

UMZIMKHULU LOCAL MUNICIPALITY



PROPOSED RESIDENTIAL DEVELOPMENT OF BEZWENI FARM 18223, UMZINKHULU, KZN

PRELIMINARY BULK AND INTERNAL SERVICES ASSESSMENT REPORT

PROJECT No. ULM-PNLG/AD-HOC 001/23

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1. BACKGROUND

1.1 Organization Background

The Umzimkhulu Local Municipality as the “client” has appointed Mlala Emazweni to prepare a bulk infrastructure assessment for the Ebuta Residential Development.

1.2 Locality

The Bezweni Residential Development is located in ward 19 of the Umzimkhulu Local Municipality of the Harry Gwala District in Kwazulu Natal and is situated within Umzimkhulu town.

1.3 Research Base

The research conducted was “Quantitative” and was based on the housing needs of the UMzimkhulu Housing Project focusing mainly on the potential project areas identified. The survey was done in liaison and conjunction with municipal official from UMzimkhulu Municipality.

Furthermore, the additional information was extracted from the Umzimkhulu Local Municipality Spatial Development Framework (SDF), Integrated Development Plan (IDP).

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2. PURPOSE

The Department of Human Settlements has in consultation with the respective beneficiary communities within the municipal area of UMzikhulu local municipality Wards 16 identified the need for subsidized housing opportunities in their area of jurisdiction as a matter of urgency in order to address the plight of the “homeless” living in unacceptable poverty stricken conditions, while systematically trying to address the ever increasing housing demand of the said area. The purpose of conducting this report is to establish the following.

- *Existing services*
- *Status Quo*
- *Quantify The Need*

3. LAND INFORMATION

The land information is as follows for the Bezweni farm housing project.

3.1 LAND OWNERSHIP AND USE

The proposed project area (outlined in figure 1) is the Bezweni farm Housing development project the proposed development. The study area is in Umzikhulu town in KZN. The latitude and longitude of the central portion of the site is

-30.23894011 and 29.91518256. The area can be accessed via P749 road. The site is vacant with Nyenyezi SP School and Umzikhulu Hospital along its boundaries.

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Image above shows the project area proposed for the housing development

3.2 LAND EXTENT

The total land size of the Bezweni Housing Development is approx. 300ha

3.3 CO-ORDINATES

The centre of the project area for the Bezweni Farm Housing Development project is at the approximate GPS of -30.23894011S and 29.91518256E. The site forms part of the greater UMzimkhulu.

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4. Needs & Housing Potential

The images below show the existing house structures within the primary project area. From the images it is evident to see that the condition of some of the houses in the area is very bad and does not meet basic RDP standards. Most of the homesteads in the area are mud huts. The

Umzimkhulu Local municipality has proposed that each qualifying beneficiary must have the basic brick RDP standard houses within the erf. (See images below)

5. Population

According to Statistics South Africa (2011), Umzimkhulu Local Municipality shows a 1.37% annual growth rate primarily due to socioeconomic benefits of the location of town on the KwaZuluNatal - (R56) road transport corridor off ramping from the N2 all the way to Pietermaritzburg. This growth is associated with the increase in commerce such as guest houses, retail shops, garages, etc. The rapid growth of Umzimkhulu from a small to a medium sized town has attracted quite a huge number of rural people and business people to either live in and around town. For example, most people in Umzimkhulu work from local shops, government departments and the municipality. This has resulted in to significant growth of guesthouses, backyard rental flats and even land invasion by those who cannot afford local rentals or commuting. The design population of town and its urban is estimated to be 8 399 people which include residential areas, hospital, prison and B&Bs. This assumption is based on the fact that all employees from government departments, department stores etc. are either from somewhere within the urban or outside of the project area and therefore have been accounted for at their respective areas of residents.

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6. WATER

The accessibility of households to piped water within the study area is clearly evident. From desk top studies and from the onsite investigations conducted during the site visit of June 2021. This information indicates that majority the household within the Housing area receives water through house/Yard connections installed in the area. Moreover, some of households in the study area utilize rain water harvesting. Therefore, it can be assumed that no water is used from untreated sources.

