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The uMkhomazi Water Project Phase 1: Module 1: Technical Feasibility Study: Raw Water

ENVIRONMENTAL SCREENING REPORT

FINAL

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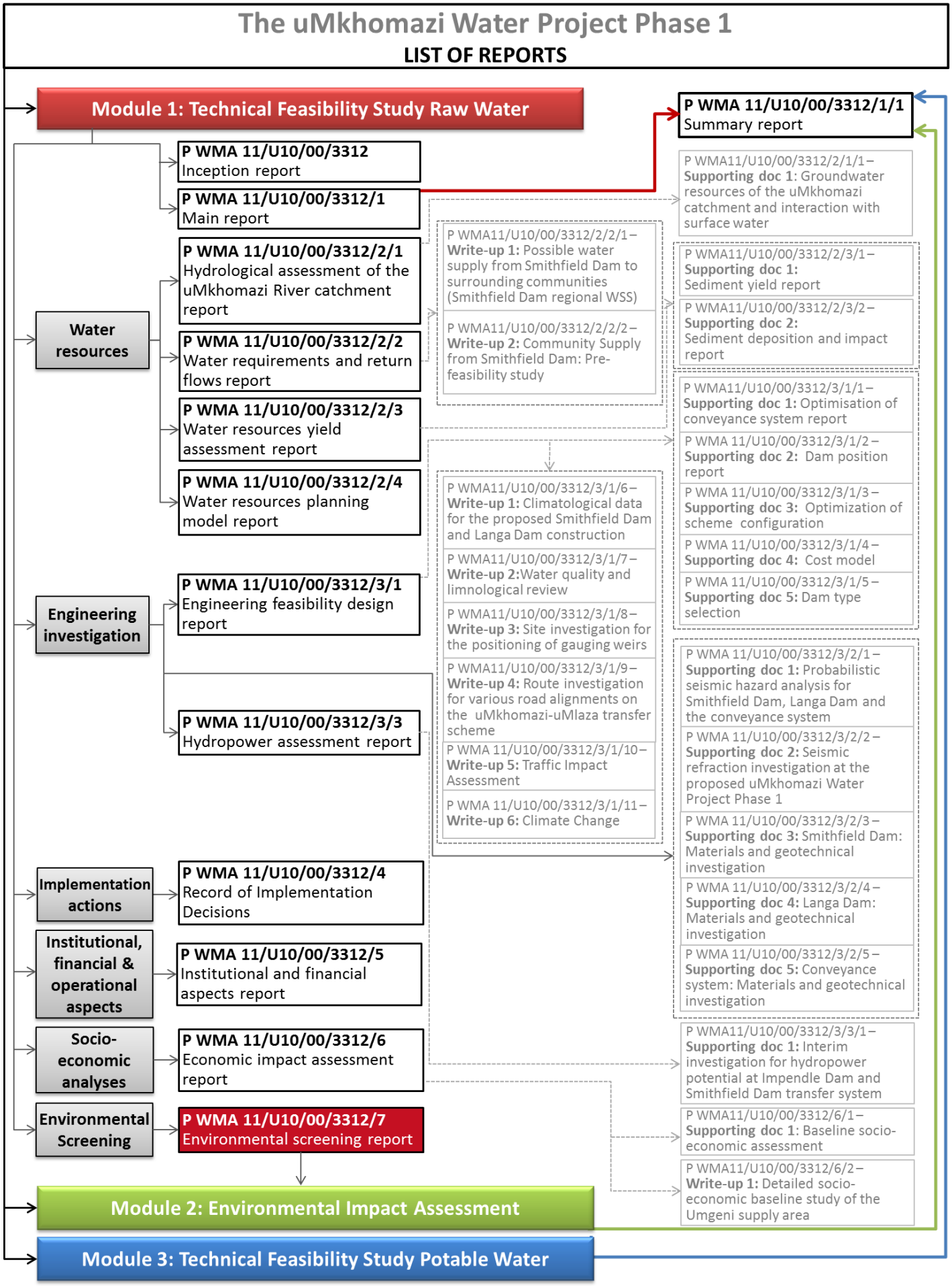
PREAMBLE

In June 2014, two years after the commencement of the uMkhomazi Water Project Phase 1 Feasibility Study, a new Department of Water and Sanitation was formed by Cabinet, including the formerly known Department of Water Affairs.

In order to maintain consistent reporting, all reports emanating from Module 1 of the study will be published under the Department of Water Affairs name.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EXECUTIVE SUMMARY

*AECOM (previously BKS) was appointed by the Department of Water Affairs (DWA) to carry out a feasibility study for the **uMkhomazi Water Project Phase 1 (uMWP-1)**. This **Environmental Screening Report (ESR)** deals with the investigation of **potential environmental implications** and the adoption of a framework within which aspects arising from or influencing the project are considered, and is the deliverable for **Task 2** of the **uMWP-1**.*

The study area is located within the Midlands area of KwaZulu-Natal and will impact on two river catchment areas; namely the uMkhomazi and the uMlaza River catchments.

The current water resources of the Mgeni System are insufficient to meet the long-term water demands of the system, comprising five million domestic and industrial users of the economic powerhouse of the KwaZulu-Natal Province. Water supply in the Mgeni System is stressed and therefore to ensure a reliable water supply is maintained for a growing and developing economy, the uMkhomazi River has been identified as the next major water resource to develop.

This report specifically considers the uMkhomazi Water Project Phase 1 which includes the construction of the proposed Smithfield and Impendle dams, a tunnel linking the uMkhomazi and uMlaza River catchments, and, the provision of a balancing dam near the existing Baynesfield Dam.

*The environmental screening investigation and resultant ESR examined **potential risks associated** with the proposed project in terms of the biophysical, social and economic environment as well as risks in terms of environmental legislation. The purpose of the ESR is to inform the environmental impact assessment (EIA) process of the **risks that need to be investigated**.*

Although the current intention is to develop the Smithfield Dam and enhance the Baynesfield Dam (or develop an alternative balancing dam nearby), with that consideration being part of the proposed EIA, the Impendle Dam will need to be considered at a later point in a separate EIA process, but was not ignored in the current ESR.

*Presented in **Table 4-20** is a summary of the potential risks associated with the proposed development of the uMkhomazi Water Project (uMWP). This screening assessment has been undertaken using a rating approach which details each risk from a positive impact (score of 5) through to a potential fatal flaw (score of 1) (refer to **Section 4**).*

*The **critical consideration** for the proposed development is that it will lead to the damming of one of the few "undammed" rivers remaining within South Africa. Part of the overall consideration of the feasibility study and the studies linked thereto (i.e. including the EIA), will be to determine whether the benefits that may be accrued from the development of the scheme as a whole significantly exceed the advantages of leaving the uMkhomazi River undammed. Should the risk and/or loss be considered to be unacceptable, this could be considered to be a fatal flaw in terms of the project continuing as this would mean that under these constraints no alternative dam sites could be considered on the uMkhomazi River. This scenario forms the basis of the EIA against which all proposed infrastructure needs to be assessed – the overall "no go" alternative.*

***Other important significant risks** could lead to alternative dam basin sites being considered on the two rivers being considered (i.e. uMkhomazi and uMlaza), or potentially different dam wall heights (i.e. a lower dam wall would lead to a smaller area being flooded). Potential changes / alternatives to the proposed scheme will need to be considered in terms of the potential losses balanced against the potential benefits of the project. These will form a significant part of the EIA process. Important significant risks include:*

- *Biodiversity: Confirmation of the presence of terrestrial fauna and flora species of conservation importance, and the ecosystems that they form part of, especially:*

  a) *The Southern KwaZulu-Natal Moist Grassland veld type being a vulnerable veld type with a low level of formal conservation thereof – both of the proposed Dam basins (i.e. Smithfield and Impendle) are deemed to be in a good ecological condition, thus loss thereof could be seen to be significant in terms of conservation of the veld type;*

  b) *Implications to a number of vulnerable species known to occur in the study area, these include:*

     - *A vulnerable Red Data species colony in the form of the Bald Ibis* (Geronticus calvus) *occurs within the proposed Impendle Dam basin;*
     - *A population of fire lilies* (Cyrtanthus *species) occurs within the proposed Impendle Dam basin; and*
     - *Millipedes of the genus* Sphaerotherium*, a threatened genus and of especial concern in the KwaZulu-Natal area, were encountered close to the existing Baynesfield Dam.*

- *Biodiversity: Consideration of impacts on the riverine and aquatic ecosystems:*

  a) *Potentially a number of sensitive fish species (IUCN classification and species of local importance) are expected to occur in the rivers within the proposed Impendle and Smithfield Dam basins – the concern relates to (i) direct modification of the habitat (i.e. flow regime, sedimentation, water quality), (ii) limitation of the movement of catadromous species to/from the sea, and (iii) the potential for the spread of invader species with a direct impact on the indigenous species.*

  b) *Potential loss of specific water features (e.g. cascades, waterfalls, rapids) and the associated ecological niches, especially on the eastern side of the proposed Impendle Dam basin.*

  c) *Known high level of invasive plant species in the uMlaza River catchment area (i.e. Baynesfield Dam area), especially within the water channel area downstream of the existing dam.*

  d) *Loss of riverine ecosystems with potential cumulative impacts to the wider area.*

- *Changes to water quality and hydrology combined:*

  a) *Water quality within the newly formed dams – including issues such as sedimentation of the dams.*

  b) *The aquatic health of the uMkhomazi River and its tributaries both up- and downstream of the proposed Smithfield and Impendle dams, and the Baynesfield Dam or new balancing dam on the uMlaza river.*

  c) *Limnological aspects (e.g. contamination by organic and inorganic substances).*

- *Socio-economic issues – to both the immediate communities and the wider population of KwaZulu Natal:*

  a) *Limited human settlements are found within the proposed Smithfield and Impendle Dam basins. In addition, health and safety risks during construction and operation of the scheme are of concern, which include: (i) spreading of HIV/AIDS, (ii) injury due to construction related activities (e.g. the dam walls and related infrastructure, new access roads, construction traffic, borrow-pits, inundation), and (iii) potential water related safety hazards.*

b) *Changes in dynamics of income patterns of local communities: (i) loss of income due to inundation of agricultural lands (i.e. crop and grazing), (ii) inundation of medicinal plant habitats, (iii) employment provision from short-term (i.e. construction of the dams and associated infrastructure), to long-term (i.e. limited number of permanent / regular contract positions over the scheme's lifespan; more significant spin-off occupations such as tourism and aquaculture), and (iv) "knock-on" job losses and/or creation. Linked to this is the opportunity for training and skills development over a broad area considering the size of the scheme and this will be a big advantage to the wider community.*

c) *Consideration of wider issues such as inter-community tensions, connectivity between different communities, as well as the possible triggering of land claims.*

d) *Changes to the demographics of the greater area with the influx of job-seekers and workers into the area.*

Additional issues that could be considered to be of significance include:

- *The possible occurrence of, at this time, unknown heritage resources and graves.*
- *The exact quantification of the number of people to be displaced.*
- *The environmental impacts of general construction activities (e.g. increased traffic, noise and dust generation).*
- *Inclusion of the consideration of ancillary items such as hydro-power generation at the outlet of the tunnel and linked to each of the proposed dams.*
- *Consideration of alternatives to optimise the size of the dams. This is a factor that will be considered in detail in the EIA process based on the outcome of the specialist / technical studies undertaken.*
- *And finally, the process specific consideration that the Environmental Authorisation may be appealed by the interested and affected parties even after the EIA process is carried out.*

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AIS	Alien Invasive Species
ARC	Agricultural Research Council
BA	Basic Assessment
BAR	Basic Assessment Report
BKS	BKS (Pty) Ltd
CAA	Civil Aviation Authority
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CMA	Catchment Management Agency
DAC	Department of Arts and Culture
DAFF	Department of Agriculture, Forests and Fisheries
DD	Data Deficient
DEA	Department of Environmental Affairs
dEMPr	Draft Environmental Management Programme
DFA	Development Facilitation Act (Act 65 of 1995)
DM	District Municipality
DME	Department of Mineral and Energy
DMR	Department of Mineral Resources
D:NWRP	Directorate: National Water Resource Planning
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWAF&UM	Department of Water Affairs and Forestry and Umgeni Water
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (Act 73 of 1989)
EC	Electrical conductivity
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
ESI	Environmental Screening Investigation
ESR	Environmental Screening Report
FSL	Full Supply Level
GHS	Globally Harmonized System
GNR	Government Notice Regulations
ha	Hectares
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
ILM	Impendle Local Municipality

IUCN	World Conservation Union
IWUL	Integrated Water Use Licence
IMP	Infrastructure Master Plan
KZN	KwaZulu-Natal
LC	Poorly adapted cultivation
LG	Light grazing
LM	Local Municipality
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MC	Moderately well adapted cultivation
MDM	uMgungundlovu District Municipality
MG	Moderate grazing
MHI	Major Hazardous Installation
MM	Metropolitan Municipality
MMTS	Mooi-Mgeni Transfer Scheme
MMTS-2	Mooi-Mgeni Transfer Scheme Phase 2
MPRD	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
MoU	Memorandum of Understanding
NE	Not Evaluated
NEMA	National Environmental Management Act (Act 107 of 1998);
NEM: BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act (Act 57 of 2003)
NEM: WA	National Environmental Management: Waste Act (Act 59 of 2008)
NFEPA	National Freshwater Environmental Protection Areas
NHRA	Natural Heritage Resources Act (Act 29 of 1999)
NHRD	National Heritage Resources Development Act (Act 25 of 1999)
NPAES	National Protected Area Expansion Strategy
NT	Near Threatened
NWA	National Water Act (Act 36 of 1998)
OHS	Occupational, Health and Safety
PMC	Project Management Committee
PPP	Public Participation Process
PSC	Project Steering Committee
PSP	Professional Service Provider
PSS	Pump Storage Scheme
RSA	Republic of South Africa
SAHRA	South African Heritage Resource Agency
SASS	South African Scoring System
SDF	Spatial Development Framework
SDM	Sisonke District Municipality
S&EIR	Scoping & Environmental Impact Report
SIA	Social Impact Assessment
SSA	Sub-Saharan Africa
STI	Sexually Transmitted Infections

SW	Sex Workers
TDS	Total Dissolved Solids
UIB	Umlaas Irrigation Board
uMWP	uMkhomazi Water Project
uMWP-1	uMkhomazi Water Project Phase 1
uMWP-2	uMkhomazi Water Project Phase 2
UW	Umgeni Water
VIC	Very intensive, well adapted cultivation
W	Wildlife
WC	Water Conservation
WCDM	Water Conservation Demand Management
WMA	Water Management Area
WTP	Water Treatment Plant
WULA	Water Use Licence Application

1. INTRODUCTION

The Department of Water Affairs appointed **BKS (Pty) Ltd** in association with three sub-consultants **Africa Geo-Environmental Services, MM&A and Urban-Econ** with effect from 1 December 2011 to undertake the **uMkhomazi Water Project Phase 1: Module 1: Technical Feasibility Study Raw Water** study.

On 1 November 2012, BKS (Pty) Ltd was acquired by **AECOM Technology Corporation**. As a result of the change in name and ownership of the company during the study period, all the final study reports will be published under the AECOM name.

*In 2010, the Department of Arts and Culture published a list of name changes in the Government Gazette (GG No 33584, 1 October 2010). In this list, the Mkomazi River's name was changed to the **uMkhomazi River**. The published spelling will thus be used throughout this Technical Feasibility Study.*

1.1. SCOPE OF THIS REPORT

BKS has been appointed by the DWA to conduct an ***Environmental Screening Report (ESR)*** for the ***uMkhomazi Water Project Phase 1: Module 1: Technical Feasibility Study: Raw Water***. The BKS Study Team, and the scope of works to carry out an environmental screening, forms part of a greater multi-disciplinary team to conduct the overall ***uMkhomazi Water Project (uMWP)***.

The aim of the uMkhomazi ESR is to:

- Update the information in the pre-feasibility study and carry out a first order due diligence assessment of the project to identify any potential fatal flaws;
- Provide the BKS Study Team with the background information on the project to allow the Study Team to assist the Department of Water Affairs (DWA) in formulating the scope of work for the Environmental Impact Assessment (EIA) study.

This ***ESR*** is the deliverable for ***Task 2*** of the ***Feasibility Study: Raw Water Study for the uMkhomazi Water Project***. The report deals with the investigation

of potential environmental implications and the adoption of a framework within which aspects arising from or influencing the project are considered.

The purpose of the ESR is to identify, using readily available information, potential environmental (biophysical, socio-economic and enviro-legal) issues of concern. The ESR is not an EIA and therefore, does not quantify any environmental issues. The ESR is also not required by current legislation, but serves as a valuable tool to identify issues, which could influence the outcome of the project.

The ESR should serve as input for the EIA Regulation process. Although the screening has been done for both the Impendle and Smithfield Dams, the EIA will only focus on the Phase 1 scheme for Smithfield.

1.1.1 Approach

This ESR report documents the results of an ***Environmental Screening Investigation*** and has been compiled to consider the following factors:

- Biophysical
  - Climate
  - Geology
  - Soil (erosion index)
  - Topography (inside and outside of the proposed dam basins)
  - Terrestrial ecology (including fauna and flora)
  - Biodiversity “hot spots”
  - Riverine ecology
  - Water quality
  - Hydrology
- Social
  - Displacement of people
  - Influx of people into area (modification of demographics)
  - Heritage and heritage landscapes
  - Health and Safety (including HIV / AIDS)
  - Access routes (accessibility to site)
  - Visual (deterrent in ecologically scenic environment)
  - Infrastructural development (water, electricity, roads etc.)

- Economic
  - Loss of local income due to project
  - Potential mining or quarrying
  - Agricultural potential loss (soil)
  - Generation of employment by project
- Enviro-Legal

The screening assessment was undertaken using a rating approach. The following rating system was used, with elaboration on certain items provided for clarification purposes:

- Positive Impact (rated at five (5) points)
- Favourable (rated at four (4) points)
- Uncertain (rated at three (3) points)
- Less favourable (rated at two (2) points)
- Fatal flaw (rated at one (1) point)

For further detail on the rating approach, please refer to **Section 4** of this document.

2. DESCRIPTION OF PROJECT

2.1 PROJECT BACKGROUND

The current water resources of the Mgeni System are insufficient to meet the long-term water demands of the system. The Mgeni System is the main water source that supplies the eThekwini Municipality, uMgungundlovu District Municipality and Msunduzi Local Municipality, the economic powerhouse of the KwaZulu-Natal Province that supplies domestic and industrial water to about five million people and industries.

The Mgeni System comprises the Midmar, Albert Falls, Nagle and Inanda Dams in KwaZulu-Natal, a water transfer scheme from the Mooi River and the newly constructed Spring Grove Dam. The current system (i.e. Midmar, Albert Falls, Nagel and Inanda Dams and the MMTS-1) has a stochastic yield of 334 million m³/annum, as measured at Inanda Dam at a 99% level assurance of supply. The short-term augmentation measure, Phase 2 of the Mooi-Mgeni Transfer Scheme (MMTS-2), currently being implemented with the construction of Spring Grove Dam, will increase water supply from the Mgeni System by 60 million m³/annum. However, this will not be sufficient to meet the long-term requirements of the system.

Pre-feasibility investigations indicated that ***Phase 1 of the uMkhomazi Water Project (uMWP 1)***, which entails the transfer of water from the undeveloped uMkhomazi River to the existing Mgeni System, is the scheme most likely to fulfil this requirement. The uMkhomazi River is the third-largest river in KwaZulu-Natal in terms of mean annual runoff (MAR).

Eight alternative schemes were initially identified as possible alternatives, and the Impendle and Smithfield scheme configurations have emerged as suitable for further investigation. The pre-feasibility investigation, concluded in 1998, recommended that the Smithfield Scheme be taken to a detailed feasibility-level investigation as its transfer conveyances would be independent of the existing Mgeni System, thus reducing the risk of limited or non-supply to eThekwini and some areas of Pietermaritzburg, and providing a back-up to the Mgeni System.

The *Mkomazi-Mgeni Transfer Pre-feasibility Study* concluded that the first phase of the uMWP would comprise a new dam at Smithfield on the uMkhomazi River near Richmond, a multi-level intake tower and pump station, a water transfer

pipeline / tunnel to a balancing dam at Baynesfield Dam or a similar in-stream dam, a water treatment works at Baynesfield in the Mlazi River valley, and, a gravity pipeline to the Umgeni bulk distribution reservoir system, below the reservoir at Umlaas Road. From here, water will be distributed under gravity to the eThekwini Metropolitan Municipality area (i.e. Durban) and possibly the low-lying areas of Pietermaritzburg. Phase 2 of the uMWP, which will only be implemented when needed, would most likely comprise the construction of a large dam at Impendle, further upstream on the uMkhomazi River, to release water to the downstream Smithfield Dam. Together, these developments have been identified as having a 99% assured stochastic yield of about 388 million m^3/annum.

The DWA aims to have the entire uMWP scheme implemented by 2022.

2.2 Governance and Organisation of the Study

As the main objective of the project is to augment water supply to the Mgeni System, an area that is managed by Umgeni Water with users mainly from the eThekwini Metropolitan Municipality, the study will require the participation from all three spheres of government.

Liaison with the DWA (i.e. the Client), key stakeholders (e.g. Umgeni Water, Municipalities (Metropolitan, Regional and Local)), Interested and Affected Parties (I&APs), and, team members will be managed through various committees, as shown in the diagram below.

The ***Project Steering Committee's*** (PSC) main function is to assist the DWA with strategic matters and to coordinate the contributions of other authorities. This committee oversees the total project, including the Raw Water, Treated Water and EIA project modules.

The ***Project Management Committee*** (PMC) is responsible for governing and driving the feasibility study, comprising the DWA Project Manager, Umgeni Water, the PSP Study Leader (supported by technical specialists) and representatives of any DWA Directorate wishing to participate at any stage of the project. The eThekwini Metropolitan Municipality is an *ad hoc* member, to ensure that the local considerations and situation of the I&APs are also accounted for at the appropriate level.

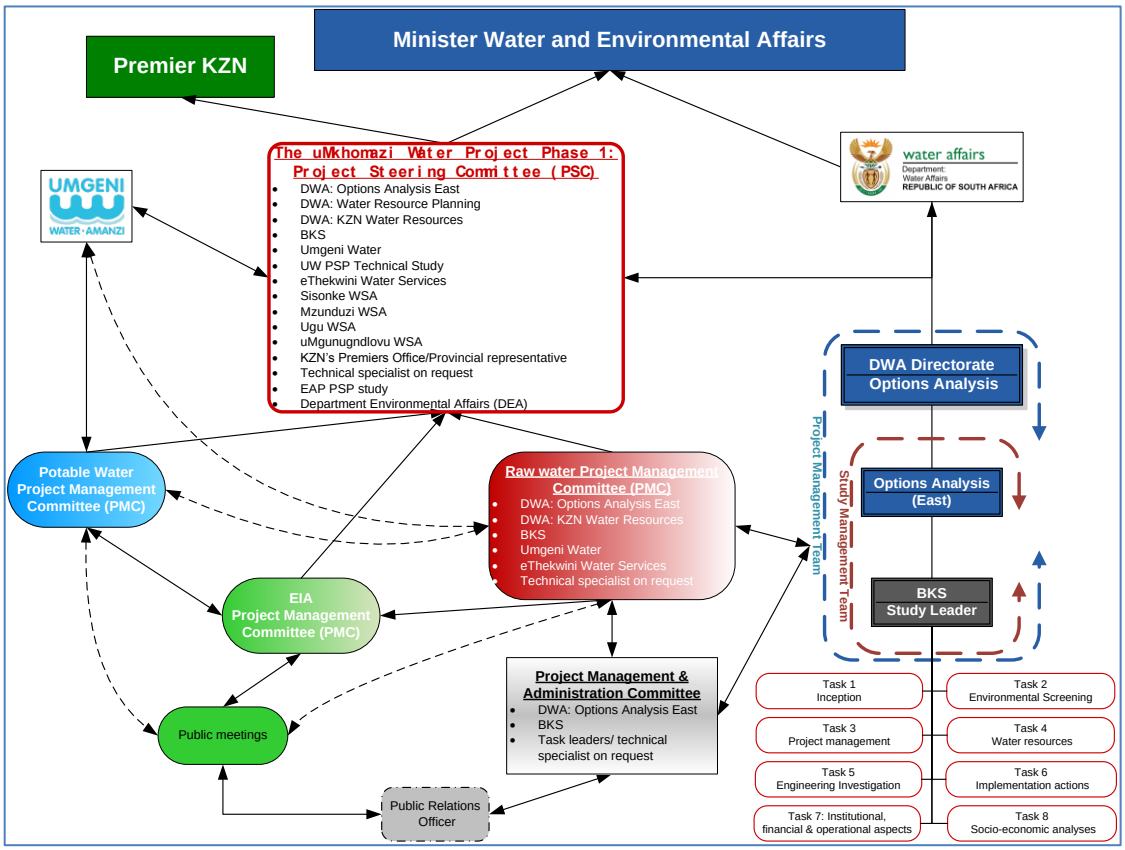

Figure 2-1: uMWP governance structure

3. OVERVIEW OF THE AFFECTED ENVIRONMENT

The uMkhomazi River catchment is in the KwaZulu-Natal Province and extends from the mountainous Drakensberg region to the Indian Ocean. The entire river catchment is 4 394 km^2 in extent. The study area falls mainly within the Sisonke and uMgungundlovu District Municipalities. Small sections of the lower regions of the river catchment are within the eThekwini Municipality and the Ugu District Municipality.

The study area, as indicated in **Map A** of **Appendix A**, comprises the upper and middle regions of the uMkhomazi River Catchment, the upper portions of the uMlaza River Catchment, and, the lower regions of the uMngeni River Catchment area.

3.1 SUB-REGIONAL CONTEXT

3.1.1 Location of Proposed Impendle Dam

The proposed Impendle Dam is located 1 km downstream of the confluence of the uMkhomazi and the Mkhomazane Rivers. The Mkhomazane River is a tributary of the uMkhomazi River. The site of the Impendle Dam is located within the Impendle Local Municipality (ILM), which is part of the greater uMgungundlovu District Municipality (MDM).

The dam site is approximately 15 km west of the town of Impendle.

3.1.2 Location of Proposed Smithfield Dam

The proposed Smithfield Dam is located 2 km upstream from the confluence of the uMkhomazi and Mfeneni Rivers, along the middle reaches of the uMkhomazi River, midway between Lundy's Hill Bridge and Deepdale. The Smithfield Dam is located within the Ingwe Local Municipality (Ingwe LM), which is part of the Sisonke District Municipalities (SDM).

3.1.3 Location of Baynesfield Dam (possible balancing dam alternative)

The existing Baynesfield Dam is located within the Richmond Local Municipality (RLM) and covers an approximate area of 52 ha (hectares), with the uMlaza River running through it in a north easterly direction.

