfall Fields Electrical Lines, Johannesburg

Kikuyu/ Waterfall Fields Water Pipelines, Johannesburg

Parkdene x7 Mixed-use Development services and road upgrades, Johannesburg

Reiger Park x19 Mixed-use Development services and road upgrades, Johannesburg

Slovo Park/ Nancefield Informal Settlement, Johannesburg

Waterfall Fields Electrical Line, Johannesburg

Winterveld x5 Residential Development Sewer, Soshanguwe

Winterveld North Sewer Outfall, Soshanguve

Winterveld South Sewer Outfall, Soshanguve

Riverwalk Electrical Line, Pretoria

Thula Mall, Bushbuckridge, Mpumalanga

Leeuwpoort South Mixed-use Development, Johannesburg

Kudube Sewer Outfall and Pump Stations, Shoshanguve

Erasmia X22 7 X23 Mixed Use Development, Pretoria

Peach tree X21-25 Electrical line, Centurion

Peach Tree X20 Bulk Water line, Centurion

Environmental Authorisations - Approved

DK Pharmaceutical Building, Lesotho - Scoping and EMPr

Peach Tree x21&22 Industrial Township, Centurion – BAR, Pt1 amendment

Peach Tree x23 Industrial Township, Centurion – Pt1 amendment

Peach Tree x24 Industrial Township, Centurion– Pt1 amendment

Peach Tree x25 Industrial Township, Centurion - BAR

Varsity College Expansion, Pretoria – Ecological Opinion

Fairlands Interchange, Johannesburg – EIA

PWV17 Freeway, Pretoria – EIA

PWV18 Route Determination – Environmental Scan

Hazeldean Boulevard Road – EIA

La Montagne Reservoirs, Pretoria – BAR

Silverlakes Trading - Rehabilitation Plan as part of compliance notice

Environmental Authorisations in Progress

Lanseria x 66 Mixed-use Development – BAR

Knopjeslaagte Filling Station, Centurion – BAR

Thula Mall – S24G and Wetland Rehabilitation Plan

Thulamahashe B Sewer Line, Mpumalanga – BAR

Peach Tree X21-25 Electrical Line, Centurion – BAR

Winterveld X5 Mixed Use Development – EIA

Peach Tree X20 Bulk Water Line, Centurion – BAR

Sunderland Ridge Portion 87 Industrial Township - BAR

Appendix H:

