

ICEBO ENVIRONMENTAL

ICEBO ENVIRONMENTAL

CONSULTANTS



**Environmental feasibility Report for Isandlwana
Housing Project (insitu upgrade of low cost housing),
within Mangwe-Buthanani Tribal Authority, Nquthu
Local Municipality**

17 NOVEMBER 2014

Email: shangen@iceboenviro.co.za

Website: www.iceboenviro.co.za

DOCUMENT DESCRIPTION

Client:

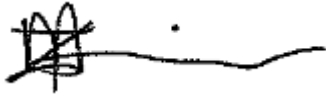
Nquthu Local Municipality

Report Name:

Environmental feasibility report for the Isandlwana housing project (insitu upgrade) within Mangwe-Buthanani Tribal Authority, Nquthu local municipality

Compiled by:

Nomcebo Monica Shange



Signature

TABLE OF CONTENTS

1. INTRODUCTION	5
2. BACKGROUND	6
3. PROJECT INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER	7
4. PROJECT MOTIVATION	8
4.1. CURRENT HOUSING DEMAND	8
5. REVIEW OF APPLICABLE ENVIRONMENTAL LEGISLATION AND POLICY	8
5.1. THE CONSTITUTION OF SOUTH AFRICA	8
5.2. NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NO 107 OF 1998)	9
5.3. NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (NO 59 OF 2008)	9
5.4. NATIONAL WATER ACT (NO 36 OF 1998)	10
5.5. OCCUPATIONAL HEALTH AND SAFETY ACT (NO 85 OF 1993)	10
5.6. HAZARDOUS SUBSTANCE ACT (NO 15 OF 1973) AND REGULATIONS	11
5.7. NATIONAL BUILDING REGULATION AND STANDARDS ACT	11
5.8. NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT	11
5.9. NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT (NO 39 OF 2004)	11
5.10. THE NATIONAL HERITAGE RESOURCES ACT (ACT NO. 25 OF 1999)	11
6. PROJECT DESCRIPTION	12
6.1. LOCALITY AND FEATURES	12
7. ISANDLWANA MANGWE-BUTHANANI TRADITIONAL AREA	17
8. ACCESSIBILITY	17
9. STORM WATER MANAGEMENT	17
10. NATURAL FEATURES	17
10.1. CURRENT LAND USE	17
10.2. DRAINAGE AND TOPOGRAPHY	18
10.3. GEOLOGY	18
10.4. VISUAL CONSIDERATION	18
10.5. AREAS OF CULTURAL SIGNIFICANCE	18
10.6. ENVIRONMENTALLY RELATED KEY ISSUES	19
10.7. ENVIRONMENTAL ISSUES ASSOCIATED WITH THE PROPOSED PROJECT	

19		
10.7.1.	Hydrological features	
10.7.2.	Description of vegetation	
10.7.3.	Wetlands	
10.7.4.	Slope analyses of the area	
10.7.5.	Flood risk areas	
11.	LEVEL OF PRESENT AND POSSIBLE POLLUTION	21
12.	ENVIRONMENTAL RISKS OR HAZARDS POSED BY THE PROPOSED DEVELOPMENT	21
■	POTENTIAL ENVIRONMENTAL RISKS OR HAZARDS POSED BY THE PROPOSED DEVELOPMENT	22
13.	PLANNING AND IMPLICATIONS	22
14.	RECOMMENDATION & CONCLUSION	23
	APPENDIX A: VEGETATION STATUS	24
	APPENDIX B: HYDROLOGY	24
	APPENDIX C: SLOPE ANALYSES GEOTECHNICAL	25
	APPENDIX D: FLOOD RISK AREA	26
	APPENDIX E: BIODIVERSITY PRIORITY AREAS	27

LIST OF FIGURES

FIGURE 1: LOCALITY MAP OF ISANDLWANA.....	13
FIGURE 2: IMAGE SHWOING THE STRUCTURE OF THE EXSING HOUSES IN THE AREA.....	14
FIGURE 3: IMAGE SHOWING HOUSEHOLDS IN CLOSE PROXIMITY TO THE RIVER.....	14
FIGURE 4: DONGA AND STREAMS TRANSEVRSING THE SITE.....	15
FIGURE 5: ISANDLWANA BATTLEFIELD	15
FIGURE 6	15
FIGURE 7: HOUSHPOLDS IN CLOSE PROXIMITY TO THE STREAMS	15

1. INTRODUCTION

Nquthu Local Municipality is one of the four local municipalities within Umzinyathi District. It is located along the north eastern boundary of the district and is boarded by eMadlangeni and Abaqulusi on the north, Ulundi on the east, Nkandla on the south and Msinga and Endumeni on the west. It covers an area of approximately 1451km², and is predominantly rural in nature with expansive low-density rural settlements being one of the major features. Nquthu Town, and Nondweni to a limited extent, are the only notable urban centres within the municipality. The primary access to Nquthu Municipality is through R68 Provincial road that runs through the municipality is the R33, passing linking Ulundi and Newcastle/ Dundee. Another important rout is through the northern areas, passing east of Nondweni before linking Vryheid with the R68. The town of Nquthu is a small but stable urban area that has established itself as the primary commercial, administrative and service centre for the Municipality as a whole. The town is an old Japie Uys town established in terms of Proclamation 67 of 1983. The majority of the land in Nquthu is Ingonyama Trust land and the municipality does not have any land registered in its own name.