The area immediately around the Baynesfield Dam forms part of the Baynesfield Estate, which is mainly composed of market-gardening crops. Although Baynesfield includes a post office and a small local centre, this is linked to the Estate rather than to a formal community area.

Both the Hopewell and Thornville communities are approximately 10 km from the Baynesfield Dam and are the closest formal townships to it.

3.1.4 Location of the Transfer Tunnel

The proposed transfer tunnel runs for approximately 34 km from the Smithfield Dam to the Baynesfield Dam which may serve as a site for the balancing dam otherwise the balancing dam will be situated nearby. The tunnel traverses the Ingwe and Richmond LMs.

The tunnel may have a number of access / maintenance points (“adits”) along its alignment and the positioning of these would need to be considered in association with the two LMs.

3.2 TOPOGRAPHY

The uMkhomazi River catchment originates within the Drakensberg, with the upper reaches of the river catchment at an altitude of 2 500 m. The remainder of the river catchment comprises incised river valleys and mountains (*eWISA, 2004*). The rugged landscape in the study area is largely a result of river and/or water erosion. It should be noted that the overall gradient of the rivers in KwaZulu-Natal is generally steep and this increases the erosion potential of the rivers. The rivers play an important economic role in sustaining agriculture and industry in the greater area (*eWISA, 2004*).

3.3 CLIMATE

The Mean Annual Precipitation (MAP) of the uMkhomazi River catchment can reach a maximum of 1 500 mm in the upper reaches of the Drakensberg. The central regions are generally the drier with an average MAP of 1 200 mm. In general, the project area has a moderate climate, with summer rainfall characterised by afternoon thunder showers (*DWAF, 2004*).

Mild to warm temperatures are experienced during the summer, whilst winters are characterised as being cold with frost occurring regularly.

Rainfall occurs predominantly during summer, but isolated winter rainfalls may occur. The winters are generally dry with cold nights and warm days.

3.4 GEOLOGY

The geology of the uMkhomazi River catchment is mainly sandstone and shale with intrusive Karoo Dolerites. The river traverses a whole succession of geological formations in its catchment ranging from old granite to Stormberg series with some sediments overlying bedrock in certain places (*DWAF, 2004*).

The characteristics of the geology for areas related to each component of the project will need to be quantified in detail to determine any potential risks. This forms part of the project and will be linked into the EIA process.

3.5 TERRESTRIAL ECOSYSTEM

The study area is situated within the Maputaland-Pondoland Region, which is a floristic unit that incorporates a number of smaller centres of endemism. This region has a very high and complex floristic diversity (*van Wyk, 2001*). The dam basin does not fall within nature reserves or protected areas, however, it should be noted that the Impendle Nature Reserve is very close to the proposed Impendle Dam site. Any impacts on a Nature Reserve require a permit in terms of the National Environmental Management: Protected Areas Act (*Act 57 of 2003*). Vegetation Types and Sensitive areas are illustrated in **Maps B** and **C** respectively of **Appendix A**.

3.5.1 Impendle Dam area

The Impendle Dam site is situated within Southern KwaZulu-Natal Moist Grassland veld type (*Mucina & Rutherford, 2006*). This veld type is characterised by gently sloping valley bottoms of tall mixed grasslands. It is a vulnerable veld type with a conservation target of 23% of the total land-area available, of which only 4% is statutorily conserved. **Figure 3-1** presents a view of a valley section within the basin of the proposed Impendle Dam.

Figure 3-1: Proposed Impendle Dam basin area

A new road is currently being constructed close to the proposed location of the Impendle Dam with road building material being sourced from borrow pits within the river catchment. Should these construction impacts not be rehabilitated sufficiently, it could cause erosion and sedimentation which may have long-term impacts on the ecosystems of the wider area and the proposed dam.

Rural settlements and forestry have had additional impacts on the ecosystems in the river catchment of the proposed Impendle Dam, although these are more local impacts in terms of biodiversity of the specific area.

Alien species associated with forestry, such as *Acacia mearnsii*, *A. dealbata* and *A. longifolia* (wattle) and various *Eucalyptus* sp. (bluegum) are found near to the proposed Impendle Dam. However, these mainly occur in disturbed areas such as road sides and spoil sites (**Figure 3-1**). Previous and ongoing agricultural activities were also observed within the proposed Impendle Dam basin, with related alien plant invasion related thereto. It is noted that a land owner must control alien invasion in terms of the Conservation of Agricultural Resources Act (*Act 43 of 1983, CARA*).

Despite the above-mentioned land uses, the terrestrial ecosystem within the proposed Impendle Dam (**Figure 3-2**) basin is still deemed to be a sensitive

ecosystem in a good to near-natural condition supporting a high biodiversity. This includes a range of wetlands which are associated with the edges of the uMkhomazi River and its tributaries.

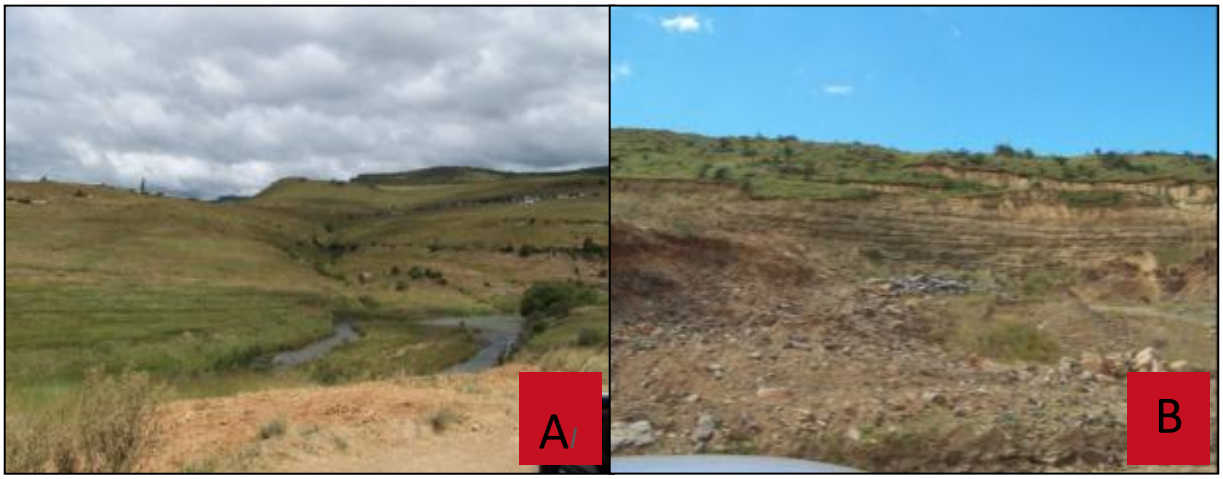

Figure 3-2: Impendle Dam Site (A) Terrestrial grassland vegetation; (B) Borrow pits in the river catchment

The Natal Museum has done a detailed survey of the Impendle Dam and has recorded a nesting site of the Bald Ibis (*Geronticus calvus*), within the proposed dam basin (**Map C**). The nesting site is just below the confluence of the uMkhomazi and Nzinga Rivers. The Bald Ibis is classified as vulnerable in terms of the IUCN Red List, because its numbers are declining due to a loss of habitat. The development of the proposed dam thus poses a significant risk to the survival of the Bald Ibis in the river catchment.

Also within the basin of the Impendle Dam is a population of *Cyrtanthus* species (fire lily) that will be submerged if the proposed Impendle Dam is constructed (**Map B**). This population must be investigated, as some species in this genus are on the Red Data List (*Maggs et al., 1982*). Red Data species are protected in terms of the National Environmental Management: Biodiversity Act (*Act 10 of 2004, NEM: BA*).

3.5.2 Smithfield Dam area

The proposed Smithfield Dam is situated within Southern KwaZulu-Natal Moist Grassland veld type (*Mucina & Rutherford, 2006*). This veld type is characterised by gently sloping valley bottoms of tall mixed grasslands. The veld type has a conservation status of 23% (i.e. only 23% of the original area covered by this vegetation type remains natural), of which only 4% is statutorily conserved.

Figure 3-3 presents a view of the valley in which the proposed Smithfield Dam *will be constructed.*

Figure 3-3: Valley in the vicinity of the proposed Smithfield Dam (Source: Google Earth – linked photographs)

Agriculture is the predominant current and past land use in the vicinity of the proposed Smithfield Dam. Ecological impacts in this area are therefore related to agriculture. Soil and gully erosion is found within the riparian zone and could be a risk in terms of sedimentation of the proposed dam.

Alien species associated with forestry, such as *Acacia* (wattle) and *Eucalyptus* species (bluegum) are found near the proposed Smithfield Dam (**Figure 3-4**). It is noted that a land owner must control alien invasion in terms of CARA.

Despite some impacts from human activities (i.e. cultivation, cattle grazing, etc.), the proposed Smithfield Dam basin is in a good ecological condition. The vegetation is mainly grasslands with wetlands associated with the stream channels. Wetlands are specific ecosystems that are protected by CARA, the National Water Act (*Act 36 of 1998, NWA*) and the National Environmental Management Act (*Act 107 of 1998, NEMA*), and thus are deemed to be of crucial importance in all future investigations.

Figure 3-4: Terrestrial vegetation within the proposed Smithfield Dam basin

3.5.3 Baynesfield Dam area

The existing Baynesfield Dam (**Figure 3-5**) is located in an area that is transitional between the Indian Ocean Coastal Belt and the Savannah biomes. The vegetation type has been classified as Ngongoni Veld, which is considered to be vulnerable (*Mucina & Rutherford, 2006*).

Figure 3-5: Representative section of the Baynesfield Dam catchment

Baynesfield Dam is in a relatively small catchment, which is intensively cultivated (**Figure 3-6**), and for which the dam supplies the required irrigation water. There is also a piggery, forestry (*Pinus* species) and extensive market-gardening fields within the catchment.

Due to these agricultural activities, alien invasive species such as thorn apples (*Datura stramonium*), *Lantana camara* and Bugweed (*Solanum mauritianum*) are

found growing in open spaces and along the road sides. It is again noted that all land owners must control alien invasion in terms of CARA.

Millipedes from the genus *Sphaerotherium* were seen adjacent to the Baynesfield Dam (**Figure 3-6 (C)**). It is however noted that none of the species in this genus have been classified as threatened at this time.

The terrestrial ecosystems in this river catchment are generally disturbed and less sensitive than others within the greater study area.

Figure 3-6: Baynesfield: (A) afforestation; (B) Baynesfield Dam and cultivated land; (C) Sphaerotherium sp. millipede

3.5.4 Tunnel area

The general area under which the tunnel will be constructed is characterised by extensive grasslands and areas of commercial plantations (**Figure 3-7**). The grasslands are noted to be in a good ecological condition.

Any aquifers encountered along the tunnel route that could increase the risk of dewatering while tunnelling must be investigated during the EIA as these could have an impact on the vegetation above the alignment through changes to the groundwater flow patterns. Also included must be the identification of any present faults or dykes. Potential disturbances impacting on any agricultural groundwater usage or dam stability located along the tunnel route must be addressed as well during the EIA.

Figure 3-7: Terrestrial vegetation of area above tunnel route

3.6 RIVERINE ECOSYSTEMS

Fish species recorded in the uMkhomazi River Catchment were obtained from **Ezemvelo KZN Wildlife** in March 2012. These species are listed in **Table 3-1** below with a Red Data Categorisation in terms of the International Union for Conservation of Nature and Natural Resources (*IUCN Red Listing*). It is noted that threatened and endangered species are protected in terms of NEM: BA.

Of special concern for the proposed dams are potentially sensitive fish species recorded in the vicinity of the proposed Smithfield and Impendle Dam basins (**Appendix A: Map C**). These include *Labeobarbus natalensis*, classified as "Least Concern", which has been recorded at (a) the proposed Smithfield Dam, (b) between the proposed Smithfield and Impendle Dams, and (c) in the areas between the proposed Smithfield and existing Baynesfield Dams. Also recorded between the proposed Smithfield and Impendle Dams were *Anguilla mossambica*, which is not evaluated by IUCN but still considered to be of local importance, along with the alien invasive species *Micropterus salmoides. Barbus anoplus* and *Amphillius natalensis,* both classified as "Least Concern", were recorded at both the existing Baynesfield Dam and the proposed Smithfield Dam area. Of specific concern with fish species is the presence of species such as *Myxus capensis* (freshwater mullet) which is catadromous, meaning that they live in fresh water but breed in the sea. Catadromous species are particularly sensitive to the impoundment of rivers. However, none of these species were recorded close to the proposed dam basins, with the only representatives of these species recorded in the lower reaches of the river catchment.

Although not directly physically impacted on (e.g. due to loss of habitat) by the presence of the proposed dams and linking infrastructure, dams may indirectly modify the characteristics of the watercourses downstream of the dams as a whole (including estuaries, and features such as gorges, waterfalls and cascades). As noted in **Table 3-1** below, the majority of sensitive fish species within the affected catchments occur within the estuaries, thus significant changes to the flow regime, sedimentation levels, or for specific water quality characteristics will have a direct impact on these already compromised fish species. The specialist studies with respect to these issues should be linked into the EIA process, and should inform the detailed design of the dams.

The locality of the Red Fish Species is illustrated on **Map C** of **Appendix A**.

Table 3-1: Fish species in the uMkhomazi River Catchment (Karssing, 2012)

Taxon name	English name	Locality
Endangered (En)		
Pseudobarbus quathlambae	Maloti minnow	Sani Top, presence in uMkhomazi not confirmed
Data Deficient (DD)		
Platycephalus indicus	Bartail flathead	uMkhomazi Estuary
Near Threatened (NT)		
Favonigobius reichei	Tropical sand goby	uMkhomazi estuary
Oreochromis mossambicus	Mozambique tilapia	uMkhomazi River and Estuary, Lufafa River, Umhlanga Lagoon Nature Reserve
Taenioides jacksoni	Bearded eel goby	uMkhomazi estuary
Least Concerned (LC)		
Ambassis ambassis	Longspine glassy	uMkhomazi Estuary
Ambassis gymnocephalus	Bald glassy	Umhlanga Lagoon Nature Reserve
Ambassis productus	Longspine glassy	uMkhomazi Estuary
Amphilius natalensis	Natal mountain catfish	Gqunu, KuZinkwana, uMkhomazi, Elands and NZinga Rivers
Anguilla bengalensis labiata	African mottled eel	Mzinhlanga river
Barbus anoplus	Chubbyhead barb	Lurane, KuZinkwana, Elands, uMkhomazana, Nzinga Rivers
Barbus viviparus	Bowstripe barb	uMkhomazi River
Caranx sexfasciatus	Bigeye kingfish	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary

Taxon name	English name	Locality
Croilia mossambica	Burrowing goby	uMkhomazi estuary
Eleotris fusca	Dusky sleeper	uMkhomazi estuary
Glossogobius callidus	River goby	uMkhomazi Estuary
Hippichthys heptagonus	Belly pipefish	uMkhomazi Estuary
Labeobarbus natalensis	KwaZulu-Natal yellowfish	Good Hope Dam, Nhlavini, Xobho, uMkhomazi, Lufafa, Gqunu, Masikelenjane, Mzinhlanga, KuZinkwana Rivers
Mugil cephalus	Flathead mullet	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Myxus capensis	Freshwater mullet	uMkhomazi River and Estuary
Redigobius dewaali	Checked goby	uMkhomazi Estuary
Not Evaluated (NE)		
Acanthopagrus berda	Riverbream	uMkhomazi estuary
Ambassis natalensis	Slender glassy	uMkhomazi Estuary
Amblyrhynchotes honckenii	Evileye blaasop	uMkhomazi Estuary
Anguilla mossambica	Longfin eel	uMkhomazi, Nhlavini, Lufafa, Gqunu, Xobho and Mzinhlanga Rivers and Good Hope Dam
Argyrosomus hololepidotus	Southern meagre	uMkhomazi Estuary
Arothron immaculatus	Blackedged blaasop; Blackedged puffer	uMkhomazi Estuary
Awaous aeneofuscus	Freshwater goby	uMkhomazi River
Bothus pantherinus	Leopard flounder	uMkhomazi Estuary
Caffrogobius natalensis	Baldy	uMkhomazi Estuary
Clarias gariepinus	Sharptooth catfish	Lufafa, Nhlavini, Mzinhlanga Rivers and uMkhomazi Estuary
Crenimugil crenilabis	Fringelip mullet	Umhlanga Lagoon Nature Reserve
Drepane punctata	Spotted sicklefish	uMkhomazi Estuary
Gerres filamentosus	Longspine pursemouth	uMkhomazi Estuary
Gerres methueni	Evenfin pursemouth	KwaZulu-Natal (RSA)
Gilchristella aestuaria	Estuarine round herring	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Glossogobius giuris	Tank goby	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Hypseleotris cyprinoides	Golden sleeper	uMkhomazi River SAICCOR weir

Taxon name	English name	Locality
Leiognathus equulus	Slimy	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Liza alata	Diamond mullet	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Liza dumerilii	Groovy mullet	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Liza macrolepis	Large scale mullet	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Lobotes surinamensis	Tripletail	uMkhomazi Estuary
Lutjanus argentimaculatus	River snapper	KwaZulu-Natal (RSA)
Lutjanus fulviflamma	Dory snapper	KwaZulu-Natal (RSA)
Megalops cyprinoides	Oxeye tarpon	KwaZulu-Natal (RSA)
Monodactylus falciformis	Oval moony	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Oligolepis acutipennis	Sharptail goby	uMkhomazi Estuary
Periophthalmus sobrinus	Bigfin mudhopper	uMkhomazi estuary
Pomadasys commersonnii	Smallspotted grunter	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Pomadasys hasta		uMkhomazi Estuary
Pomadasys maculatus	Saddle grunt	uMkhomazi Estuary
Pomadasys multimaculatum	Cock grunter	uMkhomazi Estuary
Psammogobius knysnaensis	Speckled sandgoby	uMkhomazi Estuary
Rhabdosargus holubi	Cape stumpnose	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Rhabdosargus sarba	Natal stumpnose	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Scomberoides commersonianus	Talang queenfish	uMkhomazi Estuary
Secutor insidiator	Slender soapy	uMkhomazi Estuary
Solea bleekeri	Blackhand sole	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Stolephorus commersonii	Commerson's anchory	uMkhomazi Estuary
Terapon jarbua	Thornfish	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary
Valamugil buchanani	Bluetail mullet	uMkhomazi Estuary
Valamugil cunnesius	Longarm mullet	Umhlanga Lagoon Nature Reserve and uMkhomazi Estuary

Taxon name	English name	Locality
Alien Invasive Species (AIS)		
Cyprinus carpio	Carp	Home Farm Dam
Lepomis macrochirus	Bluegill sunfish	Xobho and Ngudwini Rivers
Micropterus salmoides		Good Hope Dam, Ngudwini and Mzinhlanga Rivers
Salmo trutta	Brown trout	uMkhomazi River, Lotheni Nature Reserve
No Category		
Anguilla sp.		uMkhomazi River Mouth
Barbus natalensis	Scaly	uMkhomazi Estuary
Gerres acinaces	Smallscale pursemouth	uMkhomazi Estuary
Glossogobius sp.		uMkhomazi estuary
Johnius belangerii	Belanger's croaker	uMkhomazi Estuary

**AIS: Alien Invasive Species; DD: Data Deficient; En: Endangered; NE: Not Evaluated; NT: Near Threatened*

3.6.1 Impendle Dam area

The riverine ecosystem (**Figure 3-8**) at the proposed Impendle Dam basin is deemed to be in an excellent condition with a high diversity of plant and animal species.

A tributary forms a cascade as it enters the uMkhomazi River (**Map C**), which will be impounded by the proposed Impendle Dam (**Figure 3-8**). The aquatic life upstream and downstream of the waterfall is likely to differ, which increases the current diversity and sensitivity of the river system. More cascades could occur in the area to fall within the rest of the proposed Impendle Dam basin, because of the sudden drop in topography on the eastern side of the uMkhomazi River. Such cascades could however not be confirmed during the site visit, due to the inaccessibility of the rest of the area.

The potential development of the river reach below the waterfall may pose a risk of impacting on the aquatic diversity of the area, which must be investigated during further studies. The presence of any other cascades must also be determined and mapped during future investigations. The detailed design would need to take into account all the specialist studies to determine where such cascades are located relative to the dam basin.

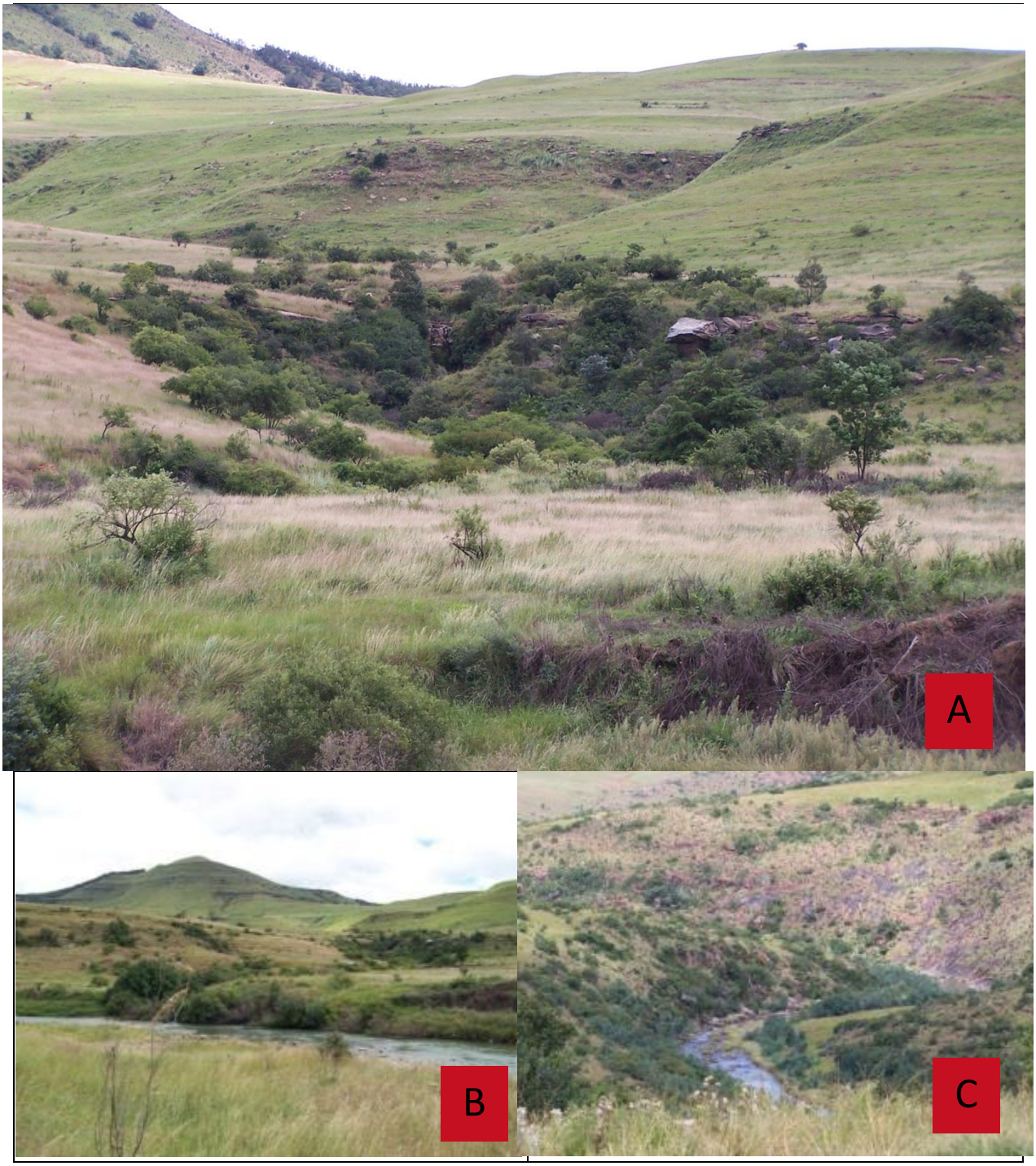

Figure 3-8: (A) Example of a cascade in the Impendle Dam basin; (B and C) Riverine ecosystems at Impendle Dam basin

3.6.2 Smithfield Dam area

The riverine ecosystem of the proposed Smithfield Dam is similar to that of the Impendle Dam in that it is also in a good to natural condition. There are few land uses between the proposed Impendle and Smithfield Dam basins that could pose a significant risk to either the water or aquatic ecosystem quality. There is, however, some erosion in the riparian zone at the proposed Smithfield Dam basin that could impact on the water quality.

3.6.3 Baynesfield Dam area

Alien species associated with forestry, such as *Acacia* species (wattle) and *Eucalyptus* species (bluegum), as well as other alien species such as *Arundo donax* (Spanish reed), are found within the uMlaza River channel (**Figure 3-8**). The riparian ecosystems in this river catchment are generally disturbed and less sensitive.

Figure 3-9: Alien species in the uMlaza River

3.7 WATER QUALITY

Water quality data was obtained from the DWA. Water quality monitoring stations occurring within the greater study area are illustrated in **Map D** of **Appendix A**.

A monitoring station (*MS 102619*) is located just upstream of the proposed Smithfield Dam where frequent sampling is done (**Map D**).

No data was available for bacteriological, solids related (i.e. turbidity, suspended solids, total phosphorus), metals or organic concentrations. The monitoring station at Baynesfield Dam does not have adequate data to provide a detailed analysis based on data from MS 102619.

Table 3-2 indicates the water quality statistics, including minimum, maximum, 5th percentile, median, 95th percentile, and mean values for Calcium, Chloride, Total Dissolved Solids (TDS), Electrical conductivity (EC), Potassium, Magnesium, Sodium, Ammonia, pH, Phosphates, and Sulphates for the information available at this time.

The statistics are compared to the DWA domestic standards (*DWAF, 1996*).

Table 3-2: Water quality statistics at monitoring station 102619 upstream of the proposed Smithfield Dam (DWA, 2012)

Parameter	Unit	Min	P5	Median	P95	Max	Mean	Ecosystem Standard	Domestic Standard
Calcium	mg/l	2.200	3.300	6.320	9.950	30.000	6.640		32
Chloride	mg/l	0.450	1.500	3.500	7.140	26.000	3.790		100
Total Dissolved Solids	mg/l	21.000	34.540	56.760	87.680	173.000	59.120		450
Electrical Conductivity	mS/m	3.000	4.400	7.300	11.010	33.200	7.570		70
Potassium	mg/l	0.058	0.150	0.570	1.720	4.660	0.730		50
Magnesium	mg/l	0.500	1.480	2.700	4.400	7.800	2.760		30
Sodium	mg/l	0.221	1.000	3.460	5.600	23.300	3.690		100
Ammonia	mg/l	0.015	0.020	0.040	0.130	0.420	0.049		1
pH		5.040	6.400	7.440	8.010	8.560	7.320		6 to 9
Phosphates	µg/l	0.003	0.003	0.014	0.072	0.248	0.022	<5 Oligotrophic; 5-25 Mesotrophic; 25-250 Eutrophic; >250 Hypertrophic	
Sulphates	mg/l	0.380	2.000	2.000	9.610	15.500	3.740		200

Key (Table 3-2):

Domestic standard

Exceed domestic standard	Within domestic standard

Ecosystem status (Phosphor)

<5µg/l Oligotrophic	5-25 µg/l Mesotrophic	25-250 µg/l Eutrophic	>250 µg/l Hypertrophic

Median values of all parameters indicate that water quality at the proposed Smithfield Dam is within acceptable limits.

