SWELLENDAM HOUSING PROJECT
ON REMAINING EXTENT OF ERF 1, SWELLENDAM

REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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eco impact Environmental Health & Safety Legal Consulting	**Title:** Swellendam Housing Project on Remaining Extent of Erf 1, Swellendam Revised draft Environmental Impact Assessment Report

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EXECUTIVE SUMMARY

Proposed Project and Site Description:

The Swellendam Municipality proposes to establish a mixed-use housing development on the Remaining Extent of Erf 1 at Swellendam.

The Swellendam Municipality proposes a subsidised housing project on a Remainder of Erf 1 at Swellendam, comprising of 950 residential erven. As well as 4 erven for community facilities, 2 erven for business, 3 for mixed use and 10 erven for public open space. Associated internal roads and associated services infrastructure.

Upgrades to attenuation dams 4 and 5 as the proposed development's runoff will have a direct influence on the capacity. These attenuation dams are situated in a degraded non-perennial drainage line which runs to the west of the proposed site.

Dam 5 –

- Clear and grub of wall embankments.
- Clear and grub for basin extensions (10,000m²)
- Cut to spoil for basin enlargements (7,100m³)
- Cut to fill wall embankment from selected excavated/imported material (1,000m³)
- Cut to fill berm from selected excavated/imported material (144m³)
- Construction of gabion lined spillway
- Concrete outlet structure (25m³)

Dam 4 –

- Upgrading of the outlet works

Bulk water distribution will need to be upgraded. The following is currently proposed:

- SSW4.1: 94 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.6: 282 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.10: 77 m x 160 mm Ø inter-connection pipe
- SSW4.11: 352 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.17: 300 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.18: 263 m x 110 mm Ø new supply pipe & connections
- SSW5.2: 140 m x 160 mm Ø new supply pipe & connections
- SSW5.3: 107 m x 110 mm Ø new supply pipe & connections
- SSW4.7a: New 110 mm Ø zone valve
- SSW4.7b: New 75 mm Ø zone valve
- SSW5.1: New 15 ℓ/s @ 20 m booster pump station

Sewer reticulation will need to be upgraded to accommodate the proposed development. The following is currently proposed:

- SSS1.2: 250 mm Ø New flow diversion
- SSS1.3: 84 m x 250 mm Ø New outfall sewer
- SSS1.6: 315 mm Ø New flow diversion
- SSS1.7: 100 m x 315 mm Ø New outfall sewer
- SSS1.8: 229 m x 315 mm Ø Re-align existing bulk sewer
- SSS1.9: 304 m x 315 mm Ø Re-align existing bulk sewer

See detail in maps in Appendix B.

The proposed development site is an unused vacant area of ± 25.3ha which is located south east of the town Swellendam's southern residential area. It consists of an undulating area in-between the residential area and the railway line of Swellendam South.

Site H is an undulating area in-between the residential area and the railway line of Swellendam South.

According to the 2017 Western Cape Biodiversity Spatial Plan Site H been classified as a terrestrial **Ecological Support Area** (ESA1). The site has been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown). As according to Mucina and Rutherford (2006) the type of natural vegetation originally occurring on site is Swellendam Silcrete Fynbos (**Endangered**). Little to mainly no indigenous vegetation species have returned to this transformed area and this area therefore has low conservation value and low botanical sensitivity. No significant fauna or avifauna breeding, roosting or their associated habitat will be impacted upon. Site H is now dominated by a mix of agricultural grasses and herbs, and some pioneer indigenous species. Species include *Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Hyparrhenia hirta, Elytropappus rhinocerotis, Ursinia discolor, Anthospermum spathulatum, Gnidia laxa, Protea repens, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia, Melinis repens, Corycium orobanchoides* and *Tritonia disticha.* No plant Species of Conservation Concern were recorded, and none are expected to occur. **Botanical sensitivity is Low**.

According to the NFEPA Database no wetland features are located within the study area and no seasonally wet soils or watercourse characteristics were observed or recorded on the surveyed site itself (housing).

However, a Channelled Valley Bottom Wetland was identified approximately 300m to the west of the study area. The proposed new access road, an extension of Theunissen Street is proposed, and two new attenuation ponds are within the identified Channelled Valley Bottom Wetland. Similarly, water pipelines will be upgraded within Sofietjies Street, Ellis Street, September Street and Reisiebaan Street within the existing residential area to the west of the study area, two of these portions cross the identified Channelled Valley Bottom Wetland.

The Koornlands River was identified as a NFEPA wetland area (Natural valley floor floodplain wetland). The sewer pipeline segments are located within this large natural floodplain system, within the western portion of the study area. This floodplain is considered to be in a moderately modified condition.

A channelled valley bottom wetland is also located just outside and just north of the study area. A portion of this wetland is considered to be natural, albeit largely modified, however a large extent thereof is considered artificial.

A small artificial wetland flat is being traversed by the most southern water pipeline segment. Other wetland flats (also considered to be artificial) are located within the central southern portion of the larger investigation area.

Summary of Specialist Studies

ECOLOGICAL BASELINE ASSESSMENT FOR PROPOSED SWELLENDAM HOUSING PROJECT (Sites E & H on RE/1 and Site I on RE/157) – ECO IMPACT – 2015 and revised in 2018

At least ±42ha of the ±50ha area surveyed have been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown). As according to Mucina and Rutherford (2006) the type of natural vegetation originally occurring on all three sites as surveyed are classified as Swellendam Silcrete Fynbos (Endangered). The species present include typical widespread

agricultural weeds and grasses, and a few indigenous resilient herbs and grasses. Little to mainly no indigenous vegetation species have returned to this 42ha transformed area and this area therefore has low conservation value and low botanical sensitivity. No significant fauna or avifauna breeding, roosting or their associated habitat will be impacted upon. Most species occasionally visiting the recommended development areas will move out of the area into adjacent indigenous vegetation habitats when construction activities start.

BOTANICAL BASELINE ASSESSMENT OF FIVE POTENTIAL HOUSING SITES IN SWELLENDAM - NICK HELME BOTANICAL SURVEYS - 29 NOVEMBER 2017

Site H - This large area was previously a cultivated field (more than ten years ago), and is now dominated by a mix of agricultural grasses and herbs, and some pioneer indigenous species. Species include *Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Hyparrhenia hirta, Elytropappus rhinocerotis, Ursinia discolor, Anthospermum spathulatum, Gnidia laxa, Protea repens, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia, Melinis repens, Corycium orobanchoides and Tritonia disticha.* No plant Species of Conservation Concern were recorded, and none are expected to occur. Botanical sensitivity is Low. Areas H and I present no significant botanical constraints to the proposed development, and these areas thus present the best opportunities for the expansion of housing in the study area, along with the Low sensitivity portion of Area B.

BOTANICAL STATEMENT: IMPACT OF HOUSING DEVELOPMENT ON SITE H, SWELLENDAM- NICK HELME BOTANICAL SURVEYS – 14 DECEMBER 2018

The southern quarter of site H is mapped as a CBA (but is excluded from development), whilst the rest – including the whole development area – is mapped as an ESA by Pence (2017). As noted in the baseline assessment the entire proposed development area is deemed to be of Low botanical sensitivity, as it was all previously cultivated, and although it has lain fallow for quite some time the indigenous species diversity is still relatively low (less than 15% of what would have been present in the area prior to cultivation). All indigenous species noted are common and widespread species typically found in disturbed or partly disturbed areas, and no plant Species of Conservation Concern or special habitats were recorded. As all vegetation currently on site will be lost the intensity of the loss of vegetation on site will be high, and at the site scale, and loss will be permanent. However, because the vegetation on site is of low diversity and low sensitivity the overall significance of the loss of the vegetation on site is Low negative, before and after mitigation. The development area is adjacent to existing development and is therefore well situated in terms of development and conservation planning, as loss of ecological connectivity and habitat fragmentation is thus minimised. The development area does not serve as an important ecological corridor between priority patches of remnant habitat. There is essentially no mitigation that can be undertaken, and given the low significance no specific mitigation is required, other than simply fencing off the development area from the southern area mapped as a CBA prior to and during all construction. The cumulative significance of the loss of the vegetation in the study area is Low negative, as although the area is fairly large the vegetation on site is all secondary (post cultivation) and contributes very little to achievement of national conservation targets for this vegetation type, and no mapped CBAs or plant Species of Conservation Concern will be lost.

FRESHWATER ECOLOGICAL IMPACT ASSESSMENT - PROPOSED SWELLENDAM HOUSING AND BULK SEWER PIPELINE CONSTRUCTION – ECO IMPACT - 23 SEPTEMBER 2018 AND REVISED 11 DECEMBER 2018 FOLLOWING PEER REVIEW

The Koornlands River was identified as a NFEPA wetland area (Natural valley floor

floodplain wetland and an artificial NFEPA wetland) was identified in the western non-perennial stream where the sewer pipeline will cross the river. The Koornlands perennial river and non-perennial river that will be impacted was identified as Ecological Support Areas (ESAs) in the latest Western Cape Biodiversity Spatial Plan (2017). The non-perennial river on the western side of the proposed housing development in which two sewer pipeline crossings, a road and the upgrade of two attenuation dams is planned and proposed starts south of the site on a cemetery and flows in a northern direction.

FRESHWATER RESOURCE VERIFICATION FOR THE PROPOSED SWELLENDAM HOUSING AND BULK SEWER AND WATER PIPELINES, WESTERN CAPE BY SCIENTIFIC AQUATIC SERVICES DATED JANUARY 2019

According to the NFEPA Database no wetland features are located within the study area. However, the sewer pipeline segments are located within a large natural floodplain system, within the western portion of the study area. This floodplain is considered to be in a moderately modified condition (WETCON = C). A channelled valley bottom wetland is also located just outside and just north of the study area. A portion of this wetland is considered to be natural, albeit largely modified (WETCON Z2), however a large extent thereof is considered artificial. A small artificial wetland flat is being traversed by the most southern water pipeline segment. Other wetland flats (also considered to be artificial) are located within the central southern portion of the investigation area. The study area is approximately 33 hectares in extent and is located just south of the N2 highway. No watercourses were identified within the study area, however, a Channelled Valley Bottom Wetland was identified approximately 300m to the west of the study area.This system was identified as a non-perennial river by Hanekom (2018).

The proposed new access road, an extension of Theunissen Street is proposed, and two new attenuation ponds within the identified Channelled Valley Bottom Wetland. Similarly, water pipelines will be upgraded within Sofietjies Street, Ellis Street, September Street and Reisiebaan Street within the existing residential area to the west of the study area, two of these portions cross the identified Channelled Valley Bottom Wetland.

Three segments of the bulk sewer pipeline will be upgraded on Station Street (85m in length), Lombard Street (328m in length) and from Rothman Street in a north eastern direction (300m in length). The segments are located within 100m of or will cross the Kroonlands River.

SWELLENDAM LOW COST HOUSING PROJECT TRANSPORT IMPACT ASSESSMENT - DECA CONSULTING ENGINEERS - MARCH 2018

From the analysis it can be concluded that, although the development will generate a considerable number of trips, the traffic impact thereof will be moderate, with no improvements required at any of the affected intersections except for the 4-way stop Soufietjie Street / Ellis Street intersection where service levels can be improved by removing stop control on the Soufietjie Street legs. It can be concluded from the study that the proposed low-cost housing development in Railton, Swellendam, will have a moderate traffic impact.

It is recommended that the proposed Swellendam low cost housing development be approved, on condition that the following recommendations are considered:

- The Station Street / Industries / SWD Bande intersection should be upgraded as shown in Figure 3 to improve safety;

- The surface of Station Street between the N2 underpass and the railway crossing is in need of repair;
- The four-way stop at the Soufietjie Street / Ellis Street intersection should be changed so that traffic on Soufietjie Street has free flow and only traffic on Ellis Street has to stop;
- Swellendam Municipality should reserve space along the proposed alignments of the three routes that may serve as links between Railton and the external road network (N2 and DR 1321)
    - Route 1: R60 Extension
    - Route 2: Production Street Link
    - Route 3: Eastern link to Divisional Road 1321
- Space should also be reserved for the proposed new internal Railton roads so that these roads can be provided if required in future;
    - The first of these will be the extension of Reisiesbaan Street beyond the cemetery and up to the agricultural plots in the easternmost corner of Remainder Erf 1.
    - A new road is proposed from Reisiesbaan Street along the western boundary of Bontebok Primary School, the public open space on Erf 2101 and Swellendam Secondary School.
    - Another link is proposed as a link between Route 3 and Angelier Street, passing to the south of the cemetery and to the south of Swellendam Secondary School. This road will form the final link of a new route linking DR1321 to Reisiesbaan Street to Route 2, Production Street and the N2; or to Route 1 and the N2.
- Minibus taxi route descriptions should be amended to include a route through the new development, once fully occupied;
- Streets along the school bus routes (probably Theunissen Street, May Street, Soufietjie Street, Aster Avenue, Boslelie Street and Madeliefie Street) may have to be widened to accommodate regular bus traffic;
- Paved sidewalks be provided along Theunissen Street and other roads leading up to the schools.

PHASE 1 GEOTECHNICAL REPORT PROPOSED RONDOMSKRIK SUBSIDY HOUSING PROJECT IN SWELLENDAM, WESTERN CAPE PROVINCE - OUTENIQUA GEOTECHNICAL SERVICES - 13 OCTOBER 2016

The geology of the area consists of conglomerate with minor sandstone and siltstone (shale) from the Enon Formation of the Uitenhage Group which is overlain locally by alluvial terrace gravels of Tertiary age. The average soil profile is dominated by a dark red brown horizon gravelly sand topsoil, underlain by clayey silt, clayey/silty gravel, weathered soft shale or conglomerate. No hard rock is expected on the site. Stormwater systems should take into account the general topography and proximity to natural and man-made watercourses. Groundwater is highly unlikely to have a significant effect on foundations or earthworks, but subsoil drains may be required along roads and behind retaining structures to intercept seasonal seepage.

The design and construction of storm water drainage should be carried out in accordance with SABS 1200LE, COLTO, The Red Book or other applicable standards, or as directed by the engineer. Infiltration into the soil will generally be slow and restricted by fine grained soils of low permeability and a significant portion of rainfall will end up as run-off or standing water. The site has a positive slope gradient and storm water will drain towards the natural

drainage lines. A well-planned road layout can assist with storm water management. Raised barrier kerbs, mountable or semi-mountable kerbs along roads are recommended in order to channel storm water along roads and prevent over-topping into erven. Open lined side drains are also effective in dealing with flash floods. Subsoil drains along roads on the upslope side are recommended. The ponding of storm water around the exterior of houses can be avoided by shaping the ground levels around the exterior to create a fall away from the house and constructing a 1m wide a concrete apron with a 10% fall away from the house. This will also assist in maintaining ground moistures stable and minimising erosion around the house. The finished floor level of all houses should be a minimum of 150mm above final ground level to prevent flooding.

Summary of Need and Desirability

Shelter is a basic need. Housing must provide shelter, but this alone is not enough. It is a key element in structuring the urban environment. Housing affects the form and performance of settlements across scales. Settlement should function as one whole workable system of integrated networks and hierarchical systems of interconnecting nodes.

According to the Housing Act 107 of 1997, municipalities are responsible for housing delivery within their area of jurisdiction.

The overall level of access to formal dwellings is 88.6 per cent in Swellendam. According to the Swellendam Municipality the housing waiting list for Swellendam is 2193 (as at 2018). See Appendix G3. This development will help relieve this backlog significantly.

This area provides the ideal locality in terms of accessibility, proposed services and infrastructure to all for a sustainable development.

Findings of Alternatives Assessed during Draft Environmental Impact Assessment Phase:

Location alternatives –

Three site alternatives were considered for the subsidised housing development:

- Site E (Remaining Extent of Erf 1) total area of ± 20 ha originally surveyed for the proposed development.
- Site H (Remaining Extent of Erf 1) total area of ± 50 ha originally surveyed for the proposed development.
- Site I (Remaining Extent of Erf 157) total area of ± 8ha originally surveyed for the proposed development.

Site E – is a small hill/koppie with steep gradients southeast of the primary school and residential areas of Swellendam South, 20ha were originally assessed for the proposed development.

Negative attributes of the 20ha site in terms of suitability for housing development:

- The site is located on a hill/koppie with steep gradients.
- Approximately 80% of the 20ha site is characterised by indigenous vegetation in a moderate to good condition with high conservation value and high botanical sensitivity which has been classified as CBA2 (Critical Biodiversity Area: Degraded) in the 2017 Western Cape Biodiversity Spatial Plan.
- Outside the urban edge.

Site H – is an undulating area in-between the residential area and the railway line of Swellendam South, 50ha were originally assessed for the proposed development, but following specialist input, only 25.3 ha are proposed to be developed upon.

Positive attributes of the site in terms of suitability for housing development:

- Existing adjacent residential developments, which will also allow immediate access

and connection to services infrastructure.

- Located within the municipal Urban Edge of the Spatial Development Framework/Plan.
- At least ±42ha of the ±50ha area surveyed have been completely transformed presumably by previous cultivation activities that took place on the site. Little to mainly no indigenous vegetation species have returned to this 42ha transformed area and this area therefore has low conservation value and low botanical sensitivity. The proposed 25.3ha development area is located within the transformed area.
- No wetland characteristics are present on the proposed development site.

Site I – is a flat lying area in-between the residential area and the railway adjacent to the national N2 road of Swellendam south, 8ha were originally assessed for the proposed development, but currently no development is proposed on Site I.
Negative attributes of the site in terms of suitability for housing development:

- Narrow site along the N2 with infrastructure restrictions.
- Classified CBA2 and ESA 1. ESA1 - ESAs that are likely to be functional (natural, near-natural or moderately degraded condition).

Activity alternatives-
Alternative land uses, i.e. land uses that are not consistent with the relevant IDP, are not being considered, as this would be contrary to the Municipalities IDP and will not provide for the community needs.

Layout alternatives -
Two layout alternatives have been assessed thus far.

LA1 – *This entails the development of ±27.08ha: Site H and E:*

Land Use	***No. of Erven***
Residential	961
GAP Residential	86
Business	2
Community Facility	4
Mixed Use	3
Open Space	12
Roads, Infrastructure and attenuation dams	

LA 2 *– This entails the development of 25.3ha – PREFFERED. Site H ONLY:*

Land Use	***No. of Erven***
Residential	950
GAP Residential	0
Business	2
Community Facility	4
Mixed Use	3
Open Space	10
Roads, Infrastructure and upgrades to attenuation dams 4 and 5	

Reasons why Layout Alternative 1 is not preferred:

- Does not take specialists recommendations into consideration.
- Site E is located outside the urban edge.
- Site E has very little flat ground.
- The lower north side is partly disturbed (and hence of lower sensitivity), but the

remainder is largely pristine and is of High botanical sensitivity.

- Plant SCC recorded in this area include Phylica velutina (NT), Cyrtanthus leptospihon (CR), Muraltia acerosa (VU), Elegia squamosa (EN) and Aspalathus grobleri (EN).

Reasons why Layout Alternative 2 is preferred:

- Does take specialists recommendations into consideration.
- Largely inside the urban edge.
- No plant SCC were recorded, and none are expected to occur. Botanical sensitivity is Low.

Technology alternatives –
The following energy/resources saving methods must be incorporated into the design of the units where funding allows:
1. All units to be provided with energy saving compact fluorescent lamps (CLF's).
2. All electric geysers should be insulated with geyser blankets.
3. All electric geyser thermostats should be set at the most optimal temperature.
4. All fitted appliances should have an energy rating and the most efficient models must be considered.
5. Energy efficient streetlight technology should be used as far as possible to reduce the energy requirements of the streetlight network.
6. Rain water harvesting from roofs and gutters must be considered to collect and store rainwater runoff. This can be used to provide supplementary water which can be used for washing and watering gardens.
7. Shower installations must be fitted with low-flow shower heads, where the water pressure is suitable.
8. Geysers should be installed vertically to save electricity.
9. Ensure that the maximum flow rate from hand wash basin tops does not exceed 6L per minute.
10. Indoor traps must be fitted with aerators to increase the efficiency by redirecting the flow and amount of water used.
11. Flush toilets must be fitted with dual or multi flush mechanisms to ensure that the amount of water required is controlled by the user.

Operational alternatives – No operational alternatives were considered as the proposed activity is for the construction of residential erven and related infrastructure to be maintained by the owners and municipality after construction completion. Once operational, the only activities that will be undertaken are related to maintenance and upkeep of the development and associated infrastructure.

The No-Go Option- The No-Go option will result in the site remaining as it is presently, vacant municipal land. A look at the Need and Desirability input will both indicate popular local support for both the concept and place as manifested in the IDP and SDF for the Swellendam Municipality.

Potential Environmental Impacts during the Construction Phase:
During the construction phase of the proposed development it is expected that proposed **layout alternative 2, with implementation of associated mitigation measures** as included in the EMP, will have a potential -

- Low negative impact on subsurface geological layers
- Low negative impact due to soil erosion
- Low negative impact due to compaction of soil
- Low negative impact due to increase in storm water runoff/altered flow
- Medium negative impact due to Loss of indigenous vegetation

- Low negative impact of proposed development on surface water resources and hydrological features
- Low negative impact of introduction of alien plant species
- Low negative impact on the naturally occurring fauna and avifauna present in the area
- High positive impact due to temporary job creation
- Low negative impact on traffic
- Low negative impact due to construction noise
- Low negative impact due to dust and emissions from construction activities
- Low negative visual impact
- Low negative impact on archaeological, paleontological and heritage remains

Potential Environmental Impacts during the Operational Phase:
During the operational phase of the proposed development it is expected that proposed **layout alternative 2 with implementation of associated mitigation measures** as proposed and included in the EMP will have a potential -

- Low negative impact due to increase in storm water runoff due to hardening of surfaces which may lead to erosion of surrounding areas
- Low negative impact due to increase in storm water runoff leading to altered flow in lower lying drainage line
- Medium negative impact due to edge effects on indigenous vegetation areas
- Low negative impact of proposed development on surface water resources and hydrological features
- High positive impact due to Increase in housing
- Medium negative impact due to increased traffic due to proposed residential development
- Low negative impact due to noise from the new residential development
- Medium negative impact due to additional load on existing municipal services infrastructure such as electricity, water, sewage and waste handling
- Low negative visual impact

Potential Environmental Impacts during the Decommissioning Phase:
It is not anticipated that decommissioning will occur in the near future. Should decommissioning occur, the expected impacts are similar to those listed in the construction phase above with the additional positive impact of rehabilitating the decommissioned area to a near natural/indigenous state and negative impact of destroying houses and infrastructure. Impacts must be mitigated and managed according to the best practise techniques/management measures available for that time.

No-Development Option:
The No-Development option will result in the site remaining as it is presently, transformed vacant municipal land adjacent to existing residential areas. A look at the Need and Desirability input will both indicate popular local support for both the concept and place as manifested in the IDP and SDF for the Swellendam Municipality.