Impact Assessment

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
PLANNING AND DESIGN PHASE									
Bio-Physical									
Geotechnical and Soils	Direct and Indirect	-Excavation of soils for foundations -Vegetation clearing for site camp/s, parking areas and stockpile areas	-No	-Negative	-Low	-High	-Site 2 is not located near any geological structural defects. --It is critical that all civil design and construction must be in accordance with prevalent soil conditions. -Designs of storage tanks for water must be appropriate to site layout. -Determine the ground water levels on the site before designing of the structures and the tank installation. -Designs of on-site sewage package plant to cater for leak detection system and underground containment tank in the case of a power failure. -Waste water pond where the waste water (wash water, detergent and fluff) effluent from the hatchery and on-site package plant will be discharged into must be appropriately lined (SANS approved) to counteract leakage. -Include dust pollution control measures. -Paved areas to be impermeable surfaces and such surface must also be lined in order to prevent leachate/ soil pollution and ground water pollution. -Make provision for ground water quality in monitoring boreholes to assist with the monitoring of ground water levels and quality.	-High for all anticipated impacts	-Low
Topography	-Direct	- Siting and layout of the site. Levelling of the site and building it up.	-No	-Negative	-Medium	-High	-Take environmental features (water bodies, environmentally sensitive areas, heavy traffic) into consideration during site foundation. -Avoid drainage lines, -Avoid large indigenous trees or include them in the landscaping.	-High for all anticipated impacts	-Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							-Ensure sloped rehabilitated areas do not erode by using appropriate erosion control such as berms and stakes. -Rehabilitate slope areas to 1.3 and cover with topsoil, revegetate and water regularly. -Ensure that Storm water is properly managed and diverted around the site to avoid erosion. -Rehabilitation with stockpiled topsoil to occur as soon as possible.		
Hydrology	Direct and Indirect	-Leakage of on-site package plant and waste pond (that will receive effluent from the hatchery and package plant) can cause ground water pollution. -Spillages on the surface can cause surface water pollution potentially pollute the non-perennial tributary of the Crocodile River that flows from east to west along the northern boundary of the Site Alternative 2 (Portion 322 of the Farm Hartebeestfontein 445 JQ)	-Yes	-Negative	-High	-High	-Although no wetlands were identified on site during the Wetland Assessment conducted, the wetland specialist recommended that a 100m buffer must be applied around the non-perennial watercourse due to the site occurring outside the urban edge (due to connectivity that still exists upstream and downstream of the watercourse). -Design the on-site package plant to prevent surface water and ground water contamination. -Design the waste pond to include an appropriate lining (SABS approved) to prevent any leakage. -Compile an emergency and response plan for pollution and other incidents. -Take the necessary SANS standards for poultry facilities, into consideration. -Take the contaminated land provisions as set out in the National Environmental Management: Waste Act into consideration. -Paved areas to be impermeable. -Confirm water discharge standards with the local authority. -Prevent the mixing of cleaning/process water with storm water and roof water. -A proper storm water management system should be designed or in place for implementation during construction to	-High for all the anticipated impacts	-Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
							manage all surface water flows in a sustainable manner. Provision should in addition be made for an oil-water separator to remove all hydrocarbons, greases etc. as a result of waste items that may be contaminated, prior to be discharged into the municipal storm water system. - This separator must be compliant with SANS. - Proper provision should be made for a designated area on site for the duration of the operational phase for the storage of hazardous and/ or flammable items, including oils, greases, fuel etc. The said area should be lined with secondary containment and bunded to contain at least 110% of the spilled substance.		
Geohydrology	Direct and Indirect	-Leakage of on-site package plant and waste pond (that will receive effluent from the hatchery and package plant) can cause ground water pollution. -Spillages on the surface can cause surface water pollution potentially pollute the non-perennial tributary of the Crocodile River that flows from east to west along the northern boundary of the Site Alternative 2 (Portion 322 of the Farm Hartebeestfontein 445 JQ)	-Yes	-Negative	-High	-High	-A Section 21 (a) Water Use Licence Application will need to be applied for the abstraction of water from existing borehole on the site. -The water needs of the hatchery at 10 950m^3, far exceed the abstraction allowed in terms of the GA and that a non-perennial tributary of the Crocodile River flows from east to west past the site outside the northern boundary of the site, a full Water Use Licence Application is triggered. No development is allowed within the 100m buffer associated with the non-perennial stream flowing past the site outside its northern boundary. -A 24-hour yield test is required to confirm availability of water for all five phases of the hatchery development. -Borehole water quality tests must also be carried out to ascertain whether the borehole water quality meets the hatchery standards or whether water treatment will be required.		

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							-The quality of groundwater supply must be monitored frequently for parameters as stipulated in the EMPr. --Monitoring boreholes downstream of the hatchery to detect any groundwater contamination which emanate from this activity. --Regular water quality tests of the watercourse should be performed at regular intervals during the operational phase to ensure no pollution of surface water has occurred. - Designs of on-site sewage package plant to cater for leak detection system and underground containment tank in the case of a power failure. -Waste water pond where the waste water (wash water, detergent and fluff) effluent from the hatchery and on-site package plant will be discharged into must be appropriately lined (SANS approved) to counteract leakage. -Paved areas to be impermeable surfaces and such surface must also be lined in order to prevent leachate/ soil pollution and ground water pollution. -Make provision for ground water quality in monitoring boreholes to assist with the monitoring of ground water levels and quality. -Water quality in the hatchery must consider the following water quality parameters: Acidity/alkalinity (pH): A pH of 7 is neutral. Below 7, the water becomes acid (can cause corrosion) while above 7 means the water is alkaline (can indicate hard water due to high levels of calcium). Generally a pH of 6-8 is acceptable - and pH can be corrected by adding chemicals.		

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							Total hardness is an indication of hard water, which can cause limescale build-up, resulting in inefficiencies or the breakdown of equipment. The most common unit used is °dH (German degree) or mg CaCO3/l. Generally, 2-6°dH (35-107 mg CaCO3/l) is advised, with a maximum of 2°dH recommended for nozzle/spray humidification. Water softeners are used to reduce water hardness. Suspended particles should be absent, as these will block pipes, nozzles etc. Suspended solids are removed by filters. Microbial contamination should be absent. If water is contaminated, another source should be used. Disinfection can reduce contamination, but for example, using water contaminated with Pseudomonas, Acentobacter, Proteus, yeasts or molds - even after disinfection - for humidification is not advised. Some elements in water are known for aggressive reactions which cause the discolouration of equipment. Commonly, the following thresholds are used: the total sum of chloride and sulphate (Cl & SO4) max 200mg/l, Magnesium (Mg) max 50mg/l, Iron (Fe) max 0.02mg/l. These elements require specific treatments. Extremely pure water (for example distilled or Reverse Osmosis water) is also known to be aggressive. It is therefore advisable to build a small bypass into the system.		
Social and Economical									