There are no monitoring stations close to the proposed Impendle Dam, but the water quality at Impendle is assumed to be similar to the water quality at the proposed Smithfield Dam basin (i.e. in the area of the existing *MS 102619*), because:

- There are no major tributaries entering the uMkhomazi River between Impendle Dam and MS 102619, and,
- The land uses in the river catchment between Impendle Dam and MS 102619 are not expected to alter the water quality significantly

However, the Mfeneni River, downstream of MS 102619, enters the uMkhomazi River upstream of the proposed Smithfield Dam. Although there are no significant land uses in the Mfuneni River Catchment, the water could slightly alter the expected water quality of the Smithfield Dam as based on data from MS 102619.

3.8 HYDROLOGY

A hydrological assessment was done in 1997 by BKS for the uMkhomazi River Catchment (including Smithfield and Impendle) and the uMlaza River Catchment (including Baynesfield) to determine the amount of water available in these river catchments. The natural MAR was monitored at some places and in other places it was determined through scaling and simulations. Water users in the river catchment included urban and industrial, irrigation and afforestation. The total volume of existing farm dams in the area will need to be accounted for in the hydrological model and will be linked into the EIA process as specialist information. Dryland sugar cane, like forestation, is a streamflow reduction activity. The results of this hydrological assessment are summarised in **Table 3-3**.

Table 3-3: Summary of the hydrological analysis for the uMkhomazi River Catchment (BKS, 1997)

Incremental sub-catchment		Catchment area (km^2)	Observed incr. MAR (million m^3)	Annual average (million m^3)(1)					Natural incremental MAR	
Name				Nett irrigation supply	Nett effect of small dams	Reduction in runoff – afforestation and sugar cane	Nett urban and industrial demands	Inter-basin transfers(2)	(million m^3)	(mm)
UMKHOMAZI RIVER CATCHMENT										
U1H005	Camden	1 742	669	3.2	0.07	3.9	0	0	676	388
U1H006	Delos Estate	2 608	366	7.9	0.31	12.4	0	0.0	387	148
I-06	Impendle Dam	1 422	Natural runoff generated by scaling and simulation						568	399
I-22	Smithfield Dam	632	Natural runoff generated by scaling and simulation						163	258
I-19	Ngwadini Dam	2 243	Natural runoff generated by scaling and simulation						325	145
I-15	uMkhomazi mouth	91	Natural runoff generated by scaling and simulation						11	124
Total uMkhomazi River catchment		4 388	–						1 067	243
UMLAZA RIVER CATCHMENT										
I-21H	uMlaza	421	35	8.2	0.18	6.8	0	0	50	118

3.9 LAND USE

The main land use activities in the uMkhomazi catchment as a whole are large industry (*forestry: Sappi SAICCOR*) located at the mouth of the river catchment, irrigation and afforestation (*ILM SDF Review, 2007*) along the length of the river. Around the proposed dam basin sites and the linking tunnel, the main land use types are agriculture, forestry, and, small rural and peri-urban settlements characterised by a high level of subsistence farming (*uMgungundlovu IDP, 2001*).

The water demands from forestry are about 5% to 8% of the MAR for the present and future (2040) scenarios, while irrigation water demands are 3% (current) and 6% (future (2040)). The industrial demand from Sappi SAICCOR is at about 5% of the natural MAR. Both forestry and irrigation activities are concentrated in the middle reaches of the river catchment. Domestic and livestock demands amount for this area are noted as being less than 1% of the natural MAR and thus are deemed less significant. This will however be confirmed when the water demands are detailed for the project area.

3.9.1 Impendle Dam area

The proposed Impendle Dam basin shows a significant level of development with riparian agricultural lands along the uMkhomazi and uMkomazana Rivers. Well established cultivated arable fields are found within the vicinity of Rockley Lodge settlement and upstream of the Himeville Road bridge. Land is well maintained and is used to grow maize, beans, and lucerne, predominantly on a small scale subsistence farming format (*DWAF&UW Corporate Services Division, 1999*).

3.9.2 Smithfield Dam area

Settlements, in the form of traditional homesteads, are clustered on the mid slopes of the uMkhomazi Valley due to the availability of water from the river and arable riparian land. This arable land is used for subsistence farming in the form of food crop cultivation and livestock grazing (*DWAF & UW Corporate Services Division, 1999*).

3.9.3 Baynesfield Dam

The Baynesfield Dam was built as part of the Umlaas Irrigation Board (UIB) in the early 1980's to improve water availability in the area. The UIB does not formally distribute water as it has no canals or pipelines of its own, rather all the abstractions of water are made (a) directly from the uMlaza River, or, (b) from private dams in the case of the two main irrigators in the catchment. It is noted that agricultural operations such as the use of pesticides and fertilizers could impact on the water quality in the Baynesfield Dam (*Faysse, N., & Bumbo, J. 2004*).

A further point to note is that the Hopewell Community is dependent on the Baynesfield Dam for both drinking water and agricultural supply.

There are no industries upstream of the existing dam, however, an industrial bacon factory and piggery is located downstream of the Baynesfield Dam (*Faysse, N. & Bumbo, J. 2004*).

3.10 ECONOMIC POTENTIAL

The SDM has the smallest population of all the district municipalities in KwaZulu-Natal, with a population of approximately 304 000 people, two-thirds of which live in Ubuhlebezwe and Ingwe. According to Census 2001 (Note: the results from the 2011 census were not available for consideration, and that information which was, was not directly relevant), the vast majority of the population (81%) live in rural areas, as compared to an average of 78% in similar rural-inland districts in South Africa. In 2004 the annual per capita income in the SDM was an estimated at R9 920 compared with the R16 460 average for the 16 rural-inland districts outside of KwaZulu-Natal (*SDM IDP, 2006*).

The SDM (*IDP, 2006*) has a very high rate of unemployment, with 53% of the potential labour force being unemployed. This is slightly higher than the average unemployment rate in rural-inland district municipalities outside KwaZulu-Natal which is 51%. It is therefore estimated that 53% of the population is reliant, directly or indirectly, on income from state pensions and/or grants.

The people of the SDM have relatively poor access to basic services when compared with people living in similar rural-inland districts. Only 33% of people living in the SDM have access to piped water either on or off-site. An estimated 57% rely on candles for lighting, 74% are reliant on either paraffin or wood for cooking, and, only 22% have access to good sanitation in the form of flush or chemical toilets.

The ILM Spatial Development Framework (SDF) Review study mentions the incorporation of the World Heritage Site of the Drakensberg – Ukhahlamba Mountain Park within the ILM, which highlights the significant economic potential to the area for tourism, community-based craft business ventures, and, related micro-enterprises (*Impendle LM SDF Review, 2007*).

An abundance of water allows for a mixed agricultural economy, while the cold winters in the region indicate opportunities for a deciduous fruit industry.

3.11 AGRICULTURAL POTENTIAL

There are different approaches used to measure Agricultural Potential, including land suitability and land capability. Whereas land suitability only identifies the elements rendering a certain site as "being suitable for agriculture", land capability identifies agricultural activities that could be practiced sustainably on a certain land portion. Land capability has a distinct conservation-oriented focus as opposed to that of land suitability. Land capability thus considers factors such as the risks of erosion and land degradation, in order to determine sustainable agricultural practices for a site. For land capability assessments it is also important to consider difficulties or constraints imposed in terms of the land use due to physical land characteristics, such as climate or topography. Land capability is therefore the total suitability for use of a land portion, in an ecologically sustainable way, for an optimised combination of crops, grazing, woodland and wildlife.

Land capability can thus be seen to be an indication of the agricultural potential of an area, indicating the suitability of the land to be used for crops, grazing, woodland and wildlife, whilst still promoting ecological sustainability.

Land capability, as a measure of agricultural potential, is thus divided into classes, which is an interpretive grouping of land units with similar potentials and continuing limitations or hazards. The land capability of the study area is illustrated in **Map E** of **Appendix A.**

The Agricultural Research Council's (ARC) Institute for Soil, Climate and Water developed and implemented a workable land capability system for South Africa in 2002 on behalf of the Directorate Agricultural Land Resource Management (**Table 3-4**).

Eight land classes were determined of which Class I to Class IV represent arable land with few limitations to agricultural use. Class V to VII is suitable for grazing purposes. While Class VIII has limitations to agricultural use that cannot easily be corrected and is limited to wildlife grazing purposes only.

Table 3-4: Land capability classes (ARC, 2002)

LAND CAPABILITY CLASS	LAND USE OPTIONS	LAND CAPABILITY GROUPS
I	W, F, LG, MG, IG, LC, MC, IC, VIC	Arable land
II	W, F, LG, MG, IG, LC, MC, IC	
III	W, F, LG, MG, IG, LC, MC	
IV	W, F, LG, MG, IG, LC	
V	W, F, LG, MG	Grazing
VI	W, F, LG, MG	
VII	W, F, LG	
VIII	W	Wildlife

KEY (Table 3-4):
W – Wildlife
F – Forestry
LG – Light grazing
MG – Moderate grazing
IG – Intensive grazing
LC – Poorly adapted cultivation
MC – Moderately well adapted cultivation
IC – Intensive, well adapted cultivation

A high level assessment of the land capability on the various catchments is indicated in the following sections according to portion of the proposed scheme.

3.11.1 Impendle Dam area

The land capability in the vicinity of the proposed Impendle Dam basin falls mainly in Class IV (i.e. arable land). Class IV represents arable land with severe limitations to the type of crops that can be cultivated and requires very careful management and conservation practices. Class IV can support wildlife, afforestation and intensive grazing, but cultivation adapts poorly.

Approximately 107 ha of arable land will be lost to the construction of the Impendle Dam. This includes irrigated farm land and grazing adjacent to the uMkhomazana River, just above the junction of the uMkhomazana and the uMkomazi rivers, which would be inundated. About 7% of this 107 ha is currently occupied by human settlements (*DWAF & UW Corporate Services Division, 1999*).

3.11.2 Smithfield and Baynesfield Dams areas

The Smithfield and Baynesfield Dams areas fall mainly within Class III (i.e. arable land). Class III is arable land very similar to Class IV, but with slightly fewer limitations for cultivating crops. Class III can support wildlife, afforestation and intensive grazing, and cultivation adapts moderately well thereto.

The *Mkomazi-Mgeni Transfer Scheme Pre-feasibility Study* has identified that about 200 ha of arable land will be lost due to the proposed Smithfield Dam. This includes the loss of arable land within the basin which includes grazing and shrub land of "better than average quality" (*DWAF & UW Corporate Services Division, 1999*).

3.11.3 Tunnel area

The *Mkomazi-Mgeni Transfer Scheme Pre-feasibility Study* has identified that there are no direct social risk from the proposed tunnel exists other than that a potential disturbance of groundwater sources which may impact negatively on borehole yields. People within the greater project area are dependent on boreholes as their main or only potable water source.

Excavation for the establishment of the tunnel will generate significant "spoil material". This spoil has to be carefully disposed of on selected spoil areas so as to reduce the risk to surrounding potential arable land (*DWAF & UW Corporate Services Division, 1999*).

The tunnel will also need to be accessed through a number of maintenance tunnels ("adits") which will have a footprint impact where they surface. This will need to be considered in all investigations. Little is known at this time as to the number of adits that will be required and/or the nature thereof.

3.12 HERITAGE

Heritage resources, including historical structures, artefacts from the Stone and Iron Age, Rock Art etc., are protected by the National Heritage Resources Act (*Act 25 of 1999*). Impacts of heritage resources require a permit issued by the South African Heritage Resources Agency (SAHRA).

Other critical heritage resources that will also need to be considered are those related to the culture of the local communities. Such items may include features

related to tribal differences, culturally important landscapes, so-called “initiation” schools, baptism and open-air / informal church sites, and graves ranging from a single grave upwards to formal graveyards.

Map C of **Appendix A** illustrates heritage resources within the study area, which are predominantly clustered near the Baynesfield area.

3.12.1 Impendle Dam area

The Natal Museum has done an extensive archaeological survey on the Impendle Dam basin in 1982. During this field survey, 54 open-air archaeological sites were discovered. Of these sites 32 were Stone Age sites and 22 were Iron Age sites.

The Stone Age sites contained artefacts from both the Early and Middle Stone Age. Few artefacts from the Indeterminate and Later Stone Age were present.

Late Iron Age sites were found throughout the Impendle Dam site. The Late Iron Age sites indicate that Bantu-speaking people lived in the area prior to white settlements. The sites consist of stone and sometimes earth bank livestock enclosures of which both sides are faced with stone. Red ochre burnished pottery artefacts conforming to Late Iron Age sites in the Tugela Basin were found. This indicates that the people who lived here were related to the present day Zulu population (*Maggs* et al., *1982*).

3.12.2 Smithfield Dam area

According to archaeological records, the proposed Smithfield Dam and surrounds contained artefacts from the Middle Stone Age and historical structures such as circular and rectangular walls from old cattle and sheep kraals.

Between the proposed Smithfield and Impendle Dam basins artefacts from the Late Stone Age and Late Iron Age have been recorded. These include flaked stones from the Late Stone Age and pottery vessels, Khoi-Khoi pots as well as a grindstone from the Late Iron Age (*Whitelaw, 2012*).

3.12.3 Tunnel area

There are no records of archaeological sites along the tunnel route between the proposed Smithfield and existing Baynesfield Dams (*Whitelaw, 2012*). However, considering the abundance of archaeological sites at the proposed Impendle Dam

basin and more at Smithfield Dam, the likelihood of sites along the tunnel route are deemed to be good.

As highlighted in the enviro-legal assessment in **Section 5** below, specialist heritage investigations are required during the EIA phase.

3.12.4 Baynesfield Dam area

Heritage resources recorded within the town of Richmond include historical infrastructure, Early, Middle, Indeterminate and Later Stone Age sites, Indeterminate and Early Iron Age sites as well as Rock Art.

Although an extensive archaeological database exists for the town of Richmond, not many surveys have been done for the Baynesfield area (*Whitelaw, 2012*). However, considering the archaeological importance of the surroundings that has been surveyed, a heritage, and possibly and paleontological assessment is required during the EIA.

3.13 GRAVES

3.13.1 Impendle Dam area

The *Mkomazi-Mgeni Transfer Scheme Pre-feasibility Social Impact Assessment Study* anticipates that more than 80 (eighty) graves are present within the Impendle Dam basin. These graves are associated with the settlements of Makhuzeni and uMkhomazi, both of which are situated below the expected full supply level (FSL) of the proposed dam (*DWAF & UW Corporate Services Division, 1999*).

3.13.2 Smithfield Dam area

A small number of graves are expected to be located near the Smithfield settlements and this will require further studies to determine the exact number and locality of these graves expected below the FSL of the proposed Smithfield Dam (*DWAF & UW Corporate Services Division, 1999*). This will form part of the heritage assessment associated with the EIA process.

3.14 DISPLACEMENT OF PEOPLE

3.14.1 Impendle Dam area

An estimated 40 to 50 households, mostly located in the Makhuzeni Village will have to be relocated (*Mkomazi-Mgeni Transfer Scheme Pre-feasibility Study, 1999*). The implications thereof will need to be considered in the social impact assessment (SIA) as part of the EIA process for Impendle Dam. Relocation alternatives will then be considered. The information gathered through the EIA process will serve to inform the relocation process as part of the baseline information for that process.

3.14.2 Smithfield Dam area

Two households have been identified as being located close to the FSL and hence the relocation of these households will be required (*DWAF & UW Corporate Services Division, 1999*). The EIA process will need to consider this issue and provide input for the DWA in terms of possible relocation alternatives.

3.15 LAND CLAIMS

3.15.1 Impendle Basin Region

The land ownership pattern within the ILM reflects the political and economic conditions of the apartheid past. A large number of poor African people reside in Nxamalala Traditional Authority area (within the Impendle Basin) under conditions of overcrowding and poor access to arable and grazing land. There is also a high representation of people who reside on commercial farms as either labour tenants or occupants. Impendle stateland has also been a bone of contention for a long period of time with conflicting claims from a range of communities (*Impendle LM IDP, 2002*).

Poor access to land is thus one of the key issues facing the ILM. It affects different groups and is often regarded as the source of conflict between the landowners and the people who either do not have adequate access to land or do not have security of tenure. The following are key indications of the extent of this problem (*Impendle LM IDP, 2002* – more recent information is not currently available as the updated IDP is not available):

- A total of 21 land restitution claims have been lodged in respect of various land parcels within the Impendle LM area. The Regional Land Claims Commission has initiated a process for the validation of land claims, which was expected to be completed by June 2002.
- The national government has set a target of redistributing 30% of agricultural land within fifteen years from the date of the IDP (i.e. 2002 running to 2017). It is important for the ILM to set a target for itself in this regard as well. A number of emerging farmers have, through the stateland investigation processes, indicated that they would like to access good arable land where they can develop as small to medium scale farmers.
- The then Department of Land Affairs (now Rural Development and Land Reform) introduced Land Redistribution for Agricultural Development which was applied on Ingonyama Trust land. The intention was to provide an opportunity to address the land need and agricultural development issues.
- A number of communities in traditional authority and freeholds areas live under conditions of overcrowding and are exposed to diseases and poverty.

3.15.2 Smithfield Dam Basin

The *Mkomazi-Mgeni Transfer Scheme Pre-feasibility Study* of 1999 in its *Social Impact Assessment Pre-Feasibility Report of the Proposed Mkomazi Schemes* identified the following spatial strategy for the Smithfield Dam:

- *Smithfield Farm:* This farm was scheduled for settlement of individual small scale farmers. Studies during that period indicated that there were 10 applicants for this land.
- *Crowle Farm:* This farm was also scheduled for settlement of individual small scale farmers. Previous studies showed four applicants for land on this farm.
- *Valley View Farm:* This farm was also scheduled for settlement of individual small scale farmers. Previous studies showed 14 applicants for land on this farm.
- *Claremont Farm:* The farm was scheduled for restitution as a settled community project. There were 24 applicants for this farm.
- *Deepdale Farm:* The farm was scheduled for restitution as a settled community project. There were 30 applicants for this farm.
- *Camden Farm:* The farm was scheduled for restitution as a settled community project. There were 18 applicants for this farm.

- *Bhida and Zashuke Tribal Authorities:* Land occupied by these Tribal Authorities is relatively densely populated and has undergone extensive degradation.
- *Qadi Tribal Authority:* This tribal authority is not as densely populated as the Bhida and Zashuke Tribal Authorities and will only be marginally affected by the proposed Smithfield Dam.

The following procedures should be followed if:

- A land claim within either the Impendle or Smithfield Dam basins are pending, but not yet gazetted by the Department of Land Affairs (in terms of the Restitution of Land Rights Act), the EIA application for the proposed development site is allowed to proceed.
- Publication of the land claim at a later stage (i.e. after the EIA process has begun) in the Government Gazette may entail that the developer will have the right to be compensated for development costs. The Land Claims Commissioner is required to decide on the manner in which a land claim is dealt with, including financial compensation of claimants or the granting of alternative land.

Negotiations around the management of impacts and compensation for tribal and state-held land are carried out by the following relevant tribal authorities: Bhidla Tribal Authorities / Zashuke-Bomvu Tribal Authority / Qadi Tribal Authority and the Hlanganani Regional Authority, in conjunction with the relevant district municipalities, Provincial and National Government Departments.

3.16 HEALTH AND SAFETY

3.16.1 Health

Sub-Saharan Africa (SSA) remains the region most severely affected by HIV/AIDS in Africa (*AIDS Epidemic Update: UNAIDS/WHO, December, 2004*). The HIV epidemic in the SSA area is likely to continue to spread for the foreseeable future. About one-third of those currently living with HIV/AIDS are aged between 15 and 24 years.

Demographic data provides some of the clearest sources of knowledge about HIV/AIDS and the workplace. At a symposium on HIV/AIDS in the workplace in 2004, it was identified that:

- The HIV prevalence among contract workers is higher than among permanent employees.
- There is a higher HIV prevalence in lower paid than higher paid occupations.
- The HIV prevalence rate peaks between the ages of 30 and 39 years in men, and among women it peaks at a lower age.
- The epidemic disproportionately affects women in Southern Africa.

An analysis of this information points clearly to the fact that development projects could have a significant impact on local and regional prevalence of HIV / AIDS. In development projects, the bulk of the workforce is employed on contract, typically coming from areas outside of the region, the wages are generally low, and the composition of the workforce is predominantly young males placing the women from the surrounding community at risk of contracting the disease and spreading it within the community.

Socio-cultural and economic as well as demographic changes associated with population mobility in and out of a project area will determine the risk environment related to HIV/AIDS in the communities associated by the project. Within this context, attitudes, values, knowledge and practices affecting safer sex will determine the extent of risk in terms of susceptibility and vulnerability. Two risk categories can be identified, that of the risk environment and risk behaviour. This issue will need to be considered in all future environmental studies undertaken.

3.16.2 Risk Environment

A risk environment is an environment in which the chances of disease transmission are increased as a result of social, economic and cultural factors. Some risk environment factors may include the following:

- Project employees interacting on a regular basis with sex workers (SWs).
- Wage earners with affordable and disposable income for alcohol, drug use and SWs.
- Opportunities for SWs to establish activities at project sites.
- The cultural practices of drunkenness and drug usage associated with sexual activity.
- Lack of awareness and knowledge regarding sexually transmitted infections (STIs) and unsafe sex.

- Sexual relationships of people from different areas with unknown sexual histories (casual sex, multiple sex partners, etc.).
- Feelings of loneliness and sexual deprivation due to absence of regular partners.
- Poverty that reduces the ability of SWs to negotiate appropriate condom usage with their clients, etc.

3.16.3 Risk Behaviour

Individual responses and adaptation to high risk environments arising from a development project may lead to high risk behaviour conducive to HIV/AIDS transmission and infection. Risk behaviour can be classified under unsafe sexual activities, unprotected commercial sex and substance abuse. The following are some examples of risk behaviour:

- Unsafe sexual activity (homo/hetero/bisexual) through commercial and casual sex.
- SWs receptive to unsafe sex for more money.
- High risk behaviour of the individual has a ripple impact on the family, community and society. These include:
  - Exposure of sexual partners to HIV and AIDS infections.
  - Transmission from infected mother to their children during pregnancy, delivery and through breastfeeding.
  - The exposure of others (those outside the project area) to infected sex from workers who leave the project site.
  - Transmission of HIV through SWs within and outside the project area.
- Crime and associated violence is often expressed by landowner stakeholders as one of their critical concerns. Central to their concern is the perception that crime increases when contract workers have access to their land. As such the Contractor should be also be instructed to exercise due caution in ensuring the security of the land upon which he is working. Controls will need to be linked into all contract related documents to ensure that such issues remain on the agenda for the duration of the construction and rehabilitation processes.

3.16.4 Safety

Safety on a construction site in terms of health and safety, requires the cross linking of potential site activities to environmental legislation.

For instance, it would need to be clarified as to whether the presence of explosives on the sites, even though temporary, during construction of the dams and tunnel would fall within the ambit of the Major Hazard Installation Regulations (*MHI, GN R. No. 692 of 2001*), in terms of the Occupational Health and Safety Act (OHS) (*Act No. 85 of 1993*). This would need to be confirmed by a relevant specialist. If required, the findings thereof would need to be fed into the EIA process. Further information in this regard is considered in the enviro-legal assessment chapter.

The MHI also raises concerns about demographic safety issues with regards to the structural integrity of the dam wall and diversion works during the remainder of the construction period and into the operational phase. Village settlements will occur downstream of the dam wall and should the water mass exceed threshold limits, such a village would be inundated with water, with the consequences of severe negative environmental impacts including potential loss of life of residents and their livestock, combined with physical damage, loss of soil, erosion, etc.

“Dangerous goods” that are likely to be associated with the greater project, are fuel stores for generators at the various pumping station sites, as well as any such goods used within the sub-stations per site. Each site will have a fuel supply for the various stand-by generators required for provision of electricity to the critical components of the process, i.e. the pump stations. The total capacity thereof needs to be determined for the project as a whole and determined whether this listed activity is in fact triggered. The tanks for the fuel are expected to have a capacity of 20 – 30 kℓ per pumping station site. These substances could have an impact on the groundwater resources of the greater area and thus the local community’s drinking water if not properly maintained.

Other identified dangerous goods capacities should be factored into any calculations. This will form part of an inventory of all substances to be used per site, and as only one EIA is being carried out, summed across the greater project. It is considered possible that the lower threshold of 80 m^3/kℓ could thus be breached. This information will be needed before the EIA application is lodged.

It should be noted that if the capacity of "dangerous goods" is under 80 m^3 (kℓ) for the entire project, as detailed in **Table 5-3**, this specific activity could still be triggered by default. It should be noted that in the case of this activity, the lower triggering threshold is due to the sensitivity of the greater environment specifically in terms of biodiversity issues.

3.17 LOCAL INFRASTRUCTURE

A pictorial representation of the local infrastructure is presented in **Map F** of **Appendix A**, please refer.

3.17.1 Transport Routes

Access to the various sites will require, in some instances, the construction of new roads and in others, the upgrading of the road. Required access during construction and operation of the scheme can be classified in three categories namely:

- Temporary access roads to the sites during construction,
- Surrounding permanent access roads, and,
- Permanent access roads to the sites.

The implications of all three categories on the local communities will need to be considered in detail in the EIA process as all have the potential to directly impact on these communities. For instance the loss of old and creation of new roads may lead to the loss of agricultural land, fragmentation of communities, constraints for communities to access and make use of required services (e.g. community, medical, educational, recreational), and, loss of linkages between communities.

During construction the physical presence of construction vehicles and activities could temporarily limit access to the roads and thus the previously mentioned services. The construction traffic could also pose a safety and health risk to the affected communities for the duration of the construction process.

Within the study area the main roads, namely the R56, R612, and various secondary roads allow access to large parts of the area. However, the inland road system is still at a level where most secondary roads are gravel and impassable in the wet season. Within the uMkhomazi Valley area, roads are generally built on ridges / spurs and along the edges of the main river courses.

Mkomazi-Mgeni Transfer Scheme Pre-feasibility Study identified two important transport routes for the proposed Smithfield Dam that link the dam basin area with the R617.

The first road runs along the left bank of the proposed Smithfield Dam. This Deepdale road will have to be realigned as the proposed development will inundate the road for about 2 km.