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GLOSSARY OF TERMS

Alluvial	Resulting from the action of rivers, whereby sedimentary deposits are laid down in river channels, floodplains, lakes, depressions etc.
Activity	An activity identified in Government Notice Numbers R544, 545 and 546 of 2010 and 2014 GN No. R. 983, 984 and 985 as listed activities
Alternatives	In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to property, activity, design or technology.
Applicant	A person who has submitted or intends to submit an application;
Application	An application for an environmental authorization.
Associated Infrastructure	Any building or infrastructure that is necessary for the functioning of a facility or activity or that is used for an ancillary service or use from the facility.
Biodiversity	The variety of life occurring in an area, including the number of different species, the genetic wealth within each species, and the natural habitat where they are found.
Borehole	Includes a well, excavation or any artificially constructed or improved underground cavity that can be used for the purpose of: • intercepting, collecting or storing water in or removing water from an aquifer; • observing and collecting data and information on water in an aquifer; or • recharging an aquifer.
Cultural significance	Something that holds aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.
Cumulative impact	In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Environment	The environment has been defined as “The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group”. These circumstances include biophysical, social, economic, historical, cultural and political aspects.
Environmental Assessment Practitioner	Person or company, independent of the applicant (developer) that manages the environmental assessment process of a proposed project on behalf of the applicant.
Environmental Impact Assessment	In relation to an application to which scoping must be applied, means the process of collecting, organizing, analysing, interpreting and communicating information that is relevant to the consideration of that application.
Environmental Impact Report	In-depth assessment of impacts associated with a proposed development. This forms the second phase of an Environmental Impact Assessment and follows on from the Scoping Report.
Environmental management programme	An environmental management plan in relation to identified or specified activities envisaged in Chapter 5 of the National Environmental Management Act and described in regulation 34.
Heritage resources	Any place or object of cultural significance. It also includes archaeological resources.
Hydromorphic / hydric soil	Soil that in its un-drained condition is saturated or flooded long enough during the growing season to develop anaerobic conditions favouring growth and regeneration of hydrophytic vegetation. Such soils are found in and associated with wetlands.

Interested and Affected Party	An interested and affected party contemplated in section 24(4) (d) of the Act, and which in terms of that section includes – (a) Any person, group of persons or organization interested in or affected by an activity; and (b) Any organ of state that may have jurisdiction over any aspect of the activity;
Public Participation Process	A process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters; *"Registered Interested and Affected Party", in relation to an application, means an interested and affected party whose name is recorded in the register opened for that application in terms of regulation 57.*
Red Data species	All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.
Riparian	The area of land adjacent to a stream or river that is influenced by stream induced or related processes.
Scoping Report	An "issues-based" report that forms the first phase of an Environmental Impact Assessment process.
Study corridor	The corridors identified after initial investigation of technical and environmental attributes of the total study area that will then be assessed in more detail to identify a route corridor.
Significant impact	An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment;

ABBREVIATIONS

BID	Background Information Document
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
FSR	Final Scoping Report
GDP	Gross Domestic Product
GIS	Geographic Information System
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
LUPO	Land Use Planning Ordinance (Ordinance 15 of 1985)
MAR	Mean annual rainfall
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)
NEM:WA	National Environmental Management: Waste Act
NEM:AQA	National Environmental Management: Air Quality Act
NHRA	National Heritage Resources Act
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SDF	Spatial development Framework
SG	Surveyor General
ToR	Terms of Reference

SECTION 1: INTRODUCTION

This report has been prepared in compliance with the requirements of the following legislation:

- The National Environmental Management Act, 1998 (Act No. 107 of 1998) ["NEMA"];
- The Environmental Impact Assessment ("EIA") Regulations contained in Government Notice (GN) No. R983, 984 and 985 of 2014 as promulgated in terms of the NEMA ["EIA Regulations"] as amended up to and including GN 327, 325 and 324 in GG 40772 of 07 April 2017.

The purpose of these Regulations is to regulate procedures and set criteria as contemplated in Chapter 5 of the Act to enable the submission, processing, consideration and decision-making regarding applications for environmental authorization of activities and matters pertaining thereto.

1.1 SCOPE AND CONTENTS OF THE ENVIRONMENTAL IMPACT REPORT

Table 1: EIA Scope of Assessment and Content (as required by Appendix 3 of the EIA Regulations, 2014)

Requirement	Section in Report
(a) details of – (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	1.2 Appendix H:EAP CV
(b) the location of the activity, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	1.3
(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is – (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Appendix A: Locality Maps Appendix B: Site Plans
(d) a description of the scope of the proposed activity, including – (i) all listed and specified activities triggered and being applied for; and (ii) a description of the associated structures and infrastructure related to the development;	1.3
(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	1.4
(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;	2
(g) a motivation for the preferred development footprint within the approved site;	3
(h) a full description of the process followed to reach the	3

Requirement	Section in Report
proposed development footprint within the approved site, including: (i) details of the development footprint alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and (x) a concluding statement indicating the preferred alternative development location within the approved site;	4 & Appendix D: Public Participation Process 5 6
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including - (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	6
(j) an assessment of each identified potentially significant impact and risk, including – (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	6
(k) where applicable, a summary of the findings and	7

Requirement	Section in Report
recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	
(l) an environmental impact statement which contains – (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	3 8 Appendix A: Locality Maps Appendix B: Site Plans
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	7
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	3 8
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	9
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	9
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	9
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	9
(s) an undertaking under oath or affirmation by the EAP in relation to: (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	11
(t) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	9
(u) an indication of any deviation from the approved scoping report, including the plan of study, including – (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	9
(v) any specific information that may be required by the	4

Requirement	Section in Report
competent authority; and	
(w) any other matters required in terms of section 24(4)(a) and (b) of the Act.	4

1.2 ENVIRONMENTAL ASSESSMENT PRACTITIONER WHO COMPILED THIS REPORT

The role of the EAP is to manage the application for an EA on behalf of the applicant. The EAP must adhere to all relevant legislation and guidelines, ensuring that the reports contain all the necessary and relevant information required by the competent authority to make a decision. It is the responsibility of the EAP to perform all work relating to the application in an objective, appropriate and responsible manner.

Eco Impact is appointed by the Swellendam Municipality as the independent environmental assessment practitioner (EAP) for this project as required in terms of the regulations. Eco Impact is an environmental consultancy established in 2008.

This report has been prepared by Jessica Hansen.

Jessica has a BSc (Honours) in Environmental and Geographical Science in 2011 from the University of Cape Town and subsequently obtained her MSc in Zoology in 2013.

Jessica has trained as an Environmental Assessment Practitioner since 2013 and has been involved in the compilation, coordination and management of Basic Assessment Reports, Environmental Impact Assessments, Environmental Management Programmes, Waste Licence Applications, Water Use Licence Applications and Baseline Biodiversity Surveys for numerous clients.

Refer to Appendix H for a copy of the EAP's CV.

1.3 PROPOSED ACTIVITY DESCRIPTION AND APPLICABLE ACTIVITIES AS APPLIED FOR

An application for Environmental Authorisation was submitted to the competent authorities in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), the Environmental Impact Assessment Regulations 2014 (as amended).

The proposed development site consists of vacant land adjacent to existing Swellendam East residential areas and is approximately 25.3ha in total.

Site H: Remaining Extent of Erf 1
119.7918ha
C07300080000000100000
Latitude (S) 34° 02‘ 00.14“
Longitude (E) 20° 27‘ 11.70“

Dam 5: Remaining Extent of Erf 1
119.7918ha
C07300080000000100000
Latitude (S) 34° 1'41.42"
Longitude (E) 20°26'45.03"

Dam 4: Erf 1698 and Remaining Extent of Erf 157
RE/157 is 13.65233ha
RE/157 SG Code: C07300080000015700000
Erf 1698 is 2.04566ha
Erf 1698 SG Code: C07300080000169800000
Latitude (S) 34° 1'45.43"
Longitude (E) 20°26'49.18"

The Swellendam Municipality proposes to establish a mixed-use housing development on the Remaining Extent of Erf 1 at Swellendam.
The Swellendam Municipality proposes a subsidised housing project on a Remainder of Erf 1 at Swellendam, comprising of 950 residential erven. As well as 4 erven for community facilities, 2 erven for business, 3 for mixed use and 10 erven for public open space. Associated internal roads and associated services infrastructure.
Upgrades to attenuation dams 4 and 5 as the proposed development's runoff will have a direct influence on the capacity. These attenuation dams are situated in a degraded non-perennial drainage line which runs to the west of the proposed site.
Dam 5 –

- Clear and grub of wall embankments.
- Clear and grub for basin extensions (10,000m²)
- Cut to spoil for basin enlargements (7,100m³)
- Cut to fill wall embankment from selected excavated/imported material (1,000m³)
- Cut to fill berm from selected excavated/imported material (144m³)
- Construction of gabion lined spillway
- Concrete outlet structure (25m³)

Dam 4 –

- Upgrading of the outlet works

Bulk water distribution will need to be upgraded. The following is currently proposed:

- SSW4.1: 94 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.6: 282 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.10: 77 m x 160 mm Ø inter-connection pipe
- SSW4.11: 352 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.17: 300 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.18: 263 m x 110 mm Ø new supply pipe & connections
- SSW5.2: 140 m x 160 mm Ø new supply pipe & connections
- SSW5.3: 107 m x 110 mm Ø new supply pipe & connections
- SSW4.7a: New 110 mm Ø zone valve
- SSW4.7b: New 75 mm Ø zone valve
- SSW5.1: New 15 ℓ/s @ 20 m booster pump station

Sewer reticulation will need to be upgraded to accommodate the proposed development. The following is currently proposed:

- SSS1.2: 250 mm Ø New flow diversion
- SSS1.3: 84 m x 250 mm Ø New outfall sewer
- SSS1.6: 315 mm Ø New flow diversion
- SSS1.7: 100 m x 315 mm Ø New outfall sewer
- SSS1.8: 229 m x 315 mm Ø Re-align existing bulk sewer
- SSS1.9: 304 m x 315 mm Ø Re-align existing bulk sewer

See detail in maps in Appendix B.

The proposed development site is an unused vacant area of ± 25.3ha which is located south east of the town Swellendam's southern residential area. It consists of an undulating area in-between the residential area and the railway line of Swellendam South.

According to the 2017 Western Cape Biodiversity Spatial Plan Site H been classified as a terrestrial Ecological Support Area (ESA1). The site has been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown). As according to Mucina and Rutherford (2006) the type of natural vegetation originally occurring on site is Swellendam Silcrete Fynbos (Endangered). Little to mainly no indigenous vegetation species have returned to this transformed area and this area therefore has low conservation value and low botanical sensitivity. No significant fauna or avifauna breeding, roosting or their associated habitat will be impacted upon. Site H is now dominated by a mix of agricultural grasses and herbs, and some pioneer indigenous species. Species include *Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Hyparrhenia hirta, Elytropappus rhinocerotis, Ursinia discolor, Anthospermum spathulatum, Gnidia laxa, Protea repens, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia, Melinis repens, Corycium orobanchoides and Tritonia disticha*. No plant Species of Conservation Concern were recorded, and none are expected to occur. Botanical sensitivity is Low.
According to the NFEPA Database no wetland features are located within the study area and no seasonally wet soils or watercourse characteristics were observed or recorded on the surveyed site itself (housing).

However, a Channelled Valley Bottom Wetland was identified approximately 300m to the west of the study area. The proposed new access road, an extension of Theunissen Street is proposed, and two new attenuation ponds are within the identified Channelled Valley Bottom Wetland. Similarly, water pipelines will be upgraded within Sofietjies Street, Ellis Street, September Street and Reisiebaan Street within the existing residential area to the west of the study area, two of these portions cross the identified Channelled Valley Bottom Wetland.

The Koornlands River was identified as a NFEPA wetland area (Natural valley floor floodplain wetland). The sewer pipeline segments are located within this large natural floodplain system, within the western portion of the study area. This floodplain is considered to be in a moderately modified condition.

A channelled valley bottom wetland is also located just outside and just north of the study area. A portion of this wetland is considered to be natural, albeit largely modified, however a large extent thereof is considered artificial.

A small artificial wetland flat is being traversed by the most southern water pipeline segment. Other wetland flats (also considered to be artificial) are located within the central southern portion of the larger investigation area.

Table 2: Listed Activities associated with the proposed development:

Government Notice 327 Activity No(s):	Describe the relevant **Basic Assessment Activity(ies)** in writing as per **Listing Notice 1** (GN No. R. 983 as amended by GN 327) 4 Dec 2014 (as amended on 7 April 2017)	Describe the portion of the development as per the project description that relates to the applicable listed activity
9	**The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water-** (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or (b) where such development will occur within an urban area.	Infrastructure for the associated housing development.
10	**The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage,** effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve; or (b) where such development will occur within an urban area.	Bulk transportation of sewage infrastructure for the associated housing development.
12	**The development of-** (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size; (iv) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; (vi) bulk storm water outlet structures exceeding 100 square metres in size; (vii) marinas exceeding 100 square metres in size; (viii) jetties exceeding 100 square metres in size; (ix) slipways exceeding 100 square metres in size; (**x) buildings exceeding 100 square metres in size;** (xi) boardwalks exceeding 100 square metres in size; or	Road crossing watercourse at Theunissen Street.

	(**xii) infrastructure or structures with a physical footprint of 100 square metres or more;** where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, **within 32 metres of a watercourse, measured from the edge of a watercourse; -** excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; or (ee) where such development occurs within existing roads or road reserves.	
19	**The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from-** **(i) a watercourse;** (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater but excluding where such infilling, depositing, dredging, excavation, removal or moving- (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.	Road crossing at Theunissen Street. Upgrading of dams 4 and 5.
24	**The development of-** (i) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or **(ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;** but excluding- (a) roads which are identified and included in activity 27 in Listing Notice 2 of 2014; or (b) roads where the entire road falls within an	Development of internal roads associated with the proposed development.

	urban area.	
Government Notice 324 Activity No(s):	Describe the relevant **Basic Assessment Activity(ies)** in writing as per **Listing Notice 3** (GN No. R. 985 as amended by GN 324) 4 Dec 2014 (as amended on 7 April 2017)	Describe the portion of the development as per the project description that relates to the applicable listed activity
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. (f) In Western Cape: i. Areas outside urban areas; (aa) Areas containing indigenous vegetation;	Construction of a road outside an urban area containing indigenous vegetation.
18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. (f) In Western Cape: All areas outside urban areas: (aa) Areas containing indigenous vegetation;	The lengthening of a road.
Government Notice 325 Activity No(s):	Describe the relevant **Scoping and EIA Activity(ies)** in writing as per **Listing Notice 2** (GN No. R. 984 as amended by Gn325) 4 Dec 2014 (as amended on 7 April 2017)	Describe the portion of the development as per the project description that relates to the applicable listed activity
15	**The clearance of an area of 20 hectares or more of indigenous vegetation,** except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Clearance of the ±25.3ha proposed development site.

1.4 LEGISLATIVE ASPECTS

Allocation of applicable environmental legislation as at October 2018 are listed in Table 3 and the most relevant of these is discussed below

Table 3: Applicable Legislation and/or Policies etc.

LEGISLATION, POLICIES, PLANS, GUIDELINES, SPATIAL TOOLS, MUNICIPAL DEVELOPMENT PLANNING FRAMEWORKS, BY-LAWS, INSTRUMENTS ETC.	**ADMINISTERING AUTHORITY**	**CONSIDERATION DURING EIA PROECSS Permit/license/authorisation/comment / relevant consideration** (*e.g.* rezoning or consent use, building plan approval, Water Use License and/or General Authorisation, License in terms of the SAHRA and CARA, coastal discharge permit, *etc.*)	**RELVANCY AND PROGRESS** (if applicable)
Western Cape Land Use Planning Act, 2014 ("LUPA")	Swellendam Municipality	Rezoning Application	In progress (not part of EIA scope)
National Water Act, 1998 (Act No. 36 of 1998) [NWA] and relevant regulations	Department of Water And Sanitation	Water Use Authorisation required due to development proposed within 100m of a water course.	In progress – Phase 1 of the application has been submitted on e-wuulas.

Water Services Act, 108 Of 1997 And Relevant Regulations	Department of Water And Sanitation and Local Authority	Impact/s on local water services assessed and mitigated in EMPr requirements as/if required	Draft EIA Report
National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA] and relevant regulations	Western Cape Department of Environmental Affairs and Development Planning	Environmental Authorisation Application	In progress – draft EIA report phase
National Heritage Resources Act 25 of 1999 [NHRA]	Heritage Western Cape South African Heritage Resource Agency	Notice of Intent to Develop submitted to relevant authority	Final Comment Received
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [NEMWA] and relevant regulations	Western Cape Department of Environmental Affairs and Development Planning	Relevant waste management impacts assessed and mitigated in EMPr requirements as/if required Comments requested and obtained from relevant authority/ies concerning expected biodiversity impacts	Comments to be addressed during EIA phase
National Environmental Management: Biodiversity Act 10 of 2004 [NEMBA]	Western Cape Department of Environmental Affairs and Development Planning and Cape Nature	Relevant biodiversity impacts assessed and mitigated in EMPr requirements as/if required Comments requested and obtained from relevant authority/ies concerning expected biodiversity impacts	Comments to be addressed during EIA phase.
National Environmental Management: Air Quality Act, 39 Of 2004 [NEMAQA] and Relevant Regulations	Western Cape Department of Environmental Affairs and Development Planning	Relevant air quality impacts assessed and mitigated in EMPr requirements as/if required	NA
Atmospheric Pollution Prevention Act, 45 Of 1965 and Regulations	Western Cape Department of Environmental Affairs and Development Planning	Relevant atmospheric pollution impacts assessed and mitigated in EMPr requirements as/if required	NA
Conservation of Agricultural Resources Act, 43 Of 1983 [CARA]	Department of Agriculture	Comments requested.	Comments to be addressed during EIA phase.
Constitution of the Republic of South Africa, 1996	-	General application to individual rights of all on and adjacent to the sites.	Public Participation Process conducted
Fencing Act, 31 of 1963	-	Relevant requirements incorporated into EMPr requirements as/if required.	-

National Building Regulations and Building Standards Act 103 of 1977 [NBRBSA] and relevant regulations	-	Relevant requirements incorporated into EMPr requirements as/if required.	-
National Veld and Forest Fire Act 101 of 1998 [NVFFA]	-	Relevant requirements incorporated into EMPr requirements as/if required.	-
Fertilizers, Farm Feeds, Agricultural Remedies And Stock Remedies Act, 36 Of 1947 [FFFARSRA] and Relevant Regulations	Department of Agriculture	Relevant requirements incorporated into EMPr requirements as/if required.	-
Guideline on Public Participation	Western Cape Department of Environmental Affairs and Development Planning	Public participation process conducted as according to guidelines and requirements	Draft EIA Report to be submitted for 30-day commenting period.
Guidelines on Alternatives	Western Cape Department of Environmental Affairs and Development Planning	Potential alternatives assessed according to guidelines and requirements	Draft EIA Report
Guideline on Need and desirability	Western Cape Department of Environmental Affairs and Development Planning	Need & desirability assessed and motivated according to guidelines and requirements	Draft EIA Report
Guideline for Environmental Management Plans (EMP's)	Western Cape Department of Environmental Affairs and Development Planning	EMPr compiled according to guidelines and requirements	Draft EMPr attached to Draft EIA Report
Guideline on Specialist Reports	Western Cape Department of Environmental Affairs and Development Planning	Specialist reports and assessments compiled and conducted as according to guidelines and requirements	Specialist reports attached to Draft EIA Report
Overberg District Municipality Air Quality Management By-Law	Overberg District Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report
Overberg District Municipality By-Law Relating to Community Fire Safety	Overberg District Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report

Overberg District Municipality Municipal Health By-Law	Overberg District Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report
Swellendam Local Municipality Air Pollution Control By-Law	Swellendam Local Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report
Swellendam Local Municipality By-Law for The Prevention and Suppression of Nuisances	Swellendam Local Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report
Swellendam Local Municipality Electricity Supply By-Law	Swellendam Local Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report
Swellendam Local Municipality By-Law Relating To Water Supply, Sanitation Services And Industrial Effluent	Swellendam Local Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report
Swellendam Local Municipality By-Law Relating To The Prevention Of Public Nuisances	Swellendam Local Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report
Swellendam Local Municipality Storm Water Management By-Laws	Swellendam Local Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report
Swellendam Local Municipality Refuse Removal, Refuse Dumps and Solid Waste Disposal By-Laws	Swellendam Local Municipality	Potential related impacts assessed and relevant requirements incorporated into EMPr requirements as/if required.	Draft EIA Report

1.5 APPROACH TO THE PROJECT

As outlined in the Scoping Report, there are three distinct phases in the EIA process, as required in terms of the NEMA, namely the Initial Application, the Scoping Report and the EIA phases. The Initial Application phase entailed the submission of the Application Form, whilst the Scoping Report phase entailed the compilation and submission of the Scoping Report and Plan of Study for EIA. This report covers the EIA phase.

The EIR describes and assesses the range of feasible alternatives identified during the Scoping phase. The EIR also provides an assessment of all possible direct and cumulative environmental impacts. The Draft EMP, which provides management and mitigation measures for all the identified impacts accompany the EIA. The ultimate purpose of the EIR is to provide a basis for informed decision-making, firstly by the applicant with respect to the alternatives they wish to pursue, and secondly by the environmental authority regarding the environmental acceptability of the applicant's preferred option.

The approach to the EIA phase entailed the following:

- Undertaking a further review of relevant literature;
- Appointing various specialists to undertake the specialist studies as identified during the Scoping phase.
- Additional public consultation: This forms an integral component of this investigation and enables Interested and Affected Parties (I&APs) to comment on the potential environmental impacts associated with the feasible alternatives.

This Draft EIA Report will be submitted to the registered I&APs and key department to identify additional issues, which they may feel have not been adequately addressed during the Scoping Report. Once the EIA Report has been finalised and all I&AP comments have been incorporated into the report, the final EIA Report will be submitted to DEA&DP for their review and decision making.

Plan of study as was identified during the Scoping phase for the EIA phase:

- **Alternatives will be further investigated**, in a re-iterative manner, so as to avoid or minimize negative impacts and maximize potential benefits; The entire project team, including the specialist consultants, will be involved in the evaluation of alternatives;

- **Detailed Impact Assessment**:

Statements regarding the potential significance of residual impacts, taking into account proposed mitigation measures will be provided in the EIA;

- **Services Confirmation:**

The municipality must provide a written services confirmation letter, confirming the availability of the required services as per the Engineering Services Report. The availability of services must be confirmed.

- **Engineer Inputs**:
    - A site-specific Stormwater Management Plan must be provided by the engineers.

- **An Environmental Management Programme (EMP)** covering construction, operational and decommissioning phases of the proposed development will be prepared after input from specialists, incorporating recommendations for mitigation, monitoring and evaluation are received. Specific issues to be addressed in the EMPr as per recommendations of key departments/organ of state and I&APs include:
    - Site specific stormwater management plan;
    - Detailed construction management requirements;
    - Detailed operational management requirements i.e. stormwater, erosion, alien vegetation, litter control and access to the development and open space areas;
    - Waste management (and associated pollution prevention/mitigation);
    - Heritage resources management.

- **Specialist Assessments**:
    - Traffic Impact Assessment
    - Botanical Impact Assessment
    - Freshwater Impact Assessment and Water Use Risk Assessment Matrix
    - Geotechnical Report

- **Water Use Authorisation Application**:

Following the comments received on the scoping report, a Water Use Risk Assessment Matrix (as informed by the Freshwater Impact Assessment) has been completed and is to be submitted to the DWS for perusal as part of the Water Use Licence Application.

