THE UBUHLEBEZWE MUNICIPALITY

PROPOSED OR TAMBO VIEW DEVELOPMENT STORMWATER MANAGEMENT PLAN

FEBRUARY 2023

REVISION 01

Prepared by:

MXN Development Construction

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PROPOSED OR TAMBO VIEW DEVELOPMENT FOR UBUHLEBEZWE LOCAL MUNICIPALITY

STORMWATER MANAGEMENT PLAN REPORT
FEBRUARY 2023

Main Author: Thembeka Nkosi (B-Tech, Civil Eng.)

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The undersigned acknowledge that they have reviewed the Stormwater Management Plan report and agree with the information presented within this document. Changes to this report will be coordinated with and approved by, the undersigned, or their designated representatives.

Approval for Developer
MXN Development

TR Nkosi

…… 28/02/2023

Ms. TR NKOSI **Candidate Technologist (Civil)** Date

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1. INTRODUCTION

1.1 Background

In support of the rezoning and environmental applications for the proposed OR Tambo View Development, MXN Development Construction CC, as the appointed developer was assigned the responsibility to compile an Engineer's Stormwater Management Plan for the proposed development.

The development will take up a 7.3662ha land area. The project area is situated along the R56 and is proposed to cater for 88 residential stands with an average sizes between 413m^2 and 707m^2 and 4 passive open spaces. Apart from affordable bonded housing this area can also include GAP housing (Finance Linked Individual Subsidies – FLISP).

The purpose of this report is to address the requirements of the Ubuhlebezwe Local Municipality Regarding the provision of municipal services. The report summarized the level and extent of services required and in terms of this report focus is given to the Stormwater Management Plan. According to the manual "The Neighbourhood Planning and Design Guide: as developed by the Department of Human Settlements in 2019." The main objective of the Storm Water Management Plan is to:

- Minimise the threat of flooding to the area
- Protect the receiving water bodies in the area
- Preserve biodiversity in the area
- Promote the multi-functional use of stormwater management systems (provide amenity to communities)
- Promote the use of the stormwater itself as a water resource
- Develop sustainable stormwater systems

1.2 Location And Description

The development location is situated on the Portion of the Remainder of Erf 174 and a Portion of the remaining extent of Erf 175 Stuartstown in the Ixopo town, which is under Ubuhlebezwe Local Municipality (ULM). The geographic location of the development is tabulated below:

Table 1- Geographic Location - Proposed OR Tambo View Development

Project Location	Geographic Location	
	Latitude	Longitude
Ixopo Water Treatment Plant	30° 9’ 47.05” S	30° 3’ 40.71” E
Proposed O.R Tambo View	30° 9’ 41.29” S	30° 3’ 42.66” E

Access to the development is mostly by Provincial Route (R56) from Pietermaritzburg towards Kokstad by travelling approximately 85 km from Pietermaritzburg, the O.R Tambo View is on the left as you exit Ixopo town towards Kokstad next to the Ixopo Water Treatment Plant, located within Ubuhlebezwe Local Municipality (ULM). The access to the site, will however be obtained by means of the Centenary service road to the north of the development.

Figure 1 - Locality Plan of Proposed OR Tambo View Development

2. EXISTING SYSTEM

The land development area is about 7.3662 hectares, it is overgrown vegetation including informal settlements. The topography of the site has a relatively steep to very steep northeastern slope from 1030 at the river to 1140 MASL1qa towards the water reservoir and communication tower. The area is situated at the grassland biome (Mucina & Rutherford 2006).

The site itself is covered by sparse grasslands of which some was used as agriculture land, and a few indigenous thorn trees are present on site. There is currently no visible stormwater infrastructure along the development area. The current access to the development Area from the R56 is via an informal gravel road to the settlement area behind the current CRU development using Centenary service road.

According to the Heritage Impact Assessment report there are no graves or graveyards which were identified in the area during their assessment, it is very likely that there would be such sites in the study area, especially associated with the both the formal and informal settlement there. Care should be taken no to impact on these sites during any development activities. Although all efforts are made to locate, identify and record all possible cultural heritage sites and features (including archaeological remains) there is always a possibility that some might have been missed as a result of grass cover and other factors. The subterranean nature of these resources (including low stone-packed or unmarked graves) should also be taken into consideration.