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
Financial	-Direct	No financial provision for the decommissioning phase and for rehabilitation. Must be included as part of the EMP. -Peruse all the mitigation measures as supplied by all the specialists and ensure that there are sufficient funds available for rehabilitation purposes and decommissioning.	-Yes	Negative	High	Medium	Make provision for the decommissioning phase and for rehabilitation and emergency incidents prior to the construction of the proposed hatchery. If required obtain the necessary insurance to cover pollution incidents, contaminated land queries and reports as well as any other health, safety or environmental incidents that could arise during the construction, operation and decommissioning phases of the hatchery.	High	Low
Cultural/historical	Direct	Heritage discovery potential	No	Negative	Low	Low	Site Alternative 2 is the preferred site due to no impacts that will be posed on archaeological or historical sites, features or material. During the construction phase, should the construction workers identify any cultural heritage features, all construction work must cease and this must be reported to the appointed Environmental Control Officer (ECO) or site officer in charge, and the relevant Heritage Authority and in this context the North West Provincial Heritage Authority.	Low	Low
Roads Upgrades	Direct and Indirect	Impacts on provincial and local roads and on adjacent properties	Yes	Negative	Medium	Medium	-The existing gravel road that falls within an existing servitude, leading off the R551 will need to be widened to cater for deliveries and collections to and from the hatchery. --Identify surrounding properties that could potentially be affected by road widening (i.e. accesses temporarily affected) and prepare notices to distribute to such affected parties.	High	
Qualitative Environment	Direct and Indirect	-Dust pollution -Noise Pollution -Soil pollution -Construction after hours and during weekends and public	Yes, some impacts	Negative	Low, Medium and High	Medium	-Address dust pollution and specify damping down of exposed surfaces during the dry and windy seasons. -Supply working hours and rules regarding persons allowed to reside on		

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
		holidays -Visual Pollution -Waste Management -Lighting Pollution -Signage authorisations					site and noise during the construction phase. -All contractors and sub-contractors must comply with Part F: Site Operations of the National Building Regulations- ***attached hereto as Appendix E of the EMPr (EMPr attached as Appendix J of the BAR).*** -Require that construction equipment be furnished with noise muffing devices. -Make provision for drip trays in the tender documentation. -Plan signage to be visible during the day and night in such a way that it complies with the standards of the local authority, and the relevant roads authorities. -Signage must be designed to cause minimum distraction of vehicles passing by and it should not reflect into the windows of the surrounding properties (nearest property is Horizon Bricks-no residential or commercial properties are in close proximity to Portion 322) -Confirm signage application requirements with the relevant local authority, district municipality and provincial road authority -Confirm with the local authority that builder's waste can be dumped at the local registered landfill site. -Confirm the local authority's capacity to collect operational phase waste and that waste will be removed by the local authority. -Confirm locality of waste collection areas during the construction and operational phase. -Allow enough space in layout for local authority trucks and other large vehicles to move safely though the site. -Biological waste such as infertile eggs, mortalities and egg shells will be processed or reduced in size before being		

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
							carried through into steel drums situated outside of the facility via a screw conveyor. Biological waste will then be transported to the Kroon's Gourmet Chickens Abattoir's rendering plant situated in close proximity to the site.		
Health and Safety	Direct and Indirect	-Impacts on the health and safety of the surrounding environment during the construction and operational phase - Impacts on the health and safety of the employees at the chicken hatchery and any clientele at the hatchery during construction and operational phases	Yes, in some cases	Negative	High	High	-Make provision for the appointment of a suitably qualified health and safety officer to assist with compliance with the relevant health and safety legislation during all the development phases of the hatchery. -The minimum standards relating to the health and safety for chick hatcheries as stipulated in the South African Poultry Association Abridged Code of Practice: Chick Hatchery, must be adhered to. -Plan and discuss fire prevention measures and allow for the installation of the required fire equipment and health and safety signage for the operational phase. - In light of the nature of the proposed development and control measures that are required to be implemented to counteract the transmission of diseases, it is recommended that the developer may have to register in terms of the Fertilizers, Farm Feeds, Agricultural Remedies, and Stock Remedies Act.	High	Low
Institutional									
Compliance with the relevant local authority by-laws and policies	Direct	-Local authorities have specific requirements for storm water management, discharge of treated effluent into the municipal system, emergency procedures, construction works that affect roads and accesses to roads, road safety conditions, temporary disruption of services, air	Yes	Negative	Medium to High		-It is recommended that the proposed hatchery be authorised due to being in line with local plans and strategies with the provision that the hatchery development complies with the recommendations as contained in the EMPr. – Obtain copies of such by-laws/polices from the local and district municipality in	High	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
		emissions, waste management, outdoor advertising, water services, health and safety, security etc.					order to ensure compliance. -Confirm that the proposed hatchery will comply with the relevant local authority and district municipality by-laws and policies: North West Biodiversity Sector Plan, 2015; Madibeng Local Municipality Integrated Development Plan (IDP); Madibeng Local Municipality Draft Spatial and Land Use Management By-Law 2016 and; Madibeng Local Municipality Draft Waste Management By-Law, 2017. - Site Alternative 2 is in line with national, provincial and local development policies and frameworks. -The proposed hatchery is in line with the IDP and the SDF plans as the development will be contributing towards food production and employment creation. -Proposed hatchery viewed as a societal priority due to contribution to food production egg production is not conducted on a large scale within the Madibeng Local Municipality and therefore the hatchery will indirectly contribute to expanding the commercial farming sector, specifically egg production. -Minimum standards pertaining to Health and Safety, for Chick Hatcheries as set out in South African Poultry Association Abridged Code of Practice: Chick Hatchery must be conformed to. -In terms of the Madibeng Local Municipality Draft Waste Management By-Law 2019, the Municipal waste management officer must be informed of the intention to generate general waste, 60 days prior to commencement of generating waste. -The hatchery will need to comply with		

