GEORGE
TEL: +27 (0) 44 873 4923 **FAX:** +27 (0) 44 874 5953
EMAIL: info@sescc.net **WEBSITE:** www.sescc.net
ADDRESS: 102 Merriman Street, George 6530
PO BOX: 9087, George , 6530

CAPE TOWN
TEL: +27 (0) 21 554 5195 **FAX:** +27 (0) 86 575 2869
EMAIL: betsy@sescc.net **WEBSITE:** www.sescc.net
ADDRESS: Tableview, Cape Town, 7441
PO BOX: 443, Milnerton, 7435

DRAFT PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT (POSEIA)

PROPOSED KURLAND HOUSING DEVELOPMENT ON ERF 940 (PORTION OF ERF 562), KURLAND, PLETTENBERG BAY, WESTERN CAPE

APPLICATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998), AS AMENDED, AND THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 (AS AMENDED)

APPLICANT:	Bitou Local Municipality Contact: Mr V. W. Felton Contact: Mr F Maki
ENVIRONMENTAL CONSULTANT:	Sharples Environmental Services cc Author: Ameesha Sanker (EAPASA: 4372) Reviewer: Betsy Ditcham (EAPASA: 1480)
DEA & DP PROJECT REFERENCE:	16/3/3/6/7/2/D1/10/0030/21
SES REFERENCE NUMBER:	CT14/PLETT/KUR/DPOS/1222
DATE:	December 2022

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1. Introduction

This Plan of Study for EIA has been compiled in terms of the content requirements listed in Appendix 2 of the National Environmental Management Act (NEMA) Environmental Impact Assessment Regulations. The **Plan of Study for EIA (POSEIA) describes how the EIA Phase will proceed** and includes details of the specialist studies already undertaken and those still proposed.

This **ANNEXURE** must be read alongside the Draft Scoping Report compiled for the Proposed Kurland Housing Development on Erf 490, a Portion of Erf 562 at Kurland, Plettenberg Bay, Western Cape.

The 2014 EIA Regulations were promulgated in December 2014 and amended in April 2017. These new Regulations pose time restrictions on the submission of the EIA Report to the Department of Environmental Affairs and Development Planning (DEA&DP). As a direct result of these time restrictions most of the specialist environmental impact assessments are now required to take place upfront, prior to the submission of the Application Form and Final Scoping Report to the Department of Environmental Affairs and Development Planning (DEA&DP). Another reason why the impact assessment specialist studies are required prior to the submission of the Final Scoping Report is because the content requirements of the Scoping Report now require the EAP to describe the impacts of the proposed development, including the nature, extent, significance, duration and possible mitigation measures.

Scoping Phase Specialist input has therefore already been obtained to inform the findings of the Draft Scoping Report.

2. Objectives of the Environmental Impact Assessment Process

The objective of the **environmental impact assessment process** is to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted Scoping Report;
- Identify the location of the development footprint within the approved site as contemplated in the accepted Scoping Report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the--
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - degree to which these impacts-
        - (aa) can be reversed;
        - (bb) may cause irreplaceable loss of resources, and
        - (cc) can be avoided, managed or mitigated;

- Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted Scoping Report based on the lowest level of environmental sensitivity identified during the assessment.
- Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted Scoping Report through the life cycle of the activity.
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

The EIA Phase of the EIA Process will **further address potential environmental impacts** and benefits (direct, indirect and cumulative) associated with all of the life cycle stages of the project, including pre-construction, construction and operational stages of the life-cycle of the development. The EIA Phase will also effectively **respond to all input received from interested and affected parties and key Authorities** that provide comment on the Scoping Report and Plan of Study for EIA. The EIA will **provide the Authorities with sufficient information to make an informed decision** on whether or not the development should be authorized.

3. Description of Alternatives Considered & Assessed

3.1 Site and Layout Alternatives

No other layout alternatives will be considered. As an intensive process was followed (detailed below), in conjunction with community input, to determine the preferred layout. Therefore, the Preferred Alternative 1 – is the Preferred.

Plans for the alternative utilization of Erf 562 trace back to the zoning thereof for resort rights, many years ago. The Department of Rural Development and Land Reform (DRDLR) bought the property from the original owners, for land reform purposes in 2007. A few structures were erected on site. Various large erven [Erf 564 (Now erven 574 to 583), Erf 563 (Now erven 565 to 573) and Erf 536 Kurland] along Forrest Hall Road and in the central part of Erf 562 were subdivided and sold to beneficiaries.

The DRDLR is the custodian of the property. After negotiations, they have recently decided to transfer the Erf to the Municipality of Bitou to accommodate the intended housing project, with the exception of two parts of the site, which they wish to retain:

- An area and building in the north-east of the property, to be transferred to the identified occupant; and
- And the southern portion of the site for an agricultural project. The subdivision of the relevant portions was approved by the Municipality. Surveying and transfer is managed by DRDLD.

Land available to accommodate a housing project in the beneficiaries' vicinity is scarce. Area topography, conservation- and active use areas, price ownership (private) and other factors contribute to making the securing of land for housing projects difficult. From a strategic perspective, it is preferable to extend the urban fabric of Kurland, rather than creating a separate settlement in the area. Land situated north-west of the existing Kurland township was also considered but the owner is still farming there and does not wish to sell. Erf 562 belongs to the state and in a spirit of good corporate governance the decision was made to utilize the land to address the residents' housing need, subject to due process.

Only one Layout has been proposed and will be referred to as the **Preferred Proposed Layout 1**, henceforth. This will be assessed during the EIA Phase. The preferred layout has responded to identified freshwater and terrestrial constraints to the development. However, further revisions to the layout

proposed may occur as the layout must also respond to potential further comments from I&APs and Authorities. **NO-GO Alternative – Proposed Layout Alternative 2**, will indicate that the current status quo of the site will persist, and no development will take place.

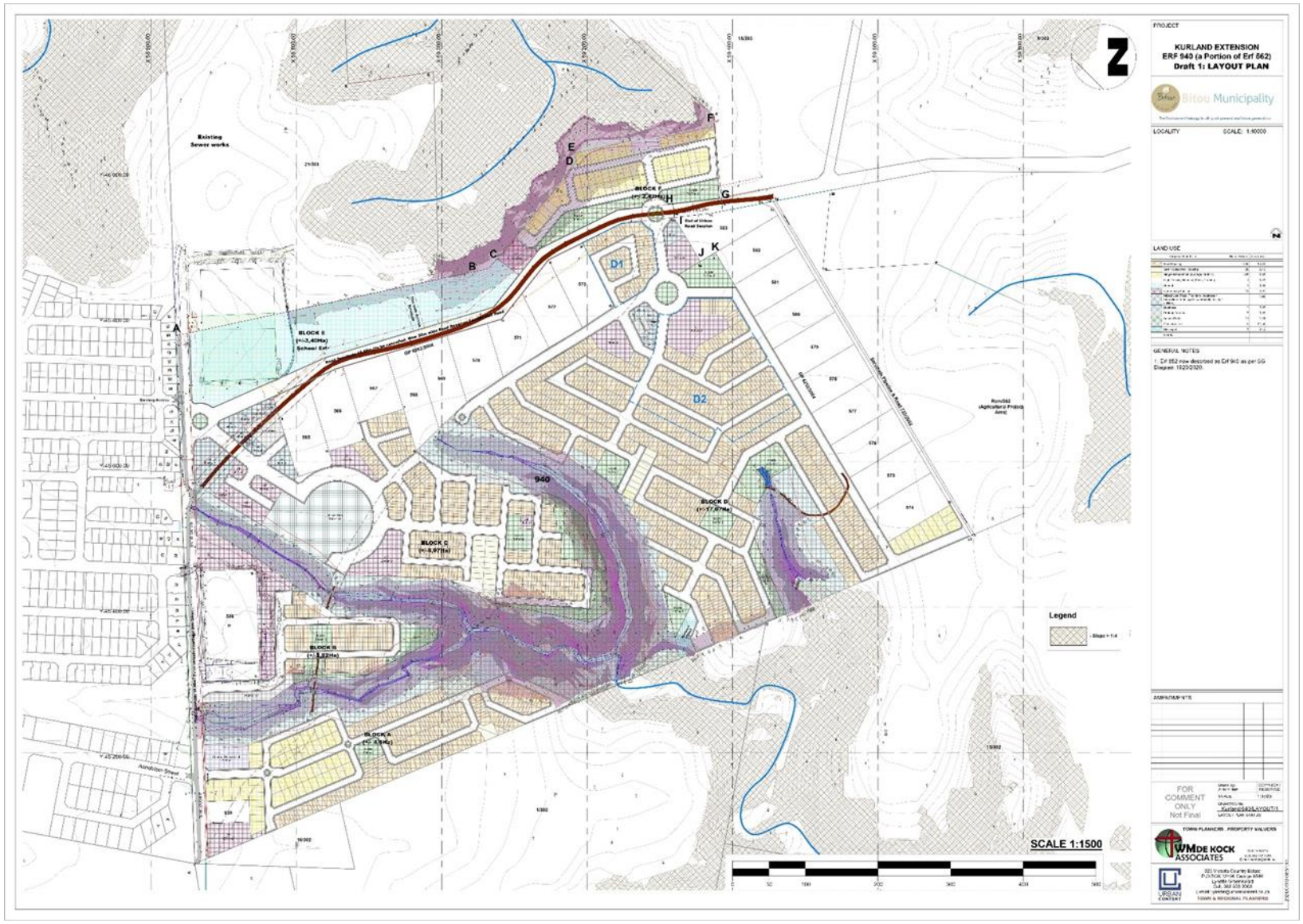
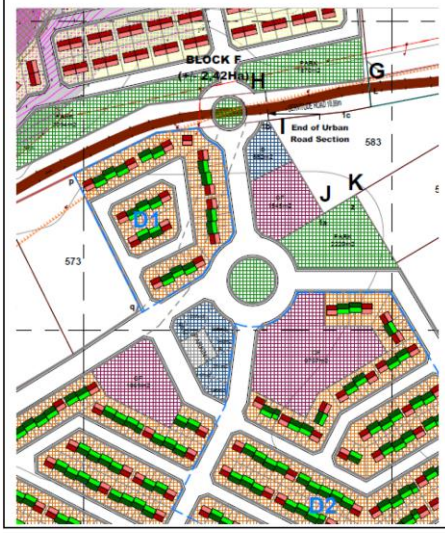


Figure 1: Proposed Preferred Alternative Layout 1.

In essence the Proposed Preferred Layout Alternative 1, includes six neighbourhoods/sections (Blocks A-F), which form part of an over-all development extension, integrated/linked on an external and internal level and includes, at this stage, the following uses:



Proposed Land Use	No of Erven	Area (ha)
Row Housing	1339	12,03
Semi- detached housing	28	0,4
Single residential (average 180m²)	125	2,56
High density housing (flats; 11units)	1	0,22
School	1	3,36
Community Facility	13	2,61
Mixed use (retail/tourism/business/recreation/ municipal/community facility/ utilities)	1	1,98
Business	17	0,86
Parking/maket	3	0,35
Active Parks	11	1,94
Conservation	2	11,56
Municipal	1	0,12
Roads		

Figure 2: Land uses as per the Proposed Preferred Layout Plan.

The proposed residential houses are likely to connect to the municipal bulk services, however the confirmation of availability of services will be confirmed during the Environmental Impact Assessment process.

All blocks are estimated at approximately 18m deep and may accommodate single storey- or double storey linked units on individual erven generally ranging from 72 to 300m². This proposed development is proposed to establish an integrated housing project, including houses of various typologies (based on a maximum 1500 units), with associated infrastructure including necessary services and the following intended support facilities (if required, on total site area):

- Internal active/passive open space (not conservation areas); neighbourhood- and community parks (at least seven sites);
- Community sports fields (at least one site);
- Three Creche sites;
- One School site;
- Two community facility/mixed use node areas (to accommodate supportive uses, job creation uses, retail, market, mobile services (library/clinic); post boxes, etc;

- Two or three church/religious sites;
- Areas of small business;
- Open spaces suitable for job creation projects;
- Conservation areas

This is proposed taking into account the Western Cape Government, Department of Environmental Affairs and Development Planning's specifications on "Quick Reference for the Provision of Facilities within Settlements of the Western Cape" (I.e. development parameters relating to supportive land uses).

The Schedule below provides an indication of the type of, and extent/order of facilities envisioned. Which can affect the proposed land use intent as detailed above, depending on input received during the planning participation process.