Part of Nquthui municipality's objectives are to eradicate slums within the municipality ; Strengthening governance and service delivery; Ensuring job creation through housing delivery; Accelerating housing delivery in rural areas; Accelerating the hostels redevelopment and upgrade programme; creating rental / social housing opportunities; Building the capacity of Housing stakeholders (especially municipalities); Promotion of homeownership; Provision of housing for vulnerable groups including those affected by HIV/ AIDS; Ensuring the provision of incremental housing; and Implementation of Financial Services Market Programme (Nquthu IDP 2011/2012)

Department of Human Settlement's vision of enabling all people to house themselves by engaging various institutions and environment stakeholders in the provision of a conducive and enabling mission to effectively and efficiently manage the implementation of national and provincial housing programmes in partnership with the relevant role players, by developing sustainable human settlements characterized by affordable and adequate shelter for qualifying citizens in KwaZulu-Natal. Isandlwana housing project is one of the projects that was planned to be constructed within the year 2014. (IDP 2011/2012)

2. Background

The Nquthu Municipality in partnership with the KwaZulu-Natal Department of Human Settlements (KZNDHS) have appointed and commissioned Kamawewe Development Consultants (KDC) as Implementing Agents, to assist them with the delivery of 1,000 housing units for the Isandlwana Rural Housing Project. Isandlwana falls within the Mangwe-Buthanani Traditional Authority area and has the following Izigodi which will be considered as part of the housing delivery programme;

- ✚ Magaga,
- ✚ Ntekeleni,
- ✚ Sgubudu,
- ✚ Sandlwana Mission Section 1,2,3,4,
- ✚ Ekheyi and
- ✚ Siqgubemeni

The profile of the community of Isandlwana Mangwe-Buthanani Tribal Authority Area is aligned with the requirements as set by the Department of Human Settlements in providing housing to the poorest of the poor. The number of households that would qualify and pass the approval criteria as set out by the Department of Human Settlements will be determined during the execution of the Sales Administration process and the size of the project can set at an initial 1000 for phase 1. It is proposed that 1000 housing units of 40m² in extent are to be constructed in the existing household footprints of each selected beneficiary. The development will include VIP toilets within each household unit. N

The reasoning behind conducting a feasibility study for such development is due to that fact that according to the National Environmental Impact Assessment Regulations, promulgated under the National Environmental Management Act (107 of 1998) the proposed development does not trigger EIA listed activities within the 2010 regulations, and therefore no environment authorisation is required for the development. However an environmental feasibility study was envisaged for the trench 1 submission. An Environmental management programme (EMPr) will be conducted for trench 2 submission to ensure environmental compliance during construction phase.

The aim of this environmental feasibility assessment was to evaluate and highlight the particular environmental legislative requirements as well as potential environmental issues or constraints for the proposed project, in relation to the scope provided. The scope of work outlined specifically required that the following be investigated for these sites:

- Natural features, such as wetlands, streams and vegetation;
- Topography and landscape features;
- Hydrology and drainage patterns;
- Negative impacts to the nearby community
- Negative impacts to the nearby biodiversity and the environment

As part of the environmental assessment for the proposed development, an Environmental Feasibility Study is required to evaluate and provide recommendations regarding the proposed development, identify potential impacts of the activity on the environment, whether and to what extent these impacts can be mitigated and whether there are any significant issues and impacts that require further investigation.

The feasibility study outlines specifically the following which was investigated:

- Natural features, such as wetlands, streams and vegetation;
- Topography and landscape features;
- Heritage significant features in the area
- Social impact assessment
- Geological features of the area
- Hydrology and drainage patterns;
- Negative impacts to the nearby community
- Negative impacts to the nearby biodiversity and the environment

3. Project Independent Environmental Assessment Practitioner

To ensure compliance with the terms of reference from the department of housing's requirement for conducting the Isandlwana housing project, Kamawewe Development Consultants (KDC) (implementing agent for the project) **appointed Icebo Environmental Consultants** as the independent Environmental Assessment Practitioner (EAP) to conduct the environmental impact assessment for the proposed development project.

Independent EAP	<i>Icebo Environmental Consultants</i>
Contact Person	Monica Nomcebo Shange
Telephone No.	(27) 793073282
Fax No:	0865498430
Email:	shangen@iceboenviro.co.za
website:	www.iceboenviro.co.za

Nomcebo Monica Shange from Icebo Environmental Consultants accompanied by the project team conducted a site inspection on the 8th October 2014 to inspect and identify any potential environmental impacts of the activity on the environment.