SECTION 2: NEED AND DESIRABILITY

2.1 RATIONALE FOR THE DEVELOPMENT

Shelter is a basic need. Housing must provide shelter, but this alone is not enough. It is a key element in structuring the urban environment. Housing affects the form and performance of settlements across scales. Settlement should function as one whole workable system of integrated networks and hierarchical systems of interconnecting nodes.

According to the Housing Act 107 of 1997, municipalities are responsible for housing delivery within their area of jurisdiction.

The overall level of access to formal dwellings is 88.6 per cent in Swellendam. According to the Swellendam Municipality the housing waiting list for Swellendam is 2193 (as at 2018). See Appendix G3. This development will help relieve this backlog significantly.

This area provides the ideal locality in terms of accessibility, proposed services and infrastructure to all for a sustainable development.

This application complies with the goals of the Local and Provincial Planning Policy with regards to housing provision as follow:

- It offers an integrated housing solution with a strong emphasis on focusing on the needs of the local community with regards to ownership and the development of a secure and socially cohesive neighbourhood in both form and desirability.
- The implementation of this development will effectively integrate with the existing residential areas to ensure the sustainability of the proposal and contribute to the viability of the town.
- The development supports and complies with the Western Cape Provincial Spatial Development Framework, Swellendam Spatial Development Framework, and the Swellendam Integrated Development Plan.
- The development also supports and comply with the criteria for the assessment of an application as per the Land use Planning Act, 2014 (Act 3 of 2014) and the Spatial Planning Land Use Management Act, 2013 (Act 16 of 2013).
- The development is accessible and there will be no major negative effects on the surrounding built environment, natural environment or economic environment.
- The development improves access to services, facilities, housing and opportunity to create a sustainable human settlement.
- The development supports a good enrolment that is liveable, legible, diverse, varied and unique.

1. Is the activity permitted in terms of the property's existing land use rights?	■	NO	Please explain
Rezoning is required from Undetermined to Residential.			
2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	YES	■	Please explain
The proposed development site is earmarked for residential development.			
(b) Urban edge / Edge of Built environment for the area	■	NO	Please explain
As can be seen in the SDF, portions of the proposed development area fall outside of the urban edge as delineated in the Municipality's Spatial Development Framework.			
(c) Integrated Development Plan and Spatial Development Framework of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	YES	■	Please explain
The proposed development site is earmarked for residential development within the municipal SDF.			
(d) Approved Structure Plan of the Municipality	YES	■	Please explain
The proposed development site is earmarked for residential development within the of the municipal SDF.			
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	■	■	Please explain
No EMF adopted for area.			
(f) Any other Plans (e.g. Guide Plan)	■	NO	Please explain
NA			
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	YES	■	Please explain
The proposed development site is earmarked for residential development within the municipal SDF.			
4. Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?	YES	■	Please explain
Yes, a need exists for housing as proposed.			
5. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES	■	Please explain
Yes, a need exists for housing as proposed.			
6. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development	YES	■	Please explain
Yes, see Appendix G for services confirmation as provided by the local municipality.			
7. Is this development provided for in the	YES	■	Please explain

infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?			
See services report under Appendix G.			
8. Is this project part of a national programme to address an issue of national concern or importance?	YES	■	Please explain
Housing projects is of National importance.			
9. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	YES	■	Please explain
The most feasible and reasonable developable areas were identified and assessed and the most preferred alternative was identified and motivated.			
10. How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	Please explain		
Sensitive areas were identified and excluded from the developable areas. These areas are incorporated into the site development plan and infrastructure avoid these areas.			
11. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc)?	Please explain		
The proposed development will improve people's health and wellbeing by providing much needed housing, and by creating job opportunities during construction. The noise levels during construction will not exceed the legal limits, no odours will occur and the development is designed in such a way as to blend in with surrounding developments.			
12. Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	■	NO	Please explain
Government housing subsidy project within the required government funding policies and regulations.			
13. What will the cumulative impacts (positive and negative) of the proposed land use associated with the activity applied for, be?	Please explain		
Cumulative impacts relate to demand on natural and social resources such as indigenous vegetation areas, water, waste generation and electricity usage. Potential impacts on the biodiversity and socio-economic environments will be mitigated by implementing the Environmental Management Programme. Refer to Section 6 of this report for the detailed impact assessment.			
14. Is the development the best practicable environmental option for this land/site?	YES	■	Please explain
Sensitive areas were identified and excluded from the developable areas. These areas are incorporated into the site layout and the proposed development avoid these areas.			
15. What will the benefits be to society in general and to the local communities?			Please explain
Create development opportunities. Provide housing.			
16. Any other need and desirability considerations related to the proposed activity?			Please explain
N/A			

SECTION 3: ALTERNATIVES ASSESSED AND OUTCOMES RELATING TO THE PREFFERED ALTERNATIVE/S

*"**alternatives**", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to –*

(a) the property on which or location where it is proposed to undertake the activity (alternative properties as well as alternative sites on the same property)*;*
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity (consideration of such alternatives is to include the option of achieving the same goal by using a different method or process)*; and*
(e) the operational aspects of the activity;

The no-go option, i.e. the option of not implementing the activity has to be considered as well.

3.1 ALTERNATIVE DETERMINATION METHODOLOGY

Alternatives are described in terms of the various types of alternatives ("alternative types") as listed above, as well as the proposed and alternative project activity(ies) ("project alternatives") which includes a combination of all the separate factors. Both the identification, investigation, and assessment of alternatives, and the generation and consideration of modifications and changes to activities must be well documented. A reasoned explanation as to why an alternative was or was not found to be reasonable and feasible has been provided for each alternative type. The following criteria were used during the consideration of alternatives.

Table 4: Criteria used for assessing alternatives

Criteria	Description / methodology
Identification of alternatives	Alternatives have been identified as early as possible in the process (planning and design phase). Alternatives will further be considered and assessed throughout the project life as amendments to the alternatives are made. Assessment of the alternatives will only cease once final alternatives have been decided upon. These will be the final alternatives for which Environmental Authorisation will be applied for. The identification of alternatives should be broad, objectively done and well documented
Comparative assessment	The project alternatives will be determined according to the alternative types identified as feasible and reasonable and assessed comparatively.
Reasonability and feasibility	All alternatives were considered in terms of reasonability and feasibility. As determined throughout the process, not all alternatives will be reasonable or feasible. These will in subsequent reports be mentioned as being considered but will not be described in detail.
Sustainability considerations and effectiveness of alternatives	The alternatives identified have taken into account the triple bottom-line of sustainability i.e. meeting the socio-economic and ecological needs of the public. The alternatives aim to maximise the benefits and avoid or minimise the negative impacts. The primary objective has been to avoid all negative impacts (where possible), rather than to minimise them. The alternatives further took into consideration the need to maximise resource use efficiency.

Criteria	Description / methodology
Discrete vs. incremental alternatives	Initial alternatives identified, also known as discrete alternatives were identified during the early stages of a project (pre-feasibility and feasibility) and comparatively assessed during the assessment phases. During subsequent consideration, as the project progressed, incremental modifications and changes to activities have occurred. These incremental changes have been considered during the amendment to the project activities during project progression. Impacts and issues of these changes have also been considered, as and when they are identified
Advantages and disadvantages	For each alternative, the related advantages and disadvantages have been considered for each alternative type. These have not been discussed in terms of the project alternatives.
Impacts and aspects	Impacts and aspects related to the implementation of each alternative are listed with the alternative type descriptions. Detailed impacts are described in Section 7 for each project alternative. The aim is to address the key impacts of the proposed alternative by maximising benefits and avoiding or minimising the negative impacts. The primary objective must be to avoid all negative impacts, rather than to minimise them.
Other considerations	The "feasibility" and "reasonability" of and the need for alternatives was determined by considering, amongst others: (a) the general purpose and requirements of the activity; (b) need and desirability; (c) opportunity costs; (d) the need to avoid negative impact altogether; (e) the need to minimise unavoidable negative impacts; (f) the need to maximise benefits;, and (g) the need for equitable distributional consequences. Also refer to Section 5 for a detailed description of the need and desirability of the project.
I&APs	I&APs have to be notified of both the preferred and alternative activities. They should also be allowed to comment on both.
No-go option	The option of not implementing the activity has been assessed to the same level of detail as the other feasible and reasonable alternatives.

3.2 ROLE OF THE VARIOUS PARTIES IN THE CONSIDERATION OF ALTERNATIVES

The role of the Applicant according to the Regulations, *inter alia*, is to:

- Consider the strategic planning and environmental context within which the development and alternatives are to be considered;
- Consider all feasible and reasonable alternatives (not only the preferred option); and
- Provide the EAP with access to all information at the disposal of the applicant regarding the application.

The role of the EAP according to the Regulations, *inter alia*, is to:

- Consider the strategic planning and environmental context within which the development and alternatives are to be considered;
- Identify, investigate and assess alternatives;
- Afford opportunities for interested and affected parties to provide input into the identification, investigation and assessment of alternatives;
- Disclose all information relevant to the consideration of alternatives to the applicant and competent authority;
- Document the process of identification, investigation and assessment of alternatives (including providing the methodology and criteria used, and how the level of investigation applied to each alternative was established); and
- Provide a comprehensive consideration of the impacts of each of the alternatives assessed.

The role of I&APs in terms of the Regulations, inter alia, is to:

- Declare their interests;
- Assist in the identification, investigation and assessment of alternatives, particularly where local knowledge is required;
- Within the specified timeframes, provide comment on the consideration of alternatives.

The alternatives considered for this project are described below.

3.3 PROPERTY/LOCATION ALTERNATIVES

Three site alternatives were considered for the subsidised housing development:

- Site E (Remaining Extent of Erf 1) total area of ± 20 ha originally surveyed for the proposed development.
- Site H (Remaining Extent of Erf 1) total area of ± 50 ha originally surveyed for the proposed development.
- Site I (Remaining Extent of Erf 157) total area of ± 8ha originally surveyed for the proposed development.

Refer to Map 1 below which indicates the location and extent of the location alternatives considered.

Site E – is a small hill/koppie with steep gradients southeast of the primary school and residential areas of Swellendam South, 20ha were originally assessed for the proposed development.

Negative attributes of the 20ha site in terms of suitability for housing development:

- The site is located on a hill/koppie with steep gradients.
- Approximately 80% of the 20ha site is characterised by indigenous vegetation in a moderate to good condition with high conservation value and high botanical sensitivity which has been classified as CBA2 (Critical Biodiversity Area: Degraded) in the 2017 Western Cape Biodiversity Spatial Plan.
- Outside the urban edge.

Positive attributes of the site in terms of suitability for housing development:

- Existing adjacent residential developments, which will also allow immediate access and connection to services infrastructure.
- A small area has been transformed and encroached by alien tree vegetation.

Site H – is an undulating area in-between the residential area and the railway line of Swellendam South, 50ha were originally assessed for the proposed development, but following specialist input, only 25.3 ha are proposed to be developed upon.

Negative attributes of the site in terms of suitability for housing development:

- ± 8ha of the 50ha site contains indigenous vegetation in a moderate to good condition with a medium conservation value and medium botanical sensitivity.

Positive attributes of the site in terms of suitability for housing development:

- Existing adjacent residential developments, which will also allow immediate access and connection to services infrastructure.
- Located within the municipal Urban Edge of the Spatial Development Framework/Plan.
- At least ±42ha of the ±50ha area surveyed have been completely transformed presumably by previous cultivation activities that took place on the site. Little to mainly no indigenous vegetation species have returned to this 42ha transformed area and this area therefore has low conservation value and low botanical sensitivity. The proposed 25.3ha development area is located within the transformed area.

- No wetland characteristics are present on the proposed development site.

Site I – is a flat lying area in-between the residential area and the railway adjacent to the national N2 road of Swellendam south, 8ha were originally assessed for the proposed development, but currently no development is proposed on Site I.

Negative attributes of the site in terms of suitability for housing development:

- Narrow site along the N2 with infrastructure restrictions.
- Classified CBA2 and ESA 1. ESA1 - ESAs that are likely to be functional (natural, near-natural or moderately degraded condition).

Positive attributes of the site in terms of suitability for housing development:

- Existing adjacent residential developments, which will also allow immediate access and connection to services infrastructure.
- Located within the municipal Urban Edge of the Spatial Development Framework/Plan.
- The ± 8ha area surveyed has been completely transformed presumably by previous land clearing which took place for cultivation and urban developments and is covered by grass and weed species usually associated with transformed cultivated or cleared land.

For further details, maps & photos of Site E and I see the EBS and Botanical Assessment in Appendix E.

3.4 ACTIVITY ALTERNATIVES

Alternative land uses, i.e. land uses that are not consistent with the relevant IDP, are not being considered, as this would be contrary to the Municipalities IDP and will not provide for the community needs.

3.5 DESIGN/LAYOUT ALTERNATIVES

Two layout alternatives have been assessed thus far.

LA1 – This entails the development of ±27.08ha: Site H and E:

Land Use	**No. of Erven**
Residential	961
GAP Residential	86
Business	2
Community Facility	4
Mixed Use	3
Open Space	12
Roads, Infrastructure and attenuation dams	

LA 2 – This entails the development of 25.3ha – PREFFERED. Site H ONLY:

Land Use	**No. of Erven**
Residential	950
GAP Residential	0
Business	2
Community Facility	4
Mixed Use	3
Open Space	10
Roads, Infrastructure and upgrades to attenuation dams 4 and 5	

Reasons why Layout Alternative 1 is not preferred:

- Does not take specialists recommendations into consideration.
- Site E is located outside the urban edge.
- *Site E has very little flat ground.*
- *The lower north side is partly disturbed (and hence of lower sensitivity), but the remainder is largely pristine and is of High botanical sensitivity.*
- *Plant SCC recorded in this area include Phylica velutina (NT), Cyrtanthus leptospihon (CR), Muraltia acerosa (VU), Elegia squamosa (EN) and Aspalathus grobleri (EN).*

Reasons why Layout Alternative 2 is preferred:

- Does take specialists recommendations into consideration.
- Largely inside the urban edge.
- No plant SCC were recorded, and none are expected to occur. Botanical sensitivity is Low.

3.6 TECHNOLOGY ALTERNATIVES

The following energy/resources saving methods must be incorporated into the design of the units where funding allows:

1. All units to be provided with energy saving compact fluorescent lamps (CLF's).
2. All electric geysers should be insulated with geyser blankets.
3. All electric geyser thermostats should be set at the most optimal temperature.
4. All fitted appliances should have an energy rating and the most efficient models must be considered.
5. Energy efficient streetlight technology should be used as far as possible to reduce the energy requirements of the streetlight network.
6. Rain water harvesting from roofs and gutters must be considered to collect and store rainwater runoff. This can be used to provide supplementary water which can be used for washing and watering gardens.
7. Shower installations must be fitted with low-flow shower heads, where the water pressure is suitable.
8. Geysers should be installed vertically to save electricity.
9. Ensure that the maximum flow rate from hand wash basin tops does not exceed 6L per minute.
10. Indoor traps must be fitted with aerators to increase the efficiency by redirecting the flow and amount of water used.
11. Flush toilets must be fitted with dual or multi flush mechanisms to ensure that the amount of water required is controlled by the user.

3.7 OPERATIONAL ASPECTS ALTERNATIVES

No operational alternatives were considered as the proposed activity is for the construction of residential erven and related infrastructure to be maintained by the owners and municipality after construction completion. Once operational, the only activities that will be undertaken are related to maintenance and upkeep of the development and associated infrastructure.

The No-Go Option- The No-Go option will result in the site remaining as it is presently, vacant municipal land. A look at the Need and Desirability input will both indicate popular local support for both the concept and place as manifested in the IDP and SDF for the Swellendam Municipality.

3.8 NO-DEVELOPMENT ALTERNATIVE

The No-Development option will result in the site remaining as it is presently, transformed vacant municipal land adjacent to existing residential areas. A look at the Need and Desirability input will both indicate popular local support for both the concept and place as manifested in the IDP and SDF for the Swellendam Municipality.

SECTION 4: PUBLIC PARTICIPATION PROCESS

4.1 INTRODUCTION

Public participation is an integral part of the environmental assessment process, and affords potentially interested and affected parties (I&APs) an opportunity to participate in the EIA process, or to comment on any aspect of the development proposals. The public participation process undertaken for this project complies with the requirements of the EIA Regulations. The

description of the public participation process as included below itemizes the steps and actions undertaken to date and as appropriate at this stage of the project.

The public participation process for the project initiation and Scoping Report phase was outlined in detail in the Scoping Report and is summarised below for reference. The purpose of this chapter is to provide a detailed overview of the public participation envisaged for the EIA phase.

4.2 SCOPING PHASE PUBLIC PARTICIPATION

4.2.1 Identification and registration of key departments and other I&APs

Liaison with the relevant authorities plays a crucial role in the successful completion of any environmental assessment process. In addition to the DEA&DP, the key departments such as the provincial departments having jurisdiction in respect of any aspect of the project, the local municipality and municipal councillor as well as other potentially affected I&APs, including adjacent property owners and dwellers, were identified.

The parties listed in the table below were identified as key departments and registered I&APs to date as per the requirements of the Regulation 42 of R982 of 2014 as amended. A list with complete details of the key department and registered I&APs is kept and will be updated as the project progresses. Refer to Appendix D for further evidence and details on the public participation process followed to date and still to be followed.

Table 5: Key Departments & Registered I&AP's (Further details in Appendix D)

STAKEHOLDER	CONTACT PERSON	TELEPHONE	FAX NUMBER	EMAIL ADDRESS
DEA&DP: Development Management (Region 2) Private Bag X9086 Cape Town 8000	Arabel McClelland	021 483 2660	021 483 3633	arabel.mcclelland@westerncape.gov.za
Breede-Gouritz Catchment Management Agency Private Bag X3055 Worcester 6850	Elkerine Rossouw	023 346 8000	023 347 2010	erossouw@bocma.co.za
Department of Agriculture Private Bag X1 Elsenburg 7606	Cor van der Walt	021 808 5099	021 808 5092	LandUse.Elsenburg@elsenburg.com
Overberg District Municipality Private Bag X22 Bredasdorp 7280	Municipal Manager, Mayor and Ward Councillors	028 425 1157	028 425 1014	info@odm.org.za
Swellendam Local Municipality PO Box 20 Swellendam 6740	Mayor / Municipal Manager / Ward Councillors	028 514 8500	028 514 2694	info@swellenmun.gov.za
CapeNature Private Bag X5014 Stellenbosch 7599	Alana Duffell-Canham	021 866 8000	021 866 1523	aduffell-canham@capenature.co.za

DEA&DP: Pollution Management Private Bag X9086 Cape Town 8000	Ms. W Kloppers	021 483 2752	021 483 3254	Wilna.kloppers@westerncape.gov.za
DEA&DP: Waste Management Private Bag X9086 Cape Town 8000	Mr. Eddie Hanekom	021 483 2728	021 483 4425	ehanekom@westerncape.gov.za
Department of Human Settlements Western Cape Private Bag X9083 Cape Town 8000	The Director	021 483 6488 / 3112 / 0611	021 483 4785	Human.settlements@westerncape.gov.za
Heritage Western Cape Private Bag X9067 Cape Town 8000DEA	Mr. Andrew September	021 483 9543	021 483 9842	andrew.september@westerncape.gov.za
Transnet Posbus 5527 Kaapstad 8000	Johannes Hanekom	021 449 4529	NA	Johannes.Hanekom@transnet.net
Swellendam Heritage Association 11 Aanhuizen St Swellendam 6740	Carol Podd	071 528 7559	NA	carolannpodd@gmail.com
Ms DE Thompson Asterlaan 43 Swellendam 6740	Ms DE Thompson	NA	NA	NA

4.2.2 Notification of I&APs

Potential I&AP's were notified about the project in the following manner (proof thereof is available under Appendix D):

- Fixing notice boards at the boundary of the property;
- Placing an advertisement in the local newspaper; and
- Written notifications were sent to potential I&APs inviting them to register and give comments on the proposed development.

4.2.3 Public Meetings and Workshops

No public meetings and/or workshops have been held nor requested thus far.

4.2.4 Availability of the Scoping Report

Both the pre-application scoping report and draft scoping report were made available for a 30-day commenting period to all key departments and registered I&APs.

Copies of the pre-application and draft scoping reports were also made available on our website at www.ecoimpact.co.za

Proof of postage/delivery is available under Appendix D.

4.2.5 Comments and Reponses during the Scoping Phase and EIR Phases

All comments received were responded to during the draft and final scoping phases. During the

draft EIR phase the comments as received were further addressed and all comments and responses are tabulated in Comments and Response Report Tables as available under Appendix D.

4.3 A SUMMARY OF THE ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES, AND AN INDICATION OF THE MANNER IN WHICH THE ISSUES WERE INCORPORATED, OR THE REASONS FOR NOT INCLUDING THEM

Refer to Appendix D for summaries of all comments received, response/s thereto and indication of how the issues/comments were addressed.

- Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the excavation of the activities above, all works must be stopped immediately and Heritage Western cape must be notified without delay. **Stated in EMP.**
- For such a large project, it is felt that the correct 'impact assessments' be conducted, and being assured there are sufficient services available would recommend that they and the roads be constructed before the houses. **Confirmation of services included in EIR. EIA being conducted.**
- Infrastructure should be designed with sufficient capacity. **Services report included.**
- The Geotechnical assessment must be utilised to give indication about the geology of the proposed development site, and the typical construction material and associated choice of structure(s) (particularly sewer pipelines and such) that will be suitable as per the geology of the area of the proposed development. **Geotechnical assessment included in the EIR.**
- Independent specialists for botanical and freshwater study required. **Independent specialists have provided additional specialist studies included in EIR.**
- Waste material generated during the construction of the housing project may only be disposed of at a licensed waste disposal facility. Skips can be placed at the Facility for temporary storage of this waste. **Stated in EMP.**
- Waste minimisation should be implemented during both the construction and operational phases of the project such as the avoidance, reduction, re-use and recycling of waste, before considering the disposal of such waste. **Stated in EMP.**
- Continuous alien vegetation clearing should take place on the Erf in order to limit fire risk and further loss of areas with a conservation value. **Stated in EMP**.
- An adequate buffer should be established and maintained to protect this botanically sensitive area from impacts relating to the construction and operational phase of this proposed development. **Stated in EMP**.
- A WULA must be submitted. **A WULA has been submitted and proof included in EIR.**

4.4 AVAILABILITY OF THE EIR

The draft EIR was be made available to the registered I&AP's and Key Departments for a 30-day period to comment on the findings of the report. Proof of the Public Participation Process conducted during the EIR phase is included in the revised draft EIR.

The revised draft EIR will be made available to the registered I&AP's and Key Departments for a 30-day period to comment on the findings of the report. Proof of the Public Participation Process conducted during the EIR phase will be included in the Final EIR.

Once all comments have been received, the EIR will be finalised taking into account the comments received and thereafter submitted to the DEA&DP for a final decision.

4.5 DECISION AND APPEAL PERIOD

Once the DEA&DP have reviewed the Final EIR and are satisfied that it contains sufficient information to make an informed decision, the DEA&DP will use the information contained within the Final EIR to determine the environmental acceptability of the proponent's preferred options. A decision on the applications and associated reports will be made by the DEA&DP based on the findings of the Final EIR.

Following the issuing of the decision, all key department and registered I&APS will be notified and afforded the opportunity to appeal the decision in terms of the NEMA.

4.6 SUMMARY OF ISSUES RAISED BY I&APS THUS FAR

Refer Appendix D: Public Participation Process for summaries of all comments received and response/s provided during the Scoping Phase. Proof of all comments received is also available under Appendix D.

- Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the excavation of the activities above, all works must be stopped immediately and Heritage Western cape must be notified without delay.
- For such a large project, it is felt that the correct 'impact assessments' be conducted, and being assured there are sufficient services available would recommend that they and the roads be constructed before the houses.
- Infrastructure should be designed with sufficient capacity.
- The Geotechnical assessment must be utilised to give indication about the geology of the proposed development site, and the typical construction material and associated choice of structure(s) (particularly sewer pipelines and such) that will be suitable as per the geology of the area of the proposed development.
- Independent specialists for botanical and freshwater study required.
- Waste material generated during the construction of the housing project may only be disposed of at a licensed waste disposal facility. Skips can be placed at the Facility for temporary storage of this waste.
- Waste minimisation should be implemented during both the construction and operational phases of the project such as the avoidance, reduction, re-use and recycling of waste, before considering the disposal of such waste.
- Continuous alien vegetation clearing should take place on the Erf in order to limit fire risk and further loss of areas with a conservation value.
- An adequate buffer should be established and maintained to protect this botanically sensitive area from impacts relating to the construction and operational phase of this proposed development.
- A WULA must be submitted.

4.7 SPECIFIC INFORMATION THAT MAY BE REQUIRED BY THE COMPETENT AUTHORITY

Refer to Appendix D: Public Participation Process for summaries of all comments received and response/s provided. Proof of all comments received is also available under Appendix D.

IAP	COMMENT	RESPONSE
NID - DEADP: Development Management 01 February 2017	Section 5.2 of the Notice of Intent to submit an application notes the requirement for a Water Use Licence Application ("WULA") in terms of the National Water Act, 1998 (Act 36 of 1998). Please be advised that proof of submission of the WULA to the Department of Water and Sanitation along with the WULA assessment information must be provided to this Department with the EIR for decision-making.	WULA information and correspondence included in EIR.
PRE-APPLICATION SCOPING REPORT - DEADP _ DM – 30 May 2017	3.4. Minimal information has been provided with respect to associated infrastructure and services for the proposed development. In addition, particularly given the watercourse traversing the site and the surrounding topography, no mention is made with respect to underground service infrastructure or potential crossings of the watercourse. In addition, it is clear that storm water facilities, in the form of attenuation ponds, are proposed within the watercourse. Furthermore, the EAP is reminded to ensure that associated infrastructure forms a part of the development description and assessment, where appropriate, particularly as listed activities related to infrastructure components have been triggered by the proposed development.	Services engineering report included in the EIR.
	3.5. It is requested that a Storm Water Management Plan is compiled during the environmental application process and appended to the Environmental Impact Assessment Report ("EIR"). Alternatively, management of storm water can be included in the engineering report to show it has been appropriately and sufficiently addressed within the design of the development.	Storm Water Management Plan included in EIR.
	3.6. You are reminded that the relevant service providers are to provide written confirmation of sufficient capacity to provide the necessary services for the proposed development specifically with respect to sewage and effluent disposal, waste management, storm water management, water and electricity supply.	Included in EIR.
	3.7. It is essential that the mandated authorities responsible for both biodiversity and water resources, notably CapeNature and the Department of Water and Sanitation ("DWS"), or its delegated authority the Breede Gouritz Catchment Management Agency {"BGCMA"}, comment on the proposed development and the findings and recommendations of the specialist(s).	BGCMA and CapeNature have both commented.
	3.8. Comments from, but not limited to, the following relevant authorities must be obtained during the Public Participation Process ("PPP"): • CapeNature; • BGCMA; • Department of Agriculture; • Department of Human Settlements; and • Swellendam Municipality (technical input required from the engineering, planning and environmental components).	Await comments from the following: • Department of Agriculture • Department of Human Settlements
	3.11. In accordance with the requirements of the EIA Regulations, 2014, a description is required of the	Further alternatives have

	process followed to reach the preferred alternative within the site, including detailed descriptions of all the alternatives considered.	been included.
	3.12. In light of the fact that Activity 19 of GN No. R.327 is triggered and future maintenance work may be required within the watercourses/wetlands on site, the Department recommends that a Maintenance Management Plan ("MMP") forms a component of the EMPr to be incorporated into the Plan of Study for the Environmental Impact Assessment ("EIA") phase.	MMP included in EIR.
Application - DEADP DM	3 A register of I&APs must be opened and maintained.	Included in EIR and appendix.
Draft scoping - DEADP_DM - 10 July 2018	3.2 It is noted that off-site infrastructure upgrades have been included in the project description, however, very limited information has been provided with respect to the required associated infrastructure and services for the proposed development, as well as the proposed upgrade of attenuation dams 4 and 5 within the watercourse to the north west of the site. The draft SR and Plan of Study refers to the inclusion of an engineering report in the Environmental Impact Assessment ("EIA") phase of the application. However, the associated infrastructure and proposed upgrades relate specifically to the listed activities and therefore must be described in detail and potential impacts identified for assessment in the EIA phase of the application. The EAP is reminded to ensure that associated infrastructure forms a part of the development description and assessment.	More information is provided with regard to the off-site infrastructure upgrades. Project description has been updated to been more detailed. Potential impacts of upgrades assessed in EIR.
	3.3 In addition to the above, based on the maps contained in Appendix E, it is evident that the proposed upgraded attenuation dams 4 and 5 are not located on the site that is the subject of this environmental application, namely the remaining extent of Erf no. 1. As the proposed works will likely trigger listed activities in terms of the EIA Regulations, 2014 (as amended), specifically Activity 19 of Listing Notice l, it is required that the property details (including erf numbers, SG codes and coordinates) are included in the application and reports. These sites must also be described in the SR.	Dam 5 is on the same erf as the housing development (on RE/1). Dam 5 is located at 34° 1'41.42"S and 20°26'45.03"E. However, Dam 4 is on erf 1698 and re/157. 34° 1'45.43"S 20°26'49.18"E. Section 2.1 on page 19 has been amended to include the above. An amended application submitted.
	3.8.2 In terms of the draft SR, the 25.3ha site has been completely transformed, presumably by previous cultivation activities that took place on the site. The exact date of when the area was ploughed and cultivated is currently unknown, but will need to be established.	Exact dates unknown and we have not been able to establish this. The municipality has been unable to

		indicate when it was ploughed. Arial Photography indicates that that land would have been ploughed prior to 2006.
	3.8.3 Should the land prove to have been cultivated in the 10-year period immediately preceding the proposed land development, a land development application to this Department in terms of section 53 of the Land Use Planning Act (Act No. 3 of 2014) will be required.	Not applicable. Not ploughed between 2006 to current as evidenced in Arial photography.
Final scoping - DEADP DM	11. If the EIA Report and EMPr are not submitted within the prescribed timeframe, the application will lapse in terms of Regulation 45 of the EIA Regulations, 2014, and your file will be closed. Should you wish to pursue the application again, a new application process would have to be initiated. A new Application Form would have to be submitted and the prescribed application fee would have to be paid again. 12. Please note that two printed copies as well as two electronic copies (saved on CD/DVD) of the final EIA Report and EMPr must be submitted to the Department for decision.	Extension has been granted. Noted.
Draft EIR - DEADP DM	3.4. Further to the above, however, it is noted that infrastructure connecting to the new development site will extend beyond the urban area and will necessitate crossing the drainage channel to the west of the site. On this basis, Activity 12 of Listing Notice 1 will be triggered by the construction and installation of the new road and pipelines on the western edge of the site, where the structures and infrastructure will result in a development footprint of 100m2 or more within 32m of the watercourse.	Activity 12 of listing notice 1 has been applied for.
	3.5. The Plan of Study for the EIA phase of the environmental application, accepted by the Department on 31 August 2018, stated a "second assessment by a 3rd party specialist" with respect to the undertaking of a Botanical Assessment. Based on the documentation submitted with the draft EIR, the Ecological Baseline Assessment, dated May 2018, as previously included with the Scoping phase of the application, has been supplemented by an initial "Botanical Baseline Assessment of five potential housing sites in Swellendam", compiled by Nick Helme Botanical Surveys and dated 29 November 2017, which predates the revised ecological baseline assessment. It is evident that this "assessment" is similarly a relatively high-level screening assessment of the housing sites initially proposed by the applicant. It does not assess in detail the preferred site, identify potential impacts or recommend mitigation measures. The preferred site, and subject of the current application, is described in a single paragraph on page 10 of the report. This specialist report, therefore, does not adequately	The 3rd party report by Nik Helm does not pre-date the EBA by Eco Impact. The EBA by Eco Impact was included in the PRE-APPLICATION scoping report and was dated October 2015. The EBA was only updated in 2018 in line with new spatial planning tools. Noted. Nick Helm

	meet the requirements of a botanical assessment for the EIA phase of the environmental application, as outlined in Appendix 6 of the EIA Regulations, 2014, or as implied by the Plan of Study submitted to the Department with the final Scoping Report, or in the responses provided to the Competent Authority and commenting authorities in the Comments and Response Report (included in Appendix D of the draft EIR}. However, it is requested that CapeNature provide comment on the adequacy of the botanical input received to date and the findings and recommendations of the specialist input included with the EIR.	has done a subsequent additional assessment. The Eco Impact EBA plus Nick Helms Report and additional Report together should meet the requirements. Cape Natures comment in included below.
	3.6. It is noted that the Freshwater Ecological Impact Assessment (dated 23 September 2018) was compiled by Eco Impact Legal Consulting (Pty) Ltd. Please be advised that as previously indicated a Freshwater Impact Assessment must be conducted by an appropriately qualified independent specialist with the relevant expertise. Please note that a Freshwater Ecological Impact Assessment compiled by an appropriately qualified independent specialist, or an independent external review of the existing Freshwater Ecological Impact Assessment, conducted by an appropriately qualified independent specialist, must be undertaken and included in a revised EIR. This revised EIR must be made available to registered interested and affected parties and commenting authorities for a 30-day commenting period.	• The Freshwater Ecological Impact Assessment (dated 23 September 2018) was compiled by Eco Impact Legal Consulting (Pty) Ltd • Review by Stephen van Staden of SAS dated 07 December 2018. • Revised Freshwater Ecological Impact Assessment by Eco Impact dated 11 December 2018. • Freshwater Resource Verification for The Proposed Swellendam Housing and

		Bulk Sewer and Water Pipelines, Western Cape by SAS dated January 2019. This is the REVISED DRAFT EIR for comment.
	3.7. Please ensure all mitigation measures proposed by the specialists are included in the EIR and the Environmental Management Programme ("EMPr"), where relevant. This is with particular reference to watercourse related management and mitigation measures during the construction phase.	All mitigation measures proposed by the specialists are included in the EIR and the Environmental Management Programme.
	3.8. Appendix Fl contains a Maintenance Management Plan ("MMP"), inclusive of method statements. However, although it is accepted that "Activity C" (page 21) and "Activity D" (page 22), which relate to erosion protection and removal of sediment, will be largely similar in terms of actions, it is queried whether these method statements should be identical. It is recommended that the method statements are reviewed and tailored to the specific actions.	MMP method statements amended.
	3.9. You are reminded to include all correspondence with the BGCMA in the final EIR submitted to the Department for decision-making, including where this correspondence relates to the Water Use Licence Application that is currently underway.	Noted. Appendix H has been updated with such correspondence.
	1.10. The applicant/Environmental Assessment Practitioner ("EAP") is reminded to include the following PPP information, in terms of the EIA Regulations, 2014 (as amended), in the EIR for decision-making: 3.10.1 . Details of the public participation process undertaken in terms of regulation41 of these Regulations, including copies of the supporting documents and inputs; and 3.10.2. A summary of the issues raised by Interested and Affected Parties ("l&APs"), and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	Updated EIR with summary of comments. Refer to section 4 of the EIR.

4.8 ANY OTHER MATTERS REQUIRED IN TERMS OF SECTION 24(4)(A) AND (B) OF THE ACT

None at this stage.

SECTION 5: ENVIRONMENTAL ATTRIBUTES OF THE PROPOSED DEVELOPMENT SITE AS ASSESSED

The information for this section is mainly based on the specialist studies undertaken for this project. These studies are attached under Appendix E.

5.1 GEOGRAPHICAL, GEOLOGICAL AND PHYSICAL ASPECTS

The site is currently vacant, undeveloped municipal land. The site has a slope classification of 3-10%.

The proposed development site is an unused vacant area of ± 25.3ha which is located south east of the town Swellendam's southern residential area. It consists of an undulating area in-between the residential area and the railway line of Swellendam South.

According to the 2017 Western Cape Biodiversity Spatial Plan Site H been classified as a terrestrial Ecological Support Area (ESA1). The site has been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown). As according to Mucina and Rutherford (2006) the type of natural vegetation originally occurring on site is Swellendam Silcrete Fynbos (Endangered). No plant Species of Conservation Concern were recorded, and none are expected to occur. Botanical sensitivity is Low. According to the NFEPA Database no wetland features are located within the study area and no seasonally wet soils or watercourse characteristics were observed or recorded on the surveyed site itself (housing).

However, a Channelled Valley Bottom Wetland was identified approximately 300m to the west of the study area. The proposed new access road, an extension of Theunissen Street is proposed, and two new attenuation ponds are within the identified Channelled Valley Bottom Wetland. Similarly, water pipelines will be upgraded within Sofietjies Street, Ellis Street, September Street and Reisiebaan Street within the existing residential area to the west of the study area, two of these portions cross the identified Channelled Valley Bottom Wetland.

The Koornlands River was identified as a NFEPA wetland area (Natural valley floor floodplain wetland). The sewer pipeline segments are located within this large natural floodplain system, within the western portion of the study area. This floodplain is considered to be in a moderately modified condition.

A channelled valley bottom wetland is also located just outside and just north of the study area. A portion of this wetland is considered to be natural, albeit largely modified, however a large extent thereof is considered artificial.

A small artificial wetland flat is being traversed by the most southern water pipeline segment. Other wetland flats (also considered to be artificial) are located within the central southern portion of the larger investigation area.

The surrounding land use:
Site H-North-Railway line, N2 national road, Swellendam residential area
East-Railway line, sand mine, previously cultivated land
South-Indigenous vegetation area,
West-Swellendam east residential area.

The geology of the area consists of conglomerate with minor sandstone and siltstone (shale) from the Enon Formation of the Uitenhage Group which is overlain locally by alluvial terrace gravels of Tertiary age. The average soil profile is dominated by a dark red brown horizon gravelly sand topsoil, underlain by clayey silt, clayey/silty gravel, weathered soft shale or conglomerate. No hard rock is expected on the site.

5.2 BIOLOGICAL AND ECOLOGICAL ASPECTS

Will the proposed development and its alternatives have an impact on CBAs or ESAs? If yes, please explain:	YES	~~NO~~

According to the 2017 Western Cape Biodiversity Spatial Plan Site H been classified as a terrestrial **Ecological Support Area** (ESA1). The site has been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown). As according to Mucina and Rutherford (2006) the type of natural vegetation originally occurring on site is Swellendam Silcrete Fynbos **(Endangered).** Little to mainly no indigenous vegetation species have returned to this transformed area and this area therefore has low conservation value and low botanical sensitivity. No significant fauna or avifauna breeding, roosting or their associated habitat will be impacted upon. Site H is now dominated by a mix of agricultural grasses and herbs, and some pioneer indigenous species. Species include *Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Hyparrhenia hirta, Elytropappus rhinocerotis, Ursinia discolor, Anthospermum spathulatum, Gnidia laxa, Protea repens, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia, Melinis repens, Corycium orobanchoides and Tritonia disticha.* No plant Species of Conservation Concern were recorded, and none are expected to occur. **Botanical sensitivity is Low.** As noted in the baseline assessment the entire proposed development area is deemed to be of Low botanical sensitivity, as it was all previously cultivated, and although it has lain fallow for quite some time the indigenous species diversity is still relatively low (less than 15% of what would have been present in the area prior to cultivation).

According to the NFEPA Database no wetland features are located within the study area and no seasonally wet soils or watercourse characteristics were observed or recorded on the surveyed site itself (housing).

However, a Channelled Valley Bottom Wetland was identified approximately 300m to the west of the study area. The proposed new access road, an extension of Theunissen Street is proposed, and two new attenuation ponds are within the identified Channelled Valley Bottom Wetland. Similarly, water pipelines will be upgraded within Sofietjies Street, Ellis Street, September Street and Reisiebaan Street within the existing residential area to the west of the study area, two of these portions cross the identified Channelled Valley Bottom Wetland.

The Koornlands River was identified as a NFEPA wetland area (Natural valley floor floodplain wetland). The sewer pipeline segments are located within this large natural floodplain system, within the western portion of the study area. This floodplain is considered to be in a moderately modified condition.

A channelled valley bottom wetland is also located just outside and just north of the study area. A portion of this wetland is considered to be natural, albeit largely modified, however a large extent thereof is considered artificial.

A small artificial wetland flat is being traversed by the most southern water pipeline segment.

Other wetland flats (also considered to be artificial) are located within the central southern portion of the larger investigation area.

Will the proposed development and its alternatives have an impact on terrestrial vegetation, or aquatic ecosystems (wetlands, estuaries or the coastline)? If yes, please explain:	YES	~~NO~~

Terrestrial vegetation

According to the 2017 Western Cape Biodiversity Spatial Plan Site H been classified as a terrestrial **Ecological Support Area** (ESA1). The site has been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown). As according to Mucina and Rutherford (2006) the type of natural vegetation originally occurring on site is Swellendam Silcrete Fynbos **(Endangered).** Little to mainly no indigenous vegetation species have returned to this transformed area and this area therefore has low conservation value and low botanical sensitivity. No significant fauna or avifauna breeding, roosting or their associated habitat will be impacted upon. Site H is now dominated by a mix of agricultural grasses and herbs, and some pioneer indigenous species. Species include *Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Hyparrhenia hirta, Elytropappus rhinocerotis, Ursinia discolor, Anthospermum spathulatum, Gnidia laxa, Protea repens, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia, Melinis repens, Corycium orobanchoides and Tritonia disticha.* No plant Species of Conservation Concern were recorded, and none are expected to occur. **Botanical sensitivity is Low.**

Aquatic ecosystems

According to the NFEPA Database no wetland features are located within the study area and no seasonally wet soils or watercourse characteristics were observed or recorded on the surveyed site itself (housing).

However, a Channelled Valley Bottom Wetland was identified approximately 300m to the west of the study area. The proposed new access road, an extension of Theunissen Street is proposed, and two new attenuation ponds are within the identified Channelled Valley Bottom Wetland. Similarly, water pipelines will be upgraded within Sofietjies Street, Ellis Street, September Street and Reisiebaan Street within the existing residential area to the west of the study area, two of these portions cross the identified Channelled Valley Bottom Wetland.

The Koornlands River was identified as a NFEPA wetland area (Natural valley floor floodplain wetland). The sewer pipeline segments are located within this large natural floodplain system, within the western portion of the study area. This floodplain is considered to be in a moderately modified condition.

A channelled valley bottom wetland is also located just outside and just north of the study area. A portion of this wetland is considered to be natural, albeit largely modified, however a large extent thereof is considered artificial.

A small artificial wetland flat is being traversed by the most southern water pipeline segment. Other wetland flats (also considered to be artificial) are located within the central southern portion of the larger investigation area.

Will the proposed development and its alternatives have an impact on any populations of threatened plant or animal species, and/or on any habitat that may contain a unique signature of plant or animal species?	~~YES~~	NO

If yes, please explain:		
Refer to information as available in the columns above and under specialist reports Appendix E. Although indigenous vegetation and animal species are located/visits on site no terrestrial or aquatic plant or animal species of conservation concern were recorded at the time of the surveys nor are expected to occur or breed on the proposed low botanical sensitivity development site to be impacted upon.		

5.3 SOCIAL AND ECONOMIC ASPECTS

What is the expected capital value of the project on completion?	Unknown	
What is the expected yearly income or contribution to the economy that will be generated by or as a result of the project?	Unknown	
Will the project contribute to service infrastructure?	YES	~~NO~~
Is the project a public amenity?	YES	~~NO~~
How many new employment opportunities will be created during the development phase?	Unknown	
What is the expected value of the employment opportunities during the development phase?	Unknown	
What percentage of this will accrue to previously disadvantaged individuals?	As much as possible	
How will this be ensured and monitored (please explain):		
Employment opportunities to be allocated as according to municipal policy/guidelines which promote the employment and appointment of previously disadvantaged individuals.		
How many permanent new employment opportunities will be created during the operational phase of the project?	Unknown	
What is the expected current value of the employment opportunities during the first 10 years?	Unknown	
What percentage of this will accrue to previously disadvantaged individuals?	Unknown	
How will this be ensured and monitored (please explain):		
Employment opportunities to be allocated as according to municipal policy/guidelines which promote the employment and appointment of previously disadvantaged individuals.		
Any other information related to the manner in which the socio-economic aspects will be impacted:		
Shelter is a basic need. Housing must provide shelter, but this alone is not enough. It is a key element in structuring the urban environment. Housing affects the form and performance of settlements across scales. Settlement should function as one whole workable system of integrated networks and hierarchical systems of interconnecting nodes. According to the Housing Act 107 of 1997, municipalities are responsible for housing delivery within their area of jurisdiction. The overall level of access to formal dwellings is 88.6 per cent in Swellendam. According to the Swellendam Municipality the housing waiting list for Swellendam is 2193 (as at 2018). See Appendix G3. This development will help relieve this backlog significantly. This area provides the ideal locality in terms of accessibility, proposed services and infrastructure to all for a sustainable development. This application complies with the goals of the Local and Provincial Planning Policy with regards to housing provision as follow:		

- It offers an integrated housing solution with a strong emphasis on focusing on the needs of the local community with regards to ownership and the development of a secure and socially cohesive neighbourhood in both form and desirability.
- The implementation of this development will effectively integrate with the existing residential areas to ensure the sustainability of the proposal and contribute to the viability of the town.
- The development supports and complies with the Western Cape Provincial Spatial Development Framework, Swellendam Spatial Development Framework, and the Swellendam Integrated Development Plan.
- The development also supports and comply with the criteria for the assessment of an application as per the Land use Planning Act, 2014 (Act 3 of 2014) and the Spatial Planning Land Use Management Act, 2013 (Act 16 of 2013).
- The development is accessible and there will be no major negative effects on the surrounding built environment, natural environment or economic environment.
- The development improves access to services, facilities, housing and opportunity to create a sustainable human settlement.
- The development supports a good enrolment that is liveable, legible, diverse, varied and unique.

5.4 HERITAGE AND CULTURAL ASPECTS

A Notice on Intent to Develop was submitted to the Heritage Western Cape ('HWC'), where after the HWC confirmed that since there is no reason to believe that the proposed mixed-use development will impact on heritage resources, no further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required.

SECTION 6: IMPACT ASSESSMENT

This impact assessment aims to assess the balance between conservation and respect for the natural environmental attributes of the general area and the socio-economic need for sustainable employment opportunities and capital. The outcome of the assessment will be used to determine the viability of the project.

Based on the EAP's assessment, issues raised by I&AP's and the project team, specialist studies were undertaken to provide baseline information to address the concerns and assess the impacts of the proposed development on the environment. The specialists are provided with set criteria for undertaking their assessments, to allow for comparative assessment of all issues, based on the requirements of the EIA Regulations.