The second access road for the proposed Smithfield Dam runs along the right-hand side of the proposed dam basin and connects the settlements of Machabasini and Nonquxa with the R617. As this road will run close to the dam, engineering studies will need to route the road above the appropriate flood levels and must not negatively impact on the local access routes within the area.

Visual reference from the site visit (5 March 2012) indicates that the secondary road to the proposed Impendle Dam, Impendle Road, has been recently upgraded (**Figure 3-10**). Road building material was sourced from borrow pits within the river catchment – it is unknown at this time as to whether these borrow pits are licenced; this should be confirmed before considering use thereof for the proposed dam and/or its associated infrastructure. It is estimated that approximately 5 to 10% of this road may be inundated by the dam, while 25% will be within 100 m of the high water level.

The social impact assessment will need to assess the current status of smaller access routes and foot-paths, linking different communities and/or the communities to their farming / grazing areas, which could be lost to inundation of the dam basin.

Figure 3-10: New road in Impendle Region

3.17.2 Mining

Both small scale quarries and mines occur within the Umgungundlovu and Sisonke District Municipalities, it is however noted that these do not play a significant role in terms of the specific study area being considered. Sand mining takes place on the uMkhomazi Estuary (within the uMkhomazi River catchment) but this does not occur within the areas designated for the proposed Smithfield and Impendle Dam Basin areas (*eWISA, 2004*).

3.17.3 Electricity

There is an existing high voltage line passing over the proposed Smithfield Dam which continues toward the east, passing the Baynesfield Dam. The specific voltage of this line will need to be determined (i.e. above or below the 275 kV threshold) and the information made available to EIA team before the EIA is started. Depending on the impact on these lines, a separate EIA process might be triggered.

Medium voltage lines run south of the Smithfield Dam. The existing high voltage line may have to be temporarily decommissioned or relocated along another route for the powerline. The necessary relocation of such lines will need to be considered in terms of the EIA process. As part thereof, discussions with Eskom and the SDM will be required to assess the implications and the way forward with regards to the re-alignment or decommissioning of this powerline.

There is a great need to improve access to electricity supply within the study area as access to electricity is below average when comparing to that of other areas in South Africa. As such, long-term considerations in terms of a possible pumped storage scheme (PSS) linked to the proposed Impendle Dam should consider the local communities who are most impacted on by the presence of the proposed dams. Alternative sources of electricity should also be considered during the EIA process to consider means to help meet this shortfall and thus capacitate existing and potential future land users in the greater area.

It is not clear at this time whether the water released from each of the water bodies (i.e. proposed Impendle Dam, Smithfield Dam and the proposed in-stream balancing dam on the uMlaza River, near the existing Baynesfield Dam) will be used to generate electricity, and if so at what output level.

Although the project at hand is specifically targeted at the transfer of water for use within the urban areas of Durban and parts of Pietermaritzburg, a spin-off of this process could be the generation of power. The amount to be generated would need to be quantified and the size of the electrical installations would need to be considered in the EIA process to follow. The possibility of generation of sufficient power generation to provide for, say, the water transfer pumps, or at least part of their required input, could also be considered given that electricity, like water, is a limited resource. A *Hydropower Assessment* will be undertaken to assess this option.

The proposed 400 kV / 132 kV multi-circuit transmission line from the Ariadne Substation (near Pietermaritzburg) to the vicinity of Oribi Substation (near Port Shepstone) and the expansion and upgrade of the Ariadne and Eros Sub-stations will also increase electrical infrastructure within the greater uMkhomazi River Catchment.

3.17.4 Visual Impacts

Inundation of the valleys will alter the aesthetic character of the areas. These impacts will have both aesthetic and cultural issues due to the long history related to the greater area across the full range of cultural groupings.

Temporary visual risks related to the construction phase of the scheme, such as landscape scarring, is expected to be significant. These risks will be due to clearing of construction servitudes, exposure of soils in previously vegetated areas, construction of access roads and haul roads, etc.

The construction work at the various sites will include related visual impacts from any additional electricity towers, new houses, offices, as well as the obvious visual impact of the dam wall infrastructure itself, and thus will have a high visual risk to the current aesthetic character of the area. Associated with this will be, the presence of plant, machinery and temporary housing for construction workers over the construction period will also represent a relatively significant visual risk for people living in the vicinity.

3.17.5 Local Economic Development

Currently the water courses in the region are unregulated and there is no major water resource infrastructure on the uMkhomazi River or on any of its tributaries. The Ixopo System lies within the uMkhomazi River catchment and is not connected to any of Umgeni Water's regional bulk systems.

The following municipal documents; Ingwe LM SDF, ILM SDF, and Umgungundlovu SDF and IDP, identify the MMTS and uMWP as major large scale developments of high priority for the region. It should be noted that Sisonke's documentation makes no direct reference to the proposed project and the reasons for this are unclear.

4. IDENTIFICATION OF POTENTIAL ENVIRONMENTAL RISKS

As detailed previously, the **ESR** considers a range of factors. Based on all information available to date, an analysis has been made on the key environmental factors so as to inform the future EIA studies that will be undertaken by an independent environmental assessment practitioner.

The screening environmental assessment includes:

- Review of available environmental information including:
  - Conservation / biodiversity specific information.
  - Topographical features (e.g. ridges, watercourses).
  - Agricultural potential.
  - Wetlands, rivers and associated aspects.
  - Geology.
  - Nature Reserves.
  - Heritage and cultural sites.
- Identify major hazards, difficulties, features or obstructions.
- Issues typically considered as part of an environmental investigation study include:
  - Proximity to potentially hazardous/toxic land uses (waste dumps, mine dumps, etc.).
  - Major geological features such as dolomitic areas prone to sinkhole formation, major faults and dykes.
  - Nature conservation, biosphere reserves and ecologically sensitive areas, such as wetlands.
  - Landscape features, especially ridges and mountains.
  - Archaeological, historically and culturally important sites.
  - Land uses and planned developments.
  - Economic initiatives.
  - Agriculture – location of high potential agricultural soils.
  - Air Traffic – location of airports, flight paths and associated matters.
  - Road traffic.

The screening assessment was undertaken using a rating approach. The rating for each of the aspects to be considered in this report, were averaged and the resultant overall risk described. An interpretation was then made on the significance of the rating and the implications for future consideration during the independent EIA process.

Risks associated with each environmental issue was rated using the following rating system (additional information relating to each impact level is detailed below).

It should be noted that the lower the value for a specific risk factor, the greater the risk due to a known issue or due to a lack of information available at this point (i.e. uncertainty). All factors with a low value should be considered in detail in the EIA process to gain greater clarity as to whether these form a significant risk or not.

- Positive Impact (rated at five (5) points) – sufficient information exists to consider a positive impact.
- Favourable (rated at four (4) points) – sufficient information exists to make a considered rating would not be significant.
- Uncertain (rated at three (3) points) – there is uncertainty on the nature and extent of the impact primarily due to a lack of information on site specific conditions. The information from technical and specialist studies could indicate either a positive or negative impact, this is unknown at this time. Although this is a consideration specific to the EIA process, this preliminary consideration aims to determine whether the possible impact could be a fatal flaw, highly significant, and so on downwards. If insufficient information is available to determine this high level consideration, the rating of “uncertain” is given.
- Less favourable (rated at two (2) points) – either sufficient information exists to determine that the site will be negatively affected, or, without specific information the possibility exists that the impact could be negative and significant.
- Fatal flaw (rated at one (1) point) – where there could be an impact which cannot be mitigated. In terms of the environmental screening investigation this is the situation where the risk is so high even at this preliminary consideration point that it is deemed to be an issue that cannot be allowed.

4.1 CLIMATE RISK ASSESSMENT

Climate related risk occurs at two levels (**Table 4-1**):

- The presence of the various dams could amend the micro-climates of each of the localities. This could in turn have a wider area knock-on effect, or lead to specific climate related events due to the presence of the new large water bodies (e.g. more intense storms, wind pattern changes).
- Changes in climate due to global level change could have an implication on the climate of the specific area which could in turn have an impact of the functionality of the scheme and the surrounding areas.

With respect to the first point a postgraduate thesis considered the impact of a reservoir to the climate of the surrounding area (i.e. the microclimate) in Greece (*Lagadinou, 2003*). Changes to the microclimate are the result of the changes to the energy balance due to the presence of the water body, which has greater heat capacity than the ground and absorbs greater latent heat because of the increase of evaporation. The study considered measurements both near and away from the dam under consideration so as to test for general climate changes not caused by the dam's presence. According to the statistical analysis of the meteorological data, the only climate change that is objectively verified is a small increase at the value of the minimum temperature at the station near the dam in comparison to the station located away from the dam. Because the change is observed only to one of the meteorological parameters, it cannot be stated that the construction of a reservoir causes significant changes in the microclimate. Additional information in this regard should be considered as form instance in this study, the perception from the local residents was that the microclimate had in fact changed.

Table 4-1: Risk on Climate

Field	Risk Description	Sufficient Information	Rating	Average
Climate	Changes due to project's presence	No	4	**3.5**
	Impacts of climate change on project	No	3	

4.2 GEOLOGY RISK ASSESSMENT

Geology risk occurs at two levels (**Table 4-2**):

- The construction of the dam wall requires suitable geological foundation conditions to ensure safety factors are met.
- The impounding of water will add a significant weight to the area and weak geological stresses could be exacerbated.

Issues such as geological stresses and possible seismic occurrences may occur. Such occurrences may have a significant impact on the proposed scheme, and by default on the surrounding area in the case of catastrophic failure. Such items would be considered to be a fatal flaw and if significantly unfavourable conditions were to be encountered the dam site would be rejected as being unsuitable.

An additional item is that certain materials are required for the construction of the proposed infrastructure that will require materials drawn from borrow-pits. The suitability of material within the dam basin will need to be considered in terms of these requirements.

Table 4-2: Risk on Geology

Field	Risk Description	Sufficient Information	Rating	Average
Geology	Wall foundations	No	3	**3**
	Geological stresses (incl. seismic issues)	No	3	
	Materials from borrow-pits	No	3	

4.3 SOIL RISK ASSESSMENT

The removal of plant material, expanding access roads, haul roads, dam construction, etc. can result in certain areas becoming prone to erosion (**Table 4-3**).

In the short term erosion leads to a change of soil stability, thus affecting the safety of the slopes. Over a longer term erosion causes exposure of soil and displacement of sediment. Should erosion prevention measures be implemented, this will have lower risk. Since there are cases of existing severe erosion within the study site, erosion measures implemented during construction could have a positive impact.

Table 4-3: Risk on Soil

Field	Risk Description	Sufficient Information	Rating	Average
Soil	Erosion	**Yes**	3	**3**

4.4 TERRESTRIAL ECOSYSTEMS RISK ASSESSMENT

The following risks are expected in terms of the terrestrial ecosystem:

- Some woodlands providing food sources and habitats will be affected during the construction phase and these will be permanently altered in the future, post construction.
- The construction of the dam may reduce the overall connectivity of the ecosystem as some of the riparian habitats will be lost. However, due to previous impacts from agricultural activities, forestry and the presence of local communities, the project sites have already have suffered a certain degree of fragmentation and the risk will be less favourable.
- Vegetation clearances during construction can potentially result in the invasion of alien species.
- The risk on animal species is not fully known at this stage, as a detailed faunal investigation has not been done yet. It is however clear that at least one fauna species, the Bald Ibis, will be detrimentally impacted on by the proposed Impendle Dam and thus this issue is deemed to require careful consideration and more information. Further preliminary indications including information from a site visit indicate that other species of importance that should be considered include the giant bullfrog, and various snake and millipede species.
- The risk on plant species is not fully known at this stage either as a detailed flora investigation has not been done yet. It is noted that the greater site includes areas of biodiversity importance and this should thus be clarified in the EIA process.

Table 4-4 outlines the potential risks in terms of impacts on fauna and flora.

Table 4-4: Risk on Terrestrial Fauna and Flora

Field	Risk Description	Sufficient Information	Rating	Average
Fauna / Flora	Woodlands removal leads to habitat change	No	2	2.2
	Loss of connectivity between ecosystems	Yes	3	
	Alien invasion due to vegetation clearance	Yes	2	
	Impact on fauna	No	2	
	Impact on flora	No	2	

4.5 RIVERINE AND AQUATIC ECOSYSTEMS RISK ASSESSMENT

The proposed dams may impact the riverine ecosystems in the following ways:

- Vegetation provides habitat to other living organisms. Terrestrial vegetation (i.e. all vegetation within the dam basin including riverine vegetation) clearance and submergence of the rivers will remove the riverine habitat permanently. This loss for much of the dam basin will be replaced by lake conditions in the main part of the basin and inundated areas on the shores and the backwaters of the two river systems (i.e. the uMkhomazi and uMlaza Rivers). The potential does exist that with long-term natural establishment, enhanced by rehabilitation, the riverine vegetation should form along the edges of the dams.
- Loss of riverine vegetation will also modify the erosion potential of areas with potential sedimentation of the watercourses and the dams.
- Both proposed dam walls will pose a barrier to the movement of species. This is both a positive and a negative risk to aquatic faunal species – (a) positive as it will limit movement of alien invasive species upriver thus stopping the colonisation of new areas, but (b) negative as it will limit the movement of catadromous indigenous species from the ocean to their spawning grounds upriver and thus potentially destroy their environmental niches.
- The potential positive risk is that the physical barrier will limit the movement of invasive fauna.
- A negative risk of the obstruction involves the obstruction of the migration of fish species further up the river.
- The estuaries downstream of the proposed dam are considered very sensitive and impacts are likely to occur on these ecosystems.

Table 4-5 outlines the potential risks in terms of impacts on the riverine ecosystems.

Table 4-5: Risk on Riverine and Aquatic Ecosystem

Field	Risk Description	Sufficient Information	Rating	Average
Riverine ecosystem	Terrestrial vegetation clearance leads to habitat loss	Yes	2	2
	Alterations to the aquatic ecosystem, reduction of water quality	No	2	
	Shift on animal niches	No	2	
	Loss in connectivity between aquatic ecosystems	No	2	
	Impacts on downstream estuaries	No	2	

4.6 WATER QUALITY RISK ASSESSMENT

Construction activities may result in contamination of the river if management actions are not implemented and enforced. Such actions could include fuel or other chemical spills, poor maintenance of equipment, insufficient facilities for workers and the possible increase in sediment release as part of vegetation clearing and road construction.

The presence of the dam itself will have a long-term impact on the water quality of the watercourses as a whole due to changes in the flow regime, sedimentation patterns, potential eutrophication of the dams, anaerobic conditions in the dams themselves.

Clearance, before a proposed dam basin is inundated, is a complex issue for the following range of considerations:

- Biomass breaking down in the water potentially under anaerobic conditions can have implications on the water quality (i.e. lead to the development of a chemocline which will modify water quality for the first few years of the dam's life).
- Clearance can lead to a higher sediment load in the waterbody.
- Trees can lead to obstructions and thus limit potential recreational use of the shallower parts of the dam. The DWA views a dam as a multi-use resource

and so even though it may be built to supply water, it may also be used for fisheries, recreation, etc. and this will indicate clearing in at least the shallower areas of the dam. Further, sensitive, indigenous flora species that are deemed suitable for relocation need to be removed from the basin individually before any mass clearance may be considered. That is, there may be commercial, ecological or medicinally important plants in the dam basin which would have to be removed in any event and this may be best accomplished by clearing.

- The presence of vegetation in the dam can act as habitat niches for more sensitive aquatic fauna species – as the EIA has not been started at this time, the biodiversity specialist studies may indicate areas that require clearing or not, depending on the need for fish habitats. .As the Water Resource Plan has not been completed, along with the dam zoning, it is not possible at this time to determine what areas and to what level clearing should be carried out.
- The water quality and predicted limnology has not been completed at this time, as this would be affected by (a) the timing of the need for raw water to be delivered to Umlaas Road water treatment facility, and (b) the filling of the impoundment itself. If water is required as early as possible and the downstream quality is within the set thresholds, then it may be necessary to clear the dam basin so as to reduce or shorten the period of decay for the plants, thereby reducing the opportunity for a chemocline to develop in the dam on filling.

So in essence any definitive statement on clearing can only be made towards the end of the design process, which would include critical input from the EIA process.

Detailed consideration of the limnological impacts is critical and as such forms part of the feasibility study being undertaken and will also feed into the EIA process to be undertaken.

The presence of communities adjacent to the dam basins with poor sanitation levels, the presence of pesticides and herbicides (i.e. from forestry and subsistence farming), contamination to the dams from potentially unvaccinated / non-de-wormed farm animals (i.e. access to water causing erosion, sedimentation, combined with faecal contamination potentially including oocytes). This contamination will be more likely to accumulate in the dams due to the change in the flow patterns.

The risks to the water quality are presented in **Table 4-6**.

Table 4-6: Risk on Water Quality

Field	Risk Description	Sufficient Information	Rating	Average
Water quality	Chemical pollution during construction	**Yes**	3	**2.6**
	Anaerobic breakdown of organic matter forming methane	**No**	3	
	Sedimentation	**No**	2	
	Water quality impacts due to reduced oxygen concentrations of the water	**No**	3	
	Contamination of water sources (e.g. herbicides, pesticides, oocytes, sewage)	**No**	2	

4.7 HYDROLOGY RISK ASSESSMENT

Sedimentation can reduce the net storage capacity of the reservoir. The design of the dam is thus critical to ensure that sedimentation of the reservoir does not occur as this has a range of impacts over and above loss of storage capacity (e.g. ecological). The design with this issue in mind is thus a critical outcome of the feasibility and planning processes.

The proposed dam can potentially impact on the baseline flow conditions if the needs identified for the reserve are not met. From a hydrological perspective the risk is low, because the reserve will prevent this. It will again form an important component of the design.

A critical issue is that the uMkhomazi River is one of the last 'undammed' rivers in South Africa. That is, its flow regime is close to the undisturbed pattern or state. Damming of the river with one of both of the proposed large dams will permanently modify the natural function of the river as a whole with a range of knock-on impacts. In order to consider this issue, the nature of the other remaining undammed rivers needs to be considered in contrast to the uMkhomazi and used in motivation for why the uMWP continues or not. This consideration should consider other undammed rivers in KwaZulu Natal (e.g. uMzimkulu) and the status thereof in order to reach a decision in this regard **Table 4-7** outlines the risks of hydrological risks to occur.

Table 4-7: Risk on Hydrology

Field	Risk Description	Sufficient Information	Rating	Average
Hydrology	Storage capacity	Yes	4	2.25
	Sedimentation	No	2	
	Streamflow change	No	2	
	Loss of the river's status as being "undammed"	Yes	1	

4.8 AGRICULTURAL POTENTIAL RISK ASSESSMENT

Modification of the groundwater flow patterns and possible losses of groundwater during the tunnel construction process will have a direct impact on the availability of water to the local communities.

Storage of water in the proposed dams will ensure that water will be available year round to those communities within the valleys within which the dam basins fall. However, the pattern of water releases from the dams to serve the rivercourses is critical in ensuring that the communities between the dams still have surface water available for both potable water and for agricultural usage.

The hydrological studies forming part of this project will serve to provide information on this issue and will be fed into the EIA process.

Table 4-8 outlines the risks of agricultural impacts to occur.

Table 4-8: Risk on Agricultural Potential

Field	Risk Description	Sufficient Information	Rating	Average
Agricultural potential	Loss of arable land	No	3	3
	Fragmentation of agricultural land	No	3	
	Reduced volumes of groundwater available for downstream farmers	No	3	
	Increased volumes of surface-water available for downstream farmers	No	3	

4.9 HERITAGE RISK ASSESSMENT

Detailed investigations have not been carried out for the entire area and thus the risk is not totally understood or quantified. The exception to this statement is for studies undertaken in the Impendle area by the Natal Museum which indicates that known graves occur within the proposed Impendle Dam basin. It is considered to be highly likely that graves will fall within both dam basins given the long term occupation of the wider area by a range of communities.

Further the range of communities implies that a number of heritage related factors will be influenced by the presence of the proposed dams and related infrastructure.

Heritage resources, including historical structures, artefacts from the Stone and Iron Age, Rock Art etc., are protected by the National Heritage Resources Act (*Act 25 of 1999*). Impacts of heritage resources require a permit issued by the KwaZulu-Natal's provincial agency of the South African Heritage Resources Agency (SAHRA), known as ***Amafa / Heritage KwaZulu-Natal***.

Other critical heritage resources that will also need to be considered are those related to the culture of the local communities. Such items may include features related to tribal differences, culturally important landscapes, so-called "initiation" schools, baptism and open-air / informal church sites.

Table 4-9 outlines the potential risks in terms of impacts on heritage resources.

Table 4-9: Risk on Heritage Resources

Field	Risk Description	Sufficient Information	Rating	Average
Heritage Resources	Loss of heritage resources	No	3	3
	Loss of cultural resources	No	3	

4.10 DISPLACEMENT OF PEOPLE RISK ASSESSMENT

No detailed investigations have been carried out in this area and thus the risk is unknown. **Table 4-10** outlines the potential risks in terms of impacts on socio-economic factors.

Table 4-10: Risk on Displacement of Persons

Field	Risk Description	Sufficient Information	Rating	Average
Displacement of people	Displacement of households	Yes	4	3
	Reducing the availability of land to local people	Yes	2	
	Relocating people to areas under different traditional leadership	No	3	

4.11 HEALTH AND SAFETY RISK ASSESSMENT

Typical health and safety risks include:

- The influx of a large number of outsiders is likely to result in number of social ills such as prostitution/ stock theft, other security problems and an increase in sexually transmitted diseases, particularly HIV and AIDS.
- Due to the impoundment of water the dam may be a safety hazard for local people.
- Major Hazard Installations may be a safety hazard for construction workers and local people.
- An increase in the number of vehicles using the road during the construction may result in a higher incidence of road accidents, injuries and/or deaths.
- The presence of a large body of water is a risk to downstream communities in the event of a catastrophic failure of the dam wall due to either technical failure of the infrastructure or external impacts such as a significant seismic event.

- Specific social risks may include such issues as, the displacement of people, the potential influx of job seekers, separation of linked communities, appearance of criminal elements and other potentially disrupting impacts. This must be seen in light of the sheer number of people that will be involved in the project both during construction and operation. Such impacts have both health and safety risks.

The health issues of relevance are presented in **Table 4-11** overleaf.

Table 4-11: Risk on Health and Safety

Field	Risk Description	Sufficient Information	Rating	Average
Health and Safety	HIV/AIDS infection	**Yes**	2	**2.6**
	Water hazard	**No**	3	
	Accidents with construction vehicles	**No**	3	

4.12 ACCESS ROUTES TO SITE RISK ASSESSMENT

Current access roads could be blocked by trucks, bulldozers, and other equipment. Potential issues on this access road are the presence of cattle, goats, children and other people that are frequently on the road. There are also several houses close to the road. Current access roads could become congested with heavy construction vehicles. Potential issues on the access roads relate to the presence of cattle, goats, children and commuters and thus the possibility of accidents. There are also several houses close to the road which could be directly damaged by passing construction-related traffic.

Potential risks are associated with the construction of new access roads in terms of the ecological sensitivity of the area. Construction vehicles can kill animals crossing the roads. Disturbed road sides are also preferred habitats for alien invasive plants.

Access roads that are poorly constructed to support the weight of construction vehicles will erode with the subsequent ecological impacts.

Table 4-12 outlines the potential risks associated with access routes to the sites.

Table 4-12: Risk of Access Routes

Field	Risk Description	Sufficient Information	Rating	Average
Access routes	Impact of the current road on households, people, children, cattle and goats in /close to access roads	No	3	2.3
	Impact of new access roads	No	2	
	Impact on the ecosystems	No	2	
	Erosion of access roads	Yes	2	

4.13 VISUAL IMPACT RISK ASSESSMENT

A range of visual impacts have already been identified to date. These range from the visual landscape character changing due to the inundation of the valleys, to direct visual impacts from the presence of new infrastructure related to the dams.

On a larger scale, visual impacts include a change in the land-use pattern to potential losses of cultural or historically important landscapes.

Temporary visual risks related to the construction phase of the scheme, such as landscape scarring, is expected to be significant. These risks will be due to clearing of construction servitudes, exposure of soils in previously vegetated areas, construction of access roads and haul roads, etc.

The construction work at the various sites will include related visual impacts from any additional electricity towers, new houses, offices, as well as the obvious visual impact of the dam wall infrastructure itself, and thus will have a high visual risk to the current aesthetic character of the area. Associated with this will be, the presence of plant, machinery and temporary housing for construction workers over the construction period will also represent a relatively significant visual risk for people living in the vicinity.

During the public participation phase the visual risks will be discussed with I&APs and any additional impacts, not already highlighted but known due to local knowledge, will need be considered.

Table 4-13 outlines the potential risks in terms of visual impacts.

Table 4-13: Risk of Visual Impacts

Field	Risk Description	Sufficient Information	Rating	Average
Visual impacts	Visual impacts – landscape level	No	3	**3**
	Visual impacts – cultural landscape	No	3	
	Visual impacts – direct impact from infrastructure	No	3	

4.14 INFRASTRUCTURAL DEVELOPMENT RISK ASSESSMENT

The potential for future underground mining activities within the dam basins is unknown, but not deemed to be likely, as few mines exist at present within the greater area. The potential for surface mining including quarrying and borrow-pits is noted as being a definite occurrence – both for this development at hand, as well as for other potential developments in the future.. The presence of the dams may sterilise some potential mining activities in the future, but is considered to be a limited risk.

As mentioned, during the development of the dams, borrow-pits and some quarrying will be required for a range of end-uses including (a) use for the construction of the dam walls, (b) surfacing of access roads, and (c) any quarrying / filling to contour parts of the dam basins (as may be needed).

The major “mining” activity for the proposed project will be the tunnel between Smithfield Dam and the balancing dam in the Baynesfield catchment. Options should be considered to use the spoil material taken from the tunnel to meet some of the needs specified above. In terms of the EIA process, a critical requirement is to limit the amount of waste generated, including rock spoil, as by re-use the need to find a suitable disposal mechanism and site is reduced.

The intention of the project as a whole is to enhance the provision of a specific infrastructural need – that is, to provide water to the larger urban areas within KwaZulu-Natal. The importance thereof is not under debate. A possible future spin-off (timeline not known at this time) is to link power production facilities to the greater project. An issue requiring consideration in terms of the studies to come is the potential for enhanced provision of electricity and piped water to the areas around the dams. The options to maximise the benefit to the local communities needs to be investigated in detail during the forthcoming studies.

Local and regional infrastructural development at all sites will most likely have a positive impact on the local communities in the area. Poor service delivery, however, could result in resistance to the project, which will then become a negative impact. The developers of the project will need to be committed to good ensuring good service delivery so as to ensure that this positive impact does not get negated.