3. DESIGN STANDARDS

The development will be designed considering all regulatory requirements as well as the conventional design standards used in the civil engineering industry. The stormwater management design is based on technical requirements as stipulated in the Guidelines for Engineering Services and Amenities in Residential Township Development as published by the National Housing Board (Red Book) to the satisfaction of Ubuhlebezwe Local Municipality. The design guidelines of the drainage system are according to the following standards:

- Guidelines for Human Settlement Planning and Design,2005 of CSIR
- The Neighbourhood Planning and Design Guide: as developed by the Department of Human Settlements in 2019.
- Guidelines on the Planning and Design of Township Roads and stormwater Drainage SAICE
- Drainage Manual 6th Edition – SANRAL
- Neighbourhood Planning and Design Guide Section L Stormwater
- South African Guidelines for Sustainable Drainage System

4. PROPOSED SYSTEM

4.1 Overview

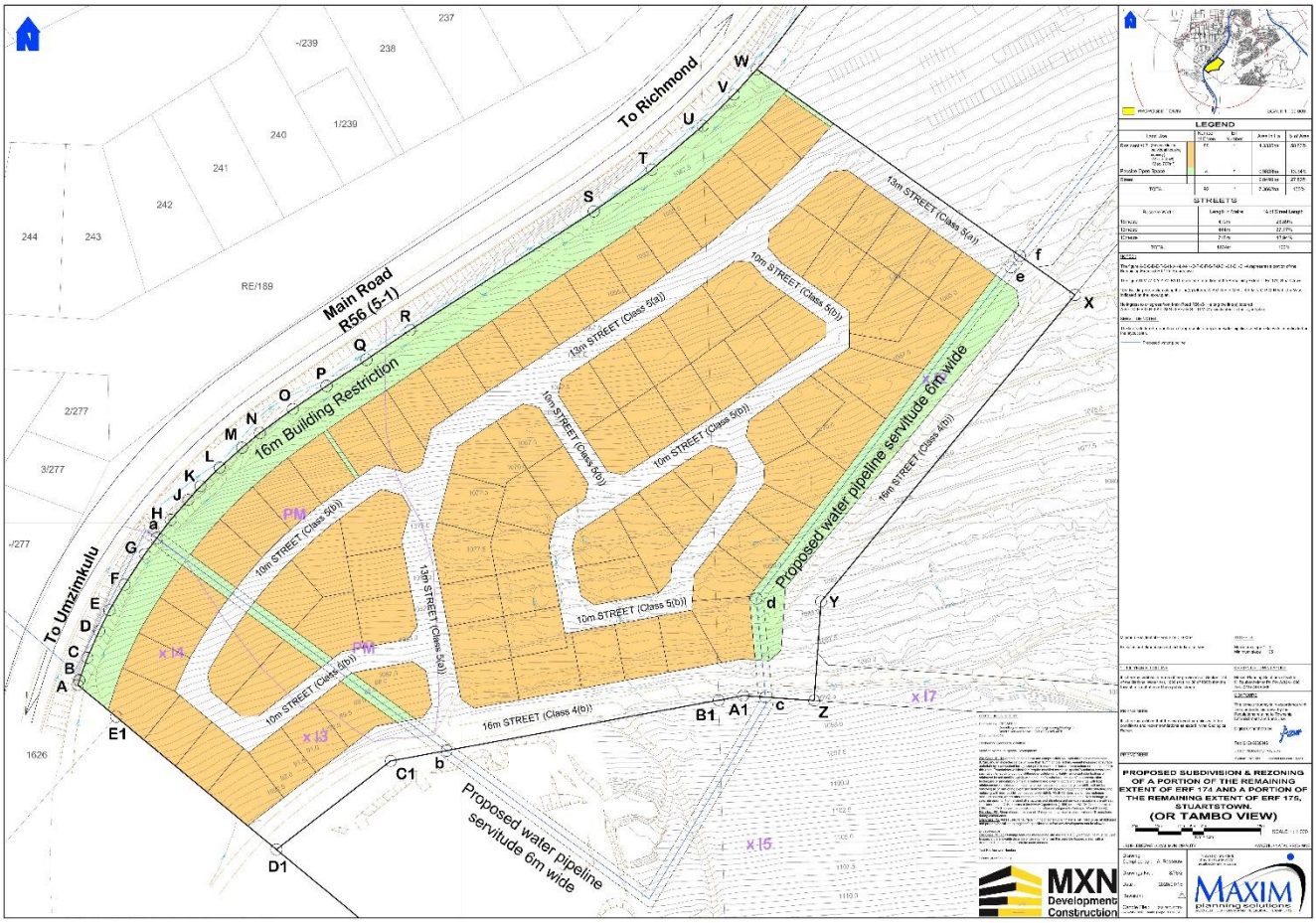

Figure 2- Proposed OR Tambo View Development

***Refer to ANNEXURE A –LAYOUT PLAN**

The proposed OR Tambo View development is a grassland field with few informal settlements and currently drains as surface runoff across the site towards the earth channel along R56. The development is expected to increase the stormwater runoff since new hard surfaces will be constructed and therefore storm water systems must be designed to have minimal impact on the environment, through the careful implementation of sustainable drainage systems (SuDS) and stormwater management systems.

The transformation of the undeveloped land to hardened surfaces increases the surface runoff from the transformed areas, which reduces the infiltration of surface water into the underground resources. It is thus important to create artificial filtration areas and construction of permeable pavements.

All stormwater related structures, pipes and drains must be designed by the project engineer in consultation with the project Environmental Control Officer. This can be achieved through the main stormwater management systems, namely:

- The construction of stormwater catch pits and pipes along the hardened road areas.

4.2 Erosion Control

The design of the storm water system must make provision for erosion protection, as the transformed area, after construction has a greater surface run-off that will contribute to higher flows. It is therefore essential that the transformed areas must be vegetated and rehabilitated as soon as possible after the completion of bulk earthworks, road works and foundation work. Erosion control measures could be a combination of attenuation structures, grass sods, soil saver, stone pitching, silt traps, geofabrics, gabion baskets and mattresses, energy dissipaters and grass lined drains.

Additional methods to minimize erosion within the development area include:

- Open exposed areas should be planted with grass or landscaped into gardens.
- Using natural rock and boulders to act as energy dissipaters.
- All exposed embankments should be covered in 100mm topsoil and planted with grass sods and staked to prevent washing away.
- All cut/fill embankments steeper than 1:2 should be covered in Soil saver with sufficient overlaps, covered in 100mm topsoil and planted with grass.
- Reducing the velocity of all stormwater run-off through energy dissipaters

- Promotion of infiltration of surface run-off through the introduction of sustainable drainage systems, especially at the outlets from the stormwater attenuation ponds.

4.3 Surface run-off

Run-off from roofs should be collected in gutters and utilized of gardening and other domestic activities. Any overflow from the tanks or gutters will be dispersed into swales and thereafter directed and collected into attenuation ponds. Surface run-off from roads, parking areas and other hardened areas will be collected in kerb inlets and channels along the roads and diverted into the strategically positioned stormwater attenuation ponds.

The implementation of rainwater harvesting tanks might act at the first form of attenuation, whilst it could also serve other uses. It should however be noted, that rainwater tanks are not recognized by the municipality as a form of attenuation, as the tanks could be full and not attenuate any flow – thus the surface run-off must be calculated by excluding the rainwater harvesting tanks in order to size pipes and attenuation systems.

The stormwater system must be kept separate from the sewage system and any contamination of surface runoff must be avoided.

5. BULK ROADS AND INTERNAL ROADS

A site development plan has been produced by the Town & Regional Planners, showing the various residential sites and road reserves in relation to the land development area. The hardened surface areas from the roads, house roofs and other buildings are the main contributing factors in the increased run-off within the development. Where possible, grass blocks and rain gardens should be introduced along roads and in parking areas to promote infiltration of storm water run-off.

The geometric design of the bulk and internal roads network will include cross falls that direct the run-off along kerbs into grid inlets and catch pits. Once collected, stormwater will be conveyed through underground concrete pipes, with an outlet into the respective stormwater attenuation. As mentioned above, methods of dissipating the kinetic energy of run-off and silt collection will be incorporated into the design of stormwater infrastructure serving the road network.

The storm water infrastructure will be constructed in accordance with "The Neighbourhood Planning and Design Guide: as developed by the Department of Human Settlements in 2019." and *"Guidelines for Human Settlement Planning and Designs",* service agreements concluded or municipal bylaws, where applicable.