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
							the Norms and Standards for Storage of Waste, 2013 published in terms of the NEM: WA due to triggering Category C (2) of the List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment, due to storing more than 80m³ of hazardous waste. -The hatchery must register in terms of the Fertilizers, farm feeds, Agricultural Remedies, Stock Remedies Act, if required. -A separate Environmental Impact Assessment process will be conducted for the Waste Management Licence and Air Quality Licence triggered by the processing of waste by means of the macerator.		
CONSTRUCTION PHASE									
Bio-Physical									
Geology and Soils	Direct	Loss of topsoil for vegetation clearing, clearing for parking areas and stockpile areas	No	Negative	Low	Medium	-Impact on the environment is expected to be of minimal importance as Portion 322 of the Farm Hartebeestfontein 445 JQ has a low ecological sensitivity. -Earth moving and vehicle access must not occur within the watercourse. -Spillages must be contained. -Vehicles are to be parked and serviced in a bermed or bunded area away from the buffer. -Demarcated and secure storage facilities must be used for the storage and handling of lubricants, oils, paint and cement. -Hay bales and/or sandbags must be used for areas close to the watercourse. -Top soil must be stockpiled separately. -Once the construction phase is complete, the stockpiled topsoil must be	Medium	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							added to the areas to be rehabilitated.		
	Direct	Loss of land capability	No	Negative	Low	Medium	-Although Portion 322 of the Farm Hartebeestfontein 445 JQ occurs in an area that is signified as arable, the site is classified as having a low ecological sensitivity. -The proposed site is also earmarked for future residential purposes (although not foreseen that the land will be under pressure for residential development in the long term).	High	Low
	Direct	Soil collapse	No	Negative	Low	Medium	- Pyroxinite, harzburgite and norite soils are the soils of the study site. Such soils do not present any collapse potential. -Mark all excavations clearly and make workers aware of possible soils collapse in and around excavations. -Trucks and equipment should be kept away from the unstable areas in order to avoid collapse.	Medium	Low
	Direct	Soil pollution	No	Negative	Low	Medium	- Temporary measures (i.e. drip trays/ temporary bunded areas) will be implemented to ensure that no hydrocarbons and/or other pollutant liquids are spilt, and if so, they are contained and a clean-up protocol to be followed. -A Waste Management Plan must be developed specifically for the hatchery. -All unusable waste must be stored in an appropriately sealed container and store in a bunded area. -Waste bins must be sealed appropriately to prevent leakage of waste and which must be emptied out regularly. -Waste should be recycled as far as possible and separated into different	High	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
							containers (paper, plastic, glass etc.). -Waste water is recommended to be re-used where possible. -Waste water disposal methods must ensure no pollution of the environment (soil and water) occurs.		
	Direct	-Perched water conditions (mainly during the rainy periods) could make excavations and the installations of the underground containment tank for sewage	No	Negative	Low	Low	Ground water elevation recorded during the geohydrological investigation reveals 1, 139 and 1, 200m above mean sea level. - It is important to take note of possible perched water conditions during the construction phase. -Sewage containment tanks must preferably be installed on a section of the site where the ground water table is the lowest.	High	Low
	Direct	**Clayish conditions:** -Possible cracks in structures -Possible damage to tanks to be installed (swelling and shrinking of soils) – can cause ground water pollution	No	Negative	Low	Low	-Geotechnical engineer to conduct more detailed geotechnical investigation of site in order to determine perched water conditions and expansiveness of soils that could pose an impact on the infrastructure and cause potential ground water pollution.	High	Low
Topography	Indirect	-Alteration of topography- cut and fill exercises- low gradient -Loose soils cause siltation	No	Negative	Low	Medium	-The impact on the environment is expected to be Low. Topography is generally flat. -Temporary construction phase storm water management measures to be implemented (i.e. sand bags and hay bales) in order to prevent siltation.	High	Low
Hydrology	Direct	-No sanitation facilities for workers -Perched water tables/ higher water tables during the rainy season	No	Negative	Low	Low	-A 100m buffer zone must be applied around the non-perennial watercourse due to the subject site being located outside of the urban edge. - No development is permitted within the	Medium	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
		-Ground water and surface water pollution					buffer zone. -It is integral that waste management measures be implemented to ensure that no pollution of the environment occurs.		
	Direct	Siltation and Erosion	Yes	Negative	Low	Medium	-Temporary storm water management solutions such as silt traps, hay bales and sand bags (especially close by to the watercourse) must be properly implemented to minimise silt discharge into surrounding systems during rainstorm events. -It is also recommended that precautionary measures be taken in order to prevent the extensive loss of soil during rainstorms. Large exposed areas should adequately be protected against erosion. -Measures should be implemented during the rainy season to channel storm water away from open excavations and foundations.	Medium	Low
Effects on fauna and flora/ bio-diversity	Direct/ indirect	Removal of indigenous vegetation	No	Neutral The study area has a low ecological sensitivity	Low	Low	-Approximately 60% (eastern part) of Portion 322 is classified as a Critical Biodiversity Area 2 (CBA 2) and the remaining 40% (western part) is classified as Ecological Support Area (ESA2) due to occurrence within the 5km buffer of a Protected Area in the form of the Hartebeespoort Nature Reserve and the Magaliesberg Protected Natural Environment, and due to occurring within an Important Bird Area and within a Freshwater Ecosystem Protected Area (FEPA) Catchment. -Due to the proposed development site occurring within the 5km buffer of a Protected Area, specific NEMA listed activities apply to the proposed hatchery. -The study site of Portion 322 has been	High	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
							classified as having a low ecological sensitivity. -Prior to construction commencing with any construction works, the development area should be fenced off from the areas that are to be retained as an open space system. The construction related impacts must be contained within the fenced-off development area. -An Ecological Management Plan (EMP) must be developed for the construction and the operational phase of the hatchery. - The indigenous plants that naturally grow on the study site (that would otherwise be destroyed) should be incorporated into the landscaped area. -The area must be properly managed throughout the construction phase in terms of fire, eradication of exotics etc. to ensure continuous biodiversity. It is proposed that as little of the vegetation cover to be cleared to prevent erosion on the application site. Only sections that are intended for the development must be cleared from vegetation. Each section must be rehabilitated as soon as construction is done.		
Social and Economical									
Cultural/historical	Direct	Heritage discovery potential – regarded as low	No	Negative	Low	Low	Site Alternative 2 is the preferred site due to no impacts that will be posed on archaeological or historical sites, features or material. During the construction phase, should the construction workers identify any cultural heritage features, all construction work must cease and this	Medium	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							must be reported to the appointed Environmental Control Officer (ECO) or site officer in charge, and the relevant Heritage Authority, and in this context the North West Provincial Heritage Authority.		
Installation of services and upgrading of roads	Direct and Indirect	Impacts on provincial and local roads and on adjacent properties	Yes	Negative	Medium	Medium	-The existing gravel road that falls within an existing servitude, leading off the R551 will need to be widened to cater for deliveries and collections to and from the hatchery. --Identify surrounding properties that could potentially be affected by road widening (i.e. accesses temporarily affected) and prepare notices to distribute to such affected parties.	Medium - High	Low
Atmospheric Emissions/Air quality pollution	Direct	Dust emissions	No	Negative	Low	Medium	-Dust suppression measures must be implemented during the construction phase to minimise dust generated by construction activities. -Regular and effective damping down of working areas (especially during the dry and windy periods) must be carried out to prevent dust pollution that will have a negative impact on the surrounding developments. -When necessary, these working areas	High	