A potential significant improvement for the wider area is that of enhanced tourism and associated infrastructure development. From the point of view of recreational land-usage, to being easier to access the area due to improved access roads. The generation of more tourism related developments will have a range of knock-on impacts and risks, which will need to be considered in the studies to come. **Table 4-14** outlines the potential risks in terms of current and planned infrastructure.

Table 4-14: Risk on Infrastructural Development

Field	Risk Description	Sufficient Information	Rating	Average
Infrastructural development	Impacts on potential tourism and associated infrastructure	**No**	3	**3.25**
	Impact on potential mining activities	**No**	3	
	Impact of infrastructure on local community	**No**	3	
	Impact on larger urban areas in KZN	**Yes**	4	

4.15 Loss of Local Income due to Project Risk Assessment

There is a risk of losing agricultural land and valuable plants, which can be used by the local community for medicine, timber or firewood.

There is a risk that some people will abandon more sustainable working practices for short-term work on the construction site. The real impact will depend on whether these people will be able to return to their former ways or not after construction is completed.

In contrast, the presence of the dams may lead to an influx of tourists as detailed above, which may have significant positive impacts on local income. **Table 4-15** outlines the potential risks in terms of local income.

Table 4-15: Risk of Losing Local Income

Field	Risk Description	Sufficient Information	Rating	Average
Loss of local income	Loss of agricultural land	Yes	4	3
	Loss of useful plants	No	2	
	People leaving sustainable works for temporary construction work	No	3	
	Development of new local income potential via possible tourism spin-offs	No	3	
	Development of water-based agricultural operations	No	3	

4.16 SOCIAL RISK ASSESSMENT

Table 4-16 outlines the potential risks in the social environment due to implementation of a large infrastructure project. This may be either positive or negative and range from the loss of houses or fields, to separation within communities, to new job opportunities, to the loss of one's livelihood in the form of farming opportunities, to impacts from increasing crime levels and an influx of job seekers.

Other typical social issues may include; the influx of people, an increase / decrease in property prices, an increase in criminal activity, traffic increases or merely changes in and the noise profile.

Cultural interference between tribes of the local residents and the incoming construction labour force may cause issues, tribal favouritism by the various employees, and possible triggers for land claims.

Table 4-16: Risks on Social Environment

Field	Risk Description	Sufficient Information	Rating	Average
Social Environment	Impact on quality of life of people	No	3	2.5
	Impact on cultural dynamics	No	2	

4.17 EMPLOYMENT CREATION RISK ASSESSMENT

The tribal community would agree to the proposed development on the condition that local labourers will be used in the construction and operational phases of the project. Training of people in the various technical and social aspects of the construction process is a positive spin-off from such an agreement and will have a beneficial impact on the local community. **Table 4-17** outlines the risks associated with employment opportunities.

Table 4-17: Risk on Employment Creation

Field	Risk Description	Sufficient Information	Rating	Average
Employment creation	Employment of local people	No	4	**3.3**
	Training local people	No	4	
	Impact of potential influx of workers – potential negative impact on locals	No	2	

4.18 PUBLIC PARTICIPATION

Public participation forms part of all the relevant legislative processes. For a detailed consideration of the public participation issues related to the proposed project, please refer to **Chapter 5** hereafter.

Consideration of the issue of public participation is presented in **Table 4-18.**

Table 4-18: Risk on Public Participation

Field	Risk Description	Sufficient Information	Rating	Average
Public Participation	Negative reaction to proposal	No	3	**2.5**
	Potential appeal of environmental authorisation	No	2	

4.19 ENVIRO-LEGAL RISK ASSESSMENT

The enviro-legal impact of the uMWP will need to be considered in light of the following legislation:

- National Environmental Management Act
- Environment Conservation Act
- National Environmental Management: Air Quality Act
- National Environmental Management: Biodiversity Act
- National Environmental Management: Protected Areas Act
- National Water Act
- Water Services Act
- Conservation of Agricultural Resources Act
- Major Hazard Installation (i.t.o. Occupational Safety and Health Act)
- National Heritage Resources Development Act
- Mineral and Petroleum Resources Development Act
- National Veld and Forest Fires Act
- The Aviation Act (Civil Aviation Authority controls)
- Department of Agriculture, Forestry and Fisheries controls

The regulations in terms of the Environmental Conservation Act (*Act 73 of 1989*) have been replaced by the new regulations identified in terms of Sections 24 and 24D of the National Environmental Management Act, 1998. To maximise the probability to obtain environmental authorisation for the proposed dam, impacts to the sensitive ecosystems and social community must be limited or prevented. If direct benefits to the local communities are less than the impact of the development on the communities, there will be a greater process risk.

Table 4-19 outlines the risks in terms of environmental legislation. For a detailed consideration of the enviro-legal issues related to the proposed project please refer to **Chapter 5** hereafter.

Table 4-19: Risk on Enviro-legal consideration

Field	Risk Description	Sufficient Information	Rating	Average
Enviro-legal	Negative Environmental Authorisation	No	3	**3**

4.20 SUMMARY OF RISKS

The risks as detailed in the sections above (i.e. Section 4.1 through 4.19) are summarised in **Table 4-20** below. Note that the key risk factors are presented, with the overall summed risk score for that specific environmental field given as the average. Cross linked to the risks is a summary of the studies (i.e. technical or specialist) that would need to be considered. Note that specific specialist studies (referenced according to the study number assigned in **Table 5-13**) that are of direct relevance to the specific environmental field are detailed under the "studies required" column. The legal permitting processes required and the legal triggers for the studies are considered in detail in the next section of this document, **Section 5**, please refer.

Table 4-20: Summary of Risks

Field	Risk Description	Ave	Interpretation of average score	Studies required (SS = Specialist Study)
		Biophysical		
Climate	• Changes due to project's presence • Impacts of climate change on project	**3.5**	**Uncertain**	*Covered in the EIA itself i.t.o. description of the affected environment.*
Geology	• Wall foundations • Geological stresses (incl. seismic issues) • Materials required from borrow-pits	**3**	**Uncertain**	To be addressed in Technical Studies SS 9: Geotechnical *Results of this study will remove most uncertainties and indicate whether any significant risks exist.*
Soil	• Erosion	**3**	**Uncertain**	To be addressed in Technical Studies SS 11: Erosion impact assessment *This will be derived from the sedimentation investigation – an addendum may be required to cross-link to implications that are wider the immediate dam basin itself.*
Fauna / Flora (Terrestrial)	• Loss of connectivity between ecosystems • Woodlands removal leads to habitat change • Alien invasion due to vegetation clearance • Impact on fauna • Impact on flora	**2.2**	**Less favourable** to Uncertain	SS 1: Biodiversity / ecological assessment SS 2: Herpetological & entomological assessment *Note that SS 2 focuses on known sensitive species (i.e. amphibians, reptiles and millipedes) in the area and will feed into SS1 which is a wider consideration of the biodiversity of the existing terrestrial ecosystem in the dam basin and surrounds, and the implications of inundation thereof.*
Riverine ecosystem	• Terrestrial vegetation clearance leads to habitat loss • Alterations to the aquatic ecosystem, reduction of water quality • Shift on animal niches	**2**	**Less favourable**	To be addressed in Technical Studies SS 1: Biodiversity / ecological assessment SS 2: Herpetological & Entomological assessment SS 3: Floodline determination / review SS 4: Wetland delineation / review SS 5: Watercourse & Wetland Information assessment (Limnology) SS 6: Aquatic SASS-5 assessment SS 7: Ichthyological Impact Assessment

Field	Risk Description	Ave	Interpretation of average score	Studies required (SS = Specialist Study)
	• Loss in connectivity between aquatic ecosystems • Impacts on downstream estuaries			*SS3 will come from the design of the dam as presented in the engineering investigation. This investigation being influenced by the remainder of the technical studies. Maximum level of inundation (floodline) considered i.t.o. ecological implications.* *The specialist information relating to the various facets of the ecosystem will be covered by the specialist studies detailed above. Baseline information will come from the technical studies, and in the case of SS 3, 4 & 5 the findings from these studies will be taken across into the EIA for assessment will minimal additional information expected to be required*
Water quality	• Chemical pollution during construction • Anaerobic breakdown of organic matter forming methane • Water quality impacts due to reduced oxygen concentrations of the water • Sedimentation • Contamination of water sources (e.g. herbicides, pesticides, oocytes, sewage)	**2.6**	Less favourable to **Uncertain**	To be addressed in Technical Studies SS 5: Watercourse & Wetland Information assessment (Limnology) SS 6: Aquatic SASS-5 assessment *The focus in this situation is the impacts of the proposed development on the quality of the uMkhomazi and those that are reliant thereon. By default this information will cross-feed into the Social Impact Assessment process.*
Hydrology	• Storage capacity • Sedimentation • Streamflow change • Loss of river's status as being "undammed"	**2.25**	**Less favourable** to Uncertain	To be addressed in Technical Studies SS 3: Floodline determination / review SS 4: Wetland delineation / review SS 5: Watercourse & Wetland Information assessment (Limnology) SS 6: Aquatic SASS-5 assessment SS 7: Ichthyological Impact Assessment *The consideration for this field is of the linked changes to the river's functionality and the ecosystems and communities reliant thereon. The technical studies will be used as baseline information for the SSs.*
Agricultural potential	• Loss of arable land • Fragmentation of agricultural land • Reduced volumes of groundwater available for downstream farmers • Increased volumes of surface-water available for downstream farmers	**3**	**Uncertain**	To be addressed in Technical Studies SS 10: Agricultural soils study SS 12: Agricultural potential study *Note that this specialist facet cross-links to the Soil field detailed above.* *The focus of this study is the consideration of the impact on agriculture from a social and economic implication.*
Heritage Resources	• Loss of heritage resources • Loss of cultural resources	**3**	**Uncertain**	SS 8: Heritage study / review *Archaeological and paleontological status of greater site and immediate surrounds. Consideration of cultural resources within wider area. Potentially leading to separate permit (or interlinked into the Environmental Authorisation) from SAHRA: Amafa / Heritage KwaZulu-Natal. Although strictly speaking a socio-economic issue, these issues will inform / feed into the Social Impact Assessment and the various social technical studies.*

Field	Risk Description	Ave	Interpretation of average score	Studies required (SS = Specialist Study)
Displacement of persons	• Displacement of households • Reducing the availability of land to local people • Relocating people to areas under different traditional leadership	3	**Uncertain**	To be addressed in Technical Studies SS 15: Social Impact Assessment SS 16: Economic Impact Assessment *This factor will be considered as part of the wider socio-economic studies. The social impact assessment will be fed into by the public participation process and will thus cross-link strongly into the EIA process.*
Social & Economic				
Health and Safety	• HIV/AIDS infection • Water hazard • Accidents with construction vehicles	2.6	Less favourable to **Uncertain**	To be addressed in Technical Studies SS 13: Major Hazard Installation SS 14: Health Impact Assessment *A project of this size will by default pose a risk in terms of health and safety issues. Consideration of these issues will cross-link into the socio-economic considerations.*
Access routes	• Impact of the current road on households, people, children, cattle and goats in /close to access roads • Impact of new access roads • Impact on the ecosystems • Erosion of access roads	2.3	**Less favourable** to Uncertain	To be addressed in Technical Studies SS 15: Social Impact Assessment SS 16: Economic Impact Assessment SS 17: Tourism Potential Assessment SS 18: Visual Impact Assessment SS 19: Noise Impact Assessment SS 20: Traffic Impact Assessment SS 21: Town and regional planning *Access roads and the implications thereof will be considered to a greater or lesser degree within each of the above studies. The most critical links will be the technical studies, SS 15, 16 and obviously 20.*
Visual impacts	• Visual impacts – landscape level • Visual impacts – cultural landscape • Visual impacts – direct impact from infrastructure	3	**Uncertain**	To be addressed in Technical Studies SS 8: Heritage study / review SS 15: Social Impact Assessment SS 18: Visual Impact Assessment *Visual impacts have a range of scales – as such these will be considered dominantly in the VIA, but a lesser extent in SS 8 and 15.*
Infrastructural development	• Impacts on potential tourism and associated infrastructure • Impact on potential mining activities • Impact of infrastructure on local community • Impact on larger urban areas in KZN	3.25	**Uncertain** to Favourable	To be addressed in Technical Studies SS 15: Social Impact Assessment SS 16: Economic Impact Assessment SS 17: Tourism Potential Assessment SS 18: Visual Impact Assessment SS 19: Noise Impact Assessment SS 20: Traffic Impact Assessment SS 21: Town and regional planning *Infrastructural development and the implications thereof will be considered to a greater or lesser degree within each of the above studies. The most critical links will be the technical studies, SS 15, 17 and obviously 20.* *Critically in this consideration are the implications to the larger communities to be supplied with water.*
Loss of local income	• Loss of agricultural land • Loss of useful plants • People leaving sustainable works for temporary construction work • Development of new local income potential via possible tourism spin-offs • Development of	3	**Uncertain**	To be addressed in Technical Studies SS 12: Agricultural Potential Study SS 15: Social Impact Assessment SS 16: Economic Impact Assessment SS 17: Tourism Potential Assessment *This factor will be considered as part of the wider socio-economic studies. The social impact assessment will be fed into by the public participation process and will thus cross-link strongly into the EIA process.*

Field	Risk Description	Ave	Interpretation of average score	Studies required (SS = Specialist Study)
	water-based agricultural operations			
Social Environment	• Impact on quality of life of people • Impact on cultural dynamics (e.g. tensions, land claim triggers)	**2.5**	Less favourable to **Uncertain**	To be addressed in Technical Studies SS 15: Social Impact Assessment SS 16: Economic Impact Assessment *This factor will be considered as part of the wider socio-economic studies. The social impact assessment will be fed into by the public participation process and will thus cross-link strongly into the EIA process.*
Employment creation	• Employment of local people • Training local people • Impact of potential influx of workers – potential negative impact on locals	**3.3**	**Uncertain** to Favourable	To be addressed in Technical Studies SS 15: Social Impact Assessment SS 16: Economic Impact Assessment *This factor will be considered as part of the wider socio-economic studies. The social impact assessment will be fed into by the public participation process and will thus cross-link strongly into the EIA process.*
Public Participation	• Negative reaction to proposal • Potential appeal of environmental authorisation	**2.5**	Less favourable to **Uncertain**	*Covered in the EIA itself.* *Cross linked into the SIA (SS 15).*
Enviro-legal				
Enviro-legal	• Negative Environmental Authorisation	**3**	**Uncertain**	To be addressed in the EIA itself. *This will most likely be supplemented by a stand-alone legal review.* SS 22: Legal Review.

5. EXPECTED LEGISLATIVE TRIGGERS

5.1 ENVIRONMENTAL AND LEGAL

5.1.1 Overview

The purpose of the Environmental Legislative Requirements Assessment is to determine, within the scope of the preliminary information available to date, the legislative requirements specific to the project.

The tables below are a formal consideration of the relevant legislation, specifically the EIA Regulations and linked regulations, in response to the request to determine the potential environmental authorisation and/or related permit / licence requirements that would be needed before the project could be allowed to potentially continue.

This assessment is by nature a preliminary or "broad-brush" assessment, regarding the project-related information with respect to a range of issues. Limitations are encountered, such as only having a general knowledge of the specific physical area, with limited technical detail as many of the detailed studies specific to the project still need to take place, and limited site specific information. This is not considered to be a flaw, but is rather an indication of the relatively early stage of the development proposal. As such the information in this section is based on a "worst case" or a highly conservative scenario, set within the context of the information from the Pre-feasibility study undertaken previously.

Once detailed planning is undertaken, a number of the potential environmental triggers, or even possibly some of the permits/licences, may not be a legal requirement any longer and thus would not be needed in the forthcoming EIA process. Further fine-tuning of the project by the Client and the project team will thus inform the environmental-related authorisation/licensing processes required so as to allow the final determination of what legislative requirements will definitely be required.

Underneath each item presented below is a comment which elaborates on: (a) the reason why an activity may be triggered, and, (b) the potential consequence(s) to the project planning process or project details.

In the context of the Environmental legislation, a feasibility or screening exercise is not legally required, however, it is considered best practice for such a process to be undertaken. Screening is effectively the consideration of the proposed risks that may derive from the proposed development, coupled with a detailed enviro-legal assessment.

Screening is thus effectively one of the three major tasks undertaken in the Scoping phase of an EIA process, the second being consideration of the implications of the risks identified, and finally, the third being public participation.

As such, an intensive screening process effectively carries out a significant portion of the EIA's scoping phase via the consideration of (a) all relevant baseline information available, (b) existing specialist information already available and that which will be generated in the remainder of the technical evaluation of the project, (c) the details of all relevant associated legally permits and/or licences that will be triggered by the project, (d) preliminary review of critical issues, (e) the identification of definite fatal flaws, and (f) gathering all information into one easily accessible document from which the EAP team can work to thus expedite the EIA as far as possible. A screening process identifies the risks of the proposed development, a scoping process takes that one step further and considers the implications of those risks in the form of preliminary impact assessment.

It remains the responsibility of the independent EAP team once appointed to determine (a) whether they believe any issues have not been considered, (b) what additional specialist information is still required or what addendums are required to the information already gathered, (c) to consider the implications of the risks and carry out high level assessment of those risks in order to determine what possible impacts need to be considered further in detail in the second phase of the EIA.

The specialist information (including all technical) presented and/or linked to the ESR is then fed into the second (EIAR) phase of the EIA process as part of the detailed impacts consideration for the proposed development. By indicating in the ESR that specific specialist information, studies or reviews are required in the EIA process this does not mean that the information already being generated by the technical feasibility study may not serve to address all or part of those specialist information requirements.

A final point to note, an EIA by default, must consider the implications of implementing the various alternatives considered in comparison to the so-called "no go" option. That is, the precautionary principle states that should the risk be deemed too high, even with mitigation, the recommendation will be that the project may not proceed. As such at all times the aim is to consider all costs and benefits, both positive and negative, and to consider what the cumulative cost is of carrying out the proposal versus that of not carrying out the proposal. Such information will be presented in the EIA as a formal recommendation in such a manner that the competent authority, i.e. the DEA, can make an informed, unbiased decision as to whether the proposal may proceed or not

An example raised by the ***National Freshwater Environmental Protection Areas (NFEPA)*** of specific negative impact of this project is that of the "un-dammed" status of the uMkhomazi, which is one of only two rivers in South Africa with this status, with all related implications thereof; versus, the positive impact of the project as a whole which is the provision of a critical resource to two large urban areas with the knock-on economic and social implications thereof. The EIA will need to balance such conflicts and determine whether such a risk is acceptable or not, and validate their final recommendation based on information gathered and analysed by that time.

5.1.2 Legislation Tables and Consideration

In order to consider the legislation in detail, information is included below in tables specific to each legislative process and/or type. The tables consider the potentially relevant listed activities within the context of a piece of legislation as a specific facet of the environmental-related legislation active within South Africa.

It should be noted that should significant changes take place in terms of the project's base premises, or if specific thresholds as detailed below are: (a) exceeded, or, (b) fall below that level, then the conclusions drawn in this consideration may no longer be correct.

It is thus recommended that, as part of the authorisation and licensing processes to be carried out, an updated legislative review process should be carried out to ensure that the conclusions drawn here remain appropriate. This updated legislative review would form part of the EIA process once started, which would be the responsibility of the appointed EAP.

Please note that the underlining in some of the tables that follow is for site and/or development-specific emphasis purposes alone and is not part of the original legislation that it was taken from.

a) Environmental Impact Assessment

Table 5-1 to **Table 5-5** deal specifically with the implications of the EIA Regulations (*Government Notice Regulations (GN R) No. 543, 544, 545 and 546, of June 2010, as amended*). These regulations are the implementing regulations of the NEMA, as amended and are the dominant environmental legislative tools in South Africa controlling development with respect to environmental controls.

The EIA Regulations are linked to sets of listed activities, presented in 3 (three) addenda to the regulations (i.e. GN R No. 544, 545 and 546).

A contextual overview of the two EIA processes and the products that each process generates is presented in **Table 5-1** and **Table 5-2.** The information presented in these tables is drawn from the "***Arrangement of EIA Regulations (2010)***" (*GN R. 543*) in which the procedures required to be carried out in an EIA process are detailed.

The listed activities presented in **Table 5-3** and **Table 5-5** would require that a basic assessment (BA) process be undertaken, with those detailed in **Table 5-5** (*Listing Notice 3, GN R No. 546*) being province-specific and in addition to those listed in Listing Notice 1 (*GN R No. 544*).

A BA is the less intensive EIA process with only one required iteration of public participation, and thus is the quicker EIA process of the two. A BA is required for developments deemed to be potentially detrimental to the environment, but where the potential impact is deemed to be moderate.

A BA is defined in the EIA Regulations as ***"(A) basic assessment report"*** *means a report contemplated in regulation 22"*. Regulation 22 specifies (**Table 5-1**) the following:

Table 5-1: BA process definition (critical information alone presented)

BA information:
22.(2) A BA report must contain all the information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 25, and must include —
(a) details of — *(EAP specific)*;
(b) a description of the proposed activity;
(c) a description and a map of the property on which the activity is to be undertaken and the location of the activity on the property, or, if it is — … ;
(d) a description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;
(e) an identification of all legislation and guidelines that have been considered in the preparation of the BA report;
(f) details of the public participation process conducted … ;
(g) a description of the need and desirability of the proposed activity;
(h) a description of any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and on the community that may be affected by the activity;
(i) a description and assessment of the significance of any environmental impacts, including — ;
(j) any environmental management and mitigation measures proposed by the EAP;
(k) any inputs and recommendations made by specialists to the extent that may be necessary;
(l) a draft Environmental Management Programme containing the aspects contemplated in regulation 33;
(m) a description of any assumptions, uncertainties and gaps in knowledge;
(n) a reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
(o) any representations, and comments received in connection with the application or the BA report;
(p) the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants;
(q) any responses by the EAP to those representations, comments and views;
(r) any specific information required by the competent authority; and; …

Those listed activities presented in **Table 5-4** (*Listing Notice 2, GN R No. 545*) would require a full Scoping and Environmental Impact Report (S&EIR) process to be undertaken due to a perceived greater potential environmental impact.

An S&EIR is the more intensive EIA process due to greater detail required in terms of specialist studies, is longer due to a second iteration of the public participation process required in terms of Chapter 6 (*Regulations 54 – 57*) (*GN R. 543*). This 'larger' or more exhaustive process is required for developments deemed to potentially have a significant detrimental impact on the environment if not suitably controlled. A S&EIR is defined in the EIA Regulations as ***"(A)***

S&EIR" *means the scoping and environmental impact reporting process as contemplated in regulation* ***26*** *to regulation* ***35****"*. Regulations 26 – 35 indicate (**Table 5-2**):

Table 5-2: S&EIR process definition (critical information alone presented)

S&EIR information:
Content of scoping report 28.(1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include — (a) details of — *(EAP specific)*; (b) a description of the proposed activity; (c) a description of any feasible and reasonable alternatives that have been identified; (d) a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is — …; (e) a description of the environment that may be affected by the activity and the manner in which activity may be affected by the environment; (f) an identification of all legislation and guidelines that have been considered in the preparation of the scoping report; (g) a description of environmental issues and potential impacts, including cumulative impacts, that have been identified; (h) details of the public participation process conducted …; (i) a description of the need and desirability of the proposed activity; (j) a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity; (k) copies of any representations, and comments received in connection with the application or the scoping report from interested and affected parties; (l) copies of the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants; (m) any responses by the EAP to those representations and comments and views; (n) a plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include — …; (o) any specific information required by the competent authority; and… 31. (1) If a competent authority accepts a scoping report and advises the EAP … to proceed with the tasks contemplated in the plan of study for environmental impact assessment, the EAP must proceed with those tasks, including the public participation process for environmental impact assessment … and prepare an environmental impact assessment report in respect of the proposed activity. (2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision …, and must include — (a) details of — *(EAP specific)*; (b) a detailed description of the proposed activity; (c) a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is — …; (d) a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity; (e) details of the public participation process conducted …; (f) a description of the need and desirability of the proposed activity;

S&EIR information:

(g) a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;

(h) an indication of the methodology used in determining the significance of potential environmental impacts;

(i) a description and comparative assessment of all alternatives identified during the environmental impact assessment process;

(j) a summary of the findings and recommendations of any specialist report or report on a specialised process;

(k) a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;

(l) an assessment of each identified potentially significant impact, including — …;

(m) a description of any assumptions, uncertainties and gaps in knowledge;

(n) a reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

(o) an environmental impact statement which contains — ;

(i) a summary of the key findings of the environmental impact assessment; and

(ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;

(p) a draft Environmental Management Programme containing the aspects …;

(q) copies of any specialist reports and reports on specialised processes …;

(r) any specific information that may be required by the competent authority; and …

32. (1) An applicant or the EAP managing an application may appoint a person to carry out a specialist study or specialised process. …

33. A draft Environmental Management Programme must comply with Section 24N of the Act and include – …

(b) information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified …, including environmental impacts or objectives in respect of — …

(c) a detailed description of the aspects of the activity that are covered by the draft Environmental Management Programme;

(d) an identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);

(e) proposed mechanisms for monitoring compliance with and performance assessment against the Environmental Management Programme and reporting thereon;

(f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;

(g) a description of the manner in which it intends to —

(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;

(ii) remedy the cause of pollution or degradation and migration of pollutants;

(iii) comply with any prescribed environmental management standards or practices;

(iv) comply with any applicable provisions of the Act regarding closure, where applicable;

(v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

(h) time periods within which the measures contemplated in the Environmental Management Programme must be implemented;

S&EIR information:
(i) the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity; (j) an environmental awareness plan describing the manner in which — …; and (k) where appropriate, closure plans, including closure objectives.

Both process types will lead to an environmental authorisation (EA) being granted. Note that such an EA may be either positive or negative. In terms of the legislative requirements it should be noted that the EAP must at all times maintain its independence, thus providing an unbiased technical opinion of the potential impacts of the proposed development.

Entering into an EIA process does not guarantee that a positive EA will be obtained, or what the scope of such an EA may be (i.e. what specific parts of the development are allowed, or whether the entire preferred option is accepted as a whole). The consideration of such a process is carried out by the relevant competent authority, in this case the Department of Environmental Affairs (DEA).

As the project is of national importance and the applicant is a national department (i.e. the DWA), it is a legislative requirement that the competent authority must be the DEA and not the provincial authority even though the project is limited to KwaZulu-Natal province.

Note that only the relevant potential activities are presented in the tables below and the inapplicable sub-clauses are left out of the tables so as to make the tables easier to review.

Also note that the critical or dominant listed activities are indicated as such, these are the activities that could trigger fatal flaws.

The other activities, although not critical, will need to be considered in the resultant EIA process, but are unlikely to lead to fatal flaws for the project as a whole. **Table 5-3**, **Table 5-4** and **Table 5-5** refer to the EIA regulations, **Listing Notices 1, 2 and 3**, and the potential listed activities that may be triggered by the proposed development.