For sizing and design of storm water infrastructure, calculation of the anticipated storm water run-off will be determined on the assumption that all roofed areas, roads, and parking are considered hardened with an appropriate run-off co-efficient. Roof and gutter run-off will be included in the calculations since rainwater tanks are not recognized by the municipality as a form of attenuation.

The standards for the storm water infrastructure to be installed in the proposed development can be summarized as follows:

➢ Flood recurrence interval:	5 years and at critical points 10 years
➢ Attenuation structures:	50 years
➢ Pipe material :	Concrete
➢ Pipe Class :	100D in traffic areas, 75D in other areas
➢ Pipe diameters :	300mm Ø (minimum)
➢ Bedding :	Class C
➢ Inlets :	Catch pits / Steel Grid Inlets
➢ Outlets :	Headwalls
➢ Junctions :	Points of deflection on pipelines
➢ Road / Parking surface:	Asphalt/concrete/pavers

6. STORMWATER MANAGEMENT

The objective of a storm water management plan should be to manage the storm water resources of the collective watersheds to:

- Prevent flood damage or concentration of run-off
- Divert stormwater and surface run-off from buildings, roads and parking areas into swales or a piped system flowing into a stormwater attenuation pond
- Preserve the natural and beneficial functions of the natural drainage system downstream
- Preserve and enhance stormwater quality
- Attenuate the difference between pre and post development flows

The proposed stormwater management system has been designed to be self-regulating with no external control. It will aim to collect run-off into swales, and underground pipes to attenuate and manage the increase in flow between the pre and post development stages from the transformed areas.

The run-off from the roofs, gutters and downpipes shall be collected considering any overflows being dispersed overland into swales and ultimately collected into underground stormwater systems and contained in two stormwater attenuation channels. Hardened areas, like roads and parking areas will be routed overland, collected in kerbs and channels and into grid inlets or catch pits where it is collected in concrete stormwater pipes and diverted into the existing stormwater attenuation earth channel along the lower boundary of R56 the site where increased flow will be attenuated, whilst silt is deposited. The outlet or discharge from the attenuation channel will be protected with stone pitching, grouting, gabion mattresses and other energy dissipaters from where it will be released into the natural drainage areas and eventually into a stream in a controlled manner.

7. STORMWATER RUNOFF CALCULATIONS

All accumulated stormwater will be discharged into an existing stormwater earth channel along the R56 that abuts the western part of the development boundary, regulating stormwater flow during normal rainfall events.

The following methods will be used to analyze the stormwater runoff:

• Rational method.

The rational method is a manual design method and is used for the main watercourses and culvert design dimension. The computer program EpaSWMM5 is used for the internal stormwater analyses.

The following Stormwater Drainage systems are classified in the "Red Book" as follows;

Minor Drainage System

A stormwater drainage which caters for frequent storms of a minor nature.

The internal piped stormwater network for the residential area will be designed using a comparison between the design storm with a 1 in 5 years and 1 in 10 years recurrence interval as the design standard.

Major Drainage System

A stormwater drainage that caters for severe infrequent storm events supported by minor systems.

The internal roads for the residential area will be designed to provide for the difference between the 1 in 50year recurrence storm and the provided underground conduit.

There are three scenarios that were considered during the hydrological modelling based on pre- and post-development land use of 1:5, 1:10 and 1:50 year recurrence intervals.

Catchment Area

Annual Rainfall Precipitation = 600 – 850 mm

Table 2- Pre- Development Stormwater Runoff

Description		Area 1
Area (km^2)		0,074
Mean Annual Rainfall (mm)		827
Rural Distribution		100%
Urban Distribution		0%
Surface Slope (Cs)	Steep	0,26
Permeability (Cp)	Very Permeable	0,04
Vegetation (Cv)	Grasslands	0,21
Rural Runoff coefficient (C)		0,510
Time of Concentration (hr)		0,402
Average Intensity (mm/hr)	1:5 years	49,775
	1:10 years	62,218
	1:50 years	99,549
Peak Runoff (m^3/s)	**1:5 years**	**0,519**
	1:10 years	**0,649**
	1:50 years	**1,039**