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
				\			should be damped down at least twice a day depending on the volume of dust.		
	Direct	Emissions from vehicles and equipment (CO_2, NOx, SOx, VOC's etc.)	No	Negative	Low-Medium	Medium	-All construction vehicles must be maintained such as to operate efficiently. Idling times of machinery to be minimised.	Low	Low
	Direct	Air pollution (odours)	No	Negative	Low	Low	-The study site of Portion 322 is located the furthest from the residential areas (specifically Bushveld View Estate and Ana Agricultural Holdings), and is therefore very unlikely to pose an air pollution issue in terms of odour which would cause continuous complaints by the residents. -The wind direction is easterly during winter and westerly during summer. Any probable odour emanating from the hatchery would affect the Horizon Brick factory.	Low	Low
Noise	Direct	Noise	No	Negative	Low	Medium	-Noise could become a factor to the Hartebeespoort Nature Reserve and the Magaliesberg Protected Natural Environment situated south-west within 3kms and south-south east within 2kms of the proposed hatchery site. -Construction operations shall not occur before or after normal working hours. Noise monitoring should be undertaken as spot checks. -When required noise mufflers should be utilized to reduce noise. It is important to keep an open channel of communication between all stakeholders and keep record of any concerns raised i.e. Complaints Register to be kept on site. -All construction activities must be	High	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							restricted to normal working hours as depicted in the NBR document for site operations. -No construction may take place on Sundays and public holidays. -If any construction activities are required to take place on the aforementioned days, the surrounding neighbours must be informed of such planned works at least 48 hours prior to the relevant Sunday or public holiday.		
	Direct	Visual impact	No	Negative	Low-Medium	Medium	-The visual impact of construction activities will be low-medium term. Bollards and protective barriers as well as safety tape may be utilised around the site. -A specific location must be designated for the stockpiling of builders rubble and associated construction material. -Prior to construction commencing on the site, an area on site must be demarcated for a site camp. -The selected site should not impair views (line of sight) of drivers utilising roads, nor should it be a distraction.	Low	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
Waste Generation	Direct	Domestic waste	No	Negative	Low	Medium	-A Waste Management Plan must be developed specifically for the hatchery. -All unusable waste must be stored in an appropriately sealed container and store in a bunded area. -Waste bins must be sealed appropriately to prevent leakage of waste and which must be emptied out regularly. -Waste should be recycled as far as possible and separated into different containers (paper, plastic, glass etc.). -Waste water is recommended to be re-used where possible. -Waste water disposal methods must ensure no pollution of the environment (soil and water) occurs. -All employees will be subjected to induction to understand the environmental management requirements on site. -Domestic waste will be removed from the site by a certified waste contractor. -Waste disposal certificates must be kept on record.	High	Low
	Direct	Construction waste	No	Negative	Medium	Medium	-All construction waste must be placed in a demarcated area and disposed of accordingly. --This area will be bermed or appropriately bunded so as to prevent the dispersal of said waste by wind and rain. -Waste disposal certificates will be kept on record.	Medium	Low-Medium
	Direct	Hazardous waste	No	Negative	Medium	Medium	-The proposed hatchery must comply with the Norms and Standards for Storage of Waste, 2013 published in terms of the National Environmental Management: Waste Act, as the hatchery will store more than 80m³ of hazardous (biological waste: infertile eggs,	Medium	Low-Medium