4. Project Motivation

4.1. Current Housing Demand

The 2013-14 Nquthu Municipal IDP reports that an estimated 81% of the total population resides in mud houses or poorly constructed houses. These are predominantly rural settlements which are regarded as vulnerable settlements due to their location and poor access to infrastructure. In achieving the above the Nquthu municipality's visions involves a dynamic socioeconomically driven, healthy and safe environment through sustainable service delivery. The vision recognizes the importance of natural resources not only for the present generation, but also for the generations to come. Basic services are to be made available to all without compromising natural resources. Services should therefore be provided without disturbing the natural environment.(Nquthu IDP 2011/2012)

5. Review of applicable environmental legislation and policy

In order to protect the environment in an environmentally responsible manner, there are a number of significant pieces of environmental legislation that need to be taken into account during this study. These include but not limited to:

5.1. The Constitution of South Africa

The Bill of Rights, in the Constitution of South Africa (No. 108 of 1996), states that everyone has a right to a non-threatening environment and requires that reasonable measures be applied to protect the environment. This protection encompasses

preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in NEMA and given further expression.

5.2. National Environmental Management Act (No 107 of 1998)

The National Environmental Management Act (NEMA) (No. 107 of 1998) states that the principles of Integrated Environmental Management (IEM) should be adhered to in order to ensure sustainable development. A vital underpinning of the IEM procedure is accountability to the various parties that may be interested in or affected by a proposed development. Public participation is a requirement of the IEM procedure, in terms of the identification of potentially significant environmental impacts. The IEM procedure aims to ensure that the environmental consequences of development proposals are understood and adequately considered during all stages of the project cycle, and that negative aspects are resolved or mitigated and positive aspects enhanced.

Furthermore, Section 28(1) of the Act states that “every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”. If such pollution cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution.

5.3. National Environmental Management: Waste Act (No 59 of 2008)

The National Environmental Management Waste Act (No 59 of 2008) – the ‘Waste Act’ reforms the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

The objectives of this Act are:

- a) to protect health, well-being and the environment by providing reasonable measures for –
 - i. minimising the consumption of natural resources;
 - ii. avoiding and minimising the generation of waste;
 - iii. reducing, re-using, recycling and recovering waste;

- iv. treating and safely disposing of waste as a last resort;
 - v. preventing pollution and ecological degradation;
 - vi. securing ecologically sustainable development while promoting justifiable economic and social development;
 - vii. promoting and ensuring the effective delivery of waste services;
 - viii. remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and
 - ix. achieving integrated waste management reporting and planning;
- b) to ensure that people are aware of the impact of waste on their health, well-being and the environment;
 - c) to provide for compliance with the measures set out in paragraph (a); and
 - d) Generally to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.

5.4. National Water Act (No 36 of 1998)

The major objectives of the National Water Act are to:

- Aid in providing basic human needs;
- Meet the growing demand of water in a sustainable manner;
- Ensure equal access to water and use of water resources;
- Protect the quality of water of natural resources;
- Ensure integrated management of water resources;
- Foster social and economic development; and
- Conserve aquatic and related ecosystems.

5.5. Occupational Health and Safety Act (No 85 of 1993)

The Occupational Health and Safety Act provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.

5.6. Hazardous Substance Act (No 15 of 1973) and Regulations

Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.

5.7. National Building Regulation and Standards Act

“To promote for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities for the prescribing of building standards and for the matters connected therewith”

5.8. National Environmental Management: Biodiversity Act

The Biodiversity Act regulates South Africa’s laws relating to biodiversity. The overall purpose of the act is:

- The management and conservation of South Africa’s biodiversity and it’s components;
- The protection of species and ecosystems that warrant national protection ;
- The sustainable use of indigenous biological resources;
- The fair and equitable sharing of benefits arising from bio prospecting including indigenous biological resources; and
- The establishment of a South African National Biodiversity Institute.

5.9. National Environmental Management: Air Quality Act (No 39 of 2004)

The NEMA Air Quality Management Act states the following as it primary objective: “To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, for specific air quality measures, and for matters incidental thereto.

5.10. The National Heritage Resources Act (Act No. 25 of 1999)

The National Heritage Resources Act established the South African Heritage Resources Agency (SAHRA) in 1999. SAHRA is tasked with protecting heritage resources of national significance. Under Section 38 of this Act, all new developments with a site exceeding 5 000 m², are subject to assessment by SAHRA. A heritage impact assessment must be carried out by a heritage specialist approved by SAHRA to enable them to make an informed decision.

6. Project description

6.1. Locality and features

Isandlwana Mangwe-Buthanani is situated in the Mangwe-Bhuthanani Tribal Area(TA) within Nquthu Local Municipality –at co-ordinates $X^{\circ} X' X.XS E X^{\circ} X' X.X''E$. Isandlwana Mangwe-Buthanani Tribal Area is on Portions 2 of the Farmxxxxxxxx. , Registration Division HU, S.G. No xxxxxx, Province of KwaZulu-Natal, in extend xxxxxx (xxxxxxxxxx) hectares. The registered owner of the land is Ingonyama trust in terms of Government Title Deed No xxxxxxxx. The project area has 3 wards and comprises a number of Izigodi. .