***Refer to ANNEXURE B – PRE-DEVELOPMENT STORMWATER ROUTING PLAN**

Table 3- Post- Development Stormwater Runoff

Description		Area 1
Area (km^2)		0,074
Mean Annual Rainfall (mm)		827
Rural Distribution		13%
Urban Distribution		87%
Lawns	Sandy steep	0,175
Residential Areas	Houses	0,235
Industry	N/A	0,000
Business	Streets	0,230
Rural Runoff coefficient (C)		0,640
Time of Concentration (hr)		0,052
Average Intensity (mm/hr)	1:5 years	192,693
	1:10 years	202,328
	1:50 years	346,848
Peak Runoff (m^3/s)	**1:5 years**	**2,523**
	1:10 years	**2,649**
	1:50 years	**4,542**

***Refer to ANNEXURE C – POST-DEVELOPMENT STORMWATER ROUTING PLAN**

Table 4 – Summary of Catchment Area Design Storm Flow Rates

	Pre - Development Flow (m^3/s)			Post - Development Flow (m^3/s)		
	1:5	1:10	1:50	1:5	1:10	1:50
Catchment Area	0,519	0,649	1,039	2,523	2,649	4,542

Minimum Pipe Sizes

Stormwater pipes will have a minimum diameter of 450mm.

Minimum Gradients

The minimum longitudinal gradient of roads, pipes, box culverts and canals will be 1:150 owing to practicability during construction and problems with sedimentation, as well as to prevent lower-lying erven from being flooded. The cross-fall of streets will be a minimum of 3%.

NB: Long sections and Cross sections for storm water pipelines will be done during the detailed design stage.

8. STORMWATER FLOW ATTENUATION

The need for attenuation of the stormwater flow is recognized to minimize the peak flow across the property and from each of the buildings, hardened parking areas and roads before its eventual discharge. The distribution of the increase flow is of importance to ensure that any downstream facility is not negatively affected.

The proposed development will be transformed from the existing overgrown vegetation, gradually sloped profile to levelled platforms. This transformation in ground profile will reduce the velocity as the new platforms will be flatter than the original ground profile. However, it's the transformation of natural vegetation to grass embankments, buildings, roads, and parking areas that will increase the run-off and storm water flow. It is due to this increase from the pre-development flow to the post-development flow that attenuation of this increased run-off would be required.

The Rational Method Q=ft x C x I x A/360, where

Q = the maximum/peak rate of run-off in cumecs (m^3/s)
ft = an adjustment factor for the recurrence interval storm considered
C = run-off coefficient
I = rainfall intensity (mm/hour)
A = area of the catchment in hectares (1ha = 10,000m^2)

Typical open attenuation ponds can vary in depth depending on the requirements, slope at outlet, available space and downstream conditions although a water depth of 1,5m is normally acceptable, including a freeboard of at least 0,5m above the full water level to prevent overtopping. This depth can however vary, but not less than 1m should landscaping and aesthetics require it to be shallower. It should be noted that ponds less than 1m in depth could lead to plant growth covering the entire pond over time (depending on the type of plants and

reeds used). This could seriously impact on the effectiveness of the attenuation pond during periods of high rainfall and flow. All attenuation ponds will also be provided with at least 300mm silt trap, where the base of the attenuation pond is 300mm lower than the pre- development outlet structure – this allows for silt to settle in the pond and plants to grow in the shallow water.

The average rainfall in Ixopo is 827mm and this figure would be used in the final storm water calculations. Draining in the proposed area would be calculated to a 0.5 – 0.6 run-off factor. The pipe classes would be class 100 D underneath roads and class 50 – 75 D for other areas according to final designs. The minimum flow speed should be 1 m/s. The manholes should be distant at 80 m centres maximum.

9. MONITORING AND MAINTENANCE

9.1 Monitoring

The stormwater system must be monitored during construction at regular intervals by the Environmental Control Officer (ECO) in terms of the Environmental Management Programme (EMPr).

During the construction phase of the development, the construction process should be monitored against the EMPr, but should pay attention to the following aspects:

- Implementing temporary attenuation measures to retain surface run-off until the attenuation areas are complete and functional.
- Providing a silt screen at all grid inlets to collect debris and silt during times of heavy rain.
- Controlling dust, especially during the construction of roads and house platforms.
- Placing topsoil and grass sods onto cut/fill embankments to reduce runoff and velocity, including the use of Soil saver where embankments are steep.
- Planting of grass and other vegetation as soon as open areas are complete to prevent scouring and erosion of the low cohesion soils found on site.