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
							mortalities and egg shells) waste. -During the operational phase, all biological waste will be reduced through the use of a macerator situated inside of the facility before being transferred into steel drums outside the facility via a screw conveyor. The waste will then be transported to the Kroon's Gourmet Chickens Abattoir's rendering plant.		
Resource Consumption	Indirect	Electricity consumption	No	Negative	Low	Low	-Fair usage and minimisation of over usage. -A generator to be put in place during incidental power outages. Solar panels are also recommended for use as a backup source for power. -Energy saving light bulbs are also recommended to be used inside of the facility. -Eskom has confirmed ability to upgrade the transformer to a 500kVA transformer immediately subsequent to the property transferring to Kroon's Chickens.	High	Low
	Direct	Water consumption	No	Negative	Low	Medium	-Fair usage and care not to over use the water resources. Promote the re-use and recycling of process waste water if possible.	High	Low
	Indirect	Fuel consumption	No	Negative	Low	Medium	-All construction vehicles will be maintained such as to operate efficiently. Idling times of machinery to be minimised.	Medium	Low
	Indirect	Raw materials consumption	No	Negative	Low	Medium	Raw materials will be used efficiently. Recycling will be implemented on applicable waste streams and in accordance with the Waste Management Plan.	Medium	Low
Incidents, Accidents and Potential Emergency	Direct	Pollution incidents	No	Negative	Low-Medium	Medium	-Spillages to be cleaned up immediately. Notification to the Department of Water and Sanitation (DWS) should groundwater be affected.	Medium	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
Situations							-An emergency response plan should be devised in the event of a spillage or leak.		
	Direct	Health and safety	No	Negative	Low-Medium	Medium	-Make provision for the appointment of a suitably qualified health and safety officer to assist with compliance with the relevant health and safety legislation during all the development phases of the hatchery. -The minimum standards relating to the health and safety for chick hatcheries as stipulated in the South African Poultry Association Abridged Code of Practice: Chick Hatchery, must be adhered to. -Plan and discuss fire prevention measures and allow for the installation of the required fire equipment and health and safety signage for the operational phase. - In light of the nature of the proposed development and control measures that are required to be implemented to counteract the transmission of diseases, it is recommended that the developer may have to register in terms of the Fertilizers, Farm Feeds, Agricultural Remedies, and Stock Remedies Act.	Medium	Low
	Direct	Storage of hydrocarbons	No	Negative	Low-Medium	Medium	-All hazardous materials will be stored in a bunded and lockable area. Material Safety Data Sheet (MSDS) sheets will be available for all hazardous products. -Concrete mixing and tar preparation have to be carried out away from sensitive areas and on an impermeable substratum, all unused concrete and tar need to be removed. -Areas such as oil storage facilities must still be fitted with the necessary oil interceptors or whatever appliances /	Low	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							interceptors are required to prevent pollution. -Any damage or spills onto the existing roads will be cleaned or fixed immediately after noticing, at the contractor's/developer's cost. -All spillages of oil or fuel onto concrete surfaces shall be controlled by the use of an approved absorbent material. -All soil contaminated by oil, fuel, etc. shall be collected immediately and disposed of at an acceptable disposal site to be approved by the ECO. -Water pollution through fuels, oils or other substances must be avoided. -All clean storm water will be diverted away from potential sources of hydrocarbon contamination, dirty water will be captured and disposed of in a proper manner. -Regular maintenance will be done according to a preventative maintenance program and the SABS standards. -Records will be kept of all spills, substantial spills will immediately be reported to the authorities.		
	Indirect	Fire	No	Negative	Low	Medium	-Fire and emergency plans will be implemented during construction especially due to the two nature reserves and surrounding agricultural holdings located in close proximity. -Adequate firefighting equipment will be instituted as recommended. -Fire breaks will have to be maintained during the operational phase of the hatchery by the owner.	Medium	Low
	Indirect	Safety and security	No	Negative	Low	Medium	-Health and safety officer to be appointed prior to commencement with construction and the safety plan as well as the required safety gear for workers to	High	Low