The information from the specialist studies has been used by the planning team to inform the current development proposals. The preferred alternatives (as indicated in Section 3) were discussed with the applicant and finalised accordingly.

6.1 ASSESSMENT METHODOLOGY

Below is the assessment methodology utilized in determining the significance of the construction, operational and decommission impacts of the proposed activities, and where applicable the possible alternatives, on the biophysical and socio-economic environment. The methodology is broadly consistent to that described in DEA&DP's Guideline Document on the EIA Regulations (1998).

For each impact, the significance is determined by various factors. Significance is described prior to mitigation as well as with the most effective mitigation measure(s) in place. The mitigation described in the document (also see Appendix F for the Draft Environmental Management Programme) represents the full range of plausible and pragmatic measures *but does not necessarily imply that they all should or will be implemented*. The decision as to which mitigation measures to implement lies with the applicant and ultimately with the DEA&DP.

To facilitate informed decision-making, EIAs must endeavour to come to terms with the significance of the potential environmental impacts associated with particular development activities. Despite the attempts at providing a completely objective and impartial assessment of the environmental implications of development activities, EIA processes can never completely escape the subjectivity inherent in attempting to define significance. Recognising this, potential subjectivity in the current process is addressed as follows:

- Be clear about the difficulty of being completely objective in the determination of significance;
- Develop an explicit methodology for assigning significance to impacts and outlining this methodology in detail. Having an explicit methodology not only forces the assessor to come to terms with the various facets contributing toward determination of significance, thereby avoiding arbitrary assignment, but also provides the reader of the EIR with a clear summary of how the assessor derived the assigned significance; and
- Wherever possible, differentiating between the likely significance of potential environmental impacts as experienced by the various affected parties.

Although these measures may not totally eliminate subjectivity, they do provide an explicit context within which to review the assessment of impacts.

Table 6: Assessment criteria for the evaluation of impacts

Criteria	Description		
Nature	a description of what causes the effect, what will be affected, and how it will be affected.		
	Type	**Score**	**Description**
Extent (E)	None (No)	1	Footprint
	Site (S)	2	On site or within 100 m of the site
	Local (L)	3	Within a 20 km radius of the centre of the site
	Regional (R)	4	Beyond a 20 km radius of the site
	National (Na)	5	Crossing provincial boundaries or on a national / land wide scale
Duration (D)	Short term (S)	1	0 – 1 years
	Short to medium (S-M)	2	2 – 5 years
	Medium term (M)	3	5 – 15 years
	Long term (L)	4	> 15 years
	Permanent(P)	5	Will not cease
Magnitude (M)	Small (S)	0	will have no effect on the environment
	Minor (Mi)	2	will not result in an impact on processes
	Low (L)	4	will cause a slight impact on processes
	Moderate (Mo)	6	processes continuing but in a modified way
	High (H)	8	processes are altered to the extent that they temporarily cease

Criteria	Description		
	Very high (VH)	10	results in complete destruction of patterns and permanent cessation of processes.
Probability (P) the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned	Very improbable (VP)	1	probably will not happen
	Improbable (I)	2	some possibility, but low likelihood
	Probable (P)	3	distinct possibility
	Highly probable (HP)	4	most likely
	Definite (D)	5	impact will occur regardless of any prevention measures
Significance (S)	Determined through a synthesis of the characteristics described above: **S = (E+D+M) x P** Significance can be assessed as low, medium or high		
Low: < 30 points:	The impact would not have a direct influence on the decision to develop in the area		
Medium: 30 – 60 points:	The impact could influence the decision to develop in the area unless it is effectively mitigated		
High: < 60 points:	The impact must have an influence on the decision process to develop in the area		
No significance	When no impact will occur or the impact will not affect the environment		
Status	Positive (+)		Negative (-)
The degree to which the impact can be reversed	Completely reversible (R)	90-100%	The impact can be mostly to completely reversed with the implementation of the correct mitigation and rehabilitation measures.
	Partly reversible (PR)	6-89%	The impact can be partly reversed providing that mitigation measures as stipulated in the EMP are implemented and rehabilitation measures are undertaken
	Irreversible (IR)	0-5%	The impact cannot be reversed, regardless of the mitigation or rehabilitation measures taking place
The degree to which the impact may cause irreplaceable loss of resources	Resource will not be lost (R)	1	The resource will not be lost or destroyed provided that mitigation and rehabilitation measures as stipulated in the EMP are implemented
	Resource may be partly destroyed (PR)	2	Partial loss or destruction of the resources will occur even though all management and mitigation measures as stipulated in the EMP are implemented
	Resource cannot be replaced (IR)	3	The resource cannot be replaced no matter which management or mitigation measures are implemented.
The degree to which the impact can be mitigated	Completely mitigatible (CM)	1	The impact can be completely mitigated providing that all management and mitigation measures as stipulated in the EMP are implemented
	Partly mitigatible (PM)	2	The impact cannot be completely mitigated even though all management and mitigation measures as stipulated in the EMP are implemented. Implementation of these measures will provide a measure of mitigatibility
	Un-mitigatible (UM)	3	The impact cannot be mitigated no matter which management or mitigation measures are implemented.

6.2 IMPACT ASSESSMENT

Below is a description of the potential impacts of the project on the geographical, physical, biological, social, economic, heritage and cultural aspects environment. Each aspect is discussed in terms of the construction, operational and decommissioning phases. It is not anticipated that the planning and design phase will have any impacts on the environment and as such, this phase is not discussed below. As mentioned, the post operational activities have not yet been fully determined. Detailed decommissioning impacts will be determined closer to the end of life of the project under the relevant regulations of the day. The alternatives considered, as part of the impact assessment is the layout alternatives and the No-Go/No-development Alternative.

(A) IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION PHASE

6.2.1 POTENTIAL IMPACTS ON GEOGRAPHICAL AND PHYSICAL ASPECTS

Nature of impact:
Disturbance to subsurface geological layers

Discussion:
Construction and excavation activities will affect the underlying geological layers on site to some extent. The depth of the rocks differs throughout the proposed area; therefore, the substrata will be affected differently.

The geology of the area consists of conglomerate with minor sandstone and siltstone (shale) from the Enon Formation of the Uitenhage Group which is overlain locally by alluvial terrace gravels of Tertiary age. The average soil profile is dominated by a dark red brown horizon gravelly sand topsoil, underlain by clayey silt, clayey/silty gravel, weathered soft shale or conglomerate. No hard rock is expected on the site.

Cumulative impacts:
It is not anticipated that the cumulative impact on subsurface geological layers will be high as the affected substrata is very shallow and the integrity of the underlying ground structures will thus not be sacrificed.

Mitigation:
Due to the nature of the impacts, not much can be done to mitigate the impact, only the severity of it can be managed. Mitigation and management for affecting geology is to ensure that removal of soil is kept to a minimum – removal of soil should only be in areas where development will take place as part of the approved development footprint.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	5	5	5		
Magnitude	2	2	2	2		
Probability	4	2	4	2		
Significance	36-Medium	16-Low	36-Medium	16-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	0%		0%			
Irreplaceable loss of resources	2- Partly Replaceable		2-Partly Replaceable			
Can impacts be mitigated?	2-Partly, but impact on subsurface geological layers during excavations is inevitable.		2-Partly, but impact on subsurface geological layers during excavations is inevitable.			

Nature of impact:
Soil erosion

Discussion:
During construction site clearance, access roads for construction, workers camps, etc. will cause a disturbance to the soil and the vegetation cover. This disturbance, unless carefully managed, could spread as a result of unnecessary construction of additional access roads or site clearing outside of approved development footprint. Construction camps, if not fenced and restricted in size, could result in unnecessarily large areas being disturbed. Soil erosion could occur due to wind (wind erosion cause dust pollution) or due to overland flow should rains fall during construction.

Slope stability and erosion
•The natural slope gradients are gentle to moderate and there are no signs of macro instability on the site.
•Temporary shallow excavations are likely to be generally stable at steep angles due to significant cohesion in the soils but deep excavations exceeding 1.5m high should be assessed by the engineer.
•Erosion of fine grained soil can be a problem on slopes exceeding 1:7.5 where vegetation is stripped off the surface.

Cumulative impacts:
Exposed soil surfaces due to clearing of vegetation could lead to soil erosion and if this is not mitigation could lead to the cumulative impact such as erosion of surrounding vegetation areas outside of the development footprint.

Mitigation:

- Demarcate no-go areas before any land clearing occurs under the supervision of an ECO. Demarcation must be clearly visible and effective and no-go area must remain demarcated throughout construction phase.
- Site clearance along the border of the no-go areas must be done under the supervision of an ECO.
- Access to roads and other areas must be controlled to avoid disturbance of areas outside the development footprint. Personnel should be restricted to the construction camp site and immediate construction areas only.
- Undertake specific erosion monitoring and maintenance throughout the construction phase as and if required.
- Undertake dust suppression as needed.
- Monitor soil erosion on a regular basis and rehabilitate impacted areas as soon as possible under supervision of appointed ECO.
- Appropriate and effective storm water management measures must be put in place to ensure that erosion and environmental degradations outside of the proposed development footprint area does not occur, but the storm water measures implemented must not impede storm water flow to such an extent that it is completely stopped. Current hydrological processes outside of the proposed development footprint area must continue to function as is.
- Rehabilitate or stabilise eroded areas immediately to prevent increase in erosion.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	6	2	6	2		
Probability	4	2	4	2		
Significance	56 - Medium	8 - Low	56 - Medium	8 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significanc e if mitigated		

Reversibility	100%	
Irreplaceable loss of resources	2 Partly – while topsoil takes very long to redevelop, loss of topsoil can be prevented if correct mitigation measures are implemented	
Can impacts be mitigated?	2 Partly – Disturbance to topsoil during construction is inevitable, but erosion and increased storm water runoff can be mitigated.	

Nature of impact:
Compaction of soil

Discussion:
Heavy construction machinery will compact the soil on the site.

The compaction will lead to a change in soil structure and function. It will furthermore affect the micro-organisms in the soil detrimentally (these species may migrate to other areas where possible while some individuals may die). Soil compaction will lead to a lower growth rate in vegetation.

Cumulative impacts:
Soil compaction of areas outside of the development footprint can lead to lower growth rate in vegetation and erosion.

Mitigation:

- Undertake construction activities only in areas where required. Avoid all other areas outside of approved development footprint area.
- Cross areas with machinery as little as possible (work effectively) and make use of existing access and internal roads as far as possible.
- Rehabilitate impacted areas outside of approved development footprint area immediately upon construction completion.

Criteria	**Layout Alternative 1**		**Layout Alternative 2**		**No-Go Alternative**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative	
Duration	1	1	1	1		
Magnitude	6	4	6	4		
Probability	4	3	4	3		
Significance	36 - Medium	18 - Low	36-Medium	18-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	80%		80%			
Irreplaceable loss of resources	1-No		1-No			
Can impacts be mitigated?	2-Yes development and construction vehicles to be restricted only to demarcated footprint areas		2-Yes development and construction vehicles to be restricted only to demarcated footprint areas			

Nature of impact:
Increase in storm water runoff/altered flow

Discussion:
Removal of vegetation and hardening of surfaces due to construction of infrastructure and housing development will cause an increase in storm water runoff from the site unto the adjacent environment

Cumulative impacts:
Increase in storm water runoff could cause soil erosion on surrounding natural environment and drainage line area. Soil erosion may lead to loss in topsoil and impact environmental processes.

Mitigation:

- Undertake storm water management measures as recommended in the environmental management program and site-specific storm water management plan.
- Monitor for erosion. Should erosion be present, undertake maintenance activities to rectify and prevent further erosion.
- Demarcate no-go areas before construction commences and maintain demarcation throughout construction phase.
- All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated.
- Monitor for erosion of surrounding undeveloped areas and implement storm water management measures as recommended in the environmental management program.
- Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion.
- Rehabilitate or stabilise eroded areas immediately to prevent increase/spread of erosion.
- Construction work (i.e. site clearance and construction) must be carried out and completed in the low flow and low rainfall season (mid to late summer) as far as possible to minimise the impact on the flow in the drainage line.
- Appropriate and effective storm water management measures must be put in place to ensure that erosion and environmental degradations outside of the proposed development footprint area does not occur, but the storm water measures implemented must not impede storm water flow to such an extent that it is completely stopped. Current hydrological processes outside of the proposed development footprint area must continue to function as is.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Neutral (Site remains as is)	
Duration	5	1	5	1		
Magnitude	6	2	6	2		
Probability	4	2	4	2		
Significance	56 - Medium	8 - Low	56 - Medium	8 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					
Can impacts be mitigated?	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					

6.2.2 POTENTIAL IMPACTS ON BIOLOGICAL AND ECOLOGICAL ASPECTS

Nature of potential impact:
Loss of indigenous vegetation areas as part of ESAs

Discussion:
The habitat loss is deemed to be permanent (>15 years). According to the 2017 Western Cape Biodiversity Spatial Plan Site H been classified as a terrestrial Ecological Support Area (ESA1). The site has been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown). As according to Mucina and Rutherford (2006) the type of natural vegetation originally occurring on site is Swellendam Silcrete Fynbos (Endangered). Little to mainly no indigenous vegetation species have returned to this transformed area and this area therefore has low conservation value and low botanical sensitivity. No significant fauna or avifauna breeding, roosting or their associated habitat will be impacted upon. Site H is now dominated by a mix of agricultural grasses and herbs, and some pioneer indigenous species. Species include Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Hyparrhenia hirta, Elytropappus rhinocerotis, Ursinia discolor, Anthospermum spathulatum, Gnidia laxa, Protea repens, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia, Melinis repens, Corycium orobanchoides and Tritonia disticha. No plant Species of Conservation Concern were recorded, and none are expected to occur. Botanical sensitivity is Low.

Cumulative impacts:
Habitat fragmentation, loss of ecological connectivity and erosion

Mitigation:

- Demarcate proposed no-development areas before construction commences and maintain demarcation throughout construction phase to ensure that it is not impacted upon.
- Demarcate no-go areas before any land clearing occurs under the supervision of an ECO. Demarcation must be clearly visible and effective and no-go area must remain demarcated throughout construction phase.
- Site clearance along the border of the no-go areas must be done under the supervision of an ECO.
- Personnel should be restricted to the construction camp site and immediate construction areas only.
- Rehabilitate impacted indigenous vegetation areas outside of the development areas immediately if disturbed.
- Restrict development to low botanical sensitivity area as delineated by the specialist throughout construction phase, ensuring that no areas outside of the proposed development footprint area are further disturbed.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	5	5	5		
Magnitude	6	4	6	2		
Probability	5	5	5	5		
Significance	65 - High	50- Medium	85 - High	45- Medium		
Status	High negative significance if not mitigated	Medium negative significance if mitigated	High negative significance if not mitigated	Medium significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	2-Partial loss of resources but can be rehabilitated and mitigated		2-Partial loss of resources but can be rehabilitated and mitigated			
Can impacts be mitigated?	2- Partially mitigatable, clearance of indigenous vegetation remnants can be restricted to proposed		2- Partially mitigatable, clearance of indigenous vegetation remnants can be restricted to proposed			

	development areas as assessed and impacted surrounding areas can be rehabilitated, managed and protected.	development areas as assessed and impacted surrounding areas can be rehabilitated, managed and protected.	

NOTE: Note according to the specialist: *"As all vegetation currently on site will be lost the intensity of the loss of vegetation on site will be high, and at the site scale, and loss will be permanent. However, because the vegetation on site is of low diversity and low sensitivity the overall significance of the loss of the vegetation on site is Low negative, before and after mitigation."*

Nature of potential impact:
Impact of proposed development on surface water resources and hydrological features

Discussion:
According to the NFEPA Database no wetland features are located within the study area and no seasonally wet soils or watercourse characteristics were observed or recorded on the surveyed site itself (housing).
However, a Channelled Valley Bottom Wetland was identified approximately 300m to the west of the study area. The proposed new access road, an extension of Theunissen Street is proposed, and two new attenuation ponds are within the identified Channelled Valley Bottom Wetland. Similarly, water pipelines will be upgraded within Sofietjies Street, Ellis Street, September Street and Reisiebaan Street within the existing residential area to the west of the study area, two of these portions cross the identified Channelled Valley Bottom Wetland.
The Koornlands River was identified as a NFEPA wetland area (Natural valley floor floodplain wetland). The sewer pipeline segments are located within this large natural floodplain system, within the western portion of the study area. This floodplain is considered to be in a moderately modified condition.
A channelled valley bottom wetland is also located just outside and just north of the study area. A portion of this wetland is considered to be natural, albeit largely modified, however a large extent thereof is considered artificial.
A small artificial wetland flat is being traversed by the most southern water pipeline segment. Other wetland flats (also considered to be artificial) are located within the central southern portion of the larger investigation area.

Construction activities impact negatively upon the surface resources on and adjacent to the site. Transformation of and edge effect on watercourse and associated floodplain area as part of an ESA. Possible chemicals found on site during construction as well as any hydrocarbon spillages could affect the non-perenial drainage line. Development of new attenuation facilities within the watercourse. Installation of water and sewer pipeline via open trenching.

Cumulative impacts:
Loss of fresh water habitat and pollution of water resources. Loss of habitat and ecological structure resulting in impacts on vegetation and biota. Potential risks to water quality. Proliferation of alien and invasive spp. Changes to ecological and socio-cultural service provision. Changes to hydrological function and sediment balance. Potential risks to water quality.

Riparian zone
Earthworks in the vicinity of drainage systems leading to increased runoff and erosion and altered runoff patterns.
Construction of the pipelines and attenuation dams altering stream flow patterns and water velocities.
Alien invasive vegetation encroachment.
Erosion and incision of riparian zone.

Instream zone
Loss of aquatic refugia.
Altered substrate conditions due to the deposition of silt
Altered depth and flow regimes in the major drainage systems
Alien vegetation proliferation

Mitigation:
- All construction activities and personnel on site to stay within demarcated construction areas.

- On-going aquatic ecological monitoring must take place on a 6 monthly basis by a suitably qualified assessor.
- At no point may construction equipment stand unauthorised within or near the river.
- All excess sediment removed from the watercourses must be utilised as part of the building activities or be removed from site. At no point may this material be dumped on site or within any of the other freshwater features identified within the surrounding area.
- If any fuel or hazardous materials is spilled on site it must be treated as according to EMP hazardous spill management requirements.
- Cement mixing only to take place within demarcated cement mixing area that has a berm so that no cement mix runoff water escapes from cement mixing area as per EMP requirements.
- Ablution facilities should be available for construction workers, should be located on the proposed construction development footprint area and should be regularly serviced with no leakages.
- Proper on-site management for the storage and use of materials and waste to prevent any potential environmental pollution should be addressed in the Environmental Management Plan for the project.
- The proposed construction works should preferably take place in the dry season when runoff to the drainage line from the construction site would be minimal.
- Should the construction works take place during the rainfall period, any contaminated runoff from the construction site or activities should be prevented from entering the environment.
- It is recommended that the upgraded attenuation dams be designed to be as natural as possible (earthed and unlined) and vegetated to function as a constructed wetland for water quality filtration.
- Care must be taken when constructing the culverts to ensure that the design accommodates a 1 in 100-year flood event and that the base levels are maintained so that no erosion or ponding of water occurs surrounding the crossing.
- Soil surrounding the wingwalls must be suitably backfilled and sloped (minimum of a 1:3 ratio) and concrete aprons as well as gabion mattresses should be installed both up and downstream for energy dissipation and sediment trapping.
- All soils within the river surrounding the culvert must be loosened on completion of works to allow for revegetation.

 Contractor laydown areas and stockpiles to be established outside of all watercourses. Special care must be taken with the CVBW. The delineated watercourse must be marked as a No-go area and access must be prohibited.

 Although no watercourses were identified within the study area, it is recommended that as much indigenous vegetation be retained within the planned open space areas to assist with soil stability and reduce dust.

 Sustainable Urban Drainage (SUDs) should be developed as part of the development where earth stormwater swales are developed and direct stormwater run-off to the attenuation facilities. As far as possible piping stormwater should be avoided.

 No indiscriminate movement of construction vehicles any of the watercourses is allowed. Use must be made of existing crossings only. Vehicles to be serviced at the contractor laydown area and all re-fuelling is to take place outside of all relevant zones of regulation.

 Care must be taken to ensure that all concrete mixing is done on batter boards or within suitably bunded areas and no cement laden run-off may enter into the CVBW or Kroonlands River.

 All works associated with the sewer and water pipelines as well as the access road and attenuation facilities must be planned for the drier summer months. The CVBW is likely to have thick mud during the wet season due to the high clay content of the soils, thus movement of construction equipment required for re-sloping of the attenuation facilities and installation of culverts may prove challenging and result in unnecessary impacts to the watercourse.

 An alien and invasive control plan must be implemented for the construction and operational phases of the development to prevent proliferation of AIPs (specifically Acacia saligna which was identified in the surrounding area) into the nearby watercourses.

 The delineated CVBW should be clearly demarcated with danger tape or another appropriate mechanism by an ECO and marked as a 'no-go' area.

 Box culverts should be installed within the CVBW and not pipe culverts. Box culverts allow for better dissipation of water across the wetland feature and allows for movement of aquatic and faunal species that may utilise the habitat.

 Surveying of the upstream and downstream areas is required in order to ensure the base of the culvert is correctly designed so that water flows through the culvert and does not undercut and flow below or

result in scouring to the downstream habitat (as can be seen with the upstream pipe culvert associated with Sofietjie Street). Should a step be required a suitable cascade structure must be installed and grouted pitching implemented below the cascade wall along with placement of packed rock and/or cobbles to ensure energy dissipation and prevent erosion.

 Reno mattresses should be installed at the end of the culvert concrete aprons as scour protection.

Concrete mixing on site:

 No mixed concrete may be deposited outside of the designated construction footprint.

 A batter board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited whilst it awaits placing.

 All wet concrete areas must be contained so as to prevent any contaminated runoff into the watercourse during the curing process. At no point may dirty water be dirty pumped into the watercourse from the construction area.

 Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.

Post Construction

 Rock and/or cobbling should take place for at least 2m upstream and downstream of the culvert crossing for energy dissipation and to create a riffle and improve habitat diversity.

 All embankments disturbed by the construction activities should be re-sloped to a 1:3 ratio or the largest slope possible to tie into the surrounding embankments and revegetated with indigenous riparian vegetation.

 Erosion and sediment build up must be monitored until all vegetation has re-established.

 Prior to the contractor leaving the site, a suitably qualified freshwater ecologist should sign off that construction and rehabilitation has taken place. At this point the freshwater ecologist should highlight any defects to be rectified.

 The proposed attenuation ponds are located within the CVBW. An outlet structure must be provided in any walls to allow for throughflow of water throughout the seasons.

 The larger attenuation pond proposed near the N1 must be designed to function as a wetland habitat. All existing gullies should be rectified, and water should be allowed to dissipate across the attenuation area before leaving the area via the box culvert under the N1. Water from the modified CVBW associated with the residential area as well as the channel from the upstream dam associated with the eastern severely modified CVBW must be accounted for.

 All embankments disturbed by the construction activities should be re-sloped to a 1:3 ratio or the largest slope possible to tie into the surrounding embankments and revegetated with indigenous riparian vegetation.

 Indigenous wetland vegetation growth should be encouraged within all attenuation facilities and alien and invasive vegetation must be controlled.