6.1.1 Existing Bulk Water Supply Schemes

Water to Umzimkhulu Town is supplied through a main supply line, from the Umzimkhulu Water Treatment Works. Water is pumped to a main command reservoir whose inlet and outlet are metered by use of bulk flow meters. The reservoir feeds into a set of secondary reservoirs which then gravitates to the town supply area reticulation network through pipelines. The population distribution within the Umzimkhulu Town area is such that there are low cost residential settlements on the town outskirts that are serviced with yard connections, while middle income within the Central Business District are provided with house connections.

6.1.2 Minimum Norm and Standard of Water services

The Housing Act requires that all citizens and permanent residents of the Republic will, on a progressive basis, have access to: Permanent residential structures with secure tenure, ensuring internal and external privacy and providing adequate protection against the elements; and Potable water, adequate sanitation facilities and domestic energy supply. The following minimum levels of services are permitted in terms of the National Norms and Standards in respect of any Subsidy Schemes.

Table 2: Minimum Level of Services Permitted

Type of Services	Minimum Level
Water	House Connection (130 l/cap/day)
Sanitation	Waterborne Sewer System
Roads	Access roads
Storm water	Concrete lined open channels

6.1.3 Internal Water Services

A definition of the levels of water and sanitation services

The levels of service delivery have been derived from acceptable national policy frameworks applicable for water services and sanitation services separately. Definitions are drawn from definitions used by the Kwa Zulu Natal Department of Local Government & Traditional Affairs under the MIG program, the National Department of Water Affairs.

For the level of water services, the following definitions:

The RDP level of service providing more than sixty (60) litres of water per capita per day and less than 200 meters walking distance. It even includes a yard or house connection. The National legislated (RDP) minimum norms and standards in respect of water supply in South Africa are considered to be a maximum 200m walking distance with communal stand pipes. This national standard has also been accepted by the Department of Housing as their minimum norms and standards for the subsidized housing instrument as for a subsidized housing provision is concerned. Nevertheless, as the development is of a rural nature, the minimum norms as specified by the local Municipality would be provided.

6.1.4 Proposed Water Supply Schemes

It is difficult to quantify the reticulation needs for the proposed project area due to the fact that the town planning layouts have not yet been approved. The Bulk water pipelines are in close proximity to the proposed housing development running along the P749 and connecting to the bulk should not be difficult.

6.1.5 Hydraulic Analysis and Design

Salient Planning Parameters

Design horizon: 10 years after commissioning (2031)

Population: House hold count x average household size of 6

Growth Rate: 0% per annum



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Typical Daily Consumption: 60ℓ/house/day (AADD) (NHBRC)

Design Loss Factors-Total conveyance losses (LFr): 10%

Summer Peak Factor (SPF): 1.2

Gross Average Annual Daily Demand (GAADD): $(1+LFr) \times AADD$

Summer Peak Demand (SPD): $SPD = SPF \times GAADD$

Summer Daily Demand Connector Mains: $SDD_{pl} = SPF \times GAADD$

Design Peak Factor (DPF): 2

Design Flow Rate

Bulk Pumping Mains = Summer Peak Demand (SPD)

Maximum Static Pressure & Velocity: 250m & 1m/s (where possible)

Minimum reticulation residual pressure: 15m where possible

Design pumping period: 20 hours/day (Max period)

Minimum reticulation size: 75mm for connector mains

Reservoirs: 48 hours AADD: pumped from one source

24 hours AADD: gravity from the source

6.2 SANITATION

From the site investigations conducted March 2023 information, indications are that most of the households in and around the project uses pit latrine system, however the proposed site is near by the hospital which has the sewer connection that connects to the sewer Main sewer plant in town. System can be upgraded to allow the volume that will include that of the dwellers of the proposed development. This is very important and should be done to ensure hygiene.

6.2.1 Existing Bulk Sanitation Infrastructure

Umzimkhulu Town has an existing waste water treatment plant but the community especially in the Nyenyeze, which is near the proposed new Township area is served with variety of septic tanks, VIP pit latrines and conservancy tanks systems from where "honey sucker" remove contents and dispose at single pond in the northeast



of Umzimkhulu Town. These septic tanks may overflow during heavy rains, thereby flooding adjacent properties, especially those on low laying areas. This poses health hazard and fights amongst the neighbours.