<table>
<tr><th colspan="2">LAND USE</th><th>STANDARD WC:DEADP</th><th>TECHNICAL PROVISION BENCHMARK, BASED ON 1000-1500-UNITS</th></tr>
<tr><td colspan="2">GENERAL LAYOUT AND DESIGN PRINCIPLES</td><td colspan="2">Strive for:
– A compact/dense settlement – to also rationalize facility size, encourage walkability, lower paring requirements and facilitate accessibility
– Space Utilization Efficiency, Multi-functionality and Clustering;
– Economies of Scale, Strategic Resource Allocation and achieving maximum impact
Four persons per dwelling unit to be used for calculation in this table.</td></tr>
<tr><td rowspan="2">RECREATIONAL FACILITIES AND OPEN SPACE</td><td>SMALL NEIGHBORHOOD PLAY LOTS/ PARK</td><td>WCD EA&DP
• Quality space, may be combined with other uses, central in neighborhoods
• 1 per 250 dwelling
• Size: 400m²
• 500m -750m walking distance from users
• Could do fewer, but better quality (for of safety/maintenance)
• Promote multi-functionality</td><td>4-6 Small Parks required (0,24ha max required)</td></tr>
<tr><td>COMMUNITY/FUNCTIONAL PLAY PARKS</td><td>WCD EA&DP
• Serves broader area
• Formal and informal recreation
• Adjacent to schools or natural areas / multi use areas/ community uses/ agriculture plots
• Not as localized as play lots
• Serving wider community: accessible
• 0,9ha per 250 dwellings
• Minimum 1.5ha
• 1-3km walking distance
• Clustering of uses important</td><td>0,36-0,54ha required</td></tr>
</table>

LAND USE		**STANDARD WC:DEADP**	**TECHNICAL PROVISION BENCHMARK, BASED ON 1000-1500-UNITS**
	COMMUNITY SPORTS-FIELD	**WCD EA&DP** • May be formal or informal • Size determined by type of activity • Min size 0,2ha • Not more than 2km away from schools • 1 per 1250 dwelling units	One required – 0,2ha
	REGIONAL PARKS/ STADIUMS	**WCD EA&DP** • Regional Park: Serves region – 1 per 5000units • Within 10km • Greater upkeep requirement	Not applicable
	CEMETERIES	**WCD EA&DP** • Space intensive – not at settlement core • Ideally next to open space/ police stations/ places of public worship, in urban-rural transition area • From 0.8ha for 1250 units • A cemetery is a high-order facility and, as such, generally should only be provided at 1 per 100 000 people along public transport routes • Should not be close to hydrological features, floodplain or sensitive areas	Approx. 0,8ha space to be provided/available for 1250 units – smaller community facility – if required. Available facilities to be investigated/ requirement to be confirmed
EDUCATIONAL FACILITIES	ECD (Early Childhood Development Centers/Pre-primary school, including Daycare, crèche nursery school, after-care.	**WCD EA&DP** • 0,15m² per person of the residential population it serves • Min building footprint: 130m² to 500m² (large ECD) • 1.5m² per child (site area) • walking distance 750m (15min) • 1 ECD for every 600 families needed • Preferably on route to school	Note: – acknowledge existing facilities in Kurland – Crèches may be operated from residential premises (with consent, if larger) Three formal ECD sites may be required (combined 900m²)
	PUBLIC PRIMARY SCHOOL	**WCD EA&DP** • 1 Primary school per 1000 dwellings, if required by the Education Department • Min size 1.4ha (excluding sports-fields) or 2,8ha if sports-fields included • Walking distance 1.5Km (30min walking)	Primary school site not required by the Department of Education

LAND USE		**STANDARD WC:DEADP**	**TECHNICAL PROVISION BENCHMARK, BASED ON 1000-1500-UNITS**
		• Linkage to food-garden areas to be encouraged • Preferably on a higher order road, flat area	
	PUBLIC SECONDARY SCHOOL	**WCD EA&DP** • 1 Primary school per 1500 dwellings (some schools serve up to 6250 families) • Min size 2,6ha, if not shared and 3ha if includes sports-fields • Walking distance 1.5Km (30min walking) • Linkage to food-garden areas to be encouraged • Preferably on a higher order road	1 Secondary school site required by the Department of Education
	TERTIARY FACILITIES	**WCD EA&DP** - Generally speaking, tertiary education facilities are regional facilities, serving the population far beyond its immediate surrounds - The site size needs to be determined by the size of facility to be provided, which should be benchmarked against the site size of similar educational facilities - Minimum threshold = 37500-250 000 families, depending on the type of facility	Best suited in larger urban centers – no requirement on the specific site for such regional facility
HEALTH & WELFARE FACILITIES	MOBILE CLINIC	**WCD EA&DP** • 1 per 1250 units • The mobile clinic should be placed in a central/accessible location to capture the majority of surrounding potential users and generally within walking distance • The ideal location for a mobile clinic may be a centrally located local park, community centre, or government facility precinct – if it should exist • The mobile clinic should appear in the same place,	Reach and capacity of existing clinic to be confirmed Space to be identified for possible mobile clinic

LAND USE		STANDARD WC:DEADP	TECHNICAL PROVISION BENCHMARK, BASED ON 1000-1500-UNITS
		generally at the same times and in a predictable manner • Sheltered waiting areas and ablutions preferable • walking distance 1Km • preferably at cluster of community facilities/uses	
	COMMUNITY HEALTH-LOCAL PUBLIC CLINIC	**WCD EA&DP** • 1 per 5000 dwellings in rural areas • Close to public transport routes, away from environmentally sensitive areas • Size depends on population served: 0,125ha per 5000 people 0,25ha per 10000 people 0,5ha per 20000 people 1ha for 40 000 people • Walking distance 2-5Km or on public transport route	Capacity of existing Kurland clinic to be confirmed Community too small to warrant an additional facility – to be confirmed
	PUBLIC HOSPITALS (SECONDARY FACILITIES)	**WCD EA&DP** • Regional / District Facility • Close to highway • 1 per 112 500 dwellings	Regional – See Spatial Development Framework
	PUBLIC HOMES FOR THE AGED	**WCD EA&DP** • 1 per 16 250 dwellings • Examples 0,3-2.2ha • Based on need (as per the Department of Social Development) and policy of governing authority re home based care • Close to public health care facilities and other amenities, public transport	Regional – See Spatial Development Framework
	CHILDRENS HOMES	**WCD EA&DP** • Need based on demand • Generally: 1 per 10-15 000 dwellings • Near to schools/community facilities • 30min walk to primary school • Size 2ha, or smaller if clustered with other support uses	Refer to Socio-Economic study Note that Places of Safety may house children in residential homes, with the required permits.
	LIBRARIES	**WCD EA&DP** • 1 per 2500 dwellings • Clustered with other community facilities	Library (extent and reach) in Kurland to be confirmed

LAND USE		**STANDARD WC:DEADP**	**TECHNICAL PROVISION BENCHMARK, BASED ON 1000-1500-UNITS**
		• 0.1 to 0.2 ha • walking distance 4-5Km • Mobile libraries may be considered	
	PLACES OF WORSHIP	**WCD EA&DP** • Placed within walking distance of its users, and be located along main roads of a neighborhood • 1 per 500 dwellings (depending on religious diversity) • From 150m² to 0,3ha • Within 1.5km walking distance	2-3 sites to be provided
	COMMUNITY CENTRES/HALLS	**WCD EA&DP** • Central to overall community, combined with other uses such as libraries, clinics, etc. • 1 per 2500 dwellings • Walking distance 500m (15min walk) to 2.5km • 5min walk from public transport point	Existing Kurland Community Hall provided
PUBLIC SERVICE FACILITIES	MAGISTRATES COURT	**WCD EA&DP** • Regional Facility – one per magistrates district	Magistrates court situated along N2 in New Horizons
	HIGH COURT	**WCD EA&DP** • Regional Facility • 1 per 50 000 families (minimum) • In major urban nodes	Not applicable
	MUNICIPAL OFFICE	**WCD EA&DP** • Central – in urban node • Minimum population: 50 000 (12500 units) • Min size: 3 000 m², depending on clustering of uses • 2km walking distance or on public transport route	Main municipal office not required – regional function Municipal pay-point/general multi use space may be considered
	POST OFFICE	**WCD EA&DP** • 1 per 2500 units • Min size 100 m² • walking distance 1.2km/public transport • Could be space in shopping facility • Can be clustered with municipal uses	Space provision/allocation in greater community area to be confirmed by PO
	POLICE STATION	**WCD EA&DP** • Central in regions they serve	Regional Function

LAND USE		**STANDARD WC:DEADP**	**TECHNICAL PROVISION BENCHMARK, BASED ON 1000-1500-UNITS**
		1 per 6250 units in a rural setting • Min size: 0.1-1ha • Within 4-8km, within developed (settlement) areas. Not always possible in a rural context • Satellite facilities may be considered by SAPS	Extent and reach of the Crags Police Station to be confirmed
	FIRE STATIONS	**WCD EA&DP** • On higher order road – central and/or close to risk areas • Allowing for 8-13min response time (23min in rural areas) 1 per 15 000 units • Min size: 1.2ha • Not directly adjacent to residential areas (noise /24hour factor) • Not in highly congested areas	Extent and reach of existing fire service to be investigated.
WASTE MANAGEMENT FACILITIES		**WCD EA&DP** • Regional Municipal Facility – from 90ha • Should not be within or adjacent to sensitive ecological areas, heritage areas or water catchment areas or steep areas • The Minimum Requirements for Waste Disposal at Landfill, 2nd Edition (Department of Water Affairs and Forestry, 1998) provides a comprehensive set of locational criteria.	Regional facility not required, Waste transfer site/ recycling initiatives may be investigated.
WASTE WATER TREATMENT FACILITY		**WCD EA&DP** • Technical requirements determine size • There are no accessibility, distance and site spacing criteria for a wastewater treatment facility, however, cognizance must be taken of the National Water Act, 1998 (Act No. 36 of 1998) requirements, where the treatment facility should be located 100m away from a watercourse.	Technical determination of existing facility's capacity and upgrading requirement to be done.

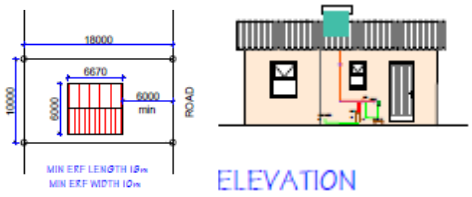
LAND USE	STANDARD WC:DEADP	TECHNICAL PROVISION BENCHMARK, BASED ON 1000-1500-UNITS
	• The site must not be proximally windward of any residential area or a buffer area may be required • Sewage Treatment Facilities must cater for the size of the population and anticipated future growth; average dry weather flow, wet weather flow and storm water ingress. • DWAF effluent standards apply • All wastewater treatment facilities must cater for the volume of effluent produced.	

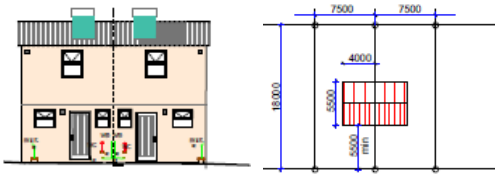
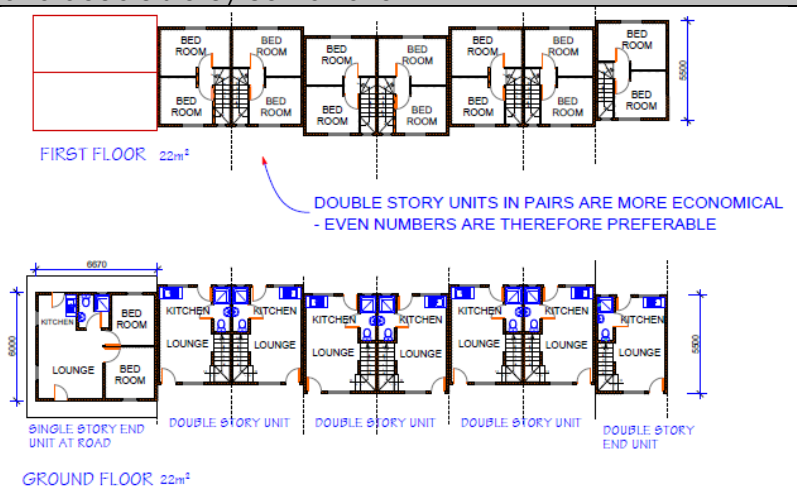
It is noted that bulk infrastructure will need to be established, however this will be addressed in a separate scope of works and under a separate application for environmental authorization.

3.2 Design Alternatives

3.2.1 Design Alternative - Housing Typologies

The required densities, in turn, dictates the housing typologies to be accommodated on site. Four Design Alternatives were considered for the Housing Typologies (as per Figure 3). With the Design Alternative (Housing Typologies) 3, being the preferred Alternative.

Design principle	Density and yield estimate
Design Alternative (Housing Typologies) 1: Individual erven- single units – free standing, single storey	
 Sketch source: Keith Lourie Architecture	
One free standing house per erf (average 180m²), or double storey.	Estimate 25units/ha Yield 575 units on the provisional block area
Design Alternative (Housing Typologies) 2: Individual erven- pairs of linked houses – free standing, single storey	
 Sketch source: Keith Lourie Architecture	
Single storey, semi-detached (average 160m²)	Estimate 28units/ha Yield 644 units on the provisional block area
Design Alternative (Housing Typologies) 2: Individual erven- pairs of linked houses – free standing, double storey	

 Sketch source: Keith Lourie Architecture	
Double storey, semi-detached (average 135m²)	Estimate 30units/ha Yield 690 units on the provisional block area
Preferred Design Alternative (Housing Typologies) 3: Individual erven – linked housing units, single and double storey combination	
  Sketch Source: Keith Lourie Architecture	
Double and single storey row houses on individually registered erven ranging between 72 to 162m² (average)	Estimate 65units/ha Yield 1495 units on the provisional block area

Preliminary/ illustrative rendering of the Kurland design concept

Figure 3: Proposed Kurland Housing Typologies (Town Planning Report, 2021)

As per the Town Planning Report, July 2021, the aforementioned housing typologies apply. Comments regarding the requirement to include FLISP (Finance linked subsidy) erven were received. In the absence of final figures regarding the number of families qualifying for such funding, a provisional area to accommodate 8% of the planned erven have been identified at the entrance to Blocks A and D. Erf sizes are an average of 180m²average size. Should more FLISP erven be required, the final layout will be updated to incorporate such requirement (individual erven, rather than linked-units). Note that the general/road layout will be affected.