- Fencing off the construction area and keeping all construction vehicles off the undeveloped portions of vegetation and buffer areas.

On completion of the construction, the Ubuhlebezwe Local Municipality will be responsible to monitor their internal storm water system and attenuation facilities to identify improvements / maintenance. The factors to be monitored include the functionality and impact of the rainwater harvesting tanks on the properties, internal roads, stormwater pipes and attenuation ponds and how they are functioning and if they are adequate.

The post development monitoring process should be done at regular intervals (suggested every 6 months) to include the following activities:

- Product (catchpits, headwalls, concrete pipes, attenuation ponds and rainwater harvesting tanks)
- Type of maintenance (rehabilitation, improvement, new)
- Urgency (immediate, next 6 months, next 12 months) and description of work to be carried out etc.

9.2 Operation and Maintenance

The system as designed requires no manual operation and is self-regulating. Maintenance work should be undertaken as required to restore and maintain the system to its original design, especially to repair and maintain scouring and erosion, especially at the outlets from the stormwater attenuation ponds.

The operation and maintenance of the storm water system is essential to ensure it functions properly to prevent damages or failures and must receive high priority from the Ubuhlebezwe Local Municipality.

During the construction period, it is important that surface runoff is monitored, controlled and temporary measures be implemented until the construction is complete and the system can

function independently. Routine maintenance will be the responsibility of the Ubuhlebezwe Local Municipality and should include:

- Clearing of kerb inlets and channels, catchpits, stormwater pipes and attenuation ponds
- Removal of silt from collection points and attenuation pond
- Plant/weed control
- Cutting grass on embankments

Figure 3- Typical Well Maintained Stormwater infrastructure

It is however recommended that specialist service providers implement more technical works like the replacement of storm water pipes and remedial work to the stormwater attenuation structures, if required.

10.RECOMMENDATIONS

The following recommendations are made for the Proposed OR Tambo View Development situated in the Ixopo town, within Ubuhlebezwe Local Municipality:

- That the Client ULM should encourage and ensure that all implementing agents close to OR Tambo View along R56 and the surrounding areas work together in designing a functional stormwater management system that will benefit all the surrounding developments within the area.
- That the storm water design parameters used in the design of the storm water management system are accepted and approved.
- The detail design of the storm water system includes recommendations of this plan.
- The storm water system must be kept separate from the sewerage system.
- All chemicals, cement, fuel, and other hazardous material used during construction should be stored in controlled areas and not lower than the internal road.
- Concentration of stormwater should be prevented where possible, but energy dissipaters should be provided in areas of concentration.
- On completion of every construction phase within the development, comprising the construction of buildings, roads and parking areas, all remaining exposed embankments and open areas must be vegetated as soon as possible, including the use of “Soil saver”, where necessary.

During the construction phase, the following aspects should be closely monitored by the Environmental Control Officer to ensure the contractor complies with the following:

- Dust control during construction must be always applied.
- Excess spoil material from topsoil or bulk earthworks must be placed in areas or even removed entirely off site to minimize silt deposition, scouring and soil erosion.
- Temporary berms and cut-off drains must be provided on site to collect run-off,

especially until the stormwater attenuation pond is complete and functional.

- Silt screens must be provided at the catchpits during road/stormwater construction.
- Topsoil must be conserved on site and prevented from entering the stormwater system.
- Exposed embankments, cut/fill slopes and open areas must be vegetated as soon as possible to reduce runoff.
- Post construction, all exposed areas must be covered in vegetation, grass or landscaped.

The proposed development is subject to the stormwater management requirements for Ubuhlebezwe Local Municipality. This report describes how stormwater management plan satisfies the objectives of the site and provides proposals to be implemented in the detailed design report. MXN Development trusts that this proposal will enable approvals to be granted for the OR Tambo View development.