The site is bounded by the streams that run along the boundary of the whole ward, and tend to be more dominant in the westerly, easterly and northerly direction of the ward, which runs along the valleys of the Sandlwana within the Traditional area of Mangwe-Buthanani . The community uses communal taps as their main of source of water within the area. There are existing Eskom power lines in most of the area which supply electricity to households. Household are accessible as there are existing gravel Roads in the area. The Isandlwana Mangwe-Buthanani area is dominated by Nothern Zululand highland Thornveld grassland however there are areas on the south westerly of the site that comprises of income sandy grassland and Thukela Thornveld. There minority of the Nothern Kwazulu Natal moist grassland exists on the western portion of the site boundary . The far western portion of the site is considered as biodiversity priority area xxx, and that area has not been disturbed by the informal dwellings.

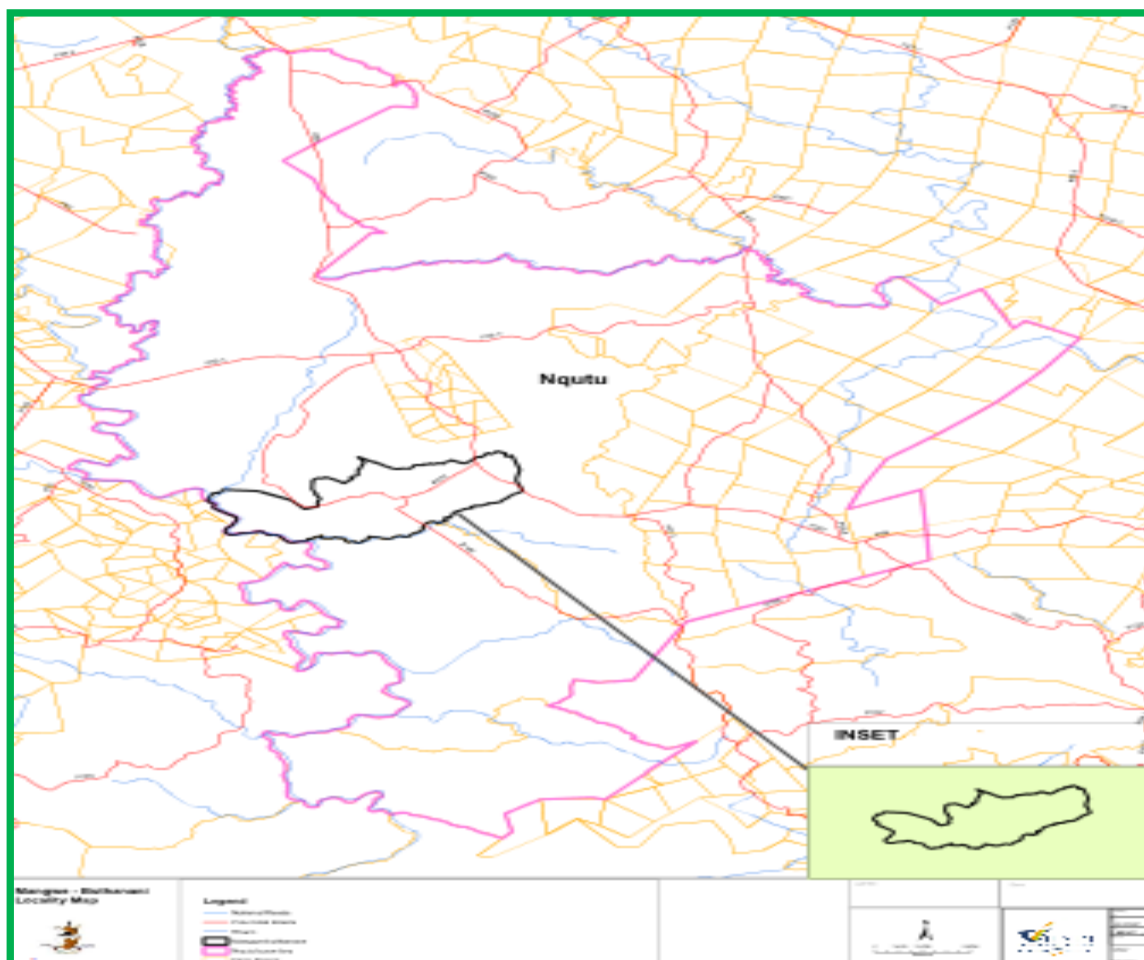


FIGURE 1: LOCALITY MAP OF ISANDLWANA



FIGURE 2: IMAGE SHWOING THE STRUCTURE OF THE EXSING HOUSES IN THE AREA



FIGURE 3: IMAGE SHOWING HOUSEHOLDS IN CLOSE PROXIMITY TO THE RIVER



FIGURE 4: DONGA AND STREAMS TRANSEVRSING THE SITE



FIGURE 5: ISANDLWANA BATTLEFIELD



FIGURE 6: IMAGE SHOWING HOUSES LOCATED ALONG THE FLOOD LINES

7. Isandlwana Mangwe-Buthanani traditional area

The Isandlwana Mangwe-Buthanani housing structures comprises of scattered residential settlements along the central to the east of the authority area. The site comprises of short scattered grassland and the slope is moderately flat within the area. Majority of the project area consists of relatively flat terrain with no steep areas. There are a number of small streams and drainage lines traversing the site. The wetlands available are associated with the streams and their immediate surroundings. Currently there are existing road tracks, which allow accessibility to the sites. Current housing conditions consist of a typical rural umuzi with some mud and some mortar and brick structures. The housing need in the area is thus very high. The number of households that would qualify and pass the approval criteria as set out by the Department of Human Settlements.