As noted, the layout may accommodate the following housing options:

- Design Alternative (Housing Typologies) 1: Individual houses (double or single storey)
- Design Alternative (Housing Typologies) 2: Semi-detached single or double storey houses
- Preferred Design Alternative (Housing Typologies) 3: Single and double storey row (linked) houses
- Design Alternative (Housing Typologies) 4: Rental units

3.2.2 Design Alternative - Density

According to the Town Planning report, the guiding principles for all development, as contained in SPLUMA, advocate the effective use of the available areas. Higher density not only relates to efficient use of land and services but also translates to more viable/sustainable social- and commercial land use. At an individual residential stand size (200m² average), approximately 500units may be accommodated on the available area (1:2.5), which implies that additional land for housing developments needs to be identified and that the provision of supportive facilities needs to be duplicated in such area.

- Preferred Design Alternative 1: Medium – High Density Housing
- Design Alternative 2: High Density Housing
- Design Alternative 3: Low Density Housing

Of the three considered Design Alternatives: Density, the proposed Alternative 1 is preferred, based on the available development footprint, services available and the proposed scope of works. The

Design Alternatives: Density, 2 would entail the construction of flats/high density/3 storey-walk up sectional title units which is more congruent with an 'inner city' context, and would create a greater strain on services, and other factors such as traffic during operational phases, etc. Design Alternatives: Density, 3 would result in mostly single units in open yards, for instance, which will result in an additional requirement for the purchase/expropriation of land, in the Kurland area, to accommodate the expressed future need.

3.2.3 Design Alternative - Access

According to the Town Planning Report, Forrest Hall Road (OP 07220) links the site, Kurland Village and numerous privately owned properties to the N2 highway. Such road, being protected via a registered 18.89m wide Right of Way servitude traverse the site. Various roads, from within Kurland Village are planned (registered) to intersect with Forrest Hall Road, including Zimris Street, Geelhout Street and Witbaraks Street. Three options have been explored:

- The road within the section of the Forrest Hall Road servitude, which runs along the southern boundary of Kurland Village has been extended (over Erf 562) to provide access to the Fire Safety Facility, the municipal sewer works and a municipal property (Portion 21/303). Freedom Street links the Kurland Village area to the site, in this area.
- A Right of Way Servitude, linking the Teniqua Wildlife Awareness Centre to Forest Hall Road, bisects the site, running just south of excluded erven 574 to 583 Kurland.
- In addition to the Forrest Hall Road Servitude, a secondary servitude was surveyed, providing a parallel running access-way across the site.

Please refer to the Town Planning Report, July 2021, Section 9.3 on page 32, in respect to:

- Detail on activity spines and nodes – additional/alternative considerations

3.2.4 Design Alternative – Sewer Outfall Concepts

Two sewer outfall concepts will be considered:

- Preferred Sewer Outfall Concept: General residential housing.
- Alternative Sewer Outfall Concept.

The preferred sewer layout is shown on Figure 4 which entails two (2) new pumpstations and the decommissioning of existing pumpstation (Kurland PS1) situated north of the proposed development. Considering this layout, the proposed pumpstation on the west will accommodate most of the flow from the development of erf 562 and all of the flow upstream of existing Kurland PS1.

A servitude may result from this preferred layout considering that the bulk gravity pipeline (green line referenced "2") needs to be located outside the boundaries of erf 562 on erf RE/1/302 and erf 15/302.

An alternative concept is therefore included but will result in three (3) pumpstations.

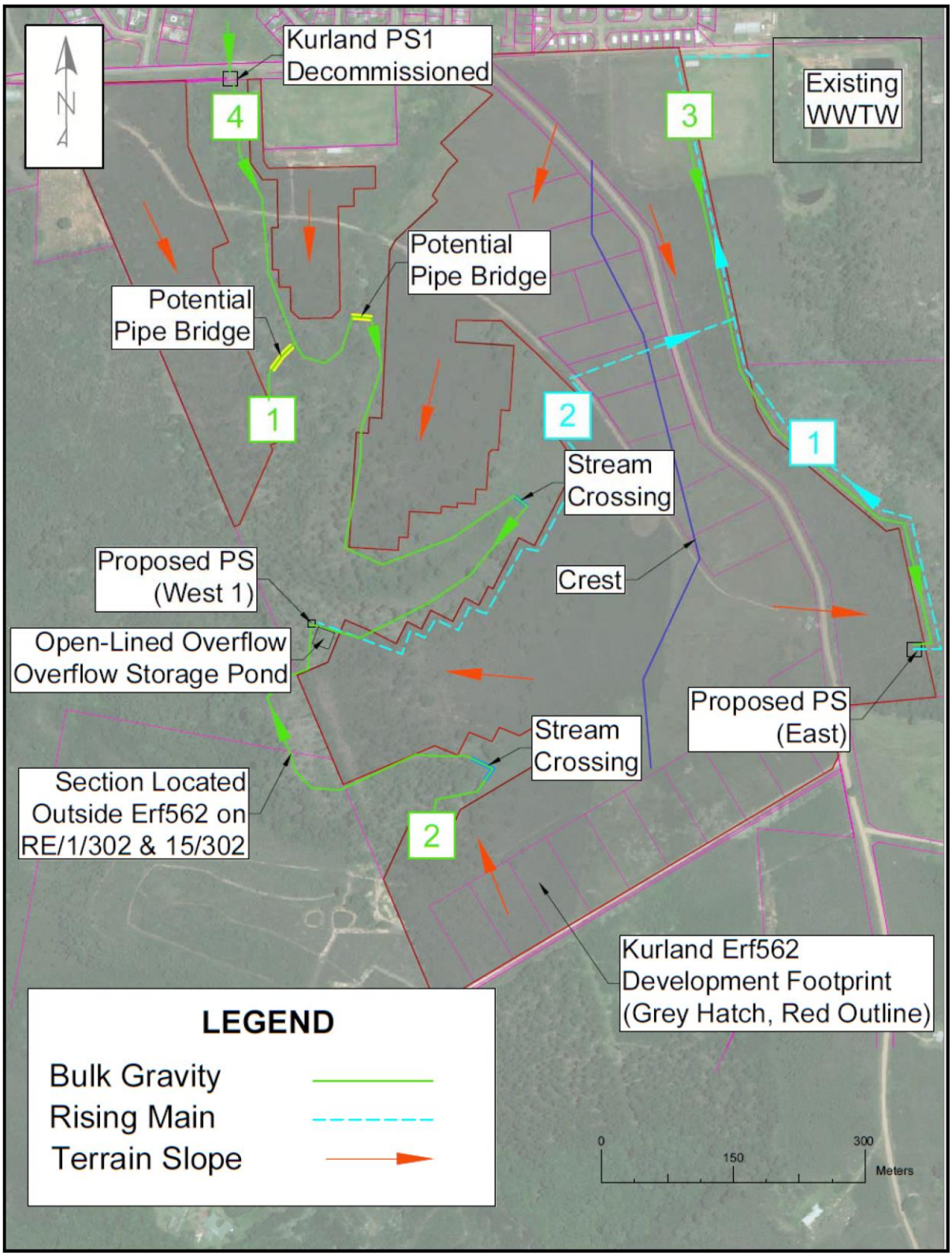


Figure 4: Preferred outfall concept.

The alternative sewer layout is shown on Figure 5. The layout incorporates an additional pumpstation on the western side to avoid the encroachment onto erf RE/1/302 and erf 15/302.

Avoiding the encroachment is the only deviation from the preferred sewer outfall concept. This option

is not considered more ideal in comparison to the preferred layout considering the additional capital, operational and maintenance costs and environmental risk because of the additional pumpstation.

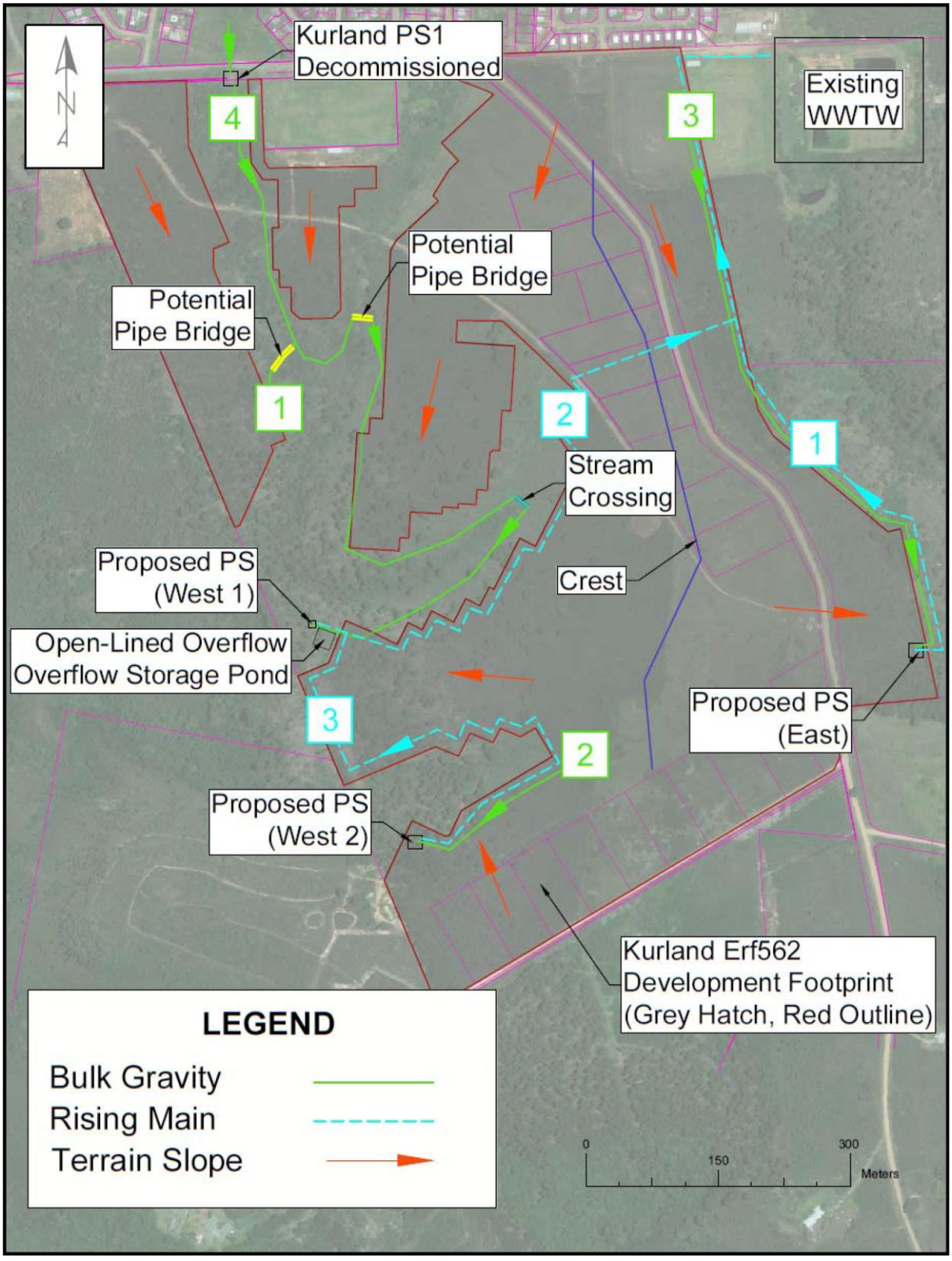


Figure 5: Alternative proposal.

3.3 Technology Alternatives

There are three Technology Alternatives, including:

- Technology Alternative 1: Pipe bridge watercourse crossings
- Technology Alternative 2: Excavations across watercourses
- Technology Alternative 3: Combination of Pipe Bridges and Excavations across non-perennial watercourses.

Where required non-perennial drainage lines will be crossed by means of open excavation and laying the pipe underground. In conjunction with material density requirements for backfill, the pipe and backfill material will be protected with gabion mattresses to avoid future erosion and damage to the pipeline during flood conditions. A typical detail of this type of crossing is included in Annexure G. Pending a detailed design, crossing of non-perennial drainage lines may require crossing over the drainage lines if excavations exceed minimum depths for underground crossings. Crossing over drainage lines will be done by means of pipe bridges if required. Considering the information available at this stage, it is estimated that crossing over drainage lines may only be required at the locations as shown on Figure 4 and 5. A detail of this type of crossing is included in Annexure G (Appendix F3).