<u>Open trenching within close proximity to a watercourse:</u>

 The trenching nearby the watercourses, within the existing servitude (sewer pipeline) and road reserve (water pipeline) must be undertaken during the drier summer months. Pre-construction planning is therefore imperative in order to meet this timeframe.

 No open trenching should be undertaken within the watercourses. All sewer pipelines are to be bolted to the existing culverts and all water pipelines must remain within the existing road reserve where pipe culverts have already been installed for hydrological connectivity to the downstream reaches.

 Excavated materials should be stockpiled and may not exceed 2m in height to minimise impact on the seedbank. Mixing of the lower and upper layers of the material.

 All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the watercourse in close proximity to these stockpiles.

 After the trench has been excavated, a bedding layer (such as clean gravel) should be placed and where existing roads have been opened, the surface should be re-tarred.

Backfilling of the trenches:

 All open trenches should be backfilled immediately after pipes have been installed;

 Trenches should be backfilled with the stockpiled excavated materials in layers, up to 150mm below the natural ground level, after which the topsoil is replaced (to the stream bed level) and re-worked and the removed vegetation is reinstated as part of the rehabilitation of the site.

 Suitable waste disposal facilities should be provided;

 These facilities should regularly be emptied and taken to a registered waste disposal facility;
 If waste/spillage has entered the watercourse and caused a decrease in the water quality of the watercourse, these spills should immediately be cleared and the water within the watercourse treated as per the instruction of the ECO.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	2	2	2	2		
Probability	4	1	4	1		
Significance	36 – Medium	16 - Low	36 – Medium	16 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	2-Partial loss of resources but can be rehabilitated and mitigated		2-Partial loss of resources but can be rehabilitated and mitigated			
Can impacts be mitigated?	2-Partly		2-Partly			

Nature of impact:
Introduction of alien plant species

Discussion:
Declared Weeds may be transported onto the site and spread to surrounding natural areas. This may have management and cost impacts on such properties. Introduction of alien plant species via building material and vehicular traffic is an important aspect that needs to be considered. Alien grass seeds for example may become attached to vehicles and be transported to site or be brought on to site in building materials such as sand. Without monitoring and control this could become problematic.

Cumulative impacts:
Disturbance and transformation of surrounding undeveloped indigenous vegetation areas.

Mitigation:
- Undertake construction activities only in identified and specifically demarcated areas.
- An important aspect of on-going maintenance is the monitoring of the rehabilitated sites and access road verges for alien plant species.
- Ensure building materials brought onto site are free of alien seeds.
- Materials such as sand and stone should, wherever possible, be sourced from local areas which are free of alien plants.
- Rehabilitation of disturbed area should be done with seeds collected in the area during rehabilitation and with topsoil as derived of the development site.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	2	3	2	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	8	2	8	2		
Probability	4	2	4	2		
Significance	64-High	10-Low	64-High	10-Low		
Status	High negative significance if not mitigated	Low negative significance if mitigated	High negative significance if not mitigated	Low negative significance if mitigated		

Reversibility	100%	100%	
Irreplaceable loss of resources	1 – Resource will not be lost	1 – Resource will not be lost	
Can impacts be mitigated?	1- Completely	1- Completely	

Nature of impact:
Impact on the naturally occurring fauna and avifauna present in the area

Discussion:
Sensitive environmental features such as medium to high botanical sensitivity areas are proposed to be excluded from the proposed development area. The proposed development should not have significant impact on fauna or avifauna species or their habitat of conservation concern.

Animals and birds will move away to adjacent remaining indigenous vegetation areas during construction activities.

Cumulative impacts:
Loss of indigenous fauna and avifauna species habitat.

Mitigation:
- Undertake construction activities only in identified and specifically demarcated areas.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	2	3	2	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	4	2	4	2		
Probability	3	2	3	2		
Significance	36-Medium	10-Low	36-Medium	10-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	2 – Partial loss		2 – Partial loss			
Can impacts be mitigated?	2 - Partly		2 - Partly			

6.2.3 POTENTIAL SOCIO AND ECONOMIC IMPACTS

Nature of impact:
Increased jobs

Discussion:
Temporary construction jobs will be created. The locals may not have sufficient skills to utilize the employment opportunities and "others (work force and job seekers)" may be employed from outside the community.

Cumulative impacts:
- Influx of contract workers due to lack of skills.
- Influx of job seekers due to jobs created.
- Littering.

Mitigation:
- Local contractors, employing or seeking to employ local (historically disadvantaged individuals (HDIs) from the region who are suitably qualified, should get preference.
- The municipality, local community and local community organizations should be informed of the project and potential job opportunities by the developer.

Criteria	Layout Alternatives 1-2	No-Go Alternative	
Status	Positive	NA	NA

Nature of impact:
Increased traffic due to the construction activities requiring various vehicles to come onto and leave the site.

Discussion:
The construction machinery will only have a traffic impact on delivery to, and collection from the site and are therefore regarded as negligible

Cumulative impacts:
The minor increase in traffic volumes at certain times of day will add to the existing traffic volumes. As the existing traffic volumes are relatively low, this cumulative impact is not expected to be significant.

Mitigation:

- Adhere to speed limit and road rules.
- Work during normal working hours and only use demarcated access and internal roads
- Only allow drivers with valid driver's licenses to drive and/or operate construction vehicles

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1		
Duration	2	1	5	1		
Magnitude	4	4	6	4		
Probability	4	3	5	5		
Significance	32 - Medium	18 - Low	65 - High	30 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if not mitigated	High negative significance if not mitigated	Low negative significance if mitigated	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Reversibility	100%		100%			
Irreplaceable loss of resources	1 – No loss		1 – No loss			
Can impacts be mitigated?	2 - Partly		2 - Partly			

Nature of impact:
Noise due to construction machinery

Discussion:
Construction machinery may cause noise disturbance to the directly adjacent land users/ owners. It is not anticipated that the noise will be considerable and will only be temporary.

Cumulative impacts:
Noise due to construction activities may cause a nuisance to adjacent residential areas.

Mitigation:

- Construction activities should be restricted to weekday working hours.
- Machinery and vehicles should be regularly maintained to prevent excessive noise.
- All machinery and work activities must adhere to the requirements of the noise regulations.
- Construction not to take place during peak holiday season middle Dec – middle January.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	2	3	2		
Duration	1	1	1	1		
Magnitude	4	2	4	2		
Probability	3	2	3	2		
Significance	24- Low	10-Low	24-Low	10-Low	Not Applicable (No	

Status	Low negative significance if not mitigated	Low negative significance if mitigated	Low negative significance if not mitigated	Low negative significance if mitigated	construction activities to take place during the No-Go Alternative)
Reversibility	This will not be a long term impact nor will it have an impact on the natural processes. It is thus 100% reversible.		This will not be a long term impact nor will it have an impact on the natural processes. It is thus 100% reversible.		
Irreplaceable loss of resources	1- No resources will be lost.		1- No resources will be lost.		
Can impacts be mitigated?	2 Partly – Construction noise will occur but it is not expected to be significant		2 Partly – Construction noise will occur but it is not expected to be significant		

Nature of impact:
Dust and emissions pollution arising from ground clearing and other construction activities

Discussion:
It is anticipated that construction will occur during the dry season in order to prevent construction delays due to the rains and to protect hydrological features from pollution. As such, dust will be present on the site and the access roads. Should the construction machinery not be properly maintained, emissions pollution may occur. Either one or a combination of the above may affect the surrounding land users/ owners if not managed.

Cumulative impacts:
Dust and emissions impacts on surrounding environment and community.

Mitigation:

- Undertake dust suppression if necessary. If dust suppression and/or surface hardening is undertaken by using water only non-potable water resources must be used.
- Only clear the areas to be developed upon, no additional areas outside of the proposed development footprint area may be cleared.
- Plant additional vegetation where needed after construction during site rehabilitation if required.
- Service and maintain construction vehicles on a frequent basis.

Criteria	Layout Alternative 1 Without Mitigation	Layout Alternative 1 With Mitigation	Layout Alternative 2 Without Mitigation	Layout Alternative 2 With Mitigation	No-Go Alternative Without Mitigation	No-Go Alternative With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	2	1	2	1		
Magnitude	4	4	4	4		
Probability	4	3	4	3		
Significance	32 - Medium	18 - Low	32 - Medium	18 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if not mitigated	Medium negative significance if not mitigated	Low negative significance if not mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	1 – No loss		1 – No loss			
Can impacts be mitigated?	2 - Partly		2 - Partly			

6.2.4 POTENTIAL IMPACTS ON HERITAGE AND CULTURAL ASPECTS

Nature of impact:
Visual impact of construction of proposed housing.

Discussion:
The surrounding land users/ owners will be exposed to the presence of the construction machinery. It is not anticipated that the visual impact of the construction activities will be very significant as it will only be temporary until development is complete.

Cumulative impacts:
Unsightly construction camp/s and activities on construction site

Mitigation:

- Proposed construction activities must be limited to development footprint site.
- Construction camp must be neatly fenced and construction site must be neat and tidy.
- Stockpile construction materials in one specific area.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	1	1	1	1		
Magnitude	6	2	6	2		
Probability	4	3	4	3		
Significance	40-Medium	12-Low	40-Medium	12-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2- Partial loss due to unavoidable visual impact					
Can impacts be mitigated?	2 Partly – Construction camp and activities will have a visual impact but significance can be mitigated					

Nature of impact:
The potential impact of the proposed development on archaeological, paleontological and heritage remains

Discussion:
Notice of Intent to Develop submitted to Heritage Western Cape and confirmation was received that HWC agrees there are no significant heritage resources on site that will be impacted upon by the proposed development and no further heritage impacts assessments are required.

Cumulative impacts:
Destruction of cultural- historical features at the site will contribute to the loss of such features in the general area due to other non-related activities. This can at all times be mitigated to prevent/ minimise the loss of such features.

Mitigation:
Should any burials, fossils or other historical material be encountered during construction, work must cease immediately and HWC must be notified.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	0	0	0	0		
Probability	1	1	1	1		
Significance	7-Low	2-Low	7-Low	2-Low		

Status	Low negative significance if not mitigated	Low negative significance if mitigated	Low negative significance if not mitigated	Low negative significance if mitigated	
Reversibility	0% reversibility – once the historical features are destroyed, it cannot be recovered.		0% reversibility – once the historical features are destroyed, it cannot be recovered.		
Irreplaceable loss of resources	3- Yes, completely irreplaceable		3- Yes, completely irreplaceable		
Can impacts be mitigated?	1-Yes		1-Yes		

(B) IMPACTS THAT MAY RESULT FROM THE OPERATIONAL PHASE

6.2.5 POTENTIAL IMPACTS ON GEOGRAPHICAL AND PHYSICAL ASPECTS

Nature of impact:
Increase in storm water runoff due to hardening of surfaces which may lead to erosion of surrounding areas

Discussion:
Due to an increase in hardened surfaces stormwater runoff and speed may increase which may lead to erosion of surrounding environments if not mitigated.

Cumulative impacts:
Soil erosion due to hardening of surfaces could lead to further degradation of surrounding indigenous vegetation areas. Soil erosion may lead to loss in topsoil and impact environmental processes of adjacent sensitive environments. Potential flooding.

Mitigation:

- Monitor for erosion of surrounding undeveloped areas and implement storm water management measures as recommended in the environmental management program.
- Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion.
- Rehabilitate or stabilise eroded areas immediately to prevent increase/spread of erosion.
- Only use existing access road to the site for operational purposes and avoid disturbance of “new” areas outside the existing access roads and infrastructure footprint.
- Stormwater infrastructure must not cause erosion of the surrounding remaining undeveloped areas, but still allow current hydrological processes to continue as is.
- The municipality must maintain all stormwater infrastructure on a regular basis to ensure that it is working effectively and is not blocked with waste.
- Maintenance in accordance with MMP.

Criteria	**Layout Alternative 1**		**Layout Alternative 2**		**No-Go Alternative**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	3	1	3	1	Neutral (Site remains as is)	
Duration	5	1	5	1		
Magnitude	6	2	6	2		
Probability	4	2	4	2		
Significance	56 - Medium	8 - Low	56 - Medium	8 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					

Can impacts be mitigated?	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.	

Nature of impact:
Increase in storm water runoff leading to altered flow in drainage line

Discussion:
Removal of vegetation and hardening of surfaces will cause an increase in storm water runoff from the site unto the adjacent environment

Cumulative impacts:
Increase in storm water runoff could cause soil erosion on surrounding natural environment and lower lying drainage line area. Soil erosion may lead to loss in topsoil and impact environmental processes. Potential flooding.

Mitigation:

- All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated.
- Monitor for erosion of surrounding undeveloped areas and implement storm water management measures as recommended in the environmental management program.
- Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion, but still allow current hydrological processes to continue as is.
- Rehabilitate or stabilise eroded areas immediately to prevent increase/spread of erosion.
- Manage storm water in accordance with site specific Storm Water Management Plan.
- Maintenance in accordance with MMP

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Neutral (Site remains as is)	
Duration	5	1	5	1		
Magnitude	6	2	6	2		
Probability	4	2	4	2		
Significance	56 - Medium	8 - Low	56 - Medium	8 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					
Can impacts be mitigated?	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					

6.2.6 POTENTIAL IMPACTS ON BIOLOGICAL AND ECOLOGICAL ASPECTS

Nature of potential impact:
Edge effects on terrestrial indigenous vegetation areas including ESAs

Discussion:
During the operation of the proposed housing development human impacts such as illegal waste dumping, informal settlements etc. can have a detrimental impact on the surrounding indigenous vegetation areas. The hardening of surfaces may also lead to an increase in storm water runoff which will also have a detrimental impact on adjacent indigenous vegetation areas.

Cumulative impacts:
Habitat fragmentation; loss of ecological connectivity and erosion.

Mitigation:

- The site-specific storm water management plan must be complied with for the operational phase of the proposed development and implemented in such a manner as to prevent any additional storm water run-off entering the adjacent indigenous vegetation areas and potentially causing erosion leading to further habitat fragmentation.
- The no-go areas must be maintained and the municipality must manage and ensure that no illegal waste dumping, vegetation clearance, informal settlement establishment etc. occurs within these areas.
- Should any erosion, illegal waste dumping, vegetation clearance, informal settlement establishment etc. occur within the buffer and no-go areas the municipality must ensure that these impacts are rectified as soon as possible and take active steps to rehabilitate the impacted areas and prevent these impacts from re-occurring.
- The municipality must ensure that all windblown or dumped waste that might be present along the edge or within the applicable indigenous vegetation areas be removed on a monthly basis so as not to have any potential detrimental impact on the environment.
- An ongoing alien vegetation clearing and monitoring programme must be implemented to eradicate all alien vegetation species on applicable land as owned by the municipality.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	5	5	5		
Magnitude	10	6	10	6		
Probability	5	5	5	5		
Significance	90 - High	60- Medium to High	90 - High	60- Medium to High		
Status	High negative significance if not mitigated	Medium to High negative significance if mitigated	High negative significance if not mitigated	Medium to High negative significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	2-Partial loss of resources but can be rehabilitated and mitigated		2-Partial loss of resources but can be rehabilitated and mitigated			
Can impacts be mitigated?	2- Partially mitigatable, clearance of indigenous vegetation remnants can be restricted to proposed development areas as assessed and impacted surrounding areas can be rehabilitated, managed and protected.		2- Partially mitigatable, clearance of indigenous vegetation remnants can be restricted to proposed development areas as assessed and impacted surrounding areas can be rehabilitated, managed and protected.			

Nature of potential impact:
Impact of proposed development on surface water resources and hydrological features

Discussion:
Operational activities may impact negatively upon the surface resources on and adjacent to the site. Transformation of and edge effect on watercourse and associated floodplain area as part of a ESA.
During the operation of the proposed housing development human impacts such as illegal waste dumping, informal settlements etc. can have a detrimental impact on the adjacent watercourse and its associated floodplain area. Maintenace of storm water infrastructure within the watercourse may also impact of the functining of the watercourse if not managed effectively. The non-perennial riverine systems have very low flows as part of their annual hydrological cycles and are particularly susceptible to changes in habitat condition. The proposed development project has the potential to lead to habitat loss and/or alteration of the aquatic and riparian resources on the study area. It is however important to note that the freshwater ecology, and especially aquatic habitats of most of the systems has been seriously to critically impaired or impacted already as a result of existing infrastructure and as such the risk to the receiving environment as a result of the proposed project is reduced to some degree.

Possible contamination of freshwater soils and increased toxicants into the downstream watercourses. Potential failure of infrastructure, resulting from blockages or leakages.

Cumulative impacts:
Loss of fresh water habitat and pollution of water resources.
Riparian zone -Alien invasive vegetation encroachment. Erosion and incision of riparian zone.
Instream zone - Loss of aquatic refugia. Altered substrate conditions due to the deposition of silt. Altered depth and flow regimes in the major drainage systems Alien vegetation proliferation

Mitigation:
- A site specific storm water management plan.
- Open areas must be maintained and the municipality must manage and ensure that no illegal waste dumping, vegetation clearance, informal settlement establishment etc. occurs within these areas.
- Should any erosion, illegal waste dumping, vegetation clearance, informal settlement establishment etc. occur within the buffer and no-go areas the municipality must ensure that these impacts are rectified as soon as possible and take active steps to rehabilitate the impacted areas and prevent these impacts from re-occurring.
- All alien invasive plant species must be removed and managed on an ongoing basis within the drainage line area and surrounds. Removal of alien invasive plant species must take place according to CapeNature approved methods, having the least negative impact on the environment.
- Any maintenance activities must take place according to an approved MMP.
- Operational phase EMPr must be complied with.

 An alien vegetation management plan should be developed and implemented and managed for all open space areas as well as the CVBW and associated attenuation facilities.
 As much indigenous terrestrial vegetation should be included into the landscape plan for the open space areas. This is especially true as open space areas will likely be utilised by the local community as grazing for livestock.
 Both the water and sewer pipeline and all manholes must be pressure tested for integrity upon the completion of construction.
 It is recommended that the managing authority test the integrity of the pipelines at least once every five years or more often should there be any sign or reports of a leak.
 Should a blockage occur all possible steps are to be taken to prevent the pollution (specific to the sewer pipeline) of the watercourse during repair, including the placement of sheeting around the manhole used for access as well as containment barrels for any effluent withdrawn.
 No vehicles are permitted to drive through any watercourses. Any maintenance works must be undertaken by foot or the relevant authorisations obtained beforehand.
 On repair of any leaks, all excavated areas must be backfilled, and alien vegetation proliferation must be monitored until basal cover has been established.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	2	2	2	2		
Probability	4	1	4	1		
Significance	36 – Medium	16 - Low	36 – Medium	16 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	2-Partial loss of resources but can be rehabilitated and mitigated		2-Partial loss of resources but can be rehabilitated and mitigated			
Can impacts be mitigated?	2-Partly		2-Partly			

6.2.7 POTENTIAL SOCIO AND ECONOMIC IMPACTS

Nature of impact: Increase in housing
Discussion: The proposed development will provide much needed housing. The overall level of access to formal dwellings is 88.6 per cent in Swellendam. According to the Swellendam Municipality the housing waiting list for Swellendam is 2193 (as at 2018). See Appendix G3. This development will help relieve this backlog significantly.
Cumulative impacts: The reason for this development is to provide the community with residential housing
Mitigation: Ongoing maintenance of services infrastructure.

Criteria	Layout Alternative 1 Layout Alternative 2	No-Go Alternative
Status	High positive significance	High Negative Impact, no provision of housing to take place

Nature of impact: Increased traffic due to proposed residential development.
Discussion: From the analysis it can be concluded that, although the development will generate a considerable number of trips, the traffic impact thereof will be moderate, with no improvements required at any of the affected intersections except for the 4-way stop Soufietjie Street / Ellis Street intersection where service levels can be improved by removing stop control on the Soufietjie Street legs.
Cumulative impacts: The increase in traffic volumes at certain times of day will add to the existing traffic volumes.

Mitigation:
It is recommended that the proposed Swellendam low cost housing development be approved, on condition that the following recommendations are considered:

- The Station Street / Industries / SWD Bande intersection should be upgraded as shown in Figure 3 to improve safety;
- The surface of Station Street between the N2 underpass and the railway crossing is in need of repair;
- The four-way stop at the Soufietjie Street / Ellis Street intersection should be changed so that traffic on Soufietjie Street has free flow and only traffic on Ellis Street has to stop;
- Swellendam Municipality should reserve space along the proposed alignments of the three routes that may serve as links between Railton and the external road network (N2 and DR 1321)
- Space should also be reserved for the proposed new internal Railton roads so that these roads can be provided if required in future;
- Minibus taxi route descriptions should be amended to include a route through the new development, once fully occupied;
- Streets along the school bus routes (probably Theunissen Street, May Street,
- Soufietjie Street, Aster Avenue, Boslelie Street and Madeliefie Street) may have to be widened to accommodate regular bus traffic;
- Paved sidewalks be provided along Theunissen Street and other roads leading up to the schools.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	3	3	3	Neutral (Site remains as is)	
Duration	5	5	5	5		
Magnitude	8	6	8	6		
Probability	4	4	4	4		
Significance	64- High	56-Medium	64- High	56-Medium		
Status	High negative significance if not mitigated	Low negative significance if mitigated	High negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	1-Will not be lost		1-Will not be lost			
Can impacts be mitigated?	2 Partly – Traffic Impact will occur, but will not be significant due to very low existing traffic and scale of proposed development.		2 Partly – Traffic Impact will occur, but will not be significant due to very low existing traffic and scale of proposed development.			

Nature of impact:
Noise due to new residential development.

Discussion:
Once developed this will lead to additional “residential noise” created in the area.

Cumulative impacts:
Noise due to residential development may cause a nuisance to adjacent residential areas. It is however not expected that this will be significant as it will not be in excess of current residential noise produced by existing residential areas.

Mitigation:

- Municipality to implement law enforcement as/if required to maintain average residential noise levels.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without	With	Without	With	Without	With

	Mitigation	Mitigation	Mitigation	Mitigation	Mitigation	Mitigation
Extent	3	2	3	2		
Duration	1	1	1	1		
Magnitude	4	2	4	2		
Probability	3	2	3	2		
Significance	24- Low	10-Low	24-Low	10-Low		
Status	Low negative significance if not mitigated	Low negative significance if mitigated	Low negative significance if not mitigated	Low negative significance if mitigated	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Reversibility	100%		100%			
Irreplaceable loss of resources	1- No resources will be lost.		1- No resources will be lost.			
Can impacts be mitigated?	2 Partly – Noise will occur but it is not expected to be significant		2 Partly – Noise will occur but it is not expected to be significant			

Nature of impact:
Additional load on existing municipal services infrastructure such as electricity, water, sewage and waste handling.

Discussion:
The addition of the proposed residential development will lead to increased pressure on municipal services infrastructure in terms of electricity and water provision, sewage and waste handling facilities.

Cumulative impacts:
Increased pressure on municipal services infrastructure i.e. water, electricity and waste disposal services.

Mitigation:

- The municipality to ensure that adequate municipal services infrastructure exists to service the proposed housing development and to maintain existing and all new services infrastructure as proposed.
- Upgrade and maintain municipal services infrastructure as required according to the Engineer Services Report as available under Appendix G of this report.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1		
Duration	5	5	5	5		
Magnitude	8	4	8	6		
Probability	5	5	5	5		
Significance	80 - High	50 - Medium	80 - High	60 - Medium		
Status	High negative significance if not mitigated	Medium negative significance if mitigated	High negative significance if not mitigated	Medium negative significance if mitigated		
Reversibility	100%				Neutral (Site remains as is)	
Irreplaceable loss of resources	1 – Resource will not be lost					
Can impacts be mitigated?	2 Partly – While increase in demand for municipal services will occur the significance thereof can mitigate by confirming that current services infrastructure is adequate to accommodate proposed industrial development and by ongoing maintenance of existing and proposed services infrastructure.					