8. Accessibility

The proposed site is well located in terms of accessibility, as there are existing roads tracks that allow access to the site.

9. Storm water Management

Although the housing developments are of relatively medium density due to the rural nature of the community, it is important to dispose of storm water effectively as uncontrolled runoff can cause damage to property and may erode and destabilize fill banks. The objectives of the storm water management system should be as follows:

- To adequately dispose of runoff from developed areas without causing soil saturation or erosion. This is particularly important on steep slopes;
- To provide overland flow routes through developments to cater for major storms and thereby minimising any risk of damage to property;
- Storm water systems should be designed to function adequately with low maintenance in the long term, and should cater for silting.

10. NATURAL FEATURES

10.1. Current Land Use

The Isandlwana Mangwe-Buthanani TA is currently underdeveloped with existing poor housing structures with scattered grassland, nearby, streams and wetlands which need to be avoided during construction phase. The majority of the rural settlements are located in the **central and eastern areas** of Isandlwana Mangwe-Buthanani study area. The location and formation of the family groups within the area does not adhere to any formal settlement layout. During the site inspection no evidence of livestock was indentified in the area nor was there

any significant subsistence farming. Which is characterized by poor land management practices and presents a challenge in respect of the unlocking of the agricultural potential that exists.

10.2. Drainage and Topography

The majority of the project area consists of relatively flat terrain with no steep areas, dissected by three major drainage networks. Drainage is dictated by the Buffels, Ngqobongo and Batshe River along the east and southern boundary of Isandlwana resulting in secondary drainage across a large portion of the site to be aligned. A storm water management plan/system needs to be drawn up and implemented to ensure proper management of storm water on the site during and after construction to ensure that pollutants and sediment are not released into the Rivers and associated wetlands within the area. Communities tend to settle in proximity to rivers and streams, mostly without due consideration of flood lines along these water courses.

10.3. GEOLOGY

The Isandlwana is underlain by the Vryheid Formation and the Pietermaritzburg Formation. Sandstone, shale and grit represent rocks of the Vryheid Formation while the Pietermaritzburg Formation comprised shale bedrock. These formations are intruded both in the local and regional scale by Jurassic Dolerite. The investigation undertaken indicated, the majority of the site to be underlain by residual and weathered dolerite bedrock with the remainder comprising shale bedrocks. A detailed geotechnical report conducted by an appointed geotech specialist should be able to provide more detailed findings.

10.4. Visual Consideration

Care must be taken to ensure that the visual impact from the public is assessed and mitigated. The visual impact of the development e.g. Buffer areas, where development is not permitted will require careful attention.

10.5. Areas of cultural significance

In addition to the areas of environmental significance, it is important to identify any buildings or areas of historical or cultural significance that need to be conserved. The municipality intends to identify and conserve these areas through close relationships with Amafa as well as through the municipality's LUMS. The municipality is blessed with several important battlefields and areas of cultural and historical importance in the area.

Isandlwana has historical background as this is the area where there was the first major encounter in the Anglo-Zulu War between the British Empire and the Kingdom. It was called "The Battle of Isandlwana on 22 January 1879". Therefore the demarcated area where the event took place is regarded as a major historical site. There

are also cemeteries in the area, which have been developed by the local people where caution should be considered during the planning phase of the project

No old buildings which indicate heritage significance, were identified during a site visit, which need to be addressed, however an environmental management programme should be implemented in order to ensure no interference with any of the heritage significant items or land is impacted negatively.

10.6. Environmentally Related Key Issues

The degradation of wetlands is occurring as a result of cultivation and artificial drainage, river nitrification, dams, urbanization, soil erosion and alien plant invasion and has serious consequences for ecological function and water quality. Informal housing along the banks of rivers and streams and near major transportation has substantial impacts in respect of water pollution due to a lack of sanitation, aesthetics and poor land management.

10.7. Environmental issues associated with the proposed project

The following critical habitat types exist within Isandlwana Mangwe-Buthanani Tribal area:

- Secondary grassland
- Wetland
- Rivers
- Natural vegetation
- Degraded Unimproved (natural) Grassland

10.7.1. Hydrological features

The municipal area is well endowed with natural water resources, making it ironic that the most urgent human developmental need is the provision of potable water. The municipality has the following notable natural water sources: Buffels River, Ngxobongo River & Batshe River. These rivers are fed by many smaller rivers, streams and springs and it is from these that the rural communities obtain their water in a purified or unpurified form. Within Isandlwana Mangwe-Buthanani Drainages are dictated by the above mentioned 3 Rivers which traverses easterly along the southern sector of the site. These streams then feed into the streams situated along the northern part of the area.