Table 5-3: EIA regulations: Listing Notice 1: GN R 544 (2010), requiring a BA process

Listing Notice 1	
Activity No.	**Activity Description**
The activities listed in Appendix 1 of Listing Notice 1 are identified in terms of Section 24(2)(a) of the NEMA as activities that may not commence without an EA from the competent authority. The investigation, assessment and communication of potential impact of activities must follow the procedure as prescribed in regulations 21 to 25 of the EIA Regulations published in terms of Section 24(5) of the NEMA. ***BA process required.***	
9	The construction of facilities or infrastructure exceeding 1 000 metres in length for the bulk transportation of water, sewage or storm water – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
Comment:	***CRITICAL / DOMINANT TRIGGER ACTIVITY:*** *The main part of the water transfer infrastructure is the proposed tunnel linking Smithfield Dam and the balancing dam to be constructed on the uMlaza River – this tunnel is in the region of 33 km long, and the internal diameter of the tunnel is given as 3 m. At either end of the tunnel a pipeline will be included; the length of each is as yet unknown. That is, the exact nature of the linkages from (a) the Smithfield Dam to the tunnel, (b) then a tunnel to the new balancing dam on the uMlaza River (in-stream), or, to the existing Baynesfield Dam (off-stream), and, (c) from the chosen balancing dam to the water treatment plant to be constructed, is also not known. The final linkage between the Impendle and Smithfield Dams is via the uMkhomazi River.* *Note that the scope of this consideration does not consider the water treatment plant or the mechanism of transfer from this plant to the Umlaas Road uptake point, as that forms part of the Umgeni Water scope of works.*
Definitions:	**"urban areas"** means areas situated within the urban edge (as defined or adopted by the competent authority), or in instances where no urban edge or boundary has been defined or adopted, it refers to areas situated within the edge of built-up areas.
10	The construction of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or …
Comment:	*The exact dimensions and power throughput of the sub-stations that are assumed to be required for the pump-stations related to the dams, pipelines and/or tunnel at the various sites of the project, are not yet finalised. It is, however, assumed that they could trigger this activity threshold (i.e. over 33 kV).*
11	The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs;

Listing Notice 1	
Activity No.	**Activity Description**
	(vi) bulk storm water outlet structures; … (x) buildings exceeding 50 square metres in size; (xi) infrastructure or structures covering 50 square metres or more; where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
Comment:	***CRITICAL / DOMINANT TRIGGER ACTIVITY:*** *A number of watercourses could be impacted on by this development. The extent and significance of this impact can only be determined through the EIA process. In terms thereof, the range of possible impacts may include some or all of the above structures.* *Primarily the uMkhomazi River could be affected due to inundation at both the Impendle and Springfield Dam basins, as both are to be in-stream dams along portions of the uMkhomazi River.* *The uMlaza River could be impacted on by the proposed balancing dam to receive the transferred water from the uMkhomazi River, near the existing Baynesfield Dam; this could also be an in-stream dam on the river.* *In addition, tributaries of the uMkhomazi and uMlaza rivers may be modified by (a) inundation from the dams, (b) crossings for related facilities (e.g. pipeline crossings, access road crossings, powerlines, culverting, stormwater control systems, footprints of infrastructure intruding into the floodplain / 32 m buffer area along watercourses, tunnel related infrastructure at entrance and exit points, etc.). Note that the presence of adits / maintenance access points to the tunnel will also have footprint implications.* *The chances of this specific listed activity being triggered is thus deemed definite, but should be confirmed in relation to the alignment and exact position of each.* *A survey should be carried out to determine the presence of, and, if present, the delineation of any wetlands (including perched aquifers) associated with the watercourses, that may be impacted on by the proposed development.*
Definitions:	**"development setback"** means a setback line as defined or adopted by the competent authority and where none has been defined or adopted it will be assumed that no setback line applies. "**watercourse**" means – a) a river or spring; b) a natural depression in which water flows regularly or intermittently; c) a wetland, lake or dam into which, or from which, water flows; and d) any collection of water which the Minister may, …, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks; and "**wetland**" means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically (i.e. 3 months) covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.
12	The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 19 of Listing Notice 2 (i.e. GN 545 of 2010).
Comment:	*This specific activity could be triggered if the dam wall of the Baynesfield Dam is proposed to be extended / heightened. All other impoundments are in-stream and thus would fall within the ambit of Listing Notice 2, activities 10 and 19.*
Definitions:	**"dam"** when used in these regulations means any barrier dam and any other form of impoundment used for the storage of water.
13	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined

Listing Notice 1	
Activity No.	**Activity Description**
	capacity of 80 but not exceeding 500 cubic metres.
Comment:	*"Dangerous goods" that are likely to be associated with the greater project, are fuel stores for generators at the various pumping station sites, as well as any such goods used within the sub-stations per site. Each site could have a fuel supply for the various stand-by generators required for provision of electricity to the critical components of the process, i.e. the pump station(s).* *The total capacity thereof needs to be determined for the project as a whole and determined whether this listed activity is in fact triggered. The tanks for the fuel are expected to have a capacity of 20 – 30 Kℓ per pumping station site.* *Other identified dangerous goods capacities should be factored into any calculations. This will form part of an inventory of all substances to be used per site, and as only 1 (one) EIA is being carried out, summed across the greater project. It is considered possible that the lower threshold of 80 m^3 / Kℓ could be breached.* *This information will be needed before the EIA application is lodged with the DEA.*
Definitions:	**"dangerous goods"** means goods as contemplated in South African National Standard No. 10234, supplement 2008 1.00: designated "List of classification and labelling of chemicals in accordance with the Globally Harmonized System (GHS)" published by Standards South Africa.
18	The infilling or depositing of any material of more than five cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse; … but excluding where such infilling, depositing, dredging, excavation, removal or moving … (ii) occurs behind the development setback line.
Comment:	***CRITICAL / DOMINANT TRIGGER ACTIVITY:*** *During the building of various dam related infrastructure, the linking pipelines, and, the tunnel (approximately 33 km), the chance of modifying a watercourse through the infilling or removal of more than 5 m^3 of material therein, is considered to be definite.* *A query raised as part of this review relates to where the excavated materials from the tunnel will be deposited. The positioning of the waste material could trigger an EIA listed activity in and of itself. The fate of this material will thus need to be made clear during the scoping phase of the EIA.*
19	Any activity which requires a prospecting right or renewal thereof in terms of Section 16 and 18 respectively of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).
Comment:	*In terms of a Memorandum of Understanding (MoU) between the Department of Water Affairs (DWA) and the Department of Mineral Resources (DMR), it is noted that the DWA is formally exempt from the conditions of the Mineral and Petroleum Resources Development Act (MPRDA, Act No. 28 of 2002) (refer to the MMTS2 project EIA review). The single requirement being that the DWA must identify a potential quarry or borrow pit (if so required), complete the relevant forms, submit the forms to the DMR, have an EMPr ready at the site, and then continue with excavations without a permit from the DMR.* *In terms of this consideration it is noted that this requirement will be triggered by the presence of borrow pits – it is, however, further noted that the intention is to place the borrow pit(s) within the dam basins to limit the impact thereof, and to limit the need to transport the materials to the point of usage.*
20	Any activity requiring a mining permit in terms of Section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) or renewal thereof.
Comment:	*As per activity 19 above.*

Listing Notice 1	
Activity No.	**Activity Description**
22	The construction of a road, outside urban areas, (i) with a reserve wider than 13.5 meters or, (ii) where no reserve exists where the road is wider than 8 metres, …
Comment:	*Access roads to the sites – either in terms of upgrading of existing roads to facilitate access to the sites (i.e. dams, tunnel and pipelines) by the construction equipment – could trigger this activity. This will need to be confirmed prior to the inception of the EIA process.*
26	Any process or activity identified in terms of Section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Comment:	***CRITICAL / DOMINANT TRIGGER ACTIVITY:*** *The sites all fall within the rural portions of KwaZulu-Natal between the Drakensberg foothills and the urban areas closer to Pietermaritzburg, forming part of the so-called Midlands area.* *Of the various portions of the scheme, the dam basin (including the dam and related infrastructure) of the proposed Impendle Dam may fall within or close to a defined biodiversity "hotspot". The information provided in the regulations released in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004): "*National list or ecosystems that are threatened and in need of protection*" (GN R. 1002, 9 December 2011) indicates that the site may occur within Listed Area 81: "*Impendle Highlands*". The resolution and clarity of the map included in the Gazetted Regulations is however not clear and as such this would need to be addressed in detail in the required biodiversity study to be undertaken as part of the paired EIAs.* *Biodiversity sensitive areas on the uMlaza River appear to be limited to the Mlazi Gorge (Listed Area 29), which is within a few kilometres of the Indian Ocean.* *Further it is clear that given the sheer size of the area impacted on by the proposed project the potential to impact on a species of biodiversity importance, as well as areas that show a combination of biodiversity relevant factors, is highly probable.* *It is noted that the exact status of the greater site and its component areas would need to be confirmed in the site specific biodiversity studies that would form part of the EIA process as a critical specialist study.*
37	The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where: (a) the facility or infrastructure is expanded by more than 1 000 metres in length; or (b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more – excluding where such expansion: (i) relates to transportation of water, sewage or storm water within a road reserve; or (ii) where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
Comment:	*The DWA part of the project is not an expansion of an existing bulk transportation system, but as the EIA will consider the linkage to the Umlaas Road infrastructure as controlled by Umgeni Water, this activity could be triggered in respect thereof.*

Listing Notice 1	
Activity No.	**Activity Description**
39	The expansion of (i) canals; (ii) channels; (iii) bridges; (iv) weirs; (v) bulk storm water outlet structures; … within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.
Comment:	*Existing infrastructure not specifically related to the project may be impacted on by the proposed development. This is not considered a critical issue, but it is a listed activity that should be included in the activities triggered by the proposed project.*
40	The expansion of … (iii) buildings by more than 50 square metres; or (iv) infrastructure by more than 50 square metres within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, but excluding where such expansion will occur behind the development setback line.
Comment:	*Although not within the scope of the DWA portion of the project, the presence of the new or expanded water treatment plant at Umlaas Road would trigger this activity.*
41	The expansion of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, where the combined capacity will be increased by 50 000 cubic metres or more.
Comment:	*Should the Baynesfield Dam be used as the balancing dam after the tunnel, this listed activity would be triggered. This would obviously be linked to the volume of water that would be held in the Baynesfield Dam in addition to its normal capacity prior for transferring to the Umlaas Road water treatment works.*
47	The widening of a road by more than 6 metres, or the lengthening of a road by more than one kilometre – (i) where the existing reserve is wider than 13.5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres – …
Comment:	*This activity is considered to be unlikely, but should be checked for relevance once more detailed plans are in place.*
52	The expansion of facilities or infrastructure for the transfer of water from and to or between any combination of the following: (i) water catchments; (ii) water treatment works; or (iii) impoundments; where the capacity will be increased by 50 000 cubic metres or more per day, but excluding water treatment works where water is treated for drinking purposes.
Comment:	*This does not apply as the DWA portion of the proposal as the development is for a new water transfer project, not expansion of an existing system. This activity may, however, be triggered by the Umgeni Water portion of the project as the Umlaas Road linkage is already extant.*

Listing Notice 1	
Activity No.	**Activity Description**
55	The expansion of a dam where: (i) the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, was originally five metres or higher and where the height of the wall is increased by 2.5 metres or more; or (ii) where the high-water mark of the dam will be increased with ten hectares or more.
Comment:	*This will only be relevant should it be decided that using the Baynesfield Dam as a balancing dam is the preferred option. This option will thus be useful as an alternative within the EIA process used in comparison to the current preferred option of a new in-stream balancing dam on the uMlaza River.*
56	Phased activities for all activities listed in this Schedule, which commenced on or after the effective date of this Schedule, where any one phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold; – excluding the following activities listed in this Schedule: 11(i)-(vii); 19; 20; 22(i); 26; 39 *(only relevant items are listed).*
Comment:	*Phased activities are of importance when, by considering the different phases individually, the thresholds are not exceeded and thus (a) instead of a BAR, no authorisation would be needed or, (b) instead of a S&EIR, only a BAR would be needed.*
Definitions:	**"phased activities"** means an activity that is developed in phases over time on the same or adjacent properties to create a single or linked entity through interconnected internal vehicular or pedestrian circulation, sharing of infrastructure, or the continuum of design, style or concept by the same proponent or his or her successors.

Table 5-4: EIA regulations: Listing Notice 2: GN R 545 (2010), requiring a S&EIR process

Listing Notice 2	
Activity No.	**Activity Description**
The activities identified in Appendix 1 of Listing Notice 2 may not commence without EA from the competent authority. The investigation, assessment and communication of the potential impact of activities must follow the procedure as prescribed in regulations 26 to 35 of the EIA Regulations. ***S&EIR process required.***	
1	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.
Comment:	*The power generation potential of the various portions of the site via some form of hydropower is deemed unlikely to be above this threshold of 20MW or more and thus on the issue of power generation specifically it is assumed that the greater project should not trigger this specific threshold. This is due to the fact that the intention is the transfer of water, rather than hydropower* per se. *It is, however, noted that should a pumped storage scheme be linked to the proposed Impendle Dam at a later point, not clearly specified at this point, so as to link into the Eskom network, such an activity could probably trigger this specific activity. Such a pumped storage scheme (PSS) was mentioned in the "Mkomazi-Mgeni Transfer Scheme Pre-feasibility Study", to quote: "*Eskom showed a keen interest in the development of the Impendle Dam for its potential to support a pumped storage scheme which they investigated concurrently with the DWAF pre-feasibility study. At the time Eskom considered this pumped storage scheme as the one with the best potential in the country, after a scheme on the Steelpoort River. Unfortunately, the PSS had to be put on hold until the need to construct the Impendle Dam would arise. At the

Listing Notice 2	
Activity No.	**Activity Description**
	time it seemed as though the dam would only be required by 2014, or later, depending on how successful the eThekwini MM [Metropolitan Municipality] would be with their WCDM [Water Conservation Demand Management] initiative." *As such, the potential inclusion of a PSS could be considered in the EIA process for the project as a whole. If it is, however, not deemed to be a concern at this time, the PSS could be left out of the current EIA consideration. In this scenario the DWA should be aware that a separate EA would need to be obtained from an extra S&EIR process specific thereto when it is decided to go ahead with the PSS portion of the greater water scheme.* *In terms of saving both effort, time and to limit costs, it is recommended that if information is available with respect to the proposed PSS that the scope of the project be extended to include this additional item.* *It is noted that although the initial date of the start of construction is constrained by an EA, subsequent activities approved within an EA may be implemented over a number of years. Should the exact specifications of the PSS require amendment prior to it being developed, it would be easier to obtain an amendment specific thereto at that time, rather than to carry out a new EIA specific to that portion of the greater scheme alone.*
8	The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.
Comment:	*The total project site is considered to be likely to transmit and/or distribute electricity at a level higher than this threshold. This is due to the significant power requirements relating mainly to the various pumping station(s) linked into the system.* *The exact number and specifications (i.e. electrical requirements) of the pumping stations to be included within the greater scheme is not clear at this point. Such information will need to be clarified prior to the EIA processes being started.* *It should however be noted that the trigger for an EIA would potentially fall within the requirements to be met on the part of Eskom and not fall within the EIAs specifically related to the water portion of the scheme.*
10	The construction of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following: (i) water catchments, (ii) water treatment works; or (iii) impoundments, excluding treatment works where water is to be treated for drinking purposes.
Comment:	***CRITICAL / DOMINANT TRIGGER ACTIVITY:*** *As per the original tender documents, the following preliminary figures were extracted and considered in terms of the listed activity above. The combined capacity of the total scheme, including both phases of the Impendle Dam, is given as over 300 million m^3 / annum in 2040. The threshold above converted to a yearly amount is 18.25 million m^3 / annum. As such the final combined capacity of the scheme is in excess of this by a factor of more than 15 times.* *The Phase 1 pumping rate of the Smithfield Pumping Station of 7.0 m^3 / second, gives a potential pumping volume of 604 800 m^3 / day if a constant maximum pumping rate is met for 24 hours. This obviously significantly exceeds the threshold above. Although a maximum pumping rate for 24 hours of a day is unlikely, the maximum potential capacity of the transfer must be considered in light of the above listed activity.* *As such it is confirmed that the scope of this proposal definitely triggers this listed activity.* *Note that the exclusion only excludes treatment works and not the transfer between catchments, different treatment works, or impoundments.*

Listing Notice 2	
Activity No.	**Activity Description**
19	The construction of a dam, where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is five metres or higher or where the high-water mark of the dam covers an area of ten hectares or more.
Comment:	***CRITICAL / DOMINANT TRIGGER ACTIVITY:*** *The proposed dams included within the scheme, i.e. the Smithfield and Impendle Dams, are significantly in excess of the 5 m threshold, and are far in excess of the 10 ha threshold. For instance, the proposed Smithfield Dam feeding into the tunnel is given as having an area of 580 ha with a height of 71 m (Figure 4: Pre-feasibility Study Dam, Tender documentation). The Impendle Dam (phase 1 and then later phase 2) is larger than Smithfield.* *The dimensions of the dams and impoundments will need to be confirmed as accurately as possible for consideration in the EIA process.*
20	Any activity which requires a mining right or renewal thereof as contemplated in sections 22 and 24 respectively of the MPRDA, 2002 (Act No. 28 of 2002).
Comment:	*As per Listing Notice 1, activity 19 above.*
21	Any activity which requires an exploration right or renewal thereof as contemplated in sections 79 and 81 respectively of the MPRDA, 2002 (Act No. 28 of 2002).
Comment:	*As per Listing Notice 1, activity 19 above.*

Table 5-5: EIA regulations: Listing Notice 3: GN R 546 (2010), requiring a BA process (province-specific)

Listing Notice 3	
Activity No.	**Activity Description**
The activities listed in Appendix 1 of Listing Notice 3 are identified in terms of Section 24(2)(a) of the Act as activities that may not commence without an EA from the competent authority. The investigation, assessment and communication of potential impact of activities must follow the procedure as prescribed in regulations 21 to 25 of the EIA Regulations published in terms of Section 24(5) of the Act. ***BA Process required.***	
2	The construction of reservoirs for bulk water supply with a capacity of more than 250 cubic metres: (a) In … KwaZulu-Natal … provinces: (iii) Outside urban areas, in: (aa) National Protected Area Expansion Strategy Focus areas; (bb) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (cc) Sites or areas identified in terms of an International Convention; (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Areas within ten kilometres from national parks or world heritage sites or five kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve …
Comment:	*The above items will need to be confirmed in detail in the biodiversity study as part of the S&EIR process; with this list serving as an indicator of specific items to consider.*

Listing Notice 3	
Activity No.	**Activity Description**
	*Note that only those deemed to be potentially relevant are listed above. Note that item (cc) includes Ramsar sites (refer to definitions below). It should be noted that as per the consideration in **Tables 5-3** and **5-4** above, the project will require a S&EIR as a minimum and thus this trigger is not crucial but should rather be considered in the EIA process as a checklist to ensure all relevant biodiversity factors are considered.*
Definition:	***"bioregional plan"** means the bioregional plan contemplated in Chapter 3 of the NEM:BA;* ***"indigenous vegetation"** refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years;* ***"National Protected Area Expansion Strategy"** means South Africa's national strategy for expansion of the protected area network, led by the DEA and developed in collaboration with national and provincial conservation authorities. The NPAES sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. Focus areas for protected area expansion are identified in the NPAES. They are large, intact, unfragmented areas of high importance for land-based protected area expansion, suitable for the creation or expansion of large protected areas;* ***"NEM: BA"** means the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004);* ***"NEM: PAA"** means the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003);* ***"protected area"** means those protected areas contemplated in Section 9 of the NEMPAA and the core area of a biosphere reserve and shall include their buffers;* ***"sites or areas listed in terms of an International Convention"** means any area and its buffer, unless specifically defined, of five kilometres extending from its listed boundary, listed in terms of an international convention but does not include world heritage sites, and shall include but not be limited to the Ramsar Convention on Wetlands (Ramsar, Iran, 1971);* ***"systematic biodiversity plan"** is a plan that identifies important areas for biodiversity conservation, taking into account biodiversity patterns (i.e. the principle of representation) and the ecological and evolutionary processes that sustain them (i.e. the principle of persistence). A systematic biodiversity plan must set quantitative targets/thresholds for aquatic and terrestrial biodiversity features in order to conserve a representative sample of biodiversity pattern and ecological processes.*
4	The construction of a road wider than 4 metres with a reserve less than 13,5 metres: (a) In … KwaZulu-Natal … provinces: (iii) Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; … (gg) Areas within ten kilometres from national parks or world heritage sites or five kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve …

Listing Notice 3	
Activity No.	**Activity Description**
Comment:	*The potential construction of new access roads – to access the dams and to replace access roads to dwellings that are inundated by the dam/s will be needed. It is considered highly likely that these will be more than 4 m wide (i.e. one or more lane wide), but with a reserve of less than 13.5 m, and occurring with areas that are deemed to be important from a biodiversity point of view. As such even if the road-specific listed activities from Listing Notices 1 or 2 are not triggered, this province-specific activity would require that a BA process be followed, or to form part of a S&EIR process if that is triggered by other activities, as it is.*
10	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres: (a) In … Kwazulu-Natal … provinces: (ii) Outside urban areas, in: (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (b) Areas within ten kilometres from national parks or world heritage sites or five kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve. (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined
Comment:	*As per activity 2.* *It should be noted that if the capacity of "dangerous goods" is under 80 m^3 (kℓ) for the entire project, as detailed in Table 3, this specific activity would be triggered by default. It should also be noted that in the case of this activity, the lower triggering threshold is due to the sensitivity of the greater environment specifically in terms of biodiversity issues.*
12	The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation: (a) Within any critically endangered or endangered ecosystem listed in terms of Section 52 of the NEM: BA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; (b) Within critical biodiversity areas identified in bioregional plans.
Comment:	*As per activity 2.*
13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where … *(not applicable)*. (a) Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority. (c) In … KwaZulu-Natal …: (ii) Outside urban areas, the following: (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent

Listing Notice 3	
Activity No.	**Activity Description**
	authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Areas within ten kilometres from national parks or world heritage sites or five kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;
Comment:	*As per activity 2 – this will need to be confirmed in the biodiversity study, but especially within the dam basins it is considered to be a definite trigger. The cumulative size of the construction camps and the construction lay-down areas is almost certainly large enough to cross the threshold of 1 ha (10 000 m^2) and thus these areas should be considered in terms of this activity in the EIA process.*
14	The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where … *(not applicable)*: (a) In … KwaZulu-Natal …: (i) All areas outside urban areas.
Comment:	*As per activity 2 – this will need to be confirmed in the biodiversity study, but especially within the dam basins it is considered to be a definite trigger.*
16	The construction of: (iii) buildings with a footprint exceeding ten square metres in size; or, (iv) infrastructure covering ten square metres or more, where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. (a) In … KwaZulu-Natal …: (ii) Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Areas within ten kilometres from national parks or world heritage sites or five kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.
Comment:	*As per activity 2 – this will need to be confirmed in the biodiversity study, but especially within the dam basins it is considered to be a definite trigger.*
17	The expansion of reservoirs for bulk water supply where the capacity will be increased by more than 250 cubic metres: (a) In … KwaZulu-Natal … provinces: (i) Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework

Listing Notice 3	
Activity No.	**Activity Description**
	as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an International Convention; (ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; … (hh) Areas within ten kilometres from national parks or world heritage sites or five kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;
Comment:	*This is specific to the potential expansion of Baynesfield Dam as the required balancing dam after the transfer tunnel, should that be considered in the EIA process.*
19	The widening of a road by more than 4 metres, or the lengthening of a road by more than one kilometre: (a) In … KwaZulu-Natal … provinces: (ii) Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; … (gg) Areas within ten kilometres from national parks or world heritage sites or five kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; … (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined
Comment:	*As per activity 2 – this will need to be confirmed in the biodiversity study, but especially within the dam basins it is considered to be a definite trigger.*
26	Phased activities for all activities listed in this Schedule and as it applies to a specific geographical area, which commenced on or after the effective date of this Schedule, where any phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold: All the areas as identified for the specific activities listed in this Schedule.
Comment:	*As per the previous phased development listed activities in **Tables 5-3** and **5-4**.*

Summary:

Given the considerations in **Tables 5-3** to **5-5** above, it is deemed that as a minimum an **S&EIR process will be triggered**. This is not unexpected given the scale of the project at hand. It should be noted that specific triggering activities for the BA process, although a lesser process, should be used as a form of

checklist by the EAP to ensure that all facets of the project are considered in terms of the full suite of listed activities relevant to the proposed project.

Items related to the third set of listed activities will need to be confirmed in the biodiversity study which will need to be undertaken as part of the EIR phase of the S&EIR. This will form a critical requirement of the EIA process.

b) Atmospheric emissions

Given the information provided to date on the proposed development, the potential for air / atmospheric emissions being generated is acknowledged to be unlikely.

The major potential air pollutants to be generated relate to the construction process alone and would be limited to dust and vehicle emissions. These, although considered an irritant and needing to be considered and mitigated for in terms of the EIA process and its resultant Environmental Management Programme (EMPr), do not require an atmospheric emissions licence as controlled by the National Environmental Management: Air Quality Act (*Act No. 39 of 2004*): "**Listed Activities and Associated Minimum Emission Standards**" (GN R 248, March 2010, as identified in Terms of Section 21 of the Act). These listed / scheduled activities are those which may result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social, economic, ecological or cultural heritage conditions.

Table 5-6 overleaf provides a preliminary overview of the potential triggers for an atmospheric emissions licence.