3.4 Operational Alternatives

There are two Operational Alternatives (Housing), including:

- Preferred Operational Alternatives (Housing) 1: General residential housing.
- Operational Alternatives (Housing) 2: Retirement residential housing.

Of the three considered Operational Alternatives, the proposed Alternative 1 is preferred, based on the available development footprint, services available and the proposed scope of works. The Operational Alternative 2 would entail the construction of flats/high density/3 storey walk up sectional title units which is more congruent with an 'inner city' context, and would create a greater strain on services, and other factors such as traffic during operational phases, etc. Operational Alternative 3 will not be in line with the surrounding development and will have special requirements that are beyond the existing designs, but in line with the requirements of for support of an elderly community.

3.4 No-Go Alternative

The "No Go" alternative is the option of not developing the proposed development and associated infrastructure and will be considered Alternative 2. The no-development option would result in a lost opportunity in terms of the housing, so as to address the existing housing backlog, employment opportunities associated with the construction and operation phase, as well as the benefits associated with the provision of a support facilities including clinics, parks, creches, etc, that can cater to the new development as well as the Crags community located just north of the proposed site.

The "no-go" alternative will result in the visual environment staying the same with the natural character of the area contributing to the "sense of place". Considering it has been determined that the site currently consists of degraded Fynbos and fallow land, the opportunity to transform the site will improve the sense of place and prevent further degradation of the land.

4. Description of Aspects to be Further Assessed by Specialists in the EIA Phase

4.1 Description of Identified Aspects (Impacts)

4.1.1 Pre-Construction Phase

Climate Change Considerations

Designs must take into account climate change risks, and final designs should focus on integrating green building materials, water saving and energy saving technologies/ infrastructure where feasible, as well as have an appropriately designed stormwater management plan. All appropriate approvals must be obtained and remain valid, prior to the start of construction, or non-compliances and penalties may apply.

4.1.1 Construction Phase

The following potential environmental impacts have been identified by the EAP, and by initial input from Botanical and Freshwater specialists, as impacts that may occur during the construction phase that need to firstly be avoided and if unavoidable, mitigated to an acceptable level of impact significance.

Agricultural Potential Impact - Loss of agricultural land

According to CapeFarmMapper the proposed housing site is classified as very high dryland potential, while the DEA Screening Tool recommended a "High" sensitivity for this theme. It was confirmed by the botanical specialist that the site exhibits areas of fallow land, clearly indicating past agricultural use, adjacent to the central spine road, Forrest Hall Road, as depicted in the screening tool. An agricultural specialist will be appointed to address the existing land capability and loss of the identified fallow land, that may have been utilized for cultivation of crops or other agricultural purposes (opportunity cost). The area is fairly small, as it is limited by steep slopes.

Botanical Impact - Permanent or temporary loss of vegetation cover as a result of site clearing:

Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint, in terms of the housing development, clearance will be permanent in most areas, with designated open space areas where natural cover will be restored. It has been noted in the botanical survey, that the potential impact on vegetation type per se is not of a great concern.

Botanical Impact - Loss of Species of Conservation Concern during pre-construction site clearing activities:

No Species of Conservation Concern were identified within the proposed housing site, however, fynbos (although degraded), is considered conservation worthy and one protected tree species (i.e. Afrocarpus falcatus) was recorded in the western part of site, this species can be damaged or removed during construction.

Soil Erosion and Slope Stability:

The proposed housing site is surrounded by slopes > 1:4, therefore consideration must be given to the removal of vegetation cover and construction activities leading to soil disturbance, which may result in some areas being susceptible to soil erosion after completion of the activity.

Contamination & Pollution Impact – Associated with Construction Activities

Construction activities will generate waste. In addition, fuel, oil, lubricants and other pollutants may leak from vehicles/ machinery and contaminate the soil. Pollution and soil contamination could also occur from chemical toilets, cement mixing directly on the soil and stormwater runoff may flow over the site camp area and carry contaminants off-site.

Dust & Noise Impact:

Temporary dust and noise impacts may result due to construction activities on the site and the proposed routes. Excavations and associated earth-moving activities may generate noise and vibration which may pose a nuisance to surrounding residents and other land users. Movement of heavy vehicles to & from the site may generate noise, which may affect surrounding residents.

Impacts on faunal species due to construction activities:

Animal Species sensitivity is recorded as high, according to the DEA Screening Tool. Activities associated with vegetation clearing and killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

Freshwater Resources Impact – Disturbance/Loss of aquatic vegetation and habitat:

Indigenous aquatic vegetation within the stream catchments, and possibly within the riparian zone, will be removed and disturbed due to construction activities such as excavations and infilling, as well as machinery and workers on site. The movement of topsoil and incorrectly placed stockpiles could bury aquatic habitat. This will be a direct and immediate impact resulting in short to medium term vegetation loss. Due to construction, alien invasive species may encroach further into any disturbed areas and outcompete indigenous vegetation thereby reducing aquatic biodiversity.

Freshwater Resources Impact – Erosion of the banks and sedimentation of the watercourses:

Vegetation clearing and exposure of bare soils directly within and adjacent to the aquatic habitat during construction will decrease the soil binding capacity and cohesion of the upslope soils and thus increase the risk of erosion and sedimentation downslope. This may cause the burying of aquatic habitat. Ineffective site stormwater management, particularly in periods of high runoff, can lead to soil erosion from confined flows. Formation of rills and gullies from increased concentrated runoff might also occur. This increase in volume and velocity of runoff increases the particle carrying capacity of the water flowing over the surface. Soil compaction resulting in reduced infiltration and increased surface runoff together with the artificial creation of preferential flow paths due to construction activities, will result in increased quantities of flow entering the systems. The magnitude of this impact is increased by the steep topography adjacent to these drainage lines.

Freshwater Resources Impact – Water Pollution:

During construction there are a number of potential pollution inputs into the aquatic habitat (such as hydrocarbons and raw cement). These pollutants alter the water quality parameters such as turbidity, nutrient levels, chemical oxygen demand and pH. These alternations impact the species composition of the systems, especially species sensitive to minor changes in these parameters. Sudden drastic changes in water quality can also have chronic effects on aquatic biota in general and result in

localised extinctions. Hydrocarbons including petrol/diesel and oils/grease/lubricants associated with construction activities (machinery, maintenance, storage, handling) may potentially enter the system by means of surface runoff or through dumping by construction workers. Raw cement may enter the systems through incorrect batching procedure and/or direct disposal. The incorrect positioning and maintenance of the portable chemical toilets and use of the surrounding environment as ablution facilities may result in sewage and chemicals entering the systems.

Freshwater Resources Impact – Flow Modification:

Land clearing and earth works upslope of aquatic habitat will reduce infiltration rates and increase the surface runoff volume and velocity. Such changes in surface roughness and runoff rates may lead to some rill and gully erosion. Altered water inputs from upslope disturbances as well as modified water distribution and retention patterns will ultimately affect the hydrological integrity of water resources. This impact is likely to be magnified by the steep slopes around drainage lines.

Socio-Economic Impacts - Encroachment onto Private Property:

Privately owned properties are located along the proposed central road along the proposed site. The proposed development will encroach upon these areas. This can result in disgruntled owners, regarding the encroachment and the establishment of subsidy housing around their properties.

Socio-Economic Impact – Creation of business and employment opportunities:

The majority of work during the construction phase is likely to be undertaken by local contractors and builders. The proposed development will therefore represent a positive benefit for the local construction and building sector in the Garden Route District Municipality (GRDM) and Bitou Local Municipality (BLM). The majority of the building materials associated with the construction phase will be sourced from locally based suppliers from the GRDM and BLM. A significant portion of the annual wage bill will be spent in the local GRDM and BLM. The long-term economic impacts will be massive given the scale and duration of the proposed housing development. Most of the labour will be made up of Historically Disadvantaged Individuals (HIDs).

Traffic & Safety Impact:

It is proposed that there will be multiple deliveries of a significant amount of materials and equipment to the site during the construction phase of the development. Numerous truck trips will be required every day that could cause a temporary disturbance to traffic in the area. Impacts are expected to occur to the traffic in the area due to increased truck and construction vehicle traffic expected during the construction phase, particularly as Forest Hall Road is the only access into the Crags and Kurland. Construction vehicles may impact on the existing road conditions (road capacity and congestion). Vehicles may impact on road safety conditions due to an increase in construction phase vehicles entering and exiting the site and they may impact on the condition of the existing road network.

Visual Impact:

The construction phase is associated with temporary disturbance as a result of construction (trench excavations, vehicles, machinery, fencing & signage) that may have a negative visual impact to the area.

4.1.2 Operational Phase

Botanical Impact - Invasion by exotic and alien species:

Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.

Botanical Impact - Disturbances to ecological processes:

Activity may result in disturbances to ecological processes.

Faunal Impact - Loss of faunal species due to operational activities:

Faunal species loss due to increased vehicle activity, noise and lighting.

Freshwater Resources Impact – Disturbance/Loss of aquatic vegetation and habitat:

There is less direct risk to aquatic habitat during the operational phase as it will have been transformed already during construction. However, any remaining habitat is at threat due to the possibility of urban sprawl encroaching into aquatic habitat or increase pressure from livestock. The project may promote the establishment of disturbance-tolerant biota, including colonization by invasive alien species, weeds and pioneer plants if there is any ongoing disturbance near the riparian zone. Although this impact is initiated during the construction phase it is likely to persist into the operational phase. Additionally, the stormwater infrastructure of the housing and associated road network will increase and concentrate flows into the systems. This may lead to erosion in the systems.

Freshwater Resources Impact – Erosion of the banks and sedimentation of the watercourses:

Where soil erosion problems and bank stability concerns initiated during the construction phase are not timeously and adequately addressed, these can persist into the operational phase of the development project and continue to have a negative impact downstream. The increase in hardened surface by development, and the impact of road and pipe crossings will be considerable and, if not mitigated against, will result in further erosion. Surface runoff and velocities will be increased, and flows will be concentrated by stormwater infrastructure. Cultivation in the agricultural area may lead to increased sedimentation since large areas will be left unvegetated for periods of time. The steep slopes increase the magnitude of this impact.

Freshwater Resources Impact – Water Pollution:

Micro-litter such as cigarette butts may travel through certain stormwater grids and grids may not be regularly cleared. The increase in vehicles on the property due to the development increases the potential for pollutants to enter the systems. During maintenance of the development there could be water pollution impacts similar to those encountered in the construction phase. It is assumed that all wastewater will be disposed of via existing infrastructure and will not be treated on the property. It is likely that wastewater will be treated at the existing WWTW adjacent to the development, if there is capacity. The establishment of sewer pipes within and/or in close proximity to watercourse always poses a long-term threat to the water quality and ecological health of freshwater ecosystems due to the relatively high likelihood that surcharge events will occur at some point in the future. The agricultural area might be subject to fertiliser use which will lead to pollution from excess nutrients when runoff from these areas enter the aquatic habitat.

Freshwater Resources Impact – Flow Modification:

Hardened/artificial infrastructure will alter the natural processes of rainwater infiltration and surface runoff, promoting increased volumes and velocities of storm water runoff, which can be detrimental to the aquatic habitat receiving concentrated flows off of these areas. According to the SANRAL (2006), urbanisation typically increases the runoff rate by 20-50%, compared with natural conditions. Increased volumes and velocities of storm water draining from the area and discharging into the aquatic habitat will alter the natural ecology, increasing the risk of erosion and channel incision/scouring. Irrigation on the agricultural area may lead to altered and increased runoff when not managed properly.

Socio-Economic Impact - Provision of housing:

The proposed development will assist to address some of the housing backlog in the area.

Socio-Economic Impact - Provision of housing:

The proposed development will assist to address some of the housing backlog in the area.

Socio-Economic Impact - Provision of public open spaces:

The development proposal makes allowance for the provision of public open space.

Socio-Economic Impact - Provision of sports field:

The proposed development makes provision for the establishment of a sports field to be utilized by the community. These components will not only contribute to an improved quality of life for the various members of the community but will also provide a safe and well-equipped environment for the youth to come together and learn new skills.

Socio-Economic Impact - Employment and business:

The support facilities of both business, educational and commercial components, in the form of a shops, school, and creche will create employment opportunities for local residents. The majority of the employment opportunities are likely to benefit Historically Disadvantaged Individuals (HDIs), who will be housed in this community. Given the high unemployment levels in Kurland, coupled with the low income and education levels, this would represent a positive social impact.

Socio-Economic Impact - Broaden the rates base:

The development will result in an increase in the rates base. In addition, the proposed development would also generate revenue for the local municipality from the consumption of water and electricity.

Socio-Economic Impact - Property Values of surrounding landowners:

Values of real estate are driven by various factors, among others supply and demand, interest rates, the contraction or expansion of the local economy, population growth rates and changes in disposable income to debt ratios. With the increase in facilities, it is likely that surrounding properties values may increase due to their proximity.

Traffic & Safety impact:

A significant increase in traffic is expected to occur in the area as a result of the proposed development. Vehicles may impact on the existing road network and road safety conditions due to an increase in vehicles entering and exiting the site.