Wetland degradation is especially evident near built up areas and occurs mainly as a result of inappropriate informal development. Soil erosion occurs throughout the region, but especially in the rural areas and in association with roads, pathways and subsistence agriculture.

GIS analyses and site observations indicate that, the study area contains many rivers or drainage lines with associated wetland along the rivers. In order to inform planning of the housing development, flood risk areas have been mapped by buffering perennial, main rivers and drainage lines with 100m development setback buffer.

10.7.2. Description of vegetation

Loss of indigenous vegetation communities and habitats due to:

- Alien plant invasion
- Poor catchment management
- Informal housing

The Isandlwana Mangwe-Buthanani area is dominated by Kwazulu Natal Highland Thornveld with patches of Thukela Thornveld and income sandy grassland situated on the south west area of the site. Nothern Kwazulu natal moist grassland is also available only on the boundary of the western portion of Isandlwana TA (see attached appendix)

10.7.3. Biodiversity priority areas

10.7.4. Wetlands

The wetlands were observed along the eastern to the southern boundary of the Isandlwana Mangwe-Buthanani area where most of the Rivers are situated. From the information provided by the GIS mappings and site observations, some of the houses are situated in close proximity to the streams. Therefore it is recommended that the development be located 32m away from any watercourse in order to comply with the National Environmental Impact Assessment Regulations, promulgated under the National Environmental Management Act (107 of 1998) the proposed development does not trigger EIA listed activities within the 2010 regulations.

Wetland protection is of primary importance and includes all rivers, streams and natural drainage courses passing through the municipality, and conservation zoning needs to be extended to include these areas. This is not only important from a biophysical perspective, but also provides an opportunity to link the “green” areas (including parks, sports fields etc.) within the town which will contribute to improving the general social amenity and ambiance of the urban areas. In addition the meaningful conservation of wetland areas will assist in minimizing soil erosion and land degradation, two of the major environmental problems in Nquthu.

The municipality is criss-crossed by a number of rivers and aquifers upon which many communities and households depend for their daily water needs for both them and their livestock. Vegetation along streams and water courses shall be protected. Pollution by toxic substances, excessive nutrients and suspended particle matter shall be avoided. The area around rivers has been identified as environmental management areas.

10.7.5. Slope analyses of the area

The site is within a relatively flat terrain with no steep areas recorded during the investigation. However a high erosion risk / poor founding conditions are anticipated. To avoid discharge of residue, sediments and further erosion during construction, it is recommended the construction of the newly proposed houses be along the properly levelled sites where clearing of vegetation and excavation could lead to minimum erosion.

The site is also dominated by eroded gullies/dongas. The encroaching of these erosion gullies into the residential areas may be cause for slope instability. The general site is however, still stable and is suitable for intended development provided that the recommendations given in this report are adhered to.

10.7.6. Flood risk areas

No accurate data has been received for the actual boundaries which show the flood risk areas. Where flood lines are unknown or cannot be determined from the GIS mappings provided, it is recommended that a 100m buffer from the existing rivers be delineated to indicate the potential, flood risk areas in the area. Therefore from the above mentioned existing rivers, a 100m buffer has been delineated to indicate possible flood risk areas. The 100m buffer area from the river is regarded as the flood risk area, and therefore it is recommended that no development should take place within 100m from the existing rivers.

11. Level of present and possible pollution

Potential pollution impact that could occur within the study area during the construction of the houses could be:

Potential pollution impact that could occur within the study area during the construction of the houses could be:

- Impact on groundwater sources by VIP sanitation
- Discharges into river systems from clothes being washed
- Discharges into river systems from construction activities
- Air emissions from fire
- Noise from existing settlements and roads

12. Environmental risks or hazards posed by the proposed development

The following are the key considerations in planning and development of the site:

- Positioning of structures and infrastructure, including on site sanitation, VIP, away from sensitive river system drainage lines.

- Hazardous waste is to be disposed at a Permitted Hazardous Waste Landfill Site, i.e. Oil and other lubricants, diesel, paints, solvent; Containers that contained chemicals, oils or greases,
- Contaminated wastewater including cement-contaminated water shall not enter any watercourse and shall be managed to ensure that the existing water resources on and off site are not polluted by activities emanating from the above development.

- **POTENTIAL ENVIRONMENTAL RISKS OR HAZARDS POSED BY THE PROPOSED DEVELOPMENT**

The following are the key considerations in planning and development of the site:

- Positioning of structures and infrastructure, including on site sanitation, VIP,
- Disposal of hazardous waste, i.e. oil and other lubricants, diesel, paints, solvent; Containers that contained chemicals, oils or greases,
- Contaminated waste water including cement-contaminated water

13. Planning and implications

In order to ensure medium to long term sustainability of the development, sensitive environmental features within the study area have been delineated(see attached appendices) and must be used to inform, planning and site selection for the proposed housing development.