The current capacity of the waste water treatment works is unknown and is situated on the lower east side of town along the Umzimkhulu river. The treatment works is fully operational but, may need to be upgraded to accommodate for a new housing development.

Sewer networks are designed to collect the wastewater generated in properties across the town to the WWTW. Sewer networks are planned and designed to achieve their intended objectives throughout their lifetime without any risk to public health, public safety and environment. Similarly, when designing the sewer network for this project, all the above objectives have been kept in consideration

6.2.2 Internal Sanitation Services

One of the following will be assessed as a sanitation service solution for the proposed project. The National legislated (RDP) minimum norms and standards in respect of sanitation in South Africa are considered to be a ventilated improved pit toilet (VIP). This national standard has also been accepted by the Department of Housing as their minimum norms and standards for all the housing instruments as far as subsidized housing provision is concerned.

6.3 ROADS

Department of Transport is the Service Authority in this area and are responsible for routine maintenance and upgrading of roads respectively surrounding the proposed development area.

6.3.1 Internal Access Roads Design

Umzimkhulu Local Municipality will be the service Authority for the maintenance of the internal roads and if funds allow, internal roads should be surfaced with Asphalt as the final layer. New storm water system will be implemented to manage storm water. The road width varies from 5.5m wide to 7m wide.

6.3.2 The project will include the following:

- The upgraded road will conform to the TRH 17 design guidelines wherever possible.



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- Topsoil and grass on the verges and shoulders will be removed, stockpiled and later used for the rehabilitation (top soiling and grassing) of the banks;
- A maximum width of 15 meters will be cleared and grubbed for construction purposes;
- Excavated material from the earthworks box will be used for cut to-fill purposes, as well as for the construction and fill to the shoulders of the road;
- The in-situ material below the earthworks box will be used as subgrade, and will be ripped and re-compacted to a density of 93% Mod AASHTO;
- All clay material will be removed up to a depth of 1m below the earthworks box in order to ensure that optimum densities are archived in all road layer works;
- A 150mm thick sub grade will be constructed by ripping and re-compacting the in situ material or borrowed granular material;
- A 150 mm thick sub-base will be constructed with G5 gravel material compacted to 95% Mod AASHTO.
- A 30 mm thick Asphalt will be used as a final layer of the road.
- Storm water facilities and pipe culverts will be constructed.
- Road signage and markings will be provided along the total length of the road.

6.3.3 Geology and Soils

Report associating with Geotechnical studies will be drafted and submitted separately.

6.3.4 Road Material Sources

Based on the Geotechnical findings materials for sub grade, sub base and base course will be obtained from an approved borrow pit within the site area. An existing borrow pit located within 5km from the Project Site and has good G5 material.

It is assumed that, the recommended materials would be obtained and used as follows: Fill material - From in-situ cut operations Topsoil - From in-situ material Layer





works - Natural gravels from local borrow pit and local (G5 – G7) Commercial sources,
(G1 G4 where required) Storm water - Fill material from in-situ excavated material

All other materials imported from commercial sources

6.3.5 Design Life, Speed and Traffic

The road design would be done in accordance with the relevant TRH 4, TRH 14 and TRH 17 guidelines and as well as the Guidelines for Human Settlement Planning and Design (Red Book).

An analysis period of 5 years and a design period of 10 years would be used for design purposes. The design speed will be 40km/h, since the roads are going through built-up areas.



6.3.6 Pavement Structure

The minimum pavement structure would be designed based on the Catalogue Method (TRH 14 guidelines).

Wearing course - 30 mm premixed asphalt

Sub grade - 150mm Rip and re-compact in-situ

6.3.7 General Cross-section Design

The proposed roads will have a carriageway width of 6m - 8m with sidewalks where practicable. The cross-sectional slope of the road will be cambered with 3% with falls either side of road.

A combination of earth drains, earth channels and Concrete Culverts will be provided to assist with storm water drainage.