Visual Impact – Land use character & "sense of place":

It is proposed to change the land use character and existing sense of place of the site from degraded Fynbos and fallow land, to significantly dense housing development, with additional support facilities. The proposed development would impact on the "sense of place" of the area to sensitive receptors that can see the development.

Visual Impact - Visual intrusion of night lighting:

With the establishment of housing and roadways, the additional lighting along the road and as a result of the housing will create a visual impact at night, which would be visible from the surrounding landscape.

Climate Change Impacts

A lack of awareness/knowledge of the climate risks faced by the community (including, storm risks, water shortages, fire risks, etc). and the integrated designs/technologies aimed at lowering climate risks, will not allow residents/community leaders to understand the importance and risks related to climate change, and what can be done within the community, in the future to address these risks. A lack of knowledge can lead to infrastructure being improperly managed, and potentially compromised.

Contamination & Pollution Management

Sewer infrastructure failure as a result of overflows or electrical faults that may affect pumps, needs to be considered.

Failure to manage solid waste, and other waste products can lead to litter of the surrounding environments, and contamination of affected natural areas. As well as lead to unsafe conditions for the public, or kids playing out in public areas.

4.2 Aspects Considered in the Scoping Phase

The following **Specialist Impact Assessments** and **external engineering consultant** input has been undertaken, in order **to inform the design, layout and infrastructure requirements** of the development proposal and **fulfill the content requirements of the Scoping Report in terms of the expected impact significance**:

- A **Town Planning Motivation Report** was produced by WM De Kock Associates and Urban Content, dated 2021.
- A **Preliminary Engineering Services Report** by Niel Lyners and Associates, September 2021.
- A **Biodiversity Survey** was undertaken by Mark Berry Environmental Consultants, dated 2020, on the Original Conceptual Site Layout Plan.
- A **Freshwater Impact Assessment: Phase 1** was undertaken by Debbie Fordham of Sharples Environmental Services cc in 2020 on the Original Conceptual Site Layout Plan;

The assessments listed above have therefore informed the Draft Scoping Report and associated proposed preferred layout plan.

4.3 Aspects Proposed to be considered during the EIA Phase

It is proposed to undertake the following additional Specialist Impact Assessment Studies and Technical Reports during the EIA Phase:

- An **updated Biodiversity Impact Assessment** that must include a comparative assessment of the proposed layout alternatives of the site.
- An **updated Freshwater Habitat Assessment** that must include a comparative assessment of the proposed layout alternatives of the site.
- An **Animal Species Compliance Statement/Impact Assessment**.
- An **Agricultural Compliance Statement**.
- A **Socio-Economic Impact Assessment.**
- Based on **HWC's feedback on the NID**, potentially:
- **A Visual Impact Assessment;**
- **A Palaeontological Impact Assessment**
- **A Heritage Impact Assessment.**

5. Methodology for Assessing the Environmental Aspects

5.1 Methodology for Additional Ecological/Botanical Input

Mark Berry Environmental Consultants have already produced a Biodiversity Survey on the original draft Site Layout Plan. The updated proposed Site Layout Plan has since been revised to respond to the recommendations made in the various specialist reports as well as input from the engineers. The same methodology previously used should be followed, including all four alternatives (No-Go included).

The methodology includes the following:

- To determine if vegetation of high conservation value will be affected by the project. Reference will be made to its conservation value and potential impact on ecological linkages, CBA's, etc.
- To determine if any rare and threatened (Species of Conservation Concern) plant species will be affected.
- To comparatively assess the presented alternatives in terms of the identified impacts.
- To propose mitigation measures to be included in the EMP to ensure that the impact on biodiversity is minimised.
- The contents of the Updated Biodiversity Survey must meet the requirements of the required content as listed in in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity, published in Government Notice No: 320, Government Gazette 43110, on March 2020, and the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species, Government Notice No. 1150 Government Gazette 43855, on October 2020.

5.2 Methodology for Additional Freshwater Habitat Assessment Input

The Aquatic Specialist has already produced a Phase 1 Freshwater Habitat Assessment on the original Site Layout Plan. The original proposed Site Layout Plan has since been revised to respond to the recommendations made in the various specialist reports as well as input from the engineers. The Aquatic Specialist therefore needs to follow the same methodology as before and comparatively assess the Freshwater Impact for the (No-Go included).

The required scope of work includes the following:

- Desktop delineation of all watercourses within a 500m radius of the proposed development utilising available aerial photography, contour data and water resource date;

- Contextualisation of the study area in terms of important biophysical characteristics and aquatic conservation planning information (including National Freshwater Ecosystem Priority Areas);
- Undertake a risk screening assessment to determine which of the desktop delineated watercourses is likely to be measurably affected by the proposed activity;
- Detailed infield delineated freshwater habitats in relation to the proposed construction using the manual A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas (DWAF, 2005)
- Classification of delineated freshwater habitats in accordance with the National Wetland Classification System for Wetlands and other Aquatic Ecosystems in South Africa (Ollis et al, 2013) and WET-Ecoservices (Kotze et al, 2009);
- Identification of site-specific biophysical characteristics, e.g. hydrology, vegetation, geomorphological features and soils;
- Conduct a Present Ecological State (PES) and functional importance assessment of the delineated wetland habitats, utilising:
    - Level 1 WET-Health tool (Macfarlane et al, 2009 – PES);
    - WET-Ecoservices (Kotze et al, 2009) – Functional assessment;
- Conduct a Present Ecological Status (PES) and present Ecological Importance and Sensitivity (EIS) assessment of the delineated river/riparian habitats, utilising:
    - Qualitative Index of Habitat Integrity (IHI) tool adapted from (Kleynhans, 1996) – PES;
    - DWAF (DWS) river EIS tool (Kleynhans, 1999) – EIS;
- Undertake water quality sampling and analysis to inform current instream habitat water characteristics;
- Identification, prediction and description of the potential impacts of the proposed project on the delineated wetland/ riparian areas and the significance of these impacts; and
- Recommendation of impact management/mitigation guidelines for the proposed project including guidelines for the rehabilitation of disturbed areas and monitoring protocols.
- The contents of the Updated Freshwater Impact Assessment must meet the requirements of the required content as listed in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity, published in Government Notice No: 320, Government Gazette 43110, on March 2020.

5.3 Terms of Reference Provided to All Specialists

Specialists in their field of expertise will verify site sensitivity as per the relevant applicable themes, as identified in the DEA Screening Tool, and advise on appropriate reporting format, ie: Compliance Statement or Impact Assessment Report as per the relevant theme, which includes: Agriculture, Aquatic, Animal, Archaeological and Cultural, Civil Aviation, Defence, Paleontological, Plant and Terrestrial Biodiversity.

Further to this Specialists must consider baseline data and identify and assess impacts according to predefined rating scales. Specialists will also suggest optional or essential ways in which to mitigate negative impacts and enhance positive impacts. Further, specialists will, where possible, take into consideration the cumulative effects associated with this and other projects which are either developed or in the process of being developed in the local area. The results of these specialist studies will be integrated into a Draft Environmental Impact Report.

Specialists' reports must comply with content requirements as listed in the specific environmental theme protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts, published in Government Notice No: 320, Government Gazette 43110, and

Government Notice No. 1150 Government Gazette 43855, on March 2020 and October 2020, respectively, where applicable.

The specific environmental theme protocol is to replace Appendix 6 of the Environmental Impact Assessment Regulations, 2014 (as amended 2017), as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), however where a specialist assessment is required and no specific environmental theme protocol has been prescribed, the required level of assessment must be based on the findings of the site sensitivity verification and must comply with Appendix 6 of the EIA Regulations.

Environmental themes as per the DEA Screening Tool and Relevant Protocols include:

Impact Assessment	Protocol	Relevant to the Proposed Kurland Housing
Agriculture	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf	Yes, an agricultural specialist will be appointed to undertake the relevant study
Archeological & Cultural Heritage	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pd	TBD
Paleontology		
Geotechnical		Technical input
Socio-Economic		Yes
Landscape/ Visual		Yes, will not be undertaken
Hydrology		Yes , will not be undertaken
Aquatic Biodiversity	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf	Yes, an aquatic specialist has been appointed to undertake the relevant study
Terrestrial Animal Species	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf	Yes, a specialist will be appointed accordingly
Terrestrial Plant Species	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf	Yes, an ecological specialist has been appointed to undertake the relevant study

Terrestrial Biodiversity	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf	
Avifauna	https://screening.environment.gov.za/ScreeningDownloads/Assessment/Wind/DraftAvianProtocol.pdf	Not applicable

General requirements of all protocols (specific environmental and general) state that:

- A site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
- The outcome of the site sensitivity verification must be recorded in the form of a report that--
  (a) confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
  (b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
  (c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations (EIA Regulations).
- Specialist reports may only be undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the relevant field.

Specialist reports should include as a minimum:

1. Details of-
   a. the specialist who prepared the report; and
   b. the expertise of that specialist to compile a specialist report including a curriculum vitae;
2. A declaration that the specialist is independent in a form as may be specified by the competent authority;
3. An indication of the scope of, and the purpose for which, the report was prepared;
4. An indication of the quality and age of base data used for the specialist report;
5. A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
6. The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;
7. A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
8. Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
9. An identification of any areas to be avoided, including buffers;
10. A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
11. A description of any assumptions made and any uncertainties or gaps in knowledge;
12. A description of the findings and potential implications of such findings on the impact of the proposed activity, or activities.
13. Any mitigation measures for inclusion in the EMPr;

14. Any conditions for inclusion in the environmental authorisation;
15. Any monitoring requirements for inclusion in the EMPr or environmental authorisation;
16. A reasoned opinion-
    a. whether the proposed activity, activities or portions thereof should be authorised;
    b. regarding the acceptability of the proposed activity or activities; and
    c. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
17. A description of any consultation process that was undertaken during the course of preparing the specialist report;
18. A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
19. Any other information requested by the competent authority.

In addition to the above, specialists are expected to:

- Review the Scoping Report to familiarize themselves with all relevant issues or concerns relevant to their field of expertise;
- In addition to the impacts listed in the Scoping Report, identify any issue or aspect that needs to be assessed and provide expert opinion on any issue in their field of expertise that they deem necessary in order to avoid potential detrimental impacts;
- Assess the degree and extent of impacts employing the criteria and methodology set out in the Scoping Report of all identified impacts and issues that the preferred project activity and its proposed alternatives, **including that of the no-go alternative**, may have;
- Identify and list all legislation and permit requirements, relevant to their field of study, required before construction may commence.
- Reference all sources of information and literature consulted; and
- Include an executive summary to the report.

The specialist is expected to prepare a report that addresses the scope of the work as set out above, and as per the specific environmental theme protocol, where applicable.

The following assessment methodology will be provided to all the specialists so that the same impact significance methodology is used across the board:

Table 4: Methodology in determining the extent, duration, probability, significance, reversibility and cumulative impact of an environmental impact

Determination of Extent (Scale):

Site Specific	1	The impact is limited to the development site (development footprint) or part thereof.
Local	2	The impacted area includes the whole or a measurable portion of the site, but could affect the area surrounding the development, including the neighbouring properties and wider municipal area.
Regional	3	The impact would affect the broader region (e.g. neighbouring towns) beyond the boundaries of the adjacent properties.
National	4	The impact would affect the whole country (if applicable).

Determination of Duration:

Temporary	1	The impact will be limited to part of the construction phase or less than one month.
Short term	2	The impact will continue for the duration of the construction phase, or less than one year.
Medium term	3	The impact will continue for part the operational phase
Long term	4	The impact will continue for the entire operational lifetime of the development, but will be mitigated by direct human action or by natural processes thereafter.
Permanent	5	This is the only class of impact that will be non-transitory. Such impacts are regarded to be irreversible, irrespective of what mitigation is applied.

Determination of Probability:

Improbable	1	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
Probable	2	There is a possibility that the impact will occur to the extent that provisions must therefore be made.
Highly probable	3	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up to mitigate the activity before the activity commences.
Definite	4	The impact will take place regardless of any prevention plans.

Determination of Significance (without mitigation):

No significance	1	The impact is not substantial and does not require any mitigation action.
Low	2	The impact is of little importance, but may require limited mitigation.
Medium	3	The impact is of sufficient importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
Medium-High	4	The impact is of high importance and is therefore considered to have a negative impact. Mitigation is required to manage the negative impacts to acceptable levels.
High	5	The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.
Very High	6	The impact is critical. Mitigation measures cannot reduce the impact to acceptable levels. As such the impact renders the proposal unacceptable.

Determination of Significance (with mitigation):

No significance	1	The impact will be mitigated to the point where it is regarded to be insubstantial.
Low	2	The impact will be mitigated to the point where it is of limited importance.
Medium	3	Notwithstanding the successful implementation of the mitigation measures, the impact will remain of significance. However, taken within the overall context of the project, such a persistent impact does not constitute a fatal flaw.
High	4	Mitigation of the impact is not possible on a cost-effective basis. The impact continues to be of great importance, and, taken within the overall context of the project, is considered to be a fatal flaw in the project proposal.