11. REFERENCES

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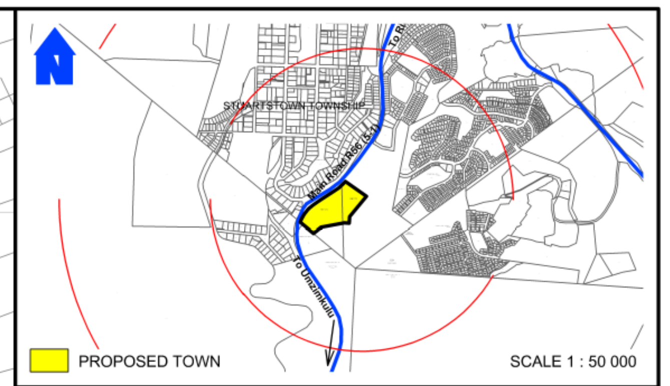
12.ANNEXURES

- **ANNEXURE A - LAYOUT PLAN**
- **ANNEXURE B – PRE-DEVELOPMENT STORMWATER ROUTING PLAN**
- **ANNEXURE C – POST-DEVELOPMENT STORMWATER ROUTING PLAN**

ANNEXURE A - LAYOUT PLAN

ANNEXURE A – LOCALITY



LEGEND

Land Use		Number of Erven	Erf Number	Area in Ha	% of Area
Residential 3 (Finance linked individual housing subsidy) (Min. 413m²) (Max. 707m²)		88	*	4.3335ha	58.83%
Passive Open Space		4	*	0.9828ha	13.34%
Street				2.0499ha	27.83%
TOTAL		92	*	7.3662ha	100%

STREETS

Reserve Width	Length in Metre	% of Street Length
16metre	472m	28.89%
13metre	444m	27.17%
10metre	718m	43.94%
TOTAL	1634m	100%

NOTES :

The figure A-B-C-D-E-F-G-H-J-K-L-M-N-O-P-Q-R-S-T-U-B1-C1-D1-E1-A represents a portion of the Remaining Extent of Erf 175, Stuartstown.

The figure U-V-W-X-Y-Z-A1-B1-U represents a portion of the Remaining Extent of Erf 174, Stuartstown.

16m Building Restriction along the line(s) lettered A-B-C-D-E-F-G-H-J-K-L-M-N-O-P-Q-R-S-T-U-V-W as indicated on the layout plan.

No ingress to or egress from Main Road R56 (5-1) along the line(s) lettered A-B-C-D-E-F-G-H-J-K-L-M-N-O-P-Q-R-S-T-U-V-W as indicated on the layout plan.

SERVITIDE NOTES :

The line(s) lettered a-b and c-d-e-f represents a proposed water pipeline servitude 6m wide as indicated on the layout plan.

Proposed water pipeline

Minimun Residential Erven Size : 400m²

Erf sizes and dimensions subject to final survey.

STREETS:

Maximum slope 1 : 1
Minimum slope 1 : 25

1 : 100 YEAR FLOODLINE

It is hereby certified in terms of the provisions of Section 144 of the National Water Act, 1998 (Act No.36 of 1998) that the township is not affected by a public stream.

PR ENGINEER

It is hereby certified that the town layout complies with the conditions and recommendations as stated in the Geological Report.

PR ENGINEER

DESIGN OF TOWN LAYOUT

Maxim Planning Solutions (Pty) Ltd
K. Raubenheimer Pr. Pln A/924/1996
Tel. (018) 468 6366

CONTOURS

The contour survey is in accordance with the standards laid down by the Regulations relating to Township Establishment and Land Use.

Digital Orthophoto by: Azur

Tel: (012) 8030346

Date of Photography : May 2019

System : WGS84 Central Meridian : Lo31

GEOTECHNICAL REPORT

Compiled by : GEOSET cc
Consulting Environmental and Engineering Geologists
David S.van der Merwe : Cel: (082) 925 4075
Date : June 2019

Engineering Geological Zonation

Modified Normal to Special Development:

Site Class H1-H2: A medium expansive and compressible soil, with thickness of more than 0,75m, and an expected range of more than 15mm of total soil movement measured at surface, underlain by a competent ferruginized pebble marker or hard rock sandstone or mudstone form this zone. Foundations will therefore require modified normal to special foundation techniques such as stiffened strip footings, stiffened or cellular rafts, lightly reinforced strip footings or reinforced boxed steel in slightly widened strip foundations, the use of split construction techniques or articulation joints at all internal and external doors and openings with light reinforcement (brickforce) in masonry, or soil replacement by an engineered fill soil raft by removing all or part of the expansive horizon to 1,0m beyond the perimeter of the structure and replacing with inert backfill, compacted to 93%MOD ASSHTO density at or near optimum moisture content, where after normal strip footing foundations can be used. Site drainage, a concrete apron of 1,0m around all structures and plumbing and service precautions are advised. It is classified as C1R in terms of the NHBRC guidelines (1995) or the SAICE Code of practice (1995) and 1A1F as per the classification for urban development (Partridge, Wood & Brink).
Site class PS: Steep slopes in excess of 12 degrees may require special cut and fill operations during construction.
Site Class PQ: Areas used for surface mining of construction material will need to be rehabilitated and properly backfilled to engineer's specification before any development can be allowed.