6.3.8 Vertical Alignment

The roads will be designed to follow the existing vertical alignment, but within standards to:

- Avoid batters interfering with houses,
- Facilitate storm water flow and to avoid the ponding of water and,
- Improve the quality of the ride
- Vertical gradients adopted within this alignment will vary with a maximum gradient of 6% satisfying the following vertical alignment minimum standards:

K min = 16

L min = 100 mw

A max = 7%



6.4 ELECTRICITY

The Eskom is responsible for the planning, supply and network distribution of electricity within the proposed development area. At this stage of the study we have not obtained reliable updated as-built and future planning information from the services authority/provider.

6.4.1 Existing Infrastructure

Currently there are a number of Medium Voltage transmission lines running within the project area.

Further details regarding the location of the existing electrical infrastructure within the proposed development area will be prepared in the next phase of the study.

6.4.2 Planned Infrastructure

The provision of an internal electrical reticulation network is not viewed as a minimum requirement as far as subsidized housing is concerned. The provision of any future electricity supply and metered reticulation to the subsidized top structures will rest with UMzimkhulu Municipality and Eskom who are the services authority responsible for the planning, supply and network distribution for the area.

6.5 TELECOMMUNICATION

Telkom is the fixed land line services authority that is responsible for the planning, supply and distribution of the fixed land line telecommunication network within the proposed development area. However, all 4 of the registered national mobile wireless network license holders, namely, Vodacom, MTN, Cell C and Telkom Mobile etc. have varying degrees of network coverage over the development area.





6.5.1 (Telecommunications)

The majority of the UMzinkhulu population has access to some form of telecommunication infrastructure.

The growing importance of direct access to appropriate telecommunication infrastructure to facilitate access to appropriate sources of information in support of Local Economic Development is becoming an increasingly important development consideration. The inclusion of aspects such as urban telecentres as part of the housing development initiative could play an important role to address this gap.

6.5.2 Planned Infrastructure

No future planning information has been made available – private or semi-private owned infrastructure



6.6 STORM WATER

Whilst medium income/subsidized housing developments have huge budgetary constraints on the design and implementation of storm water management and control system, it is nevertheless important to dispose of storm water as efficiently as possible, because uncontrolled runoff can cause damage to property and may erode and destabilise fill and cut banks. The objectives of the storm water management system should be as follows:

- To adequately dispose of runoff from development areas without causing soil saturation or erosion. This is particularly important on any sites underlain by erosion or collapsible soils;
- To provide overland flow routes through development in order to cater for major storms and thereby minimizing any risk of damage to property and other immovable assets;
- Storm water system should be designed to function adequately with low maintenance in the long term, and should cater for silting etc.

The following options and design considerations will be noted prior to the planning and design of a storm water disposal system.

Storm water Soak pits

Depending on the calculated storm water runoff, permeability and structural make-up of the sub-soils the specific drainage area, as well as available size of the disposal area, the use of storm water soak pits may be a consideration in certain instances as an option of last resort, but it is not recommended as a primary solution. However, storm water attenuation and/or retardation structures will certainly be considered as storm water control devices.

Discharge to Road Hardenings

Wherever possible, storm water discharge from houses will be led away and discharged onto the road hardening and/or directly into the road storm water drainage systems which will be designed to cater for such a runoff control.

Discharge to Valley Bottoms

Use of simple storm water outfalls for discharge into valley bottoms is not recommended due to the erosion risk. Consequently, it is recommended that the



discharge points will be designed in such a manner as to avoid erosion, and control measure such as keying of headwall onto the bedrock surface, stone pitching or Reno mattresses down slope of the headwall, will be considered and incorporated into the design philosophy, funding permitting.

Overland Flow Routes, Overland flow routes will be planned to cater for excessive storm water runoff from major storms for individual sites and within the road network, as well as low point/valley lines. Surface channels will be created within non-user servitudes in areas where valley lines do not occur but in which overland flow is likely.

Roads and verges will be sloped accordingly to ensure that surface runoff will be directly down the overland flow routes with erosion protection measures incorporated such as grassing, erosion protection measures incorporated such as grassing, erosion strips, check berms etc. being provided along the designated drainage routes, funding permitting.