Determination of Reversibility:

Completely Reversible	1	The impact is reversible with implementation of minor mitigation measures
Partly Reversible	2	The impact is partly reversible but more intense mitigation measures
Barely Reversible	3	The impact is unlikely to be reversed even with intense mitigation measures
Irreversible	4	The impact is irreversible and no mitigation measures exist

Determination of Degree to which an Impact can be Mitigated:

Can be mitigated	1	The impact can be completely mitigated
Can be partly mitigated	2	The impact can be partly mitigated
Can be barely mitigated	3	It is possible to mitigate the impact only slightly
Not able to mitigate	4	It is not possible to mitigate the impacts

Determination of Loss of Resources:

No loss of resource	1	The impact will not result in the loss of any resources

Marginal loss of resource	2	The impact will result in marginal loss of resources
Significant loss of resources	3	The impact will result in significant loss of resources
Complete loss of resources	4	The impact will result in a complete loss of all resources

Determination of Cumulative Impact:

Negligible	1	The impact would result in negligible to no cumulative effects
Low	2	The impact would result in insignificant cumulative effects
Medium	3	The impact would result in minor cumulative effects
High	4	The impact would result in significant cumulative effects

The Significance ratings have been calculated based on the Consequence, Probability and the Reversibility of the impacts.

The following formulas were used to calculate the Significance:

Significance = (Consequence x Likelihood) + Reversibility

where:

Consequence = Degree of Loss + Extent + Duration

and:

Likelihood = Probability + Level of Mitigation

Significance ratings of impacts after mitigation have been colour coded for ease of reference, as follows:

POSITIVE IMPACTS	Rating	NEGATIVE IMPACTS
Very High	90-108	Very High
High	76-90	High
Medium-High	61-75	Medium-High
Medium	46-60	Medium
Low-Medium	31-45	Low-Medium
Low	16-30	Low
Negligible	0-15	Negligible

6. Consultation with the Competent Authority

Section 7 (Duties of Competent Authorities) of the NEMA EIA Regulations of 2014 states that "*Where a Competent Authority is requested by an applicant to comment in terms of these Regulations, such competent Authority must submit its comments within 30 days*". In an effort to ensure that the Final EIA Report contains sufficient information for DEA & DP to make an informed decision and to ensure they satisfy the content requirements listed in the EIA Regulations of 2014, as amended, DEA & DP will be

requested to provide comment on the draft Environmental Impact Assessment Report when it is made available for 30 days Public Participation.

The Competent Authority could comment on whether they deem it necessary to conduct additional specialist assessments other than what is proposed already in this POSEIA when they accept the Final Scoping Report.

7. Public Participation Process during the EIA Phase

The Environmental Impact Assessment Report, still to be compiled, will take into account all comments received from interested and affected parties, commenting Authorities and the Competent Authority during the two Public Participation Phases on the Scoping Report. The EIA will respond to each written comment received in a "Comments & Response" Table. In addition, further changes to the layout, development proposal or proposed specialist input to be undertaken, will be informed by the comments received during the Scoping Phase 30-day Public Participation Periods.

This process will comply with the National Environmental Management Act, 1998 (Act 107 of 1998), of the Environmental Assessment Impact Regulations, 2014 (as amended 2014), section 41 "Public Participation Process".

There is however only 1 opportunity for the public and commenting authorities to provide input during the EIA Process. There is **one 30-day PP period** on the Draft EIA Report, after which the report is revised and submitted for final decision making.

8. Description of Tasks to be undertaken during the EIA Phase

The following tasks are proposed to be undertaken during the EIA Phase:

Environmental Impact Assessment Report & Specialist Assessments & WULA

- Compilation of the Terms of Reference for additional specialist input for the EIA phase specialist reports required / addendums to previous impact reports.
- Management of the appointment of the additional specialists and input;
- Review of specialist assessments and provide detailed comments for amendment (if required).
- Project management meetings with applicant and specialists.
- Additional site visits with specialists, authorities and I & AP's, if required.
- Co-ordination of various specialists input to produce sensitivity maps and site layouts for inclusion in the EIA Report.
- Compile EIA Report;
- Compile Environmental Management Plan;
- Submit EIA & EMP to DEA & DP.
- Compile WULA Report. The WULA will be undertaken by the Aquatic Specialist;

30 days Public Participation on EIA Report (including WULA)

- Conduct 30 days PP on EIA Report – including printing colour hardcopies and courier to all key commenting Authorities;
- Written Notification letters to I & AP's;
- Uploading onto website;
- Respond to each comment received;

- Project management meetings and focus group meetings with I & AP's;
- Update Comments & Response Table;
- Update I & AP Database;
- Update EIA Report and EMP based on all comments received during PP;
- Printing and submission of hardcopies to DEA & DP and to client.
- Submit WULA to DWS.

DEA & DP provide 106 days to submit the EIA Report from the day the Scoping Report is accepted. During which time 30 days PP on the EIA Report must take place and the EIA Phase specialist assessments. The EIA Report and EMP must also be updated during this time period before submission.

9. Measures to Avoid, Reverse, Mitigate or Manage Impacts

The following measures are proposed to avoid, reverse, mitigate or manage impacts:

9.1 Pre-Construction Phase

9.1.1 General

- Planning and design team must take into consideration on relevant conditions of any relevant licenses/permits/authorizations.
- All relevant licenses/permits/authorizations must be obtained prior to the start of construction.
- Local contractors, suppliers, labour must be utilized.
- The appointed consulting engineer must ensure that the aforementioned conditions/requirements are integrated into appropriate contractual documentation, including the tender document.
- An appropriately registered/qualified ECO must be appointed prior to construction to ensure that all pre-construction conditions are met.
- An appropriately registered/qualified Environmental Auditor must be appointed prior to construction to ensure that all pre-construction conditions are met.

9.1.2. Climate Change Considerations

- Final designs must include:
    - Green building materials must be integrated into the development as much as possible.
    - Apply soft engineering techniques, where possible.
    - Take into consideration floodline/drainage areas that can be exacerbated during flooding/storm surge events.
    - Incorporate thermal efficiency into designs and use climate-resilient technologies.
    - Water saving technologies/techniques (jo-jo tanks for rainwater collection) and energy saving technologies/techniques (solar geezers/solar panels on roofs, potentially in for light poles, etc. and utilizing energy saving bulbs where possible).
    - An appropriate stormwater management plan must be compiled and approved.
    - Ensure materials are sourced locally, and consider Life Cycle of all materials utilized, when selecting materials.

9.2 Construction Phase

9.2.1 Agricultural Potential Impact - Loss of Agricultural Land

- No mitigation is proposed.

9.2.2 Botanical Impact - Permanent Loss of Indigenous Vegetation

- Ensure sufficient quality, quantity and connectivity of habitat remains throughout the area of

the property.
- Remove alien invasive plants and rehabilitate.
- Develop and implement fire management program, by establishing suitable firebreaks.
- Development of an EMPr to control construction impacts.
- Set aside areas for public open space system and managed as such.
- Attempt to reutilize degraded fynbos, in proposed vegetated areas, ie. sidewalks, etc.

9.2.3 Botanical Impact - Loss of Species of Conservation Concern

If intended to be maintained:
- Demarcate tree species.
- Indicate this as a no-go area.
- Ensure labour and construction vehicle operators are well aware of the importance of maintenance of this tree.
- Remove alien invasive plants and rehabilitate.
- Development of an Environmental Management Programme (EMPr) to control construction impacts.

If intended to be removed:
- Follow procedures required to obtain a permit for removal from the Department of Forestry.
- Remove alien invasive plants and rehabilitate
- Development of an Environmental Management Programme (EMPr) to control construction impacts.

9.2.4 Erosion & Sedimentation

Planning:
- All activities should be set back from steep slopes.
- Stockpiled materials should be situated away from steep slopes.
- Suitable measures must be implemented in areas that may be susceptible to erosion.
- Areas must be rehabilitated immediately after construction.
- Stormwater management measures must be implemented appropriately.
- Development of an Environmental Management Plan (EMP) to control construction impacts.
- Observe recommended 19m aquatic buffer. Ensure this is established, and silt fencing is in place to capture runoff downslope.

Stockpiles:
- Bund stockpiles.
- Do not exceed 2 metres in height.
- Do not locate next to slopes, particularly when wet weather is expected.

Earthworks:
- Should be planned appropriately.
- Slope stability measures should be implemented during construction to avoid collapse of slope side of excavations, when establishing foundation.
- Heavy machinery should not be permitted along steep slopes.
- A geotechnical specialist should be involved in earthworks and the construction of foundations to assist the engineer with quality control.
- Compaction control testing is essential during construction.
- Earthworks should be designed and conducted in accordance with SABS 1200D, COLTO 3300 or any site-specific specifications provided by the engineer.
- Foundations should be designed and constructed in accordance with the NHBRC Home Builders Manual, SANS 10400-H and/or as specified by the structural engineer.
- The development layout should take into account the topography of the site and due consideration should be given to development in or directly adjacent to natural water courses

(Terrain 2 as per Figure 9), where saturated soil and marshy surface conditions can be expected, requiring special engineering (e.g. for road crossings).

- If any uncontrolled fill material is uncovered, such as rubble, plastic, etc., it should be completely removed from house platforms or treated as per the engineers instructions.
- Some bulk earthworks and possibly low retaining walls may be required to create level platforms on sites where slopes exceed 1:10. In cut to fill operations, all organic matter should be removed from the footprint area before bulk earthworks.
- The insitu soils may not be suitable for use in bulk fills, unless the material is approved by the engineer and can be effectively compacted to the specified level. Platforms should be cut and rolled to achieve a minimum of 93% of the Modified AASHTO density (<30mm/blow of DCP).
- It is recommended that platforms are capped off with minimum 150mm G5 or G7 gravel (compacted to 95% MDD) prior to excavation of foundation trenches.
- The recommended foundation system for the proposed single/double storey structures is inverted-T beams, founded at a nominal depth of 0.8m below GL on insitu soils or engineered fill with design bearing pressures limited to 75kPa.
- The structural engineer can consider the placement of a layer of engineered fill, such as G5 crushed rock, in trenches to improve founding conditions and to facilitate compaction.
- Alternative methods can include stiff raft foundations placed directly on insitu soil.

Road pavements:

- Access roads should be constructed in accordance with SABS 1200, COLTO, TRH4, TRH14, The Red Book or other applicable specifications and standards, or as directed by the engineer.
- Improvement of the subgrade is recommended with lower and upper SSG layers included in the design of roads at the engineers discretion.
- General preparation of the roadbed (subgrade) should include the following:
    - Cut to line and level.
    - Compact to 90% MDD. Recommended moisture content before rolling is optimum moisture content (OMC) minus 2%.
    - Remove any incompressible or wet soil and reinstate with G9 material or as directed by the engineer.

Stormwater management:

- An appropriately designed stormwater management plan should be drawn up and approved by the municipality.
- This must be adopted for construction and operational management of the site.
- Implement all necessary measures, as recommended by aquatic specialist.
  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.
- Minor flood events can be handled with kerb inlets and underground pipes, which discharge at suitable points into existing stormwater network or natural drainage lines, as directed by the engineer.
- Stormwater from major flood events can be contained within the road prism but should not overflow into adjacent erven. Well-designed access roads with sufficient level difference from the adjacent property, and adequate side drains and culverts is recommended.
  Subsoil drains are recommended along roads as a precaution to keep the subgrade drained.
  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 minimizing erosion around the house. The finished floor level of all houses should be a minimum of 150mm above final ground level to prevent flooding.

9.2.5. Contamination & Pollution Impact – Associated with Construction Activities

- Appoint an independent Environmental Control Officer (ECO) to monitor construction activity.
- Site inspections should be undertaken on a regular basis, for the duration of the construction phase.
- ECO monitoring audit reports should compiled, auditing on the compliance of the property developer with the conditions of the Environmental Authorisation and the approved EMP.

General Pollution Management:

- No pollution of surface water or ground water resources may occur due to any activity on the site.
- No storm water runoff from any premises containing waste, or water containing waste emanating from construction activities may be discharged into the environment.
- Polluted stormwater must be contained on the site.
- Cement batching / mixing may not take place directly on the soil surface, it must be done on an impervious lining that will prevent cement particles from contaminating the soil.

General Waste Management:

- Dedicated waste bins or skips must be provided on site, and kept in a demarcated area on an impermeable surface.
- Separate waste bins/skips must be provided for recyclable waste, general waste and hazardous waste. Recovered builder's rubble & green waste may be stockpiled on the ground within the site camp, or in separate skips until removal.
- Waste must be placed in the appropriate waste bins/skips/ stockpiles.
- Hazardous waste bins must be kept on an impermeable bunded surface capable of holding at least 110% of the volume of the bins.
- Skips/ bins must be provided with secure lids or covering that will prevent scavenging and windblown waste or dust.
- Waste bins/skips must be regularly emptied and must not be allowed to overflow.
- Construction workers must be instructed not to litter and to place all waste in the appropriate waste bins provided on site.
- The Contractor must ensure that all workers on site are familiar with the correct waste disposal procedures to be followed.
- Waste generated on site must be classified and managed in accordance with the National Environmental Management: Waste Act – Waste Classification and Management Regulations (GN No. R. 634 of August 2013).
- Disposal of waste to landfill must be undertaken in accordance with the National Environmental Management: Waste Act – National Norms and Standard for the Assessment of Waste for Landfill Disposal (GN No. R. 635 of August 2013).
- All waste, hazardous as well as general, which result from the proposed activities must be disposed of appropriately at a licensed Waste Disposal Facility (WDF).