Undevelopable
Site Class PD/H3: Drainage features intersect the site and the 1:100 year flood line must be used to specify the allowable distance of development from this possible flooded areas, with a minimum distance of 32m from the main streams.

Test Position and Number x I1

Inferred zone boundary

PROPOSED SUBDIVISION & REZONING OF A PORTION OF THE REMAINING EXTENT OF ERF 174 AND A PORTION OF THE REMAINING EXTENT OF ERF 175, STUARTSTOWN.

(OR TAMBO VIEW)

30m 20m 10m 5m 0m 25m
1cm = 10m
SCALE 1 : 1 000

UBUHLEBEZWE LOCAL MUNICIPALITY   KWAZULU-NATAL PROVINCE

Drawing Compiled by : A. Rossouw

Drawings Nr. : 8/76/2

Date : 2020/01/15

Revision : 1

Caddie File : Z:\8-PROJECTS\8-76-2-K-T O.R. Tambo (Ixopo)\Maps\CAD

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ACCREDITED TOWN AND REGIONAL PLANNERS

ANNEXURE B – PRE-DEVELOPMENT STORMWATER ROUTING PLAN

MUNICIPAL
17620m²

STUARTSTOWN TOWNSHIP

Proposed water pipeline servitude 6m wide

Catchment Area 1
Area= 0,074km2

10m STREET (Class 5(b))
16m STREET (Class 4(b))
13m STREET (Class 5(a))

-/1533
1626
-/277
3/277
276
2/277
RE/189
243
244
245
242
241
240
1/239
238
-/239
237
248

a
b
c
d
e
f

NOTES

LEGEND

N

REVISIONS

No	Drg No	Title

Drawing Purpose:		
Preliminary:	For Planning Phase	X
Approval:	For Construction	
Report :	For As-Built Records	
Drawing Approval		Date
Designed by:	Ms. T.R Nkosi	24/02/2023
Drawn by:	Ms. T.R Nkosi	24/02/2023
Checked by:		
Engineer:		
Client Approval:	Signature	

Developer
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Client
UBUHLEBEZWE LOCAL MUNICIPALITY

Project
Proposed O.R Tambo View

Drawing Title
PRE-DEVELOPMENT STORMWATER ROUTING PLAN

ORT/CIV/SWMM/001
Drawing No

Scale 1:750

Rev No 00

ANNEXURE C – POST-DEVELOPMENT STORMWATER ROUTING PLAN

MUNICIPAL
17620m²

STUARTSTOWN TOWNSHIP

Proposed water pipeline servitude 6m wide

Catchment Area 1
Area = 0.074km2

10m STREET (Class 5(b))
16m STREET (Class 4(b))
13m STREET (Class 5(a))
10m STREET (Class 5(b))
16m STREET (Class 4(b))
10m STREET (Class 5(b))
13m STREET (Class 5(a))
10m STREET (Class 5(b))
16m STREET (Class 4(b))
10m STREET (Class 5(b))
13m STREET (Class 5(a))
10m STREET (Class 5(b))
13m STREET (Class 5(a))

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-/277
3/277
276
2/277
RE/189
243
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240
1/239
238
-/239
237
248

NOTES

LEGEND

N

REVISIONS

No	Drg No	Title

Drawing Purpose:			
Preliminary:		For Planning Phase	X
Approval:		For Construction	
Report :		For As-Built Records	
Drawing Approval			Date
Designed by:		Ms. T.R Nkosi	26/02/2023
Drawn by:		Ms. T.R Nkosi	26/02/2023
Checked by:			
Engineer:			
Client Approval:		Signature	

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Client
UBUHLEBEZWE LOCAL MUNICIPALITY

Project
Proposed O.R Tambo View

Drawing Title
POST- DEVELOPMENT STORMWATER ROUTING PLAN

ORT/CIV/SWMM/002
Drawing No

Scale 1:750

Rev No 00