6.6.1 Structural Design

The storm water drainage system will comprise of the following basic structures:

- The road will be incorporated as part of the drainage system. Concrete V drains and Channels in accordance with the Department of Transport's standard details will be provided along the entire route to assist with storm water drainage.
- Side inlets will be provided at all low points and at all low-lying intersections.
- Storm water crossings will be provided varying in size from 600 mm to 1200 mm diameter.
- Erosion protection on velocities exceeding 2.5m/s will be provided with gabion structures.



6.6.2 Design Period

All storm water facilities will be designed for minor floods only. A 1:5-year recurrence period will be used for design purposes

6.6.3 Gradients

A minimum longitudinal gradient (for channels) of 0.4 % will be used to minimize sedimentation. A maximum longitudinal gradient will be such that the flow velocity in the open drains does not exceed 3 m/s. The cross-sectional slope of the road will be 2.5% with cross-falls.

7. SUMMARY

7.1 CONCLUSION

The natural reaction from a technical perspective, would be to primarily provide a sustainable full services package for the subsidized housing scheme, by providing services and housing that not only comply with the norms and standards that match the socio economic profile of the beneficiary community, but are fundamentally “better” than the standard set out in the minimum requirements for a subsidized housing development. As there are technical limitations in providing higher levels of service to the communities, we have to consider and leave space for incremental socio economic approaches which realistically relates to what people “get” in relation to what they can afford or would normally be willing to pay for.

The second concerns the economic and social impact of development. As the development is urban in nature, it will require sustainable employment operations within the UMzikhulu area and effective self-help program promoting education and training. People with sustainable employment are at the centre of any sustainable development process.

The development has the required resources as indicated by the various services organizations in order to provide an efficient service to the community. Some of the existing services as reported need to be upgraded for the future requirement of the area. However, bridging the gap from informal settlement to an urban living lifestyle / environment will require a culture of payment for services received, but also assist maintenance and the efficient use of services in order to make a successful of the proposed development.

The area is suitable for an urban development as the services requirement for the said development can be attained from the required location and/or immediate surroundings.

Similarly, the constitution of the development process must be defensible where the “some for all, and not all for some” principle must be adopted, applied and also upheld as far as possible. This could be very difficult in instances where only a certain number of the homeless beneficiaries from within Umzimkhulu municipal area will be accommodated under this project and not any other area, and who potentially all qualify and are eligible for a subsidy. Nevertheless, this development is viewed as a progressive multi-phased process in order to ensure an equitable demographic spread of subsidies over the entire municipal area, whilst systematically eradicating the housing backlog within this municipality over a period of time.

7.2 RECOMMENDATIONS

It is recommended that the following Level of Service be adopted for the proposed development areas wherever financially and technically feasible

7.2.2 Water

The provision of internal services will have to be provided during the implementation of the housing project. The existing basic level of service as according to RDP guidelines will be provided for.

7.2.3 Sanitation

The existing ventilated improved pit toilets will be decommissioned

as sanitation technology for the area as they meet the minimum RDP standards and housing code.

7.2.4 Roads

Tar wearing course for all internal roads where funding permits this operation to be undertaken to the development area.

7.2.5 Storm water Drainage

Open storm water drainage system along road reserves, box or pipe culverts at perennial streams and storm water control structures at all access road crossings. All storm water facilities will be designed for minor floods only. A 1:5-year recurrence period will be used for design purposes.

Further, for a development of this nature, it is imperative that the total product, (i.e. essential services package and top structure product) be in keeping with the minimum norms and standards of the subsidies Housing theme, where the needs and aspirations of the prospective end-user/beneficiaries under the guidance of the Department of Housing and the Local Municipality, are taken into consideration and used to shape the future vision of the community at large.

This, however, can only be attained where the housing product and services package are delivered in accordance with acceptable construction and building practices. In terms of which, it is therefore essential that details of the project specific proposal aspects be forwarded to the Municipality for approval prior to the finalization of the technical solution / model proposed for the UMzikhulu Ward 1 & 2 housing development.