6.2.8 POTENTIAL IMPACTS ON HERITAGE AND CULTURAL ASPECTS

Nature of impact:
Visual impact of proposed housing.

Discussion:
It is not anticipated that the visual impact of the proposed housing will have a significant visual impact as it will blend in with adjacent existing residential areas once developed and will not be directly adjacent to any significant tourist routes.

Cumulative impacts:
Visual impact of newly created housing.

Mitigation:

- Proposed development activities must be limited to the proposed development footprint site.
- If any areas outside of the proposed development footprint area is disturbed it must be immediately rehabilitated.

Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	1	1	1	1		
Magnitude	6	2	6	2		
Probability	4	3	4	3		
Significance	40-Medium	12-Low	40-Medium	12-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2- Partial loss due to unavoidable visual impact					
Can impacts be mitigated?	2 Partly – Top structures to blend in with existing residential areas.					

(C) IMPACTS THAT MAY RESULT FROM THE DECOMMISSIONING PHASE

It is not anticipated that decommissioning will occur in the near future. Should decommissioning occur, the expected impacts are similar to those listed in the construction phase above with the additional positive impact of rehabilitating the decommissioned area to a near natural/indigenous state and negative impact of destroying houses and infrastructure. Impacts must be mitigated and managed according to the best practise techniques/management measures available for that time.

(D) IMPACTS THAT MAY RESULT FROM THE NO DEVELOPMENT ALTERNATIVE

The No-Development option will result in the site remaining as it is presently, transformed vacant municipal land adjacent to existing residential areas. A look at the Need and Desirability input will both indicate popular local support for both the concept and place as manifested in the IDP and SDF for the Swellendam Municipality. Also refer to motivational reports as attached under Appendix H.

SECTION 7: SPECIALIST ASSESSMENTS, RECOMMENDATIONS AND CONCLUSIONS

ECOLOGICAL BASELINE ASSESSMENT FOR PROPOSED SWELLENDAM HOUSING PROJECT (Sites E & H on RE/1 and Site I on RE/157) – ECO IMPACT – 2015 AND REVISED IN MAY 2018

Site H is an undulating area in-between the residential area and the railway line of Swellendam South. At least ±42ha of the ±50ha area surveyed have been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown). Little to mainly no indigenous vegetation species have returned to this 42ha transformed area and this area therefore has low conservation value and low botanical sensitivity.

The ± 8ha area which seems not to have been ploughed continuously or not at all in some sections still contains indigenous vegetation in a moderate to good condition, but due to isolated nature of the remnant and low ecological connectivity value it therefore has a medium conservation value and medium botanical sensitivity. No evidence of surface water or aquatic vegetation species indicating the presence of a wetland area is present on the site.

According to the Western Cape Biodiversity Spatial Plan (WCBSP, 2017) approximately 19 ha is classified as Critical Biodiversity Area 2 ("CBA2") while approximately 31ha is classified as Ecological Support Areas. ESA are defined as areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs and are often vital for delivering ecosystem services. From the survey conducted this specialist believes the CBA status of this area has not been be ground-truthed and has indicated their observations on Map 5 of this report.

As according to Mucina and Rutherford (2006) the type of natural vegetation originally occurring on all three sites as surveyed are classified as Swellendam Silcrete Fynbos (Endangered).

Site H- At least ±42ha of the ±50ha area surveyed have been completely transformed presumably by previous cultivation activities that took place on the site (exact date of when the area was last ploughed and cultivated is unknown) and supports no intact natural habitat, and very low to mainly non-existent indigenous plant diversity. The species present include typical widespread **agricultural weeds and grasses, and a few indigenous resilient herbs and grasses**. Little to mainly no indigenous vegetation species have returned to this 42ha transformed area and this area therefore has low conservation value and low botanical sensitivity. No alien tree infestation is present on the site.

If strict adherence is kept to the recommendations as set out in this report and a site-specific Environmental Management Programme with associated storm water management guidelines is compiled and implemented, the proposed development will not have a significant impact on any listed species or sensitive environments.

No significant fauna of avifauna breeding, roosting or their associated habitat will be impacted upon. Most species occasionally visiting the recommended development areas will move out of

the area into adjacent indigenous vegetation habitats when construction activities start.

BOTANICAL BASELINE ASSESSMENT OF FIVE POTENTIAL HOUSING SITES IN SWELLENDAM - NICK HELME BOTANICAL SURVEYS - 29 NOVEMBER 2017

The CapeNature Spatial Biodiversity Plan (Pence 2017) indicates that large parts of the study areas are mapped as Environmental Support Areas (ESAs) or Critical Biodiversity Area (CBA 2), and only a small portion as CBA1. It should be noted that I do not agree with much of this automated mapping, as it is clearly inaccurate and misrepresents the real conservation priorities in the area.

The CBA2 category is supposed to reflect degraded areas that still have biodiversity value, whereas the CBA1 category is supposed to apply to undisturbed areas, and ESAs are also generally partly degraded areas and are of lower status than CBAs. All CBAs are considered essential for the maintenance of biodiversity and for meeting national conservation targets for species and ecological processes. In reality large parts of the areas mapped as ESA and CBA 2 are essentially pristine areas which should actually be mapped as CBA1. The mapping would seem to indicate that sites B, D and E are of higher conservation value than I and H, which is supported. The mapping overstates the conservation case for sites I and H, as both are previously cultivated.

Site H - This large area was previously a cultivated field (more than ten years ago), and is now dominated by a mix of **agricultural grasses and herbs**, and **some pioneer indigenous species**. Species include *Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Hyparrhenia hirta, Elytropappus rhinocerotis, Ursinia discolor, Anthospermum spathulatum, Gnidia laxa, Protea repens, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia, Melinis repens, Corycium orobanchoides and Tritonia disticha*.

No plant SCC were recorded, and none are expected to occur. Botanical sensitivity is Low.

Development of the study areas will effectively result in the loss of all existing natural and partly natural vegetation on site. This loss will occur at the construction phase and is regarded as a direct impact. An additional important direct construction phase impact will be the loss of the site populations of the plant Species of Conservation Concern on site.

Indirect impacts usually occur at the operational phase. Indirect impacts are often related to the loss of ecological connectivity and habitat fragmentation associated with development, and the impacts on fire return intervals for adjacent natural vegetation.

Areas H and I present no significant botanical constraints to the proposed development, and these areas thus present the best opportunities for the expansion of housing in the study area, along with the Low sensitivity portion of Area B.

The landowner (Municipality) should be required to implement their duty of care under NEMBA and CARA, and should clear all invasive alien vegetation in the High sensitivity areas, using CapeNature approved methodology. All woody invasive alien vegetation should be removed from these areas as soon as possible, and certainly by the end of 2018. A qualified alien

clearing contractor should be employed to undertake the work, as they should have the tools and knowledge to do the work properly. In this regard it is essential that no spraying of herbicide be allowed on site, due to the high risk of collateral damage to non-target plants. Appropriate herbicide must be hand painted onto the cut stumps of all felled Acacia within ten minutes of felling, in order to prevent re-sprouting. All cut alien material must be removed by hand from the conservation area, and can then be chipped for mulch, or should be neatly stacked into pyramids on site.

BOTANICAL STATEMENT: IMPACT OF HOUSING DEVELOPMENT ON SITE H, SWELLENDAM- NICK HELME BOTANICAL SURVEYS – 14 DECEMBER 2018

The southern quarter of site H is mapped as a CBA (but is excluded from development), whilst the rest – including the whole development area – is mapped as an ESA by Pence (2017). As noted in the baseline assessment the entire proposed development area is deemed to be of Low botanical sensitivity, as it was all previously cultivated, and although it has lain fallow for quite some time the indigenous species diversity is still relatively low (less than 15% of what would have been present in the area prior to cultivation). All indigenous species noted are common and widespread species typically found in disturbed or partly disturbed areas, and no plant Species of Conservation Concern or special habitats were recorded. As all vegetation currently on site will be lost the intensity of the loss of vegetation on site will be high, and at the site scale, and loss will be permanent. However, because the vegetation on site is of low diversity and low sensitivity the overall significance of the loss of the vegetation on site is Low negative, before and after mitigation. The development area is adjacent to existing development and is therefore well situated in terms of development and conservation planning, as loss of ecological connectivity and habitat fragmentation is thus minimised. The development area does not serve as an important ecological corridor between priority patches of remnant habitat. There is essentially no mitigation that can be undertaken, and given the low significance no specific mitigation is required, other than simply fencing off the development area from the southern area mapped as a CBA prior to and during all construction. The cumulative significance of the loss of the vegetation in the study area is Low negative, as although the area is fairly large the vegetation on site is all secondary (post cultivation) and contributes very little to achievement of national conservation targets for this vegetation type, and no mapped CBAs or plant Species of Conservation Concern will be lost.

FRESHWATER ECOLOGICAL IMPACT ASSESSMENT - PROPOSED SWELLENDAM HOUSING AND BULK SEWER PIPELINE CONSTRUCTION – ECO IMPACT - 23 SEPTEMBER 2018 AND REVISED 11 DECEMBER 2018 FOLLOWING PEER REVIEW

The Koornlands River was identified as a NFEPA wetland area (Natural valley floor floodplain wetland and an artificial NFEPA wetland) was identified in the western non-perennial stream where the sewer pipeline will cross the river. The Koornlands perennial river and non-perennial river that will be impacted was identified as Ecological Support Areas (ESAs) in the latest Western Cape Biodiversity Spatial Plan (2017). The non-perennial river on the western side of the proposed housing development in which two sewer pipeline crossings, a road and the upgrade of two attenuation dams is planned and proposed starts south of the site on a cemetery and flows in a northern direction. Based on the impact assessment it is evident that there are seven possible impacts on the freshwater ecology of the area observed. In considering the impacts and mitigation, it is assumed that a high level of mitigation will take place without high prohibitive costs. From the table it is evident that prior to mitigation, the impacts on the loss of

freshwater ecology habitat, disturbance to subsurface geological layers, degradation / loss of naturally occurring / indigenous flora and habitats are medium level impacts, which can be mitigated and will be reduced to low level impacts. The other four impacts identified all has low impacts that is reduce to very low with the proposed mitigation measures.

Essential mitigation measures:

• Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of aquatic habitats in the area.
• Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the project. The non-impacted areas of the water courses and wetlands, its riparian zones and 32m buffer areas is regarded as no go and no impact areas.
• On-going aquatic ecological monitoring must take place on a 6 monthly basis by a suitably qualified assessor.
• Contractor laydown areas and stockpiles to be established outside of the 100m Zone of Regulation implemented around the water courses and wetlands.
• Vehicles to be serviced at the contractor laydown area and all re-fuelling is to take place outside of all relevant zones of regulation;
• Care must be taken to ensure that all concrete mixing is done on batter boards or within suitably bunded areas and no cement laden run-off may enter into the preferential surface flow pathway or the downstream ephemeral stream;
• Permit only essential construction personnel within 32m of all riparian systems;
• Restrict construction activities to the drier summer months, if possible, to avoid sedimentation and siltation of riparian features in the vicinity of the proposed development and aim for completion in early spring at which time revegetation should take place allowing for a full summer growing season to become established.
• Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation.
• In order to access the river with the required construction equipment and activities, and upgrading of the attenuation dams, vegetation will need to be cleared. All vegetation removed must be disposed of at a suitable disposal facility.
• At no point may construction equipment stand unauthorised within or near the river.
• All excess sediment removed from the watercourses must be utilised as part of the building activities or be removed from site. At no point may this material be dumped on site or within any of the other freshwater features identified within the surrounding area. Topsoil will have a high density of alien invasive seeds which will need to be controlled into the operational phase.
• It is recommended that the upgraded attenuation dams be designed to be as natural as possible (earthed and unlined) and vegetated to function as a constructed wetland for water quality filtration.
• One culvert crossings are proposed over the river to gain access. Care must be taken when constructing the culverts to ensure that the design accommodates a 1 in 100 year flood event and that the base levels are maintained so that no erosion or ponding of water occurs surrounding the crossing.
• Soil surrounding the wingwalls must be suitably backfilled and sloped (minimum of a 1:3 ratio) and concrete aprons as well as gabion mattresses should be installed both up and downstream for energy dissipation and sediment trapping.
• All soils within the river surrounding the culvert must be loosened on completion of works to allow for revegatation.
• Should any damage occur to existing infrastructure or private property as a result of

construction activities; the relevant service provider / landowner must be contacted and the repair/replacement must be commissioned to the satisfaction of the service provider / landowner. Should spillage occur, the BGCMA and DEA&DP: Pollution and chemical management directorate must be informed immediately.

• All waste generated on site shall be collected and disposed of at a registered landfill facility;

• All safe disposal certificates and waste manifests from service providers to be kept and maintained;

• All staff to receive training on correct waste management practices.

• The preferential flow pathway of the stormwater outlets to the non-perennial river should be rehabilitated into an earth stormwater swale and re-vegetated with indigenous wetland species. All stormwater swales proposed for the study area as well as the two proposed attenuation ponds should be constructed with a slope of not steeper than a 1:3 ratio and a degree of sinuosity should be re-established. The swale should be lined with rock and/or cobbles to create additional ecological habitat.

Operational Phase

• Regular inspection and maintenance of the sewer pipeline.

• Infrastructure failure reported or identified to be fixed as a priority.

• Spillage of raw sewerage to be mitigated and remediated where required.

• Should any damage occur to existing infrastructure or private property as a result of construction activities; the relevant service provider / landowner must be contacted and the repair/replacement must be commissioned to the satisfaction of the service provider / landowner. Should spillage occur, the BGCMA and DEA&DP: Pollution and chemical management directorate must be informed immediately.

Conditions for inclusion in the environmental authorisation

• Appointment of Environmental Control Officer during construction phase

• Should any damage occur to existing infrastructure or private property as a result of construction activities; the relevant service provider / landowner must be contacted and the repair/replacement must be commissioned to the satisfaction of the service provider / landowner. Should spillage occur, the BGCMA and DEA&DP: Pollution and chemical management directorate must be informed immediately.

FRESHWATER RESOURCE VERIFICATION FOR THE PROPOSED SWELLENDAM HOUSING AND BULK SEWER AND WATER PIPELINES, WESTERN CAPE BY SCIENTIFIC AQUATIC SERVICES DATED JANUARY 2019

According to the NFEPA Database no wetland features are located within the study area. However, the sewer pipeline segments are located within a large natural floodplain system, within the western portion of the study area. This floodplain is considered to be in a moderately modified condition (WETCON = C). A channelled valley bottom wetland is also located just outside and just north of the study area. A portion of this wetland is considered to be natural, albeit largely modified (WETCON Z2), however a large extent thereof is considered artificial. A small artificial wetland flat is being traversed by the most southern water pipeline segment. Other wetland flats (also considered to be artificial) are located within the central southern portion of the investigation area. The study area is approximately 33 hectares in extent and is located just south of the N2 highway. No watercourses were identified within the study area, however, a Channelled Valley Bottom Wetland was identified approximately 300m to the west of the study area.This system was identified as a non-perennial river by Hanekom (2018).

The proposed new access road, an extension of Theunissen Street is proposed, and two new

attenuation ponds within the identified Channelled Valley Bottom Wetland. Similarly, water pipelines will be upgraded within Sofietjies Street, Ellis Street, September Street and Reisiebaan Street within the existing residential area to the west of the study area, two of these portions cross the identified Channelled Valley Bottom Wetland.

Three segments of the bulk sewer pipeline will be upgraded on Station Street (85m in length), Lombard Street (328m in length) and from Rothman Street in a north eastern direction (300m in length). The segments are located within 100m of or will cross the Kroonlands River.

There are five key ecological risks on watercourses that were assessed, namely:

➢ Loss of freshwater feature habitat and ecological structure resulting in impacts to biota;

➢ Changes to the socio-cultural and service provision;

➢ Impacts on the hydrology and sediment balance of the freshwater features;

➢ Impacts on water quality; and

➢ Proliferation of alien and invasive plant species.

The proposed housing development will fall within 500m of the Channelled Valley Bottom Wetland and therefore consideration must be given to the potential risks of the development to the system. Similarly, two segments of the proposed water upgrade will traverse the CVBW within an existing road, a new access road will be developed as well as two new attenuation ponds within the CVBW. Furthermore, a new pump house will be developed within 32m of the CVBW.

The proposed sewer upgrade will traverse the Kroonlands River, however, segment 1 of the bulk sewer upgrade is located approximately 30m north of the river and all crossings over the Kroonlands River will be undertaken by bolting the pipe to the existing bridges (Segments 2 and 3) the risks associated with the construction and operational phases are considered to be Low. Consideration must, however, be given to the operational phase of the sewer pipelines as there is a potential risk that untreated effluent may enter the watercourse, which has the potential to increase the concentration of salts, nitrate and toxic ammonia concentrations, as well as Escheria coli and increased biological oxygen demand within the system and may lead to eutrophication, as well as anoxic conditions, leading to biodiversity simplification and the excess production of hydrogen sulphide gas.

The proposed water pipeline upgrades will traverse the CVBW within two existing road crossings. It is assumed that open trenching will be undertaken, however, the existing pipeline is located within the road and thus the trenching activities will have a limited impact on the surrounding wetland feature. It is however recommended that directional drilling be considered for all pipeline upgrades associated with a watercourse as this method significantly reduces the impacts on the receiving freshwater environment.

SWELLENDAM LOW COST HOUSING PROJECT TRANSPORT IMPACT ASSESSMENT - DECA CONSULTING ENGINEERS - MARCH 2018

There is currently only a single access road linking Railton to the rest of Swellendam and to the N2. The road layout of the new housing development will link with the existing road network, but due to congestion and safety concerns on the single access road, it was requested that the

transport impact assessment should include the investigation of an alternative access route or routes to Railton. A few of proposals are discussed as part of the transport impact assessment.

All of the roads in the new subsidised housing neighbourhood on the eastern side of town, including the Soufietjie Street link, were surfaced relatively recently and are in good repair.

5.3 Future internal Railton road links

As shown in Figure 2 (and Diagram 3), a few new high order roads are also proposed in Railton to complete the Class 3 and 4 road network. The first of these will be the extension of Reisiesbaan Street beyond the cemetery and up to the agricultural plots in the easternmost corner of Remainder Erf 1. A new road is proposed from Reisiesbaan Street along the western boundary of Bontebok Primary School, the public open space on Erf 2101 and Swellendam Secondary School. Another link is proposed as a link between Route 3 and Angelier Street, passing to the south of the cemetery and to the south of Swellendam Secondary School. This road will form the final link of a new route linking DR1321 to Reisiesbaan Street to Route 2, Production Street and the N2; or to Route 1 and the N2. It is recommended that Swellendam Municipality keeps space open along the proposed alignments of Routes 1 to 3 as well as the proposed new internal Railton roads so that these roads can be provided if required in future.

Generated trips were added to Year 2023 background traffic volumes and affected intersections were again analysed with SIDRA to determine post-development service levels. Total traffic volumes and service levels are shown in Figure 7. Station Street / Industries / SWD Bande: The Station Street approaches will continue to operate at a level of service A, but service levels on the side streets will deteriorate to a level of service C during both peak hours. Station Street / Theunissen Street: Movements on Station Street will operate at a level of service A or B, while the side streets will operate at a level of service B during both peak hours.

Reisiesbaan Street / Soufietjie Street: The Reisiesbaan Street approaches will continue to operate at a level of service A, with the Soufietjie Street approaches operating at a level of service B during both peak hours. Reisiesbaan Street / Sneeuvlokkie Street: All movements will continue to operate at a level of service A. Soufietjie Street / Ellis Street: The northern approach will operate at a level of service F during the morning peak hour if the four-way stop control is retained. All movements will operate at a level of service A if the stop control on Soufietjie Street is removed

From the analysis it can be concluded that, although the development will generate a considerable number of trips, the traffic impact thereof will be moderate, with no improvements required at any of the affected intersections except for the 4-way stop Soufietjie Street / Ellis Street intersection where service levels can be improved by removing stop control on the Soufietjie Street legs.

It can be concluded from the study that the proposed low-cost housing development in Railton, Swellendam, will have a moderate traffic impact. Other important findings are summarised as follows:

- The development proposal entails the provision of approximately 950 subsidised housing units, about 85 Gap Housing units, community facilities, small business properties, schools and a youth centre;
- Intersections on Station Street, Reisiesbaan Street and Soufietjie Street that will be

affected by the proposed development currently operate at acceptable service levels;

- The surface of Station Street between the N2 underpass and the link to the left in / out on the N2 is in need of repair;
- A number of new developments are on the cards for Swellendam and Railton, but only the proposed further extension of the new housing development will make use of the same roads as the development that is the subject of this study;
- Three future links between Railton and the external high order road network were discussed – two of these between Railton and the N2 and the other between Railton East and Divisional Road 1321;
- A number of future high order road links in Railton is proposed;
- The development has the potential to generate 855 private vehicle trips (359 in, 497 out) during the morning peak hour and 855 trips (497 in, 358 out) during the afternoon peak hour;
- Trips generated by the eastern portion of the development were distributed via the three access points on Aster Avenue and Abelia Street to Soufietjie Street and Reisiesbaan Street;
- Trips generated by the school site next to Theunissen Street were distributed via Theunissen Street and May Street to the higher order road network;
- Trips generated by central part of the development were distributed via Reisiesbaan Street;
- Approximately 32% of Railton commuters make use of public transport;
- It is quite likely that school buses will transport learners to and from the two new schools in the eastern part of the new development;
- About 18% of Railton commuters travel on foot;
- Two new subways are being constructed underneath the N2.

It is recommended that the proposed Swellendam low cost housing development be approved, on condition that the following recommendations are considered:

- The Station Street / Industries / SWD Bande intersection should be upgraded as shown in Figure 3 to improve safety;
- The surface of Station Street between the N2 underpass and the railway crossing is in need of repair;
- The four-way stop at the Soufietjie Street / Ellis Street intersection should be changed so that traffic on Soufietjie Street has free flow and only traffic on Ellis Street has to stop;
- Swellendam Municipality should reserve space along the proposed alignments of the three routes that may serve as links between Railton and the external road network (N2 and DR 1321)
- Space should also be reserved for the proposed new internal Railton roads so that these roads can be provided if required in future;
- Minibus taxi route descriptions should be amended to include a route through the new development, once fully occupied;
- Streets along the school bus routes (probably Theunissen Street, May Street,
- Soufietjie Street, Aster Avenue, Boslelie Street and Madeliefie Street) may have to be widened to accommodate regular bus traffic;
- Paved sidewalks be provided along Theunissen Street and other roads leading up to the schools.

PHASE 1 GEOTECHNICAL REPORT PROPOSED RONDOMSKRIK SUBSIDY HOUSING PROJECT IN SWELLENDAM, WESTERN CAPE PROVINCE - OUTENIQUA GEOTECHNICAL SERVICES - 13 OCTOBER 2016

The geology of the area consists of conglomerate with minor sandstone and siltstone (shale) from the Enon Formation of the Uitenhage Group which is overlain locally by alluvial terrace gravels of Tertiary age. The average soil profile is dominated by a dark red brown horizon gravelly sand topsoil, underlain by clayey silt, clayey/silty gravel, weathered soft shale or conglomerate. No hard rock is expected on the site.