Pollution Management – hydrocarbons (oil, fuel etc.)

- Vehicles and machinery must be in good working order and must be regularly inspected for leaks.
- If a vehicle or machinery is leaking pollutants it must, as soon as possible, be taken to an appropriate location for repair. The ECO has the authority to request that any vehicle or piece of equipment that is contaminating the environment be removed from the site until it has been satisfactorily repaired.
- Repairs to vehicles/ machinery may take place on site, within a designated maintenance area at the site camp. Drip trays, tarpaulin or other impermeable layer must be laid down prior to undertaking repairs.
- Refuelling of vehicles/ machinery may only take place at the site camp or vehicle maintenance yard. Where refuelling must occur, drip trays should be utilised to catch potential spills/ drips.
- Drip trays must be utilised during decanting of hazardous substances and when refilling chemical/ fuel storage tanks.
- Drip trays must be placed under generators (if used on site) water pumps and any other machinery on site that utilises fuel/ lubricant, or where there is risk of leakage/spillage.
- Where feasible, fuel tanks should be elevated so that leaks are easily detected.
- A spill kit to neutralise/treat spills of fuel/ oil/ lubricants must be available on site, and workers must be educated on how to utilise the spill kit.
- Soil contaminated by hazardous substances must be excavated and disposed of as hazardous waste.

Pollution Management – Ablution facilities

- Chemical toilets should be kept at the site camp, on a level surface and secured from blowing over.
- Toilets must be located well outside of any storm water drainage lines, and may not be linked to the storm water drainage system in any way.
- Chemical toilets must be regularly emptied and the waste disposed of at an appropriate waste water disposal/ treatment site. Care must be taken to prevent spillages when moving or servicing chemical toilets.

Pollution Management – Hazardous Substances

- Any hazardous substances (materials, fuels, other chemicals etc.) that may be required on site must be stored according to the manufacturers' product-storage requirements, which may include a covered, waterproof bunded housing structure.
- Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases.
- Hazardous chemicals and fuels should be stored on bunded, impermeable surfaces with sufficient capacity to hold at least 110% of the capacity of the storage tanks.

Cement Batching:

- Cement batching must take place on an impermeable surface large enough to retain any slurry or cement water run-off. If necessary, plastic/ bidem lined detention ponds (or similar) should be constructed to catch the run-off from batching areas. Once the water content of the cement water/ slurry has evaporated the dried cement should be scraped out of the detention pond and disposed of at an appropriate disposal facility authorised to deal with such waste
- Cement batching should take place on already transformed areas within the footprint of the facility.
- Unused cement bags must be stored in such a way that they will be protected from rain. Empty cement bags must not be left lying on the ground and must be disposed of in the appropriate waste bin.
- Washing of excess cement/concrete into the ground is not allowed. All excess concrete/ cement must be removed from site and disposed of at an appropriate location.

9.2.6. Dust & Noise Impact – Associated with Construction Activities

Dust Mitigation:

- Land clearing and earthmoving activities should not be undertaken during strong winds, where possible.
- Cleared areas should be provided with a suitable cover as soon as possible, and not left exposed for extended periods of time.
- Stockpiles of topsoil, spoil material and other material that may generate dust must be protected from wind erosion (e.g. covered with netting, tarpaulin or other appropriate measures. Note that topsoil should not be covered with tarpaulin as this may kill the seedbank).
- The location of stockpiles must take into account the prevailing wind direction and should be situated so as to have the least possible dust impact to surrounding residents, road-users and other land-users.
- Speed limits must be enforced in all areas, including public roads and private property to limit the levels of dust pollution.
- The speed limit should be set at 20-40km/h.
- Dust must be suppressed on access roads and the construction site during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that will not result in the generation of excessive run off.
- Dust suppression measures such as the wetting down of sand heaps as well as exposed areas around the site must be implemented especially on windy days.
- The use of straw worked into the sandy areas may also help and the ECO must advise when this is necessary.
- If dust appears to be a continuous problem the option of using shade cloth to cover open areas may be necessary or the erecting of shade netting above the fenced off are may need to be explored.
- All vehicles transporting sand need to have tarpaulins covering their loads which will assist in any windblown sand occurring off the trucks.
- Work on site must be well-planned and should proceed efficiently so as to minimise the handling of dust generating material.
- Dust levels specified in the National Dust Control Regulations (GN 827 of November 2013) may not be exceeded. i.e. dust fall in residential areas may not exceed 600mg/m2/day, measured using reference method ASTM D1739;
- A Complaints Register must be available at the site office for inspection by the ECO of dust complaints that may have been received.

Noise Mitigation:

- A noise complaints register will be opened.
- Excavations and earth-moving activities must be restricted to normal construction working hours (7:30 – 17:30) as far as possible.
- Work on site must be well-planned and should proceed efficiently so as to limit the duration of

the disturbance.

- Vehicles and equipment must be kept in good working condition. Machinery and equipment should be fitted with mufflers/ exhaust silencers. No unnecessary disturbances should be allowed to emanate from the construction site.
- Due to the proximity of the proposed development site to residents, noise levels must be kept to a minimum at all times. If excessive noise is expected on the boundary of the residential erven bordering the site they must be informed in advance of when the high noise levels will occur and for how long they will occur.
- Workers should be educated on how to control noise-generating activities that have the potential to become disturbances, particularly over an extended period of time.
- Noise levels must comply with the relevant health & safety regulations and SANS codes and should be monitored by the Health & Safety Officer as necessary and appropriate.
- Affected parties must be informed of the excessive noise factors.
- The noise management and monitoring measures prescribed in the EMPr must be adhered to.

General:

The appointed Environmental Control Officer (ECO) must undertake a site inspection once per week, for the duration of the construction phase, and to produce a short monthly ECO monitoring audit report, auditing on the compliance of the property developer with the conditions of the Environmental Authorisation and the approved EMP.

9.2.7 Faunal Impact – Loss of Species and Habitat

- The appointed Environmental Control Officer (ECO) must undertake site awareness talks (environmental inductions) for new labour/contractors, this should include, but not be limited to:
- Identifying fauna that is common to the area and site.
- Encouraging labour to avoid interactions with fauna, where possible.
- Monitoring removal of any fauna that needed to be relocated as they were at risk of being harmed.
- Recommending that working corridor/fence lines be established, with appropriate shade netting, to limit wandering fauna onto site.
- Advise on appropriate emergency numbers for animal rescue and
- Ensure all necessary measures are taken to avoid harming fauna on site.
  Search and rescue of fauna should be undertaken prior to demarcation of site, and on a daily basis prior to the commencement of activities.
- Emergency numbers should be available in case of animal encounters.

9.2.8 Freshwater Resources Impact – Loss and disturbance of aquatic vegetation & habitat

Design and Planning

- The mitigation measures should be included in financial planning of the construction phase.
- Standard management measures should be implemented to ensure that any on-going activities do not result in a decline in water resource quality. Consideration should also be given to the rehabilitation of watercourses where feasible. Mitigation measures related to the impacts associated with the construction activities are intended to augment standard/generic mitigation measures included in the project-specific Environmental Management Programme (EMPr).
- Ensure monitoring by a suitably qualified independent Environmental Control Officer with an appropriately timed audit report. In the case where there is extensive damage to any aquatic

system, where rehabilitation is required, a suitably qualified aquatic specialist must audit the site.
- Monitoring for non-compliance must be done on a daily basis by the contractors.
- Photographic records of all incidents and non-compliances must be retained.
- A 19m buffer area from the boundary of the riparian habitat must be adopted and demarcated. The buffer is measured from the edge of the delineated aquatic habitat which includes riparian vegetation.
- Set back infrastructure to outside of the aquatic buffer areas where possible.

Construction:

- Manage the runoff generated by the development and introduce it responsibly into the receiving environment.
- The stormwater flows must enter the wetland areas in a diffuse flow pattern without pollutants.
- Implement a formal stormwater management plan.
- Soft infrastructure must be considered where practical.
- Stormwater managed by the development should be discharged into porous channels / swales ('infiltration channels or basins') running near parallel or parallel to contours within and along the edge of the development.
- Frequent stormwater outlets must be designed to prevent erosion at discharge points. All erosion protection measures (e.g. Reno-mattresses) must be established to reflect the natural slope of the surface and located at the natural ground level.
- Stockpiles must not be located within the buffer zones around aquatic habitat.
- Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles.

9.2.9 Freshwater Resources Impact – Sedimentation and Erosion

- Construction must be carried out during the dry season where possible and contingency plans must be in place for high rainfall events during construction.
- Before any work commences, sediment control/silt capture measures (e.g. bidim/silt curtains) must be installed downstream/downslope of the active working areas.
- Silt fences/curtains must be regularly checked and maintained (de-silted to ensure continued capacity to trap silt) and repaired where necessary.
- When de-silting takes place the silt must not be returned to the watercourse.
- Excavated rock and sediments from the construction zone, and including any foreign materials, should not be placed within the delineated rivers and riparian areas in order to reduce the possibility of material being washed downstream.
- All bare slopes and surfaces to be exposed to the elements during clearing and earthworks must be protected against erosion using rows of silt fences, sandbags, hay bales and/or earthen berms spaced along contours at regular intervals. The spacing interval must be smaller for steeper slopes and if required the ECO should advise in this regard.
- Stockpiles must not be located within the buffer zones around aquatic habitat.
- Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles. Alternatively, the exposed slopes must drain into small temporary stormwater and silt traps/ponds.
- Adopt an appropriately designed stormwater management plan, that integrates the aforementioned measures and additional technical input.

9.2.10 Freshwater Resources Impact – Water Pollution

Design and Planning

- The mitigation measures should be included in financial planning of the construction phase.
- Standard management measures should be implemented to ensure that any on-going activities do not result in a decline in water resource quality. Consideration should also be given to the rehabilitation of watercourses where feasible. Mitigation measures related to the

impacts associated with the construction activities are intended to augment standard/generic mitigation measures included in the project-specific Environmental Management Programme (EMPr).
- Ensure monitoring by a suitably qualified independent Environmental Control Officer with an appropriately timed audit report. In the case where there is extensive damage to any aquatic system, where rehabilitation is required, a suitably qualified aquatic specialist must audit the site.
- Monitoring for non-compliance must be done on a daily basis by the contractors.
- Photographic records of all incidents and non-compliances must be retained.
- A 19m buffer area from the boundary of the riparian habitat must be adopted and demarcated. The buffer is measured from the edge of the delineated aquatic habitat which includes riparian vegetation.
- Set back infrastructure to outside of the aquatic buffer areas where possible.

Construction:
- Manage the runoff generated by the development and introduce it responsibly into the receiving environment.
- The stormwater flows must enter the wetland areas in a diffuse flow pattern without pollutants.
- Implement a formal stormwater management plan.
- Soft infrastructure must be considered where practical.
- Stormwater managed by the development should be discharged into porous channels / swales ('infiltration channels or basins') running near parallel or parallel to contours within and along the edge of the development.
- Frequent stormwater outlets must be designed to prevent erosion at discharge points. All erosion protection measures (e.g. Reno-mattresses) must be established to reflect the natural slope of the surface and located at the natural ground level.
- Stockpiles must not be located within the buffer zones around aquatic habitat.
- Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles.

9.2.11 Freshwater Resources Impact – Flow Modification
Design and Planning
- The mitigation measures should be included in financial planning of the construction phase.
- Standard management measures should be implemented to ensure that any on-going activities do not result in a decline in water resource quality. Consideration should also be given to the rehabilitation of watercourses where feasible. Mitigation measures related to the impacts associated with the construction activities are intended to augment standard/generic mitigation measures included in the project-specific Environmental Management Programme (EMPr).
- Ensure monitoring by a suitably qualified independent Environmental Control Officer with an appropriately timed audit report. In the case where there is extensive damage to any aquatic system, where rehabilitation is required, a suitably qualified aquatic specialist must audit the site.
- Monitoring for non-compliance must be done on a daily basis by the contractors.
- Photographic records of all incidents and non-compliances must be retained.
- A 19m buffer area from the boundary of the riparian habitat must be adopted and demarcated. The buffer is measured from the edge of the delineated aquatic habitat which includes riparian vegetation.
- Set back infrastructure to outside of the aquatic buffer areas where possible.

Construction:
- Manage the runoff generated by the development and introduce it responsibly into the receiving environment.
- The stormwater flows must enter the wetland areas in a diffuse flow pattern without pollutants.
- Implement a formal stormwater management plan.
- Soft infrastructure must be considered where practical.

- Stormwater managed by the development should be discharged into porous channels / swales ('infiltration channels or basins') running near parallel or parallel to contours within and along the edge of the development.
- Frequent stormwater outlets must be designed to prevent erosion at discharge points. All erosion protection measures (e.g. Reno-mattresses) must be established to reflect the natural slope of the surface and located at the natural ground level.
- Stockpiles must not be located within the buffer zones around aquatic habitat.
- Erosion control measures including silt fences, low soil berms and/or shutter boards must be put in place around the stockpiles to limit sediment runoff from stockpiles.