Key consideration in planning and development of the site includes:

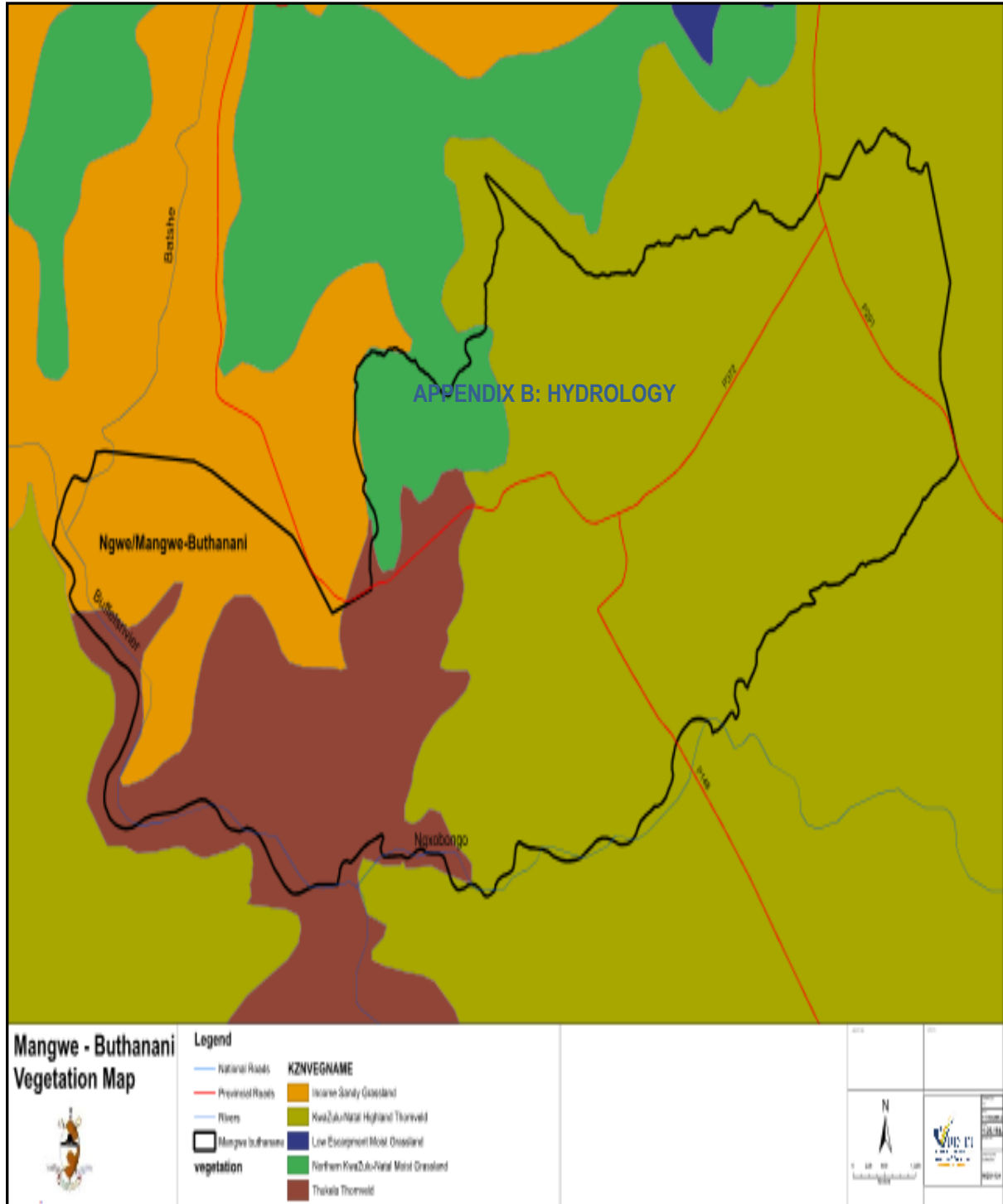
- Positioning of infrastructure and VIP toilets away from the river systems and drainage lines and out of the flood lines where possible.
- Develop buffers to protect sensitive areas and vegetation and minimize disturbance to those systems
- Position the housing structure out of the sensitive habitats or vegetation, grassland, and indigenous vegetation.
- Positioning the housing structures away from the unlevelled slopes, where clearing of vegetation and excavation could lead to increased erosion.
- Management of storm water emanating from platform for new houses and hard surface areas in order to determine the risk of erosion, loss of topsoil and sedimentation of local rivers.