Table 5-6: Listed activities / categories: GNR 248 (2010), requiring an atmospheric emissions license

Listed Activities / Categories – Atmospheric Emissions Licence	
Category No.	**Activity Description**
Category 1: Combustion installations	
None applicable to the proposed development.	
Category 2: Petroleum industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass	
Sub-category ('Sub-cat') 2.2	Storage and handling of petroleum products: Petroleum product storage tanks and product transfer facilities, except those used for liquefied petroleum gas. All permanent immobile liquid storage tanks larger than 500 m^3 cumulative tankage capacity at the site.
Comment:	*It is considered unlikely that fuel will be kept on the site(s) at a total combined capacity approaching this threshold.*
Category 3: Carbonization and coal gasification	
None applicable to the proposed development.	
Category 4: Metallurgical industry	
None applicable to the proposed development.	
Category 5: Mineral processing, storage and handling	
Sub-cat 5.1	Storage and handling of ore and coal: Storage and handling of ore and coal not situated on the premises of a mine or works as defined in the Mines Health and Safety Act 29/1996: Locations designed to hold more than 100 000 tons.
Comments:	*Clarification should be sought from the DMR in respect of this specific sub-category although it is considered that the chances of this sub-category being a trigger for this specific project are unlikely.* *It would all relate to whether the material removed, especially from the tunnel, would be deemed to be spoil or whether it would be considered a functional product. It is recommended that the EAP seek clarification on this issue once appointed.*
Sub-cat 5.8	Macadam preparation: The production mixtures of aggregate and tar or bitumen to produce road surfacing in permanent facilities and mobile plants: All plants.
Comments:	*It is unclear as to whether the need for such a mobile plant would be required for the proposed project.* *The need therefor should be considered in terms of the potential need for an atmospheric emissions permit if this should be the only potential triggering activity.*
Category 6: Organic chemicals industry	
None applicable to the proposed development.	
Category 7: Inorganic chemicals industry	
None applicable to the proposed development.	
Category 8: Disposal of hazardous and general waste	

Listed Activities / Categories – Atmospheric Emissions Licence	
Category No.	**Activity Description**
Category 8	Facilities where general and hazardous waste including health care waste, crematoria, veterinary waste, used oil or sludge from the treatment of used oil, are incinerated: Facilities with an incinerator capacity of 10 kg of waste processed per hour or larger capacity.
Comments:	*Any waste disposed of will not be incinerated by will be disposed of as per the waste management system that shall be developed as part of the outcomes of the waste EIA process.*
Category 9: Pulp and paper manufacturing activities, including by-products recovery	
None applicable to the proposed development.	
Category 10: Animal matter processing	
None applicable to the proposed development.	

Summary:

Given the considerations in **Table 5-7** above, it is deemed that the need for an **atmospheric emission licence** is not likely to be triggered.

c) Waste issues

The EIA Regulations were split in 2008 into "general" versus "waste-specific" listed activities. This process was legislated as part of the drafting and approval of the National Environmental Management: Waste Act (*NEM: WA, Act No. 59 of 2008*) and its related regulations (*GN R 718, 2009*). The waste-specific regulations giving the waste-specific listed activities were gazetted in July 2009 as Government Notice Regulations No. 718, with all waste-specific listed activities then removed from the general EIA Regulations.

Due to the inclusion of a definition for a "by-product" which is not considered to be a "waste", opportunities should be investigated within this project for the re-use of any potential waste products from the greater site. This re-use will allow for such materials to be considered as "by-products" (see definition below), which would reduce the waste amount produced by the site and thus any legislative constraints on the site. It is recommended that these potential by-products be investigated as part of the required alternative consideration within the EIA process.

It is recommended that the site specific construction and operation / maintenance of infrastructure be linked to an integrated waste management strategy which would further serve to limit any potential pollution events (e.g. oil and/or fuel from pumping stations and associated electrical sub-stations or their stand-by generators, or silt-laden water extracted from geotechnical boreholes, or concrete waste from the on-site batch plant at the dam walls).

Table 5-7 considers those possible activities that may trigger a waste-specific BA process. Note that the waste process may be combined with a general-category EIA process to a certain extent, but that some items have to be separately provided as they are only required in terms of the waste-specific process. A critical separate item is the waste license permit.

Table 5-7: Schedule 1 – Category A: GN R 718 (2009), triggering the need for an BA process

Schedule 1, Category A (Waste-specific)	
Schedule No.	**Activity Description**
3. A person who wishes commence, undertake or conduct an activity listed under this category (i.e. Category A)*, must conduct a BA process, as stipulated in the EIA Regulations made under Section 24(5) of the NEMA, 1998 (Act No. 107 of 1998) as part of a waste management licence application.*	
Definitions:	***"by-product"*** *means a substance that is produced as part of a process that is primarily intended to produce another substance or product and that has the characteristics of an equivalent virgin product or material.* ***"general waste"*** *means waste that does not pose an immediate hazard or threat to health or to the environment, and includes—* *(a) domestic waste;* *(b) building and demolition waste;* *(c) business waste; and* *(d) inert waste.* ***"hazardous waste"*** *means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.* ***"storage"*** *means the accumulation of waste in a manner that does not constitute treatment or disposal of that waste.* ***"temporary storage"*** *means continuous storage of waste, excluding a once-off storage of waste for a period not exceeding 90 days.* ***"waste"*** *means any substance, whether or not that substance can be reduced, re-used, recycled and recovered—* *(a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;* *(b) which the generator has no further use of for the purposes of production;* *(c) that must be treated or disposed of; or*

Schedule 1, Category A (Waste-specific)	
Schedule No.	**Activity Description**
	(d) that is identified as a waste by the Minister by notice in the Gazette, *and includes waste generated by the mining* (i.e. including spoil material from the dam wall sites and the tunnel excavation)*, medical or other sector,* *but—* *(i) a by-product is not considered waste; and* *(ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.*
Schedule (S.) 3(1)	Storage of waste: The storage, including the temporary storage, of general waste at a facility that has the capacity to store in excess of 100 m^3 of general waste as any one time, excluding the storage of waste in lagoons.
Comments:	*This threshold is considered very likely to be exceeded due to the spoil removed from the dam wall construction sites as well as from the tunnel. As such as a minimum a BA process w.r.t. the waste regulations will be required.* *Spoil removed from a tunnel may be considered to be a mining operation. If the removed rock/spoil can recycled / re-used via being crushed and used in the building of the dam wall or other infrastructure, it could be considered a by-product. This would depend on the geotechnical investigation which should determine the quality of the to-be-excavated spoil / rock. Feedback from the geotechnical study should be used to inform the potential minimisation of the amount of spoil that will need to be disposed of.*
S. 3(2)	Storage of waste: The storage, including the temporary storage of hazardous waste at a facility that has the capacity to store in excess of 35 m^3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons.
Comments:	*The potential for exceeding this threshold is uncertain based on the information provided to date. It is thus indicated that this issue should be revisited once more detailed knowledge is obtained with respect to the waste streams from the process and the handling thereof.* *Should the storage level remain below 35 m^3 then a waste-specific EIA process might not be required, however, this remains at the discretion of the competent authority. If this threshold is exceeded and hazardous waste is kept stored on the site for more than 90 days at a time, then a waste-specific BA process would be required.* *If the 90 day storage period is exceeded, the storage would then be defined as no longer being "temporary" and would thus trigger an S&EIR process (refer to Table 8 below).*
S. 3(7)	Re-use, recycling and recovery: The recycling or re-use of general waste of more than 10 tons per month.
Comments:	*The potential for exceeding this threshold is considered to be high due to the sheer volume of spoil material that will be generated by the construction of the dam walls and excavation of the tunnel, IF a waste minimisation process is put into place reducing the amount of waste that is not re-used in some manner. This activity is thus considered to be a probable trigger for a waste-specific BA process.*
S. 3(14)	Disposal of waste: The disposal of inert waste in excess of 25 tons and with a total capacity of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation.
Comments:	*The potential for exceeding this threshold is considered to be high due to the sheer volume of spoil material that will be generated by the construction of the dam walls and excavation of the tunnel. This activity is thus considered to be a probable trigger for a waste-specific BA process.*
S. 3(18)	Construction, expansion or decommissioning of facilities and associated structures and infrastructure: The construction of facilities for activities listed in Category A of this Schedule (not in isolation to an associated activity).

Schedule 1, Category A (Waste-specific)	
Schedule No.	**Activity Description**
Comments:	*Processing plants for the handling of waste will need to be on site due to the isolation of such sites from urban areas. This activity is thus linked to the other identified activities listed above.*

Table 5-8 considers those possible activities that may trigger a Waste-specific S&EIR process. As noted above such a process may be linked to a general-category EIA process, with the exception of a limited number of items which are specific to the waste legislation such as, for instance, the completion of the required waste license form. The EAP should indicate the potential for minimisation of work through combining of those processes which may be combined as far as is feasible.

Table 5-8: Schedule 1 – Category B: GN R 718 (2009) – triggering the need for an S&EIR process

Schedule 1, Category B (Waste-specific)	
Schedule No.	**Activity Description**
4. A person who wishes to commence, undertake or conduct an activity listed under this category (i.e. Category B)*, must conduct an environmental impact assessment process, as stipulated in the EIA Regulations made under Section 24(5) of the NEMA, 1998 (Act No. 107 of 1998) as part of a waste management licence application.*	
Definitions:	*As per **Schedule 1: Category A** table above.*
Schedule 4(10)	*Disposal of waste on land: The disposal of general waste to land covering an area in excess of 200 m^2.*
Comments:	*The potential for exceeding this threshold is considered to be high due to the sheer volume of spoil material that will be generated by the construction of the dam walls and excavation of the tunnel.* *As such as a minimum a S&EIR process w.r.t. the waste regulations will be required.*

Summary:

Given the considerations in **Tables 5-7** and **5-8** above, it is likely that a waste-specific EA requirement would be triggered, at an **S&EIR** level of detail due to the volume of spoil material that is expected to be generated by the construction of the dam walls and the tunnel excavation.

It is recommended that the EAP link this waste-specific S&EIR as far as possible with the general EIA S&EIR process.

d) Water issues

Consideration of water-specific impacts is covered in terms of the NWA (*Act No. 36 of 1999*) and its related schedules. A summary of the relevant portions thereof are presented in **Table 5-9** below, please refer, along with comments specific to this proposed project.

Clarification is sought in terms of the potential conflict with the applicant being the competent authority. All documentation seen to date refers to the DWA, but as the competent authority in terms of the NWA, cannot pass an authorisation on one of their own projects. This item requires urgent feedback.

Table 5-9: NWA and Schedule 1 (permissible water uses) thereof

Legislation information / Activity description
National Water Act (NWA): Part 1: General Principles: This Part sets out general principles for regulating water use. Water use is defined broadly…In general a water use must be licensed unless it is listed in **Schedule 1**, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a license. **21. Water use** For the purposes of this Act, water use includes- (a) taking water from a water resource; (b) storing water; (c) impeding or diverting the flow of water in a watercourse; (d) engaging in a stream flow reduction activity contemplated in Section 36; (e) engaging in a controlled activity identified as such in Section 37(1) or declared under Section 38(1); (f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process; (i) altering the bed, banks, course or characteristics of a watercourse; (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and (k) using water for recreational purposes. **22. Permissible water use** (1) A person may only use water- (a) without a license- (i) if that water use is permissible under Schedule 1; (ii) if that water use is permissible as a continuation of an existing lawful use; or (iii) if that water use is permissible in terms of a general authorisation issued under Section 39; (b) if the water use is authorised by a license under this Act; or (c) if the responsible authority has dispensed with a license requirement under subsection (3).
37. Controlled activity

Legislation information / Activity description

(1) The following are controlled activities:

(a) irrigation of any land with waste or water containing waste generated through any industrial activity or by a waterworks;

(b) an activity aimed at the modification of atmospheric precipitation;

(c) a power generation activity which alters the flow regime or a water resource;

(d) intentional recharging of an aquifer with any waste or water containing waste; and

(e) an activity which has been declared as such under Section 38.

(2) No person may undertake a controlled activity unless such person is authorised to do so by or under this Act.

38. Declaration of certain activities as controlled activities

(1) The Minister may, by notice in the Gazette, in general or specifically, declare an activity to be a controlled activity *(see summary below of controlled activities as evidenced by the need for a registration process)*.

39. General authorisation *(not applicable)*

Extract from DWA registration guideline:

Relevant registration forms:

- PART 1 FORMS
  - DW 757 Water Service Provider, or,
  - DW 758 Company, Business or Partnership; National or Provincial Government
- PART 2 FORMS
  - DW 760 Taking water from a water resource
  - DW 761 Storing water
  - DW 762 Storing water – Dam Safety Registration
  - DW 763 Impeding or diverting the flow of water in a watercourse
  - DW 764 Engaging in a Stream Flow Reduction Activity
  - DW 768 Altering the bed, banks, course or characteristics of a watercourse

Other registrations may be relevant but this would need to be negotiated with the DWA by the EAP at the start of the Water Use Licence Authorisation process.

Extract in summary from the http://www.dwaf.gov.za/projects/warms/ website:

Who Must Register? All water users instructed to register have the statutory obligation to do so. There are strict penalties, prescribed in the Act, for those who do not comply. In future, when water users are required to apply for licences, those who did not register will lower their chances of getting a licence to use water.

The following water users must register their water use: All water users, who do not receive their water from a service provider, local authority, water board, irrigation board, government water scheme or other bulk supplier and who are using water for:

i) Irrigation

ii) Mining purposes

iii) Industrial use

iv) Feedlots, or

v) In terms of a General Authorisation.

This covers the use of surface and ground water.

Other uses which must be registered, include :

1. Diversion of rivers and streams
2. Storage. Any person or body storing water for any purpose (including irrigation, domestic supply, industrial use, mining, aqua culture, fishing, water sport, aesthetic value, gardening, landscaping, golfing, etc.) from surface runoff, groundwater or fountain flow in excess of 10 000 m^3 or where the water area at Full Supply Level exceeds 1 hectare in total on land owned or occupied by that person or body and not in possession of a permit or permission. …
3. Local authorities and other bulk suppliers with their own water sources and purification works. …

Legislation information / Activity description	
4. Discharges of waste or water containing waste in terms of Section 21 of the NWA: This includes the following activities: … The above waste water uses include a number of non-point sources of discharge: …	
Schedule 1 (of the NWA): PERMISSIBLE USE OF WATER: (1) A person may, subject to this Act- (a) take water for reasonable domestic use in that person's household, directly from any water resource to which that person has lawful access; (b) take water for use on land owned or occupied by that person, for- (i) reasonable domestic use; (ii) small gardening not for commercial purposes; and (iii) the watering of animals (excluding feedlots) which graze on that land within the grazing capacity of that land, from any water resource which is situated on or forms a boundary of that land, if the use is not excessive in relation to the capacity of the water resource and the needs of other users; (c) store and use runoff water from a roof; (d) in emergency situations, take water from any water resource for human consumption or firefighting; (e) for recreational purposes- … (f) discharge - (i) waste or water containing waste; or (ii) runoff water, including stormwater from any residential, recreational, commercial or industrial site, into a canal, sea outfall or other conduit controlled by another person authorised to undertake the purification, treatment or disposal of waste or water containing waste, subject to the approval of the person controlling the canal, sea outfall or other conduit. (2) An entitlement under this Schedule does not override any other law, ordinance, by-law or regulation, and is subject to any limitation or prohibition thereunder.	
Comment:	*The sheer scale and nature of the project at hand makes it obvious that a Water Use Licence Authorisation process will need to be carried out for both the DWA and Umgeni Water portions of the project. The exact mechanisms of how this WULA will be carried out will need to be organised with DWA and linked to the EA processes as overseen by DWA's sister Department, the DEA.*

Summary:

Given the considerations in **Table 5-9** above, it is obvious that a **WULA will be required** for the project as a whole, and potentially separate WULAs will be required for each separate site making up the greater scheme (i.e. dams, tunnel and pipelines).

It is recommended that an integrated water use licence process be followed with one over-arching integrated WULA being granted for the entire scheme.

Urgent clarification is required on the issue of who will be the applicant in terms of the various authorisation processes, especially the WULA applications, as specified above.

e) Heritage issues

The heritage permitting process is controlled by the South African Heritage Resources Agency (SAHRA) and delegated provincial agencies, in this case the **Amafa / Heritage KwaZulu-Natal Agency**. The process is controlled in terms of the related schedules included therein.

Table 5-10: Heritage requirements (National Heritage Resources Act 25 of 1999)

Activity Description (NHRA Specific)	
Schedule No.	**Activity Description**
South African Heritage Resources Act (Act 25 of 1999)	
Structures	
34(1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.	
Archaeology, palaeontology and meteorites	
35(4) No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or material or any meteorite; bring onto, or use at an archaeological or paleontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and paleontological material or objects, or use such equipment for the recovery of meteorites.	
Human remains	
36(3) No person may, without a permit issued by the relevant heritage resources authority:	
(a) destroy, damage, alter, exhume or remove from its original position of otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;	
(b) destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; (*Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations*) or	
(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals.	
Heritage resources management	
38(1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—	
(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;	
(b) the construction of a bridge or similar structure exceeding 50 m in length;	
(c) any development or other activity which will change the character of a site—	
(i) exceeding 5 000 m^2 in extent; or	
(ii) involving three or more existing erven or subdivisions thereof; or	
(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or	
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;	
(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or	
(e) any other category of development provided for in regulations by SAHRA or a provincial	

Activity Description (NHRA Specific)	
Schedule No.	**Activity Description**
heritage resources authority.	
Definitions:	***"alter"*** *means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or other decoration or any other means.* ***"heritage resource"*** *means any place or object of cultural significance.* ***"structure"*** *means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.*
Comments:	*As a minimum the proposal triggers the listed activities underlined in Section 38(1).* *Given the scale of the project it is expected that a "phase / tier 2" paleontological and archaeological survey application and a resulting permit will be required for the greater site as a minimum.* *It would not in fact be unexpected for a separate survey to be required for each section of the site (i.e. each dam basin, inlet / outlet points of the tunnel, along the length of each pipeline). Such a process would need to be carried out by a registered archaeologist and would be approved by SAHRA or its delegated provincial office.* *The memorandum accompanying the heritage permit application/s will serve as a heritage specialist study forming part of the linked EIA processes.*

Summary:

Given the considerations in **Table 5-10** above, some form of heritage assessment will be required. Such an assessment will most probably take the form of a **"phase 2: paleontological and archaeological survey"** of each site. From such an investigation it will then be possible to tell whether any additional studies and/or permits will be required, although this is not a likely scenario.

The heritage survey will form a **specialist study** informing the EIA processes documentation.

f) Health and safety issues

In terms of Health and Safety issues a number of issues cross-linking to environmental legislation may be required.

For instance, it would need to be clarified as to whether the presence of explosives on the sites, even though temporary, during construction of the dams and tunnel would fall within the ambit of the Major Hazard Installation Regulations (*MHI, GN R. No. 692 of 2001*), in terms of the OHS (*Act No. 85 of 1993*). This would need to be confirmed by a relevant specialist. If required, the findings thereof would need to be fed into the EIA process.

Table 5-11: Major Hazard Installation regulations (GN R. 692 of 2001)

Activity Description (MHI Specific)	
Schedule No.	**Activity Description**
Schedules:	2. (1) Subject to the provisions of sub-regulation (3) these regulations shall apply to employers, self-employed persons and users, who have on their premises, either permanently or temporarily, a major hazard installation or a quantity of a substance which may pose a **risk** that could affect the health and safety of employees and the public.
Definitions:	***"major hazard installation"*** *means an installation-* *(a) where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or* *(b) where any substance is produced, processed, used, handled or stored in such a form and quantity that it has the potential to cause a major incident.* ***"major incident"*** *means an occurrence of catastrophic proportions, resulting from the use of plant or machinery, or from activities at a workplace*
Comments:	*Due to the known hazard of explosives, along with other potential defined "dangerous goods / hazardous substances", the potential for possible unexpected / uncontrolled explosion/s, the site would more than likely classify as a MHI in terms of the OHS Act and its MHI related regulations.*

Summary:

Given the considerations in **Table 5-11** above, some form of **hazard assessment** will be required. The nature thereof would need to be confirmed with a relevant specialist and linked to the related EIA processes.

5.1.3 Sub-processes or Linked Processes Required

Table 5-12 below provides a consideration of the linked studies to form part of the various processes, i.e. EIA processes (general and waste-specific), water use licence, major hazard installation application, and heritage permit. Note that a number of the linked processes detailed below fall outside of the ambit of the EIA processes discussed in detail above. Others are a spin-off of the EIA process and thus are facilitated by the information generated during the EIA process. The linked regulations for the acts listed below have not been detailed at this point, these would need to be confirmed specifically with the relevant competent authority prior to scheduling the project's permitting processes so as to ensure that duplication of effort is minimised.

As far as is possible and allowable in terms of the controls imposed by the various competent authorities, these processes should be run in combination for the various processes so as to save on both time and costs.

Table 5-12: Sub-processes required

Sub-processes		
Study	**Purpose**	**Comment**
Public participation process	Forming part of both EIA processes, and the WULA(s)	Part of multiple processes – may be combined to a certain extent, and all attempts must be made to ensure that it is.
Draft Environmental Management Programme (dEMPr)	Draft Environmental Management Programme	Combined document addressing both EIA processes – drafted to meet the needs of the EA as a legally required "cradle to grave" EMPr. This draft EMPr will NOT form the final post-authorisation EMPr for "Design, Pre-Construction, Construction, Commissioning, Operation, Maintenance, Decommissioning and Rehabilitation". Such a document will need to be generated prior to pegging and construction activities.
Heritage permit requirements	Approval to proceed	Consideration of impacts on heritage resources of a range of types will need to be carried out and permission to proceed by granted by the **Amafa / Heritage KwaZulu Natal** agency of the South African Heritage Resources Agency (SAHRA).
Civil Aviation Authority (CAA) requirements	Approval to proceed	Confirmation as to the need for inclusion of the site on the CAA's database with respect to their navigational systems. Determine whether the CAA has any additional requirements that need to be integrated into the design of infrastructure making up the scheme as a whole.
MPRDA approval	Approval to proceed	This approval would be in terms of the potential for making a mineral resource unavailable for future mining operations.
Department of Agriculture, Forestry and Fisheries (DAFF) permit	Approval to proceed	DAFF permits for removal of protected trees, should these be encountered and require relocation. This will be one of the spin-offs from the biodiversity study forming part of the EIA process.
DEA permit with respect to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Approval to proceed	NEM: BA permits for removal of protected species (not limited to trees), should these be encountered and require relocation. This will be one of the spin-offs from the biodiversity study forming part of the EIA process.
DEA permit with respect to the National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	Approval to proceed	NEM: PAA permits with respect to impacts on protected areas. This will be one of the spin-offs from the biodiversity study forming part of the EIA process.
Requirements of the National Veld and Forest Fires Act (Act No. 101 of 1998)	Integration of requirements into the EMPr	Integration of the requirements for the proposed construction process (dominantly), as well as the on-going operation of the site and the remainder of the project's life-cycle.
Requirements of the Water Services Act (Act No. 108 of 1997)	Integration of requirements into the EIAs, the design specifications, and	Water Services Act requirements will need to be considered and integrated into this project so as to ensure a smooth linkage into the existing water service systems. This will cross-link into the town/regional planning requirements (a totally

Sub-processes		
Study	**Purpose**	**Comment**
	the controlling EMPr	separate, non-environmental process) and should be considered in terms thereof.
Requirements with respect to the Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Integration of requirements into the EIAs, the design specifications, and the controlling EMPr	CARA requirements specifically with respect to the draining of wetlands, vleis, sponges, etc. Also in terms of the controls with respect to alien invasive species.

Summary:

Given the considerations in **Table 5-12** above, the EAP will need to carry out a **range of sub-processes or linked permitting processes**. The requirements for each of the required permitting processes should be clarified with the relevant competent authorities and it should be determined how the various permitting processes can be interlinked so as to minimise the time and other resources required in order to obtain them.

As indicated above, the full range of relevant regulations within the acts detailed above should be confirmed specifically with the relevant competent authority prior to scheduling the project's permitting processes so as to ensure that duplication of effort is minimised. As far as is possible and allowable in terms of the controls imposed by the various competent authorities, these processes should be run in combination for the various processes so as to save on both time and costs.

5.1.4 Specialist Studies Required

The specialist information (including all technical) presented and/or linked to the ESR is then fed into the second (EIAR) phase of the EIA process as part of the detailed impacts consideration for the proposed development.

By indicating in the ESR that specific specialist information, studies or reviews are required in the EIA process, this does not mean that the information already being generated by the technical feasibility study is not used to address all or part of those specialist information requirements. Rather, the intention of the list of specialist studies specified below is to highlight those facets of the environment that will need a specialist opinion on.

It should be noted that a specialist study in terms of the EIA Regulations is a blanket term for a range of products. As such, such a product may be (a)

clarification on certain points in a report plus provision of environmentally-specific recommendations to integrate into the EIA, (b) a review of existing information (i.e. a desktop review) with a context-setting site visit, (c) a peer review on a technical report, running up to (d) a detailed study requiring extensive fieldwork and evaluation, potentially including a formal modelling exercise, of the relevant information gathered.

The onus remains on the EAP to ensure that all information (i.e. background information, previous reports for the area, technical information generated by the technical study at hand of which the ESR forms part) generated by the start of the second phase of the EIA has been evaluated. A gap analysis of the information will be carried out by the EAP as part of the EIA process to identify what additional information or simple clarifications needed. This will be carried out during the EIA phase.

The potential scenarios for specialist studies needing to be generated are as follows:

- The technical and specialist studies are deemed to be the same document;
- The specialist study uses the technical study as baseline information for the EIA process, as the technical study is deemed to consider the majority of the information needing to be considered in the EIA, with an addendum of EIA-specific recommendations needing to be generated for the EIA; or,
- A separate specialist study will be required which only uses the technical studies for a certain amount of baseline information.

Until the technical reports are completed, the extent of some of the studies detailed below is not definite. The EAP should, as soon as appointed, be allowed to determine the exact scope of each relevant facet of the technical study in terms of the EIA and linked processes and should present all requirements that may need to be added to studies not already completed.

The Environmental Assessment Practitioner (EAP) will thus need to interact with the technical team to ensure that the information from the final technical study, for those not already completed, will answer the EIA-specific queries. If already completed, an addendum document may be required to address the specific information required for the EIA. In the last scenario, the EAP may indicate that the technical studies undertaken do not cover the required information and thus a separate EIA-specific specialist study will be required. It remains the duty of the

selected EAP to determine what additional information is required and to motivate for the additional addenda or stand-alone studies that may be required by the DEA for acceptance of the EIA.

It is finally noted that some studies may be able to be integrated into one larger study, or that certain sub-issues may be dealt with under another specialist study (e.g. tourism costs and opportunities may be made clear in an integrated economic study). This is however reliant on the specialists involved and remains the responsibility of the EAP to determine in consultation with the remainder of the project team.

It is the responsibility of the EAP to ensure that all possible cost and effort savings that are feasible and legally allowable be carried out.

Table 5-13 below thus provides a consideration of the specialist studies to be linked into the various processes, i.e. EIA processes (general and waste-specific), water use licence(s), major hazard installation application, heritage permit(s), and any other related processes.