9.2.12 Socio-Economic Impact – Encroachment onto Private Property

- Communicate proposed development to all private landowners, including timeframes, etc. whose properties may be directly affected, or who's access may be obstructed.
- Where encroachment is proposed, obtain landowner consent and register survey.

***Planning**:*

- Plan works appropriately to ensure encroachment is limited as much as possible.
- Notify landowners when obstruction of access may occur, and when construction may occur directly adjacent to their fence line.
- Erect signage to notify surrounding community of works, and any other necessary signage, including site information board, communicating applicants, contractors, engineers, and ECO's details.
- Keep an open line of communication, for public to liaise with project team.

***Visual Impacts**:*

- Ensure that works are screened from neighbouring properties, by establishing a fenced working area. This can also prohibit material from encroaching into private areas.
- Utilize shade cloth, or other suitable material, along the fence perimeter of the site camp and construction site.
  Work on site must be well-planned and well-managed so that work proceeds quickly and efficiently, thus minimizing the disturbance time.
- Use of lighting (if required) should take into account surrounding residents and land users and should present little or no nuisance. Downward facing, spill-off type lighting is recommended.

9.2.13. Socio-Economic Impact –Creation of Business & Employment Opportunities

In order to enhance local employment and business opportunities associated with the construction phase of the project the following measures are proposed to be implemented:

- The developer will inform the local authorities, local community leaders, organizations and councillors of the project and the potential job opportunities for local builders and contractors;
- The developer in consultation with the appointed contractor/s will look to employ a percentage of the labour required for the construction phase from local area in order to maximize opportunities for members from the local HD communities.

9.2.14 Traffic & Safety Impact – Associated with Construction Vehicles

- All construction vehicles must adhere to traffic laws when travelling to and from the site.
- All drivers and machinery operators must be sensitised to the fact that they are working in an area with a potentially high volume of foot and vehicle traffic, and must exercise due caution when entering/ exiting the site.

- Appropriate signage should be erected to warn other road users about the presence of construction vehicles.
- Speed of construction vehicles and other heavy vehicles must be strictly controlled to avoid dangerous conditions for other road users.
- Construction vehicles must adhere to the load carrying capacity of road surfaces and adhere to all other prescriptive regulations regarding the use of public roads by construction vehicles.
- The Contractor must ensure that any large or abnormal loads (including hazardous materials) that must be transported to/ from the site are routed appropriately, and that appropriate safety precautions are taken during transport to prevent road accidents.
- Where possible, construction traffic that may obstruct traffic flow on the surrounding roads should be scheduled for outside of peak traffic times.
- Where possible, heavy machinery should be parked within a secure demarcated area within the footprint of the site instead of moving the machinery to and from the site each day.

9.2.16 Visual Impact Associated with Construction Activities

- Consult with the ECO when determining the appropriate site for the site camp.
- The site camp must be kept neat and tidy and free of litter at all times.
- Waste must be managed according to the EMPr and the mitigation measures listed above in terms of waste management. Good housekeeping practices on site must be maintained to ensure the site is kept neat and tidy.
- The site camp, storage facilities, stockpiles, waste bins, and any other temporary structures on site should be located in such a way that they will present as little visual impact to surrounding residents and road users as possible.
- Work on site must be well-planned and well-managed so that work proceeds quickly and efficiently, thus minimizing the disturbance time.
- The site camp may require visual screening via shade cloth or other suitable material.
- Special attention should be given to the screening of highly reflective material.
- Use of lighting (if required) should take into account surrounding residents and land users and should present little or no nuisance. Downward facing, spill-off type lighting is recommended.
- Construction vehicles must enter and leave the site during working hours.
- The appointed Environmental Control Officer (ECO) must undertake at least once site inspection per week, for the duration of the construction phase, and to produce a short monthly ECO monitoring audit report, auditing on the compliance of the property developer with the conditions of the Environmental Authorisation and the approved EMP.

9.3 Operational Phase

9.3.1 Botanical Impact - Invasion by exotic and alien species

- Draft an alien invasive monitoring, control and eradication plan
- Implement initial and follow-up alien invasive clearing and rehabilitate the area post clearing.
- An appropriate fire regime must be applied to all the remaining natural areas that require periodic fire for rejuvenation.

9.3.2 Botanical Impact - Disturbances to ecological processes

- No clearing outside of development and infrastructure footprints to take place.
- Ensure rehabilitation is implemented in accordance with the EMPr and specialist recommendation.

9.3.3 Freshwater Resources Impact – Loss and disturbance of aquatic vegetation & habitat

- The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly concentrated before entering the buffer area. The volume and

velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the development, preventing erosion.

- Any evidence of erosion from this stormwater system must be rehabilitated and the volume/velocity of the water reduced through further structures and/or energy dissipaters. These structures must be incorporated within the layout area.
- The use and maintenance of grease traps/oil separators is recommended to prevent pollutants from entering the environment from stormwater.
- Appropriate wastewater infrastructure must be designed to prevent any such water from entering the surrounding environment.
- Maintenance of the aquatic habitat and buffer area must be implemented for it to remain effective. Apart from erosion control and alien invasive plant eradication, the encroachment of any further infrastructure or vehicles must be prevented.
- The local authority should prevent illegal dumping in this area by providing suitable waste disposal facilities where waste can be recycled and disposed of in a controlled manner.
- Engage with the community to explain the reasons why the buffer and the water resources are protected and what human activities are allowed. This could be targeted at learners to prevent the dumping of solid waste and other activities that threaten the watercourses and buffer zones.
- The community could be involved in the monitoring.
- Placement of signage near the boundary of the buffer zone should also be considered to help mark the boundary and educate the community about the purpose and value of protecting buffer zones. Information can include a description and visual of alien invasive plant species.

9.3.4 Freshwater Resources Impact – Sedimentation and Erosion

- Stormwater infrastructure must be inspected at least once every year (before the onset of rains) to ensure that it is working efficiently.
- The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly concentrated before entering the buffer area.
- The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the development, preventing erosion.
- The mitigation of impacts must focus on managing the runoff generated by the development and introducing it responsibly into the receiving environment.
- The stormwater flows must enter the wetland areas in a diffuse flow pattern without pollutants.
- Any evidence of erosion from this stormwater system must be rehabilitated and the volume/velocity of the water reduced through further structures and/or energy dissipaters. These structures must be incorporated within the layout area.

9.3.5 Freshwater Resources Impact – Water Pollution

- The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly concentrated before entering the buffer area. The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the development, preventing erosion.
- The use and maintenance of grease traps/oil separators is recommended to prevent pollutants from entering the environment from stormwater.
- Appropriate wastewater infrastructure must be designed to prevent any such water from entering the surrounding environment.
- Maintenance of the aquatic habitat and buffer area must be implemented for it to remain effective. Apart from erosion control and alien invasive plant eradication, the encroachment of any further infrastructure or vehicles must be prevented.

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- The community could be involved in the monitoring.
- Placement of signage near the boundary of the buffer zone should also be considered to help mark the boundary and educate the community about the purpose and value of protecting buffer zones. Information can include a description and visual of alien invasive plant species.

9.3.6 Freshwater Resources Impact – Flow Modification

- The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly concentrated before entering the buffer area. The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the development, preventing erosion.
- Any evidence of erosion from this stormwater system must be rehabilitated and the volume/velocity of the water reduced through further structures and/or energy dissipaters. These structures must be incorporated within the layout area.
- The use and maintenance of grease traps/oil separators is recommended to prevent pollutants from entering the environment from stormwater.
- Appropriate wastewater infrastructure must be designed to prevent any such water from entering the surrounding environment.
- Maintenance of the aquatic habitat and buffer area must be implemented for it to remain effective. Apart from erosion control and alien invasive plant eradication, the encroachment of any further infrastructure or vehicles must be prevented.
- The local authority should prevent illegal dumping in this area by providing suitable waste disposal facilities where waste can be recycled and disposed of in a controlled manner.
- Engage with the community to explain the reasons why the buffer and the water resources are protected and what human activities are allowed. This could be targeted at learners to prevent the dumping of solid waste and other activities that threaten the watercourses and buffer zones.
- The community could be involved in the monitoring.
- Placement of signage near the boundary of the buffer zone should also be considered to help mark the boundary and educate the community about the purpose and value of protecting buffer zones. Information can include a description and visual of alien invasive plant species.

9.3.7 Socio-Economic Impact – Provision of Housing

- The proposed development represents an enhancement measure on its own.

9.3.8 Socio-Economic Impact – Provision of formal Sports Facilities, Public Spaces and Enhanced access to the Dam

- The proposed development represents an enhancement measure on its own.

9.3.9 Socio-Economic Impact – Creation of business and employment opportunities

- The proposed development represents an enhancement measure on its own.

9.3.10 Socio-Economic Impact – Broaden the rates base

- The proposed development represents an enhancement measure on its own.

9.3.11 Socio-Economic Impact – Property Values of surrounding landowners

- The proposed development represents an enhancement measure on its own.

9.3.12 Traffic & Safety Impact

- Undertake a Traffic Impact Assessment to ensure the safety of vehicular and pedestrian traffic during the operational phase of the development.
- Ensure appropriate signage has been erected to caution drivers, regarding speed limits in a residential area.
- Consider traffic circles, speed bumps, pedestrian crossings, etc in final design of roads.
- Consider accommodation of public transport embayment's.

9.3.13 Visual Impact – Change of Land Use and "Sense of Place"

- Infrastructure should be designed to conform to the natural topography.
- Infrastructure should be positioned to allow adequate space for tree planting and other vegetation screening interventions.

The following general mitigation measures should be implemented to reduce the identified visual impacts:

- Infrastructure should be visually unobtrusive.
- Materials and colours used for the development should blend into the surrounding landscape.
- Infrastructure should be grouped in clusters with open spaces between clusters.
- Infrastructure should not interfere with the skyline (ridgelines), landmarks, major views and vistas.
- The development should not increase light or noise pollution.
- The development should correspond to the historical, architectural and landscape style of surrounding layout and buildings

9.3.14 Visual Impact - Visual intrusion of night lighting

- External lights will increase the visual impact of the project at night therefore attention must be given to their selection for the specific function.
- All lighting therefore must be carefully considered with regard to the extent of illumination, the intensity and color of lights and the luminaire.
- Light fittings must have shields to eliminate sight of the light source;
- Down lighting of areas is preferred to up lighting;
- Any perimeter lights are to be directed downwards and inwards to the development;
- No light fittings will spill light upwards or be directed upwards from a distance towards the area or building to be illuminated.
- It is now accepted practice that lighting of new projects should be subdued in terms of light emissions and energy efficient.

9.3.15 Climate Change Impacts

- Educate residents and community leaders on the integrated designs, especially the purpose and signs of concern.
- Where possible, such as in public places, eg: parks etc. integrate infographics on climate change measures and sustainable development, that can be adopted in a domestic set up, such as water saving techniques, waste re-use/recycling, switching off any unnecessary appliances, fire safety, etc.
- The proponent is to ensure that all relevant maintenance works, that are the municipality's responsibility, are undertaken timeously.
- The contact details for emergency services should be available on infographics in public areas, this should include fire safety/rescue, municipal services (for repairs), etc.

9.3.16 Contamination & Pollution

General:

- Ensure solid waste collection points are clearly marked.
- Ensure that the public is aware of the solid waste collection days.
- Ensure that the waste points have clear signage indicating:
  - Separation of waste receptacles;
  - Advice on re-use/recycling potential of general waste;
  - Advise on waste that cannot be collected by the municipality, that must be directed to a specific registered waste disposal site.
  - Encourage green waste collection.
  - Utilize waste exchange initiative if available.

General Pollution Management:

- No pollution of surface water or ground water resources may occur due to any activity on the site.
- No storm water runoff from any premises containing waste, may be discharged into the environment.
- Polluted stormwater must be contained on the site.
- All stormwater outfalls should potentially be fitted with waste capturing mechanisms like nets, etc. To be confirmed during detail design.

General Waste Management:

- Dedicated waste bins or skips must be provided on site and kept in a demarcated area on an impermeable surface.
- Separate waste bins/skips must be provided for recyclable waste, general waste and hazardous waste.
- Waste must be placed in the appropriate waste bins/skips/ stockpiles.
- Hazardous waste bins must be kept on an impermeable bunded surface capable of holding at least 110% of the volume of the bins (if this is being accommodated).
- Skips/ bins must be provided with secure lids or covering that will prevent scavenging and windblown waste or dust.
- Waste bins/skips must be regularly emptied and must not be allowed to overflow.
- Waste generated on site must be classified and managed in accordance with the National Environmental Management: Waste Act – Waste Classification and Management Regulations (GN No. R. 634 of August 2013).
- All waste, hazardous as well as general, which result from the proposed activities must be disposed of appropriately at a licensed Waste Disposal Facility (WDF).

Maintenance of Infrastructure:

- Ensure regular maintenance of the sewer and water infrastructure, particularly exposed sewer infrastructure (pump stations and pipe bridges.
- Erect signage including:
  - Emergency numbers.
  - Signs of failure or concern.