Stormwater systems should take into account the general topography and proximity to natural and man-made watercourses. Groundwater is highly unlikely to have a significant effect on foundations or earthworks, but subsoil drains may be required along roads and behind retaining structures to intercept seasonal seepage.

Slope stability and erosion

- The natural slope gradients are gentle to moderate and there are no signs of macro instability on the site.
- Temporary shallow excavations are likely to be generally stable at steep angles due to significant cohesion in the soils but deep excavations exceeding 1.5m high should be assessed by the engineer.
- Erosion of fine grained soil can be a problem on slopes exceeding 1:7.5 where vegetation is stripped off the surface.

Storm water drainage recommendations

The design and construction of storm water drainage should be carried out in accordance with SABS 1200LE, COLTO, The Red Book or other applicable standards, or as directed by the engineer.

Infiltration into the soil will generally be slow and restricted by fine grained soils of low permeability and a significant portion of rainfall will end up as run-off or standing water. The site has a positive slope gradient and storm water will drain towards the natural drainage lines. A well-planned road layout can assist with storm water management. Raised barrier kerbs, mountable or semi-mountable kerbs along roads are recommended in order to channel storm water along roads and prevent over-topping into erven. Open lined side drains are also effective in dealing with flash floods. Subsoil drains along roads on the upslope side are recommended. The ponding of storm water around the exterior of houses can be avoided by shaping the ground levels around the exterior to create a fall away from the house and constructing a 1m wide a concrete apron with a 10% fall away from the house. This will also assist in maintaining ground moistures stable and minimising erosion around the house. The finished floor level of all houses should be a minimum of 150mm above final ground level to prevent flooding.

SECTION 8: SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT AND STATEMENT

Potential Environmental Impacts during the Construction Phase:
During the construction phase of the proposed development it is expected that proposed **layout alternative 2, with implementation of associated mitigation measures** as included in the EMP, will have a potential -

- Low negative impact on subsurface geological layers
- Low negative impact due to soil erosion
- Low negative impact due to compaction of soil
- Low negative impact due to increase in storm water runoff/altered flow
- Medium negative impact due to Loss of indigenous vegetation
- Low negative impact of proposed development on surface water resources and hydrological features
- Low negative impact of introduction of alien plant species
- Low negative impact on the naturally occurring fauna and avifauna present in the area
- High positive impact due to temporary job creation
- Low negative impact on traffic
- Low negative impact due to construction noise
- Low negative impact due to dust and emissions from construction activities
- Low negative visual impact
- Low negative impact on archaeological, paleontological and heritage remains

Potential Environmental Impacts during the Operational Phase:
During the operational phase of the proposed development it is expected that proposed **layout alternative 2 with implementation of associated mitigation measures** as proposed and included in the EMP will have a potential -

- Low negative impact due to increase in storm water runoff due to hardening of surfaces which may lead to erosion of surrounding areas
- Low negative impact due to increase in storm water runoff leading to altered flow in lower lying drainage line
- Medium negative impact due to edge effects on indigenous vegetation areas
- Low negative impact of proposed development on surface water resources and hydrological features
- High positive impact due to Increase in housing
- Medium negative impact due to increased traffic due to proposed residential development
- Low negative impact due to noise from the new residential development
- Medium negative impact due to additional load on existing municipal services infrastructure such as electricity, water, sewage and waste handling
- Low negative visual impact
-

Potential Environmental Impacts during the Decommissioning Phase:
It is not anticipated that decommissioning will occur in the near future. Should decommissioning occur, the expected impacts are similar to those listed in the construction phase above with the additional positive impact of rehabilitating the decommissioned area to a near natural/indigenous state and negative impact of destroying houses and infrastructure. Impacts must be mitigated

and managed according to the best practise techniques/management measures available for that time.

No-Development Option:

The No-Development option will result in the site remaining as it is presently, transformed vacant municipal land adjacent to existing residential areas. A look at the Need and Desirability input will both indicate popular local support for both the concept and place as manifested in the IDP and SDF for the Swellendam Municipality.

Preferred Layout Alternative 2 – Environmental Statement:

Layout alternative 2 is currently the preferred layout alternative, because it incorporates all specialist and engineer recommendations such as:

- No development to be located within the High Botanical Sensitivity Areas as delineated by the botanical specialist.
- All development to be restricted to the Low Botanical Sensitivity Areas as delineated by the botanical specialist.
- Within the urban edge – aligned with municipal IDO and SDF.

Refer to Appendices A and B for maps of the proposed location and preferred layout.

SECTION 9: RECOMMENDED CONDITIONS TO BE INCLUDED AS CONDITIONS OF THE AUTHORISATION, ASSUMPTIONS AND LIMITATIONS

9.1 DESCRIBE THE ABILITY OF THE APPLICANT TO IMPLEMENT THE MANAGEMENT, MITIGATION AND MONITORING MEASURES

The applicant is ultimately responsible for the implementation of the EA and EMP and the financial cost related thereto. In accordance with the requirements of the EA and EMP, the applicant must ensure that any person acting on their behalf complies with the conditions / specifications contained in this EA, EMP and any other relevant permits/licences/legislation etc. related to the activities. In addition, an Environmental Control Officer must be appointed to review, monitor and report on compliance with the relevant requirements. Thus, if the applicant intends to commence with the proposed and authorised activities he/she must ensure that he/she is able to implement the required management, mitigation and monitoring measures throughout the lifespan of the project.

9.2 PROVIDE THE DETAILS OF ANY FINANCIAL PROVISIONS FOR THE MANAGEMENT OF NEGATIVE ENVIRONMENTAL IMPACTS, REHABILITATION AND CLOSURE OF THE PROPOSED DEVELOPMENT

Unknown at this stage. Mitigation for negative environmental impacts, rehabilitation and closure requirements will be determined throughout the lifespan of the proposed development depending on whether or not and what will be required. The holder of the authorisation is however ultimately responsible to ensure that any required mitigation and rehabilitation measures are implemented which may be required due to the proposed development.

9.3 DESCRIBE ANY ASSUMPTIONS, LIMITATIONS, UNCERTAINTIES, DEVIATIONS AND GAPS IN KNOWLEDGE WHICH RELATE TO THE ASSESMMENT AND IMPACT MANAGEMENT, MITIGATION AND MONITORING MEASURES PROPOSED

EAP is only knowledgeable about the potential environmental and ecosystems aspects as assessed in this report.

In undertaking this investigation and compiling the Scoping Report and EIR, the following were assumed:

- The information provided by the client, engineers and specialists is accurate and unbiased;
- The scope of this investigation is to assess the direct and cumulative environmental impacts associated with the development; and
- Should the proposed project be authorised, the applicant will incorporate the recommendations and mitigation measures outlined in the EIR, the EMP and the EA into the detailed design and construction contract specifications and operational management system for the proposed project.

The EAP is not aware of any deviations from the approved scoping report at this stage.

9.4 RECOMMENDATIONS OF THE EAP AND SPECIALISTS

(a) In my view as the appointed EAP, the information contained in this report and the documentation attached hereto is sufficient to make a decision in respect of the listed activity(ies) applied for. Provide reasons for your opinion	~~YES~~	NO
The revised Draft EIA report must still be submitted to all registered I&APs and key departments for comments before all relevant comments can be obtained and addressed for the decision-making authority to take into consideration during the final decision-making process.		
(b) If the documentation attached hereto is sufficient to make a decision, please indicate below whether, in your opinion, the listed activity(ies) should or should not be authorised:		
Listed activity(ies) should be authorised:	~~YES~~	~~NO~~
Provide reasons for your opinion		
NA		
(c) Provide a description of any aspects that were conditional to the findings of the assessment by the EAP and Specialists which are to be included as conditions of authorisation.		

It is recommended that the following recommendations be included as conditions of the authorisation:

- All specialists' recommendations must be adhered to during all phases of the proposed project.
- Demarcate no-go areas before any land clearing occurs under the supervision of an ECO. Demarcation must be clearly visible and effective and no-go area must remain demarcated throughout construction phase. This is critical due to the watercourse and sensitive botanical areas adjacent to the site.
- All development to be restricted to the Low Botanical Sensitivity Areas as delineated by the botanical specialist.
- Should any erosion, illegal waste dumping, vegetation clearance, informal settlement establishment etc. occur within no-go areas the municipality must ensure that these impacts are rectified as soon as possible and take active steps to rehabilitate the impacted areas and prevent these impacts from re-occurring.
- An ongoing alien vegetation clearing and monitoring programme (as according to CapeNature approved methods) must be implemented to eradicate all alien vegetation species on applicable land as owned by the municipality.
- Undertake all construction, operational and decommissioning activities as according to the requirement of the Environmental Management Programme.
- All the requirements of the National Water Act, 1998 (Act 36 of 1998) in terms of water use and pollution control management must be adhered to at all times.

Recommendations by specialists:

Recommendations in EBA:

Construction, Operational and Rehabilitation phases -

- The project implementation process should be subject to standard Environmental Management Programme (EMP) prescripts and conditions and only proceed under supervision of a competent and diligent Environmental Control Officer, both during the construction, operational and decommission/rehabilitation phases.
- Undertake development activities only in identified and specifically demarcated areas as proposed.
- Demarcate no-go areas before any land clearing occurs under the supervision of an ECO. Demarcation must be clearly visible and effective and no-go area must remain demarcated throughout construction phase.
- Site clearance along the border of the no-go areas must be done under the supervision of an ECO.
- Personnel should be restricted to the construction camp site and immediate construction areas only.
- Rehabilitate impacted indigenous vegetation areas immediately if disturbed.
- Ongoing monitoring and clearing of alien vegetation species must be implemented by the municipality within remaining indigenous vegetation areas. As well as ongoing monitoring and rectification of erosion as required.
- Inform residence of the importance of protecting adjacent indigenous vegetation areas and municipality to ensure that no development or any activities occurs within the remaining indigenous vegetation areas such as vegetation clearance, illegal waste dumping etc.
- Proper waste bins to be provided to construction staff and all waste to be regularly removed to municipal landfill site.
- If any fuel or hazardous materials is spilled on site it must be treated as according to EMP requirements.
- Cement mixing only to take place within demarcated cement mixing area that has a berm and has been lined with impermeable materials so that no cement mix comes into contact with bare soil and no runoff water escapes from cement mixing area.
- Inform residence of the importance of protecting adjacent drainage line and municipality to ensure that no development or any activities occurs within the 1:100year floodline and drainage line area i.e. vegetation clearance, illegal waste dumping etc.
- Undertake specific erosion monitoring and maintenance throughout the construction phase as and if required.
- Monitor soil erosion on a regular basis and rehabilitate impacted areas as soon as possible under supervision of appointed ECO.
- Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion.
- Only use topsoil as derived and conserved from the proposed development areas to be rehabilitated after development activities have ceased on the property.
- After topsoil has been replaced ongoing monitoring and removal of alien vegetation regrowth must be conducted to ensure effective rehabilitation on indigenous vegetation.
- Decommissioned areas must be rehabilitated and planted with indigenous vegetation immediately after built structures have been removed.
- Engineered contour structures reinstated and maintained.
- Monitor rehabilitation of areas impacted outside of the proposed development areas or decommissioned areas on a 6-monthly basis until effective/successful rehabilitation has been obtained.
- If erosion is detected during or after rehabilitation implement erosion rectification and

preventions measures as guided by an ECO

Recommendations by freshwater specialist (Eco Impact):

Essential mitigation measures:

- Limit the footprint area of the construction activity to what is absolutely essential in order to minimise the loss of aquatic habitats in the area.
- Keep all demarcated sensitive zones outside of the construction area off limits during the construction phase of the project. The non-impacted areas of the water courses and wetlands, its riparian zones and 32m buffer areas is regarded as no go and no impact areas.
- On-going aquatic ecological monitoring must take place on a 6-monthly basis by a suitably qualified assessor.
- Contractor laydown areas and stockpiles to be established outside of the 100m Zone of Regulation implemented around the water courses and wetlands.
- Vehicles to be serviced at the contractor laydown area and all re-fuelling is to take place outside of all relevant zones of regulation;
- Care must be taken to ensure that all concrete mixing is done on batter boards or within suitably bunded areas and no cement laden run-off may enter into the preferential surface flow pathway or the downstream ephemeral stream;
- Permit only essential construction personnel within 32m of all riparian systems;
- Restrict construction activities to the drier summer months, if possible, to avoid sedimentation and siltation of riparian features in the vicinity of the proposed development and aim for completion in early spring at which time revegetation should take place allowing for a full summer growing season to become established.
- Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation.
- In order to access the river with the required construction equipment and activities, and upgrading of the attenuation dams, vegetation will need to be cleared. All vegetation removed must be disposed of at a suitable disposal facility.
- At no point may construction equipment stand unauthorised within or near the river.
- All excess sediment removed from the watercourses must be utilised as part of the building activities or be removed from site. At no point may this material be dumped on site or within any of the other freshwater features identified within the surrounding area. Topsoil will have a high density of alien invasive seeds which will need to be controlled into the operational phase.
- It is recommended that the upgraded attenuation dams be designed to be as natural as possible (earthed and unlined) and vegetated to function as a constructed wetland for water quality filtration.
- One culvert crossings are proposed over the river to gain access. Care must be taken when constructing the culverts to ensure that the design accommodates a 1 in 100 year flood event and that the base levels are maintained so that no erosion or ponding of water occurs surrounding the crossing.
- Soil surrounding the wingwalls must be suitably backfilled and sloped (minimum of a 1:3 ratio) and concrete aprons as well as gabion mattresses should be installed both up and downstream for energy dissipation and sediment trapping.
- All soils within the river surrounding the culvert must be loosened on completion of works to allow for revegatation.
- Should any damage occur to existing infrastructure or private property as a result of construction activities; the relevant service provider / landowner must be contacted and the repair/replacement must be commissioned to the satisfaction of the service provider / landowner. Should spillage occur, the BGCMA and DEA&DP: Pollution and chemical

management directorate must be informed immediately.

- All waste generated on site shall be collected and disposed of at a registered landfill facility;
- All safe disposal certificates and waste manifests from service providers to be kept and maintained;
- All staff to receive training on correct waste management practices.
- The preferential flow pathway of the stormwater outlets to the non-perennial river should be rehabilitated into an earth stormwater swale and re-vegetated with indigenous wetland species. All stormwater swales proposed for the study area as well as the two proposed attenuation ponds should be constructed with a slope of not steeper than a 1:3 ratio and a degree of sinuosity should be re-established. The swale should be lined with rock and/or cobbles to create additional ecological habitat.

Operational Phase

- Regular inspection and maintenance of the sewer pipeline.
- Infrastructure failure reported or identified to be fixed as a priority.
- Spillage of raw sewerage to be mitigated and remediated where required.
- Should any damage occur to existing infrastructure or private property as a result of construction activities; the relevant service provider / landowner must be contacted and the repair/replacement must be commissioned to the satisfaction of the service provider / landowner. Should spillage occur, the BGCMA and DEA&DP: Pollution and chemical management directorate must be informed immediately.

Conditions for inclusion in the environmental authorisation

- Appointment of Environmental Control Officer during construction phase
- Should any damage occur to existing infrastructure or private property as a result of construction activities; the relevant service provider / landowner must be contacted and the repair/replacement must be commissioned to the satisfaction of the service provider / landowner. Should spillage occur, the BGCMA and DEA&DP: Pollution and chemical management directorate must be informed immediately.

Freshwater specialist (SAS) recommendations:

Construction phase

- Contractor laydown areas and stockpiles to be established outside of all watercourses. Special care must be taken with the CVBW. The delineated watercourse must be marked as a No-go area and access must be prohibited.
- Although no watercourses were identified within the study area, it is recommended that as much indigenous vegetation be retained within the planned open space areas to assist with soil stability and reduce dust.
- Sustainable Urban Drainage (SUDs) should be developed as part of the development where earth stormwater swales are developed and direct stormwater run-off to the attenuation facilities. As far as possible piping stormwater should be avoided.
- No indiscriminate movement of construction vehicles any of the watercourses is allowed. Use must be made of existing crossings only. Vehicles to be serviced at the contractor laydown area and all re-fuelling is to take place outside of all relevant zones of regulation.
- Care must be taken to ensure that all concrete mixing is done on batter boards or within suitably bunded areas and no cement laden run-off may enter into the CVBW or Kroonlands River.
- All works associated with the sewer and water pipelines as well as the access road and attenuation facilities must be planned for the drier summer months. The CVBW is likely to have thick mud during the wet season due to the high clay content of the soils, thus movement of construction equipment required for re-sloping of the attenuation facilities and installation of culverts may prove challenging and result in unnecessary impacts to the watercourse.

- An alien and invasive control plan must be implemented for the construction and operational phases of the development to prevent proliferation of AIPs (specifically Acacia saligna which was identified in the surrounding area) into the nearby watercourses.
- The delineated CVBW should be clearly demarcated with danger tape or another appropriate mechanism by an ECO and marked as a 'no-go' area
- Box culverts should be installed within the CVBW and not pipe culverts. Box culverts allow for better dissipation of water across the wetland feature and allows for movement of aquatic and faunal species that may utilise the habitat.
- Surveying of the upstream and downstream areas is required in order to ensure the base of the culvert is correctly designed so that water flows through the culvert and does not undercut and flow below or result in scouring to the downstream habitat (as can be seen with the upstream pipe culvert associated with Sofietjie Street). Should a step be required a suitable cascade structure must be installed and grouted pitching implemented below the cascade wall along with placement of packed rock and/or cobbles to ensure energy dissipation and prevent erosion.
- Reno mattresses should be installed at the end of the culvert concrete aprons as scour protection.

Concrete mixing on site:

- No mixed concrete may be deposited outside of the designated construction footprint.
- A batter board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited whilst it awaits placing.
- All wet concrete areas must be contained so as to prevent any contaminated runoff into the watercourse during the curing process. At no point may dirty water be dirty pumped into the watercourse from the construction area.
- Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.

Post Construction

- Rock and/or cobbling should take place for at least 2m upstream and downstream of the culvert crossing for energy dissipation and to create a riffle and improve habitat diversity.
- All embankments disturbed by the construction activities should be re-sloped to a 1:3 ratio or the largest slope possible to tie into the surrounding embankments and revegetated with indigenous riparian vegetation.
- Erosion and sediment build up must be monitored until all vegetation has re-established.
- Prior to the contractor leaving the site, a suitably qualified freshwater ecologist should sign off that construction and rehabilitation has taken place. At this point the freshwater ecologist should highlight any defects to be rectified.

Stormwater Management

- The proposed attenuation ponds are located within the CVBW. An outlet structure must be provided in any walls to allow for throughflow of water throughout the seasons.
- The larger attenuation pond proposed near the N1 must be designed to function as a wetland habitat. All existing gullies should be rectified, and water should be allowed to dissipate across the attenuation area before leaving the area via the box culvert under the N1. Water from the modified CVBW associated with the residential area as well as the channel from the upstream dam associated with the eastern severely modified CVBW must be accounted for.
- All embankments disturbed by the construction activities should be re-sloped to a 1:3 ratio or the largest slope possible to tie into the surrounding embankments and revegetated with indigenous riparian vegetation.
- Indigenous wetland vegetation growth should be encouraged within all attenuation facilities and alien and invasive vegetation must be controlled.

Water and sewer pipelines

- Suitable waste disposal facilities should be provided;
- These facilities should regularly be emptied and taken to a registered waste disposal facility;
- If waste/spillage has entered the watercourse and caused a decrease in the water quality of the watercourse, these spills should immediately be cleared and the water within the watercourse treated as per the instruction of the ECO.

Open trenching within close proximity to a watercourse:

- The trenching nearby the watercourses, within the existing servitude (sewer pipeline) and road reserve (water pipeline) must be undertaken during the drier summer months. Pre-construction planning is therefore imperative in order to meet this timeframe.
- No open trenching should be undertaken within the watercourses. All sewer pipelines are to be bolted to the existing culverts and all water pipelines must remain within the existing road reserve where pipe culverts have already been installed for hydrological connectivity to the downstream reaches.
- Excavated materials should be stockpiled and may not exceed 2m in height to minimise impact on the seedbank. Mixing of the lower and upper layers of the excavated soil should be kept to a minimum, so as for later usage as backfill material.
- All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent erosion and sedimentation of the watercourse in close proximity to these stockpiles.
- After the trench has been excavated, a bedding layer (such as clean gravel) should be placed and where existing roads have been opened, the surface should be re-tarred.

Backfilling of the trenches:

- All open trenches should be backfilled immediately after pipes have been installed;
- Trenches should be backfilled with the stockpiled excavated materials in layers, up to 150mm below the natural ground level, after which the topsoil is replaced (to the stream bed level) and re-worked and the removed vegetation is reinstated as part of the rehabilitation of the site.

Operational phase

- An alien vegetation management plan should be developed and implemented and managed for all open space areas as well as the CVBW and associated attenuation facilities.
- As much indigenous terrestrial vegetation should be included into the landscape plan for the open space areas. This is especially true as open space areas will likely be utilised by the local community as grazing for livestock.

Operation and maintenance of the sewer and potable water pipeline

- Both the water and sewer pipeline and all manholes must be pressure tested for integrity upon the completion of construction.
- It is recommended that the managing authority test the integrity of the pipelines at least once every five years or more often should there be any sign or reports of a leak.
- Should a blockage occur all possible steps are to be taken to prevent the pollution (specific to the sewer pipeline) of the watercourse during repair, including the placement of sheeting around the manhole used for access as well as containment barrels for any effluent withdrawn.
- No vehicles are permitted to drive through any watercourses. Any maintenance works must be undertaken by foot or the relevant authorisations obtained beforehand.
- On repair of any leaks, all excavated areas must be backfilled, and alien vegetation proliferation must be monitored until basal cover has been established.

(d) Please indicate the recommended periods in terms of the following periods that should be specified in the environmental authorisation:

i. the period within which commencement must occur;	Within 5 years of obtaining Environmental Authorisation
ii. the period for which the environmental authorisation is granted and the date on which the development proposal will have been concluded, where the environmental authorisation does not include operational aspects;	Ongoing maintenance of infrastructure and implementation of EMP until decommissioning.
iii. the period for which the portion of the environmental authorisation that deals with non-operational aspects is granted; and	Within 10 years of obtaining Environmental Authorisation
iv. the period for which the portion of the environmental authorisation that deals with operational aspects is granted.	Ongoing maintenance of infrastructure and implementation of EMP until decommissioning.

SECTION 10: APPENDICES

APPENDIX		Confirm that Appendix is attached
Appendix A:	Locality map	Y
Appendix B:	Site development plan(s)	Y
	A map of appropriate scale, which superimposes the proposed development and its associated structures and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffer areas;	Y
Appendix C:	Photographs	Y
Appendix D:	Public Participation Process	Y
Appendix E:	Specialist Reports	Y
Appendix F:	Environmental Management Programme and MMP	Y
Appendix G:	Services Confirmation and Engineer Reports	Y
Appendix H:	Any Other (if applicable). Appendix H: Water Use Licence Application Submission Proof Appendix H1: Environmental Assessment Practitioner CV	Y

SECTION 11: DECLARATIONS

To be included in FINAL