POTENTIAL ADVERSE IMPACTS					SIGNIFICANCE (Prior to mitigation)	PROBABILITY	MANAGEMENT & MITIGATION MEASURES	MITIGATION EFFICIENCY	SIGNIFICANCE (with mitigation)
TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							be available on the study area. -Allow for 24 hour security on the study area. -Fence the construction site at strategic points. This will keep the public out of the potentially dangerous construction area. -Site security will ensure that the site is secured and only authorised access allowed. -If required for some of the workers to sleep on the site, such workers must be accommodated in an allocated area on the construction site. -Plan for the implementation of a security system that will reflect a database of all workers and personnel on site during the construction phase. -Also indicate the names of the workers that will reside on the study area during the construction phase. -Remove the names of workers no longer involved in construction works on the study area immediately after such workers stopped with their duties/ we removed from their duties. -The 24 hour security must be notified of new construction workers/ workers to be accommodated on the study area and must also be informed of workers no longer involved in construction activities on the study area. -Workers that sleep on the study area must sign out when they leave the premises after hours and must sign back in when they return to the accommodation supplied on site. On site accommodation could prevent illegal occupation of open spaces in close proximity of the study area by workers that cannot afford daily travelling costs. -Where possible local laborers must be used in order to avoid an influx of people		

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TYPE		**DESCRIPTION**	**CUMULATIVE**	**NATURE**					
							into the area. -Details of all persons to work on the site that must be supplied to the security and project manager must include the following: • Name and Surname, ID Number or Passport Number, Driver's License, Copy of relevant ID document/ passport/ driver's license/ service delivered by worker/ employee of the worker/Contact Details of the worker and contact details of a family member or employee. -Fence the area earmarked for the temporary accommodation of construction workers. - If possible fence the construction site and allow for one/ two allocated and monitored contractor's entrance/s.		
Qualitative Environment	Direct	Visual impact	No	Negative	Low-Medium	Medium	-The visual impact of construction activities will be low-medium term. Bollards and protective barriers as well as safety tape may be utilised around the site. -A specific location must be designated for the stockpiling of builders rubble and associated construction material. -Prior to construction commencing on the site, an area on site must be demarcated for a site camp. -The selected site should not impair views (line of sight) of drivers utilising upgraded roads, nor should it be a distraction.	Low	Low
	Indirect	Damage to roads	No	Negative	Medium	Medium	-Construction vehicles must avoid using sub-standard roads (i.e. roads in agricultural holdings/ rural areas that are not constructed to provincial/ local authority standards). -Record the condition of the surrounding roads (with photographs) prior to construction and require that contractors repair all damages caused during the		