14. Recommendation & Conclusion

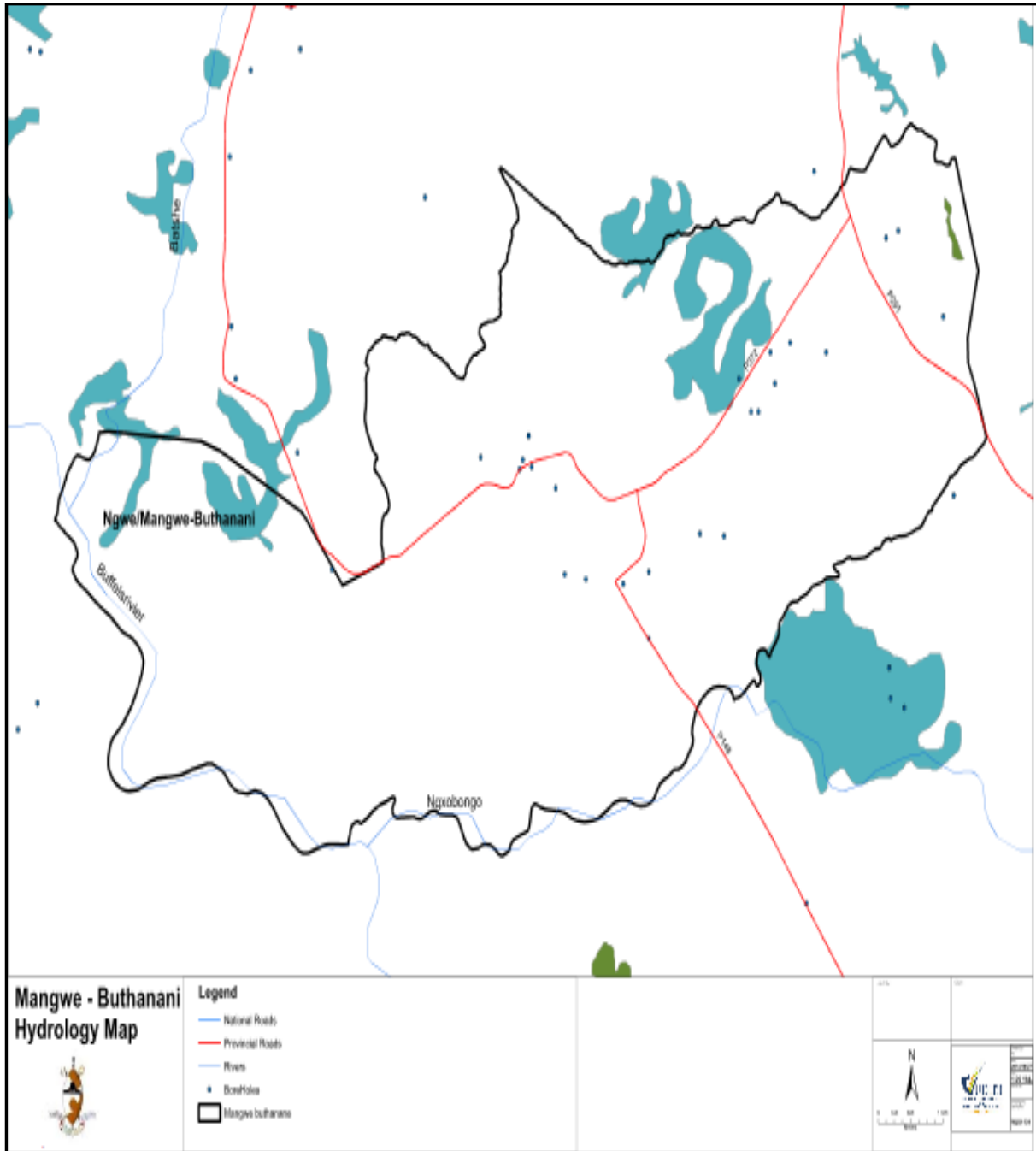
No environmental authorisation is required for the insitu upgrade of the current settlement, however to ensure protection of the environmental sensitive areas within the project area, the following should be adhered to:

- Wetlands or streams – The drainage lines or streams should be avoided to any development and buffers zones should be used during construction.
- All wetlands are to be delineated and rehabilitated.
- Sensitive environmental features have been delineated using GIS and must be used to inform site selection and planning.
- It is highly recommended that the above planning and implications be considered together with use of the GIS mappings showing all the environmental sensitive area within the area of Isandlwana Mangwe-Buthanani, in order to adequately evaluate the impact that are associated with the proposed infrastructure. This will assist in efficient identification of mitigation measures that needs to be implemented prior and during construction phase, in order to ensure that any environmental sensitive areas are not negatively impacted upon, and if there are any that are envisaged, the impact be minimise through use of efficient mitigation measures.
- Consultation with local community during planning and site selection will ensure that no grave yards are affected by the proposed development.
- Biodiversity priority areas are to be considered during planning and construction phase
- Cumulative impact needs to be taken into considerations.
- Positioning of structures and infrastructure, including on site sanitation systems, such as VIP away from sensitive development buffers and out of the flood lines and river systems and drainage lines, to protect sensitive riparian vegetation and minimise disturbance to these systems.
- Implementation of storm water management plans.
- The Isandlwana battlefield is an area of high protection as it poses high historical background in the area, therefore no interference is deemed possible as there are no households to be constructed in close proximity to the battlefield, therefore no impact or any interference is foreseen in that area.

APPENDIX A: VEGETATION STATUS



APPENDIX B: HYDROLOGY



APPENDIX C: FLOOD RISK AREA

APPENDIX D: SLOPE ANALYSES GEOTECHNICAL

APPENDIX E: BIODIVERSITY PRIORITY AREAS

APPENDIX F :WETLAND MAP