Table 5-13: Specialist studies required

Specialist / linked studies		
Study	**Purpose**	**Comment**
Biodiversity (general and terrestrial species) specific studies		
(1): Biodiversity / Ecological Assessment	Specialist study feeding into EIA process	Specialist study considering the ecological status of the sites and immediate surrounds and providing recommendations to minimise potential costs. This study is critical given the nature of the sites for the various infrastructure sections and the nature of the proposed activity. Although approved by DEA, information and detailed input will be required from KZN Ezemvelo on this study.
(2): Herpetological and Entomological Assessment	Specialist study feeding into EIA process and IWUL	To determine the presence of and impact on amphibians and reptiles (especially since there could be Giant bullfrogs, snakes, etc. in the area). In the Midlands a highly threatened species of millipede occurs, which is under threat from development. Although approved by DEA, information and detailed input will be required from KZN Ezemvelo on this study.
Water and water ecosystem specific studies		
(3): Floodline Determination / Review	Specialist study feeding into EIA process	The floodline determination – both the existing and future levels will need to be presented in the EIA as linked specialist studies.
(4): Wetland Delineation / Review	Specialist study feeding into EIA process	Delineation of wetlands in the watercourses and determination of the importance of such wetlands will need to be carried out during the EIA process. Should wetlands be identified that could be lost as a result of the construction of the impoundment, off-set wetlands that need rehabilitation should also be identified and delineated.
(5): Watercourse and wetland Information Assessment (limnology)	Specialist study feeding into EIA process	The recommendations from the water use licence process will feed into the EIA processes. A separate limnological study (the ecology of freshwater bodies) will also be linked into the consideration and will feed into the EIA processes and IWULA.
(6): Aquatic SASS-5 Assessment	Specialist study feeding into EIA process and IWUL	The aquatic health of the uMlaza and uMkhomazi rivers needs to be determined and assessed in terms of the proposed dams and transfer scheme.
(7): Ichthyological Impact Assessment	Specialist study feeding into EIA process and IWUL	To determine the impact of fish migration up and down the uMlaza and uMkhomazi rivers and tributaries. Requirements for fish ladders should also be determined. Invasion of alien fish species need to be determined and mitigation measures identified. Although approved by DEA, information and detailed input will be required from KZN Ezemvelo on this study.
Heritage specific study		
(8): Heritage Study / Review	Specialist study feeding into EIA process	Specialist study – "tier / phase 2" survey of archaeological and paleontological status of greater site and immediate surrounds. It should be noted that potentially a separate permit will be

Specialist / linked studies		
Study	**Purpose**	**Comment**
		required per section of the greater project (i.e. per dam, per pipeline, and for the tunnel). Location and identity of graves and/or sacred sites will also need to be determined and assessed. The cultural/heritage landscape will need to be determined and assessed. Cross linked to Heritage permit requirements.
Physical terrestrial environment specialist studies		
(9): Geotechnical Study	Specialist study feeding into EIA process	Information in the form of recommendations and baseline info alone is required to feed into the EIAs.
(10): Agricultural Soils Study	Specialist study feeding into EIA process	To determine the type of agricultural soils present, this will be required prior to undertaking the Agricultural Potential Study.
(11): Erosion Impact Assessment	Specialist study feeding into EIA process	To determine the level of erosion formation during construction and operation of the transfer tunnel and pipelines, along with the specific impacts of the construction activities.
(12): Agricultural Potential Study	Specialist study feeding into EIA process	Detailed consideration of the agricultural potential of each of the impacted sites will need to be provided. The loss of existing agricultural lands – both subsistence and market gardening will need to be quantified and balanced against the benefits of the water transfer benefits. Further considerations will be the potential for new agricultural industries, such as aquaculture. The information will need to be fed into the general EIA process in the main, but will have relevance to a number of the other linked processes.
Health and risk specific studies		
(13): Major Hazard Installation Assessment	Specialist study feeding into EIA process	The recommendations from the MHI process will feed into both EIAs. This process is highly specialised and there are limited specialists of this nature in South Africa. This is strongly influenced by the site and the process specifics. Information supplied with respect to the specific risks associated with the construction process will be reviewed. The potential risks relating to failure of the major infrastructure during operation will possibly also need to be considered.
(14): Health Impact Assessment	Potential specialist study feeding into EIA process, and IWULA	It will need to be determined whether a formal, separate Health Impact Assessment will be required to consider potential health implications in the short term (i.e. dominantly during construction) and later during operation of the greater scheme (e.g. safety and risk issues due to new large bodies of water being present).
Socio-economic issues specific studies		
(15): Social Impact Assessment	Specialist study feeding into EIA process, the IWULA, and social plan for implementation	To determine the social impacts of the dam and on the dam (population dynamics, etc.). Included therein will be a noise assessment. The outputs from this study will be used to inform the potential relocations, the impact of dam on property development, etc. The issue of heritage specific considerations will need to feed

Specialist / linked studies		
Study	**Purpose**	**Comment**
		into this study from the heritage study undertaken (Cross link to study (8)).
(16): Economic Impact Assessment	Specialist study feeding into EIA process	This is could be part of the SIA, but may need to be separated – it was a request from I&APs in the MMTS2 review. Users would like to know the impact of the dam construction on water levies.
(17): Tourism Potential Assessment	Specialist study feeding into EIA process	To determine the tourism potential of the dams and the expected influx of tourists into the area during operation.
(18): Visual Impact Assessment	Specialist study feeding into EIA process	To determine the visual impact of not only of the impoundment but also the associated infrastructure on surrounding landowners. Visual landscapes and identities thereof will also need to be considered and linked to the social / community related considerations.
(19): Noise Impact Assessment	Specialist study feeding into EIA process	Sensitive noise receptors need to be identified and ambient noise levels determined prior to construction starting. It should be noted that operational aspects of the transfer scheme could also impact on sensitive noise receptors.
Services specific studies		
(20): Traffic Impact Assessment	Specialist study feeding into EIA process	Construction vehicles, especially large trucks will be moving in and around the site(s) and the linking access roads and will have a significant impact on the existing local roads.
(21): Town and regional planning requirements implications	Specialist study feeding into EIA process	To determine the town and regional planning requirements as may be triggered by the proposed development. A detailed cross-check will be required with the provincial specific planning law requirements for KZN (provincial approval level). This is seen as part of an interaction within the team in order to facilitate the two processes.
General study		
(22): Legal Review	Overall legal compliance check	To determine that all legal requirements have been dealt with, not only the environmental specific items.

a) Biodiversity (general and terrestrial species) specific studies (Studies 1 and 2)

Given the information provided to date on the proposed development, the potential for biodiversity impacts is a significant concern due to the level of unknown information and due to the nature of the area within which the components of the scheme will be situated.

The project will have a potential highly significant impact on two watercourses, their catchment areas, large areas of natural vegetation, both modified and unmodified, highly variable topography with the potential for a wide range of

vegetation types and thus related ecosystems and species cohorts, etc. The impacts will come from the dams (i.e. their basins, the walls specifically, the associated infrastructure, access roads, borrow pit/s), the pipelines linking the sections of the scheme, and critically the tunnel (i.e. inlet and outlet points, maintenance access points / adits, pump stations and their footprints, electrical substation(s), access roads, spoil rock and soil removed from the tunnel including their temporary and permanent dump sites).

The site visit carried out (5 – 6th March 2012) although very preliminary in nature, highlighted that the environment, although highly modified in parts by previous and existing land uses such as forestry, rural-residential and subsistence farming, large scale market gardening (i.e. Baynesfield Estate), and, infrastructure installation (e.g. fully renovated access road to Impendle), should still be considered to be sensitive in nature. Although modified, the greater site within which the scheme falls has a significant level of environmental, social and economic functionalities and values.

It should be noted that this is not to say that the proposed development cannot occur, but rather that the consideration thereof should be carefully carried out to consider all benefits and potential losses that will derive from the project and to consider whether mitigation will be sufficient and feasible. The detailed biodiversity study(ies) to be undertaken should consider the nature of the greater area thoroughly and generate a considered opinion as to the viability of the proposed water transfer scheme from a biodiversity consideration.

Although the biodiversity study will be approved by the DEA as part of the EIA process (i.e. as a specialist study thereof), information and detailed input will be required from KZN Ezemvelo on this study.

In terms of preliminary considerations, species of specific concern within the province that may be of relevance to this area are both herpetological (i.e. snakes, frogs) and entomological (i.e. insects) species. This will either need to form a separate or a linked specialist study to the general biodiversity / ecological study carried out.

b) Heritage-specific studies (Study 8)

Given the position of the site and its known impact on two watercourses and their catchments (i.e. uMkhomazi and uMlaza), and the established occupation of the

wider area linked to these watercourses, the area is known to have been occupied by various settlements for a significant period of time. As such the need to confirm whether or not important heritage (archaeological and/or paleontological) artefacts, graves, initiation schools, sacred spaces, heritage/cultural landscapes are present on the specific sites will need to be verified.

In this specific case the heritage artefacts will be linked to a range of communities within South Africa, across a number of centuries of history, and a range of artefact types from tangible to intangible (i.e. verbal history, sense of place).

The formal approval (if given) of the heritage related aspects of this project will be granted by **Amafa / KwaZulu-Natal Heritage Agency**.

c) Water and water ecosystem-specific studies (Studies 3 to 7)

Given the nature of the project this is an obvious conclusion, that is, water specific impacts are the dominant impacts to be considered in terms of the impact consideration. Information from the WULA/s will need to be fed into the EIA processes as specialist input.

Specific critical considerations will include:

- The presence of the existing floodlines and the new inundation levels.
- The presence of existing wetlands, the status thereof in terms of sensitivity and biodiversity significance.
- The possibility to off-set lost wetlands with to be rehabilitated wetlands elsewhere in the catchment.
- The limnology of the watercourses and related existing waterbodies and water related features (e.g. wetlands) – this includes the consideration of ecology of the freshwater bodies, their functionality within themselves and as support to the surrounding terrestrial ecosystems and also linking to the socio-economic considerations of the rural community.
- A formal consideration of the health of the rivers and their component parts, along with a consideration of the implication of the proposed transfer scheme with its linked dams in terms of the long-term health thereof.
- A final specific consideration is the implications on the fish populations, species composition, alien to indigenous species ratios, etc., as related to the changing hydrological status of the watercourses. This is of critical

importance as the uMkhomazi is one of the remaining watercourses in KwaZulu-Natal which is free-flowing with minimal impoundments along its length. Issues which will also be included in terms of this study include the need for infrastructure such as fish ladders.

d) Physical terrestrial environment studies (Studies 9 to 12)

Consideration of the physical environment around (and in the case of the geotechnical study also within) the watercourses concerned forms a critical part of the detailed review and issues evaluation. In terms of the processes at hand, the recommendations of the detailed geotechnical report required as part of the engineering requirements will be more than sufficient to allow for the consideration of the geology and soils of the greater site.

The geotechnical study, will be required to inform the engineering process and EA processes in terms of possible fatal flaws, and provide mitigation measures and/or recommendations for possible mitigation. Part of this study will include a seismic impact assessment. The geotechnical study also needs to determine which materials could be recycled so as to classify them as a by-product in terms of the National Environmental Management: Waste Act.

The geotechnical study will need to be followed-up by a consideration of the soils related to the sites. This study on the impacts on agricultural potential will need to be carried out by an agronomist.

It should be noted that two studies will be required relating to agricultural resources. The first considers the agricultural implications of this project, which are crucial given the fact that the majority of the proposed scheme falls within an area of low density rural land-usage, largely dependent on subsistence farming operations. As such the status of the agricultural soils is required, along with consideration of the potential for erosion and the implications thereof, and, finally provision of information with respect to the existing agricultural value of the land to be inundated, as well as that on the margins of the inundation zone, and projections as to the potential value that may be gained from possible future agricultural operations with an aquaculture focus.

Detailed consideration of the agricultural potential for each of the impacted sites will thus need to be provided. The loss of agricultural lands, both subsistence and market gardening, will need to be quantified and balanced against the

benefits of the water transfer benefits. This information could potentially be linked to possible compensation calculations at a later point, this is however beyond the scope of the information required for the EIA and related processes. The information will need to dominantly be fed into the general EIA process, but will have relevance to a number of the other processes. This study, considering the impact on the agricultural viability of the area as a whole; this is carried out by an agricultural economist.

e) Health and risk specific studies (Studies 13 and 14)

Given the nature of the proposed development, clarity on the safety and health impacts of the construction process on those working within the site, and, the surrounding communities needs to be considered and recommendations provided. The water specific considerations, the nature of the geology, the MHI status, will feed into a consideration of the potential health impact specific to the proposal.

This will need to be clearly cross-linked to the SIA process and will need to be linked to the expropriation / resettlement process as required.

It is noted that a health impact assessment may be required, this would need to be determined in consultation with the authorities.

f) Socio-economic studies (Studies 15 to 19)

A socio-economic study will be undertaken to develop a detailed socio-economic impact assessment of the proposed dam(s) and transfer infrastructure. This will include a review of typically anticipated social impacts such: access to community land, relocation of communities, impact on job creation and health and safety factors related to construction of the dam. Economic impacts include new business growth, expansion of production capability associated with additional water resources as well as the impact of construction input purchases on the local community. The review will also include ***an assessment of non-development as an option*** as well as alternatives to the development like ***desalination or re-use of effluent*** as part of the cost-benefit analysis proposed. In addition, carbon neutrality and carbon credit generation options will be reviewed if applicable to the project. The possible production of carbon credits represents a positive outcome within a cost-benefit analysis study.

The ***approach*** will include adopting economic modelling techniques a carrying out a cost-benefit analysis and multiplier analysis.

A full SIA would be required to consider direct impacts of the scheme on the societies surrounding the proposed sites, and of course importantly any occurring within the proposed dam basins. A critical sub-component to this is that the heritage related factors of a community that has a long history in the area would also need to be integrated into this consideration.

A consideration of the economic impacts of the proposed scheme both locally to the sites and in terms of province-wide impacts should be considered. As indicated in a previous study this was specifically requested as a separate study, but could well be requested again in terms of this scheme.

Tourism is a potential large positive impact (i.e. influx of income generating tourists to new dams and associated developments) against the potential for negative impacts (i.e. loss of a way of life, change in nature of area). This would need to be considered and the impacts determined.

Visual impact assessment is critical when considering a large scale development which literally modifies the greater scenery. Landscapes are also considered to have specific value in their own right, thus the need to know what visual changes will be encountered due to the project are needed to determine whether the changes are deemed acceptable or not.

Noise is of most importance during the construction phase, especially if sensitive receptors are in close proximity to the site. In terms of the pipelines noise and vibration may be generated and the proposed level of such noise as well as the possible sensitive receptors (not only limited to humans) will need to be quantified. Note that vibration is further split into that which is airborne and that which is carried through the ground – the second tends to travel further.

g) Services specific studies (Studies 20 and 21)

Provision and amendment to services are issues that will need to be dealt with in terms of both the EIA processes and also within the KZN-specific planning legislative controls.

Traffic impacts need to be considered in terms of the impacts of construction vehicles, especially if the spoil from the tunnel cannot be used within the dams

and needs to be disposed of outside of the study area. Further, the requirements in terms of what access roads are required and whether existing roads will need to be modified, potential be moved due to inundation, etc., will all need to be considered.

h) General study (Study 22)

A re-review of the ESR document at hand will be required to check that all legislative requirements have been met.

6. RESULTS & RECOMMENDATIONS

A multi-pronged EA / permitting / licensing process will need to be followed. The deliverables relating to each process are summarised in **Table 6-1** below. The relevant information motivating the need for each of these studies has been provided in the information above.

Where it may be possible to carry out a lesser or grouped application process by (a) clarification of certain technical issues thus placing the process below a certain threshold, (b) not triggering a specific listed activity or schedule due to a formal indication that the trigger is not relevant, or (c) grouping similar applications together and considering them together (e.g. heritage and WULAs).

It is further reiterated that the EAP is to make use of the significant resources in terms of information already generated, plus specifically that generated during the wider technical study at hand. The aim is to add value to that information already present, whilst still ensuring that the information is of relevance to the environmental process at hand, and provides the competent authority with sufficient information to make an unbiased and informed decision.

As such additional specialist studies or significant additions to studies already carried out will need to be demonstrated as being of value and thus required to meet this end aim. It is thus recommended that the selected EAP be given access to all information already generated, plus be given a detailed overview of those studies still being undertaken including consideration of their scope and the nature of the results that will come therefrom, at the earliest opportunity.

Based on the potential risks associated with the proposed development of the uMkhomazi Water Project, the potential scenarios as detailed in Section 5.1.4 should be considered as early as possible so as to minimise the amount of separate information that will need to be generated for the EIA process specifically.

The Environmental Assessment Practitioner (EAP) needs to interact with the technical team to ensure that the information will answer the EIA-specific queries. It remains the duty of the selected EAP to determine what additional information is required and to motivate for the additional addenda or stand-alone studies that may be required by the DEA.

Once such a process has been undertaken, the EAP should indicate what's gaps are noted and provide input as to how these gaps may be filled. It is obviously noted that dependent on the input from the public participation process motivation will be provided for certain aspects to be considered.

Considering the minimisation of time and effort to be spent by combining common sub-processes will be the duty of the EAP to ensure through negotiation with the relevant authorities before entering into the various processes. Any submission made in response to the tender documentation for the EIA and related processes should show an awareness of the potential to minimise costs and time spent.

AECOM (previously BKS) will manage the EAP by assuring the Applicant, i.e. the DWA, that the correct processes are being followed and that all linkages between the various relevant acts have been established. The functional project management of the EIA and related processes will remain the responsibility of the appointed EAP, with AECOM acting as an expert process and document reviewer for the processes.

Any submission made in response to the tender documentation for the EIA and related processes should show an awareness of the potential to minimise costs and time spent.

Table 6-1: Studies required – summary

Studies required – summary		
Study type	**Product**	**Comment**
Main processes		
EIA process (1): General listed activities	S&EIR	A site specific "general" EIA will be required, from the review it is deemed that an S&EIR process will need to be followed. Refer to Specialist studies (1) to (11) below.
EIA process (2): Waste-specific listed activities	S&EIR	Presence of large quantities of general waste (i.e. rock and soil spoil) on the site triggers an EIA process at the S&EIR level. Refer to Specialist studies (1) to (11) below.
Atmospheric emissions licence	*Not required*	Not required from information available to date – this should be confirmed with the relevant authorities.
Water use licence/s	Water Use Licence Authorisation/s	Modification of two main watercourses, associated tributaries, related wetlands, storage of water, etc. Refer to Specialist studies (3) and (4) below. This includes regular follow-up with the competent authority, the DWA.

Studies required – summary		
Study type	**Product**	**Comment**
Major Hazard Installation Application	MHI approval in terms of the OHS Act	Consideration of risk rating of site, especially during construction, and recommendations to minimise such risks. The MHI will be informed by previous work carried out for water transfer schemes and dams. Information to feed various other permit processes as required.
Heritage Permit	Approval to proceed	Consideration of impacts on heritage resources. Approval sought from the KZN competent authority, Amafa / KwaZulu Natal Heritage Agency. Refer to Specialist study (8) below. This includes regular follow-up with the competent authority.
Civil Aviation Authority requirements	Approval to proceed	Confirmation as to the need for inclusion of the site on the CAA's database with respect to their navigational systems. Determine whether the CAA has any additional requirements that need to be integrated into the design of infrastructure making up the scheme as a whole.
MPRDA approval	Approval to proceed	This approval would be in terms of the potential for making a mineral resource unavailable for future mining operations.
DAFF permitting	Approval to proceed	DAFF permits for removal of protected trees, should these be encountered and require relocation. This will be one of the spin-offs from the biodiversity study forming part of the EIA process.
DEA permit with respect to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Approval to proceed	NEM: BA permits for removal of protected species, should these be encountered and require relocation. This will be one of the spin-offs from the biodiversity study forming part of the EIA process. Although approved by DEA, information and detailed input will be required from KZN Ezemvelo on this study.
DEA permit with respect to the National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	Approval to proceed	NEM: PAA permits with respect to impacts on protected areas. This will be one of the spin-offs from the biodiversity study forming part of the EIA process.
Requirements of the National Veld and Forest Fires Act (Act No. 101 of 1998)	Integration of requirements into the EMPr	Integration of the requirements for the proposed construction process (dominantly), as well as the on-going operation of the site and the remainder of the project's life-cycle.
Requirements of the Water Services Act (Act No. 108 of 1997)	Integration of requirements into the EIA, the design specifications, and the controlling EMPr	Water Services Act requirements will need to be considered and integrated into this project so as to ensure a smooth linkage into the existing water service systems.

Studies required – summary		
Study type	**Product**	**Comment**
Requirements with respect to the Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Integration of requirements into the EIA, the design specifications, and the controlling EMPr	CARA requirements specifically with respect to the draining of wetlands, vleis, sponges, etc. Also in terms of the controls with respect to alien invasive species.
Addendum documents to main processes		
Public participation process	Forming part of the EIA, and WULA/s	Integrated into costs of other processes. Must include as part of the outcomes an Issues and Responses Report developed from public and stakeholder interaction.
Draft Environmental Management Programme (dEMPr)	Draft Environmental Management Programme	Combined document addressing both EIA processes – drafted to meet needs of EA as a legally required "cradle to grave" EMPr. The draft EMPr submitted for authorisation will NOT form the final post-authorisation EMPr for "*Design, Pre-Construction, Construction, Commissioning, Operation, Maintenance, Decommissioning and Rehabilitation*" as the conditions of the various permits will need to be integrated into the final EMPr used for the lifespan of the development. It should be confirmed whether the generation of this document is included in the proposals in response to the environmental tender responses.
Specialist studies		
Biodiversity (general and terrestrial species) specific studies		
(1): Biodiversity / Ecological Assessment	Specialist study feeding into EIA process	Specialist study considering the ecological status of the sites and immediate surrounds and providing recommendations to minimise potential costs. This study is critical given the nature of the sites for the various infrastructure sections and the nature of the proposed activity. Although approved by DEA, information and detailed input will be required from KZN Ezemvelo on this study.
(2): Herpetological and Entomological Assessment	Specialist study feeding into EIA process and IWUL	To determine the presence of and impact on amphibians and reptiles (especially since there could be Giant bullfrogs, snakes, etc. in the area). In the Midlands a highly threatened species of millipede occurs, which is under threat from development. Although approved by DEA, information and detailed input will be required from KZN Ezemvelo on this study.
Water and water ecosystem specific studies		
(3): Floodline Determination / Review	Specialist study feeding into EIA process	The floodline determination – both the existing and future levels will need to be presented in the EIA as linked specialist studies.
(4): Wetland Delineation / Review	Specialist study feeding into EIA process	Delineation of wetlands in the watercourses and determination of the importance of such wetlands will need to be carried out during the EIA process.

Studies required – summary		
Study type	**Product**	**Comment**
(5): Watercourse and Wetland Information Assessment (limnology)	Specialist study feeding into EIA process	The recommendations from the water use licence process will feed into the EIA processes. A separate limnological study (the ecology of freshwater bodies) will also be linked into the consideration and will feed into the EIA processes and IWULA.
(6): Aquatic SASS-5 Assessment	Specialist study feeding into EIA process and IWUL	The aquatic health of the uMlaza and uMkhomazi rivers needs to be determined and assessed in terms of the proposed dams and transfer scheme.
(7): Ichthyological Impact Assessment	Specialist study feeding into EIA process and IWUL	To determine the impact of fish migration up and down the uMlaza and uMkhomazi rivers and tributaries. Requirements for fish ladders should also be determined. Invasion of alien fish species need to be determined and mitigation measures identified. Although approved by DEA, information and detailed input will be required from KZN Ezemvelo on this study.
Heritage specific study		
(8): Heritage Impact Assessment	Specialist study feeding into EIA process	Specialist study – "tier / phase 2" survey of archaeological and paleontological status of greater site and immediate surrounds. It should be noted that potentially a separate permit will be required per section of the greater project (i.e. per dam, per pipeline, and for the tunnel). Location and identity of graves and/or sacred sites will also need to be determined and assessed. The cultural/heritage landscape will need to be determined and assessed.
Physical terrestrial environment specialist studies		
(9): Geotechnical Assessment	Specialist study feeding into EIA process	Information in the form of recommendations and baseline info alone is required to feed into the EIAs.
(10): Agricultural Soils Study	Specialist study feeding into EIA process	To determine the type of agricultural soils present, this will be required prior to undertaking the Agricultural Potential Study.
(11): Erosion Impact Assessment	Specialist study feeding into EIA process	To determine the level of erosion formation during construction and operation of the transfer tunnel and pipelines, along with the specific impacts of the construction activities.
(12): Agricultural Potential Study	Specialist study feeding into EIA process	Detailed consideration of the agricultural potential of each of the impacted sites will need to be provided. The loss of existing agricultural lands – both subsistence and market gardening will need to be quantified and balanced against the benefits of the water transfer benefits. Further considerations will be the potential for new agricultural industries, such as aquaculture. The information will need to be fed into the general EIA process in the main, but will have relevance to a number of the other linked processes.

Studies required – summary		
Study type	**Product**	**Comment**
Health and risk specific studies		
(13): Major Hazard Installation	Specialist study feeding into EIA process	The recommendations from the MHI process will feed into both EIAs. This process is highly specialised and there are limited specialists of this nature in South Africa. This is strongly influenced by the site and the process specifics. Information supplied with respect to the specific risks associated with the construction process will be reviewed. The potential risks relating to failure of the major infrastructure during operation will possibly also need to be considered.
(14): Health Impact Assessment	Potential specialist study feeding into EIA process, and IWULA	It will need to be determined whether a formal, separate Health Impact Assessment will be required to consider potential health implications in the short term (i.e. dominantly during construction) and later during operation of the greater scheme (e.g. safety and risk issues due to new large bodies of water being present).
Socio-economic issues specific studies		
(15): Social Impact Assessment	Specialist study feeding into EIA process, the IWULA, and social plan for implementation	To determine the social impacts of the dam and on the dam (population dynamics, cultural, political impacts, etc.). Included therein will be a noise assessment in terms of its impact on the community. The outputs from this study will be used to inform the potential relocations, the impact of dam on property development, etc. The issue of heritage specific considerations will need to feed into this study from the heritage study undertaken (study (8) – cross check).
(16): Economic Impact Assessment	Specialist study feeding into EIA process	This is could be part of the SIA, but may need to be separated – it was a request from I&APs in the MMTS2 review. Users would like to know the impact of the dam construction on water levies.
(17): Tourism Potential Assessment	Specialist study feeding into EIA process	To determine the tourism potential of the dams and the expected influx of tourists into the area during operation.
(18): Visual Impact Assessment	Specialist study feeding into EIA process	To determine the visual impact of not only the impoundment but also the associated infrastructure on surrounding landowners. Visual landscapes and identities thereof will also need to be considered and linked to the social / community related considerations.
(19): Noise Impact Assessment	Specialist study feeding into EIA process	Sensitive noise receptors need to be identified and ambient noise levels determined prior to construction starting. It should be noted that operational aspects of the transfer scheme could also impact on sensitive noise receptors.
Services specific studies		
(20): Traffic Impact Assessment	Specialist study feeding into EIA process	Construction vehicles, especially large trucks will be moving in and around the site(s) and the linking access roads and will have a significant impact on the existing local roads.

Studies required – summary		
Study type	**Product**	**Comment**
(21): Town and Regional Planning Requirements Report	Specialist study feeding into EIA process	To determine the town and regional planning requirements as may be triggered by the proposed development. Cross check with the provincial specific planning law requirements for KZN (provincial approval level).
General study		
(22): Legal Review	Overall legal compliance check	To determine that all legal requirements have been dealt with, not only the environmental specific items.

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