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TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							construction phase. -Construction vehicles should only be permitted to use a designated construction entrance. -Construction vehicles and activities as well as other heavy vehicles to avoid peak hour traffic times.		
	Indirect	Traffic disruptions	No	Negative	Medium	Medium	-Traffic warning and calming measures will be put in place when construction activities may impact on traffic flow.	Medium	Low-Medium
	Direct	Temporary employment opportunities for construction workers	Yes	Positive	Medium	High	Not required	N/A	N/A
OPERATIONAL PHASE									
Bio-Physical									
Geology and Soils	Direct and Indirect	-Soil pollution due to spillages -Washing of paved surfaces and equipment with chemicals, soaps etc. and releasing polluted water onto the surface and allowing it to mix with storm water -On –site package plant and containment tank leakage	Yes	Negative	Medium	Medium – HIGH	-Always ensure that storm water and dirty water are separated. -Install oil traps and grease trips where required. -Maintain impermeable paved surfaces and repair areas where leakages into the ground can occur on a regular basis. -Wash paved surfaces on a regular basis. -An Emergency Plan must be implemented. -Monitoring boreholes downstream of the hatchery to detect any groundwater contamination which emanate from this activity. -Compile and implement a waste management plan which includes management of all types of waste created throughout the facility processes and include mitigation measures to prevent pollution in the case of	High	Low

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TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							equipment failure or spillages. -Regular water quality tests of the watercourse should be performed at regular intervals during the operational phase to ensure no pollution of surface water has occurred.		
Hydrology	Direct and Indirect	Contamination of ground water and surface water	Yes	Negative	Medium	Low	- Monitoring boreholes downstream of the hatchery to detect any groundwater contamination which emanate from this activity. --Regular water quality tests of the watercourse should be performed at regular intervals during the operational phase to ensure no pollution of surface water has occurred. -Implement the emergency preparedness and response plan for the operational phase and put emergency contact number on walls at strategic points for purpose of dealing with emergencies (i.e. fires, explosions, oil spills, fuel spills etc.).	High	Low
Social and Economical									
Waste Generation	Direct	Domestic waste	No	Negative	Medium	High	The Waste Management Plan developed specifically for the hatchery must be implemented. -All unusable waste must be stored in an appropriately sealed container and store in a bunded area. -Waste bins must be sealed appropriately to prevent leakage of waste and which must be emptied out regularly. -Waste should be recycled as far as possible and separated into different containers (paper, plastic, glass etc.). -Waste water is recommended to be re-used where possible. -Waste water disposal methods must ensure no pollution of the environment (soil and water) occurs.	High	Low-Medium

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							-Domestic waste will be removed from the site by a certified waste contractor. -Waste disposal certificates must be kept on record.		
	Direct	Hazardous waste	No	Negative	Medium	Medium	The proposed hatchery must comply with the Norms and Standards for Storage of Waste, 2013 published in terms of the National Environmental Management: Waste Act, as the hatchery will store more than 80m³ of hazardous (biological waste: infertile eggs, mortalities and egg shells) waste. -During the operational phase, all biological waste will be reduced through the use of a macerator situated inside of the facility before being transferred into steel drums outside the facility via a screw conveyor. The waste will then be transported to the Kroon's Gourmet Chickens Abattoir's rendering plant. A separate Environmental Impact Assessment process will be conducted for the Waste Management Licence and Air Quality Licence triggered by the processing of waste by means of the macerator.	High	Low
	Indirect	Lighting	No	Negative	Low- Medium	Medium	-Security lighting during the construction and operation phase must be carefully planned. These lights must not spill into the eyes of oncoming traffic and must not shine into adjacent properties. -Prevent the implementation of exterior advertising signs and name boards that will flicker into the eyes of surrounding neighbours and into the eyes of	High	Low

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TYPE		DESCRIPTION	CUMULATIVE	NATURE					
							oncoming traffic. -Exterior lighting, especially the lighting in the vicinity of the open space areas must be designed to shine downwards and the bulbs to be used should preferably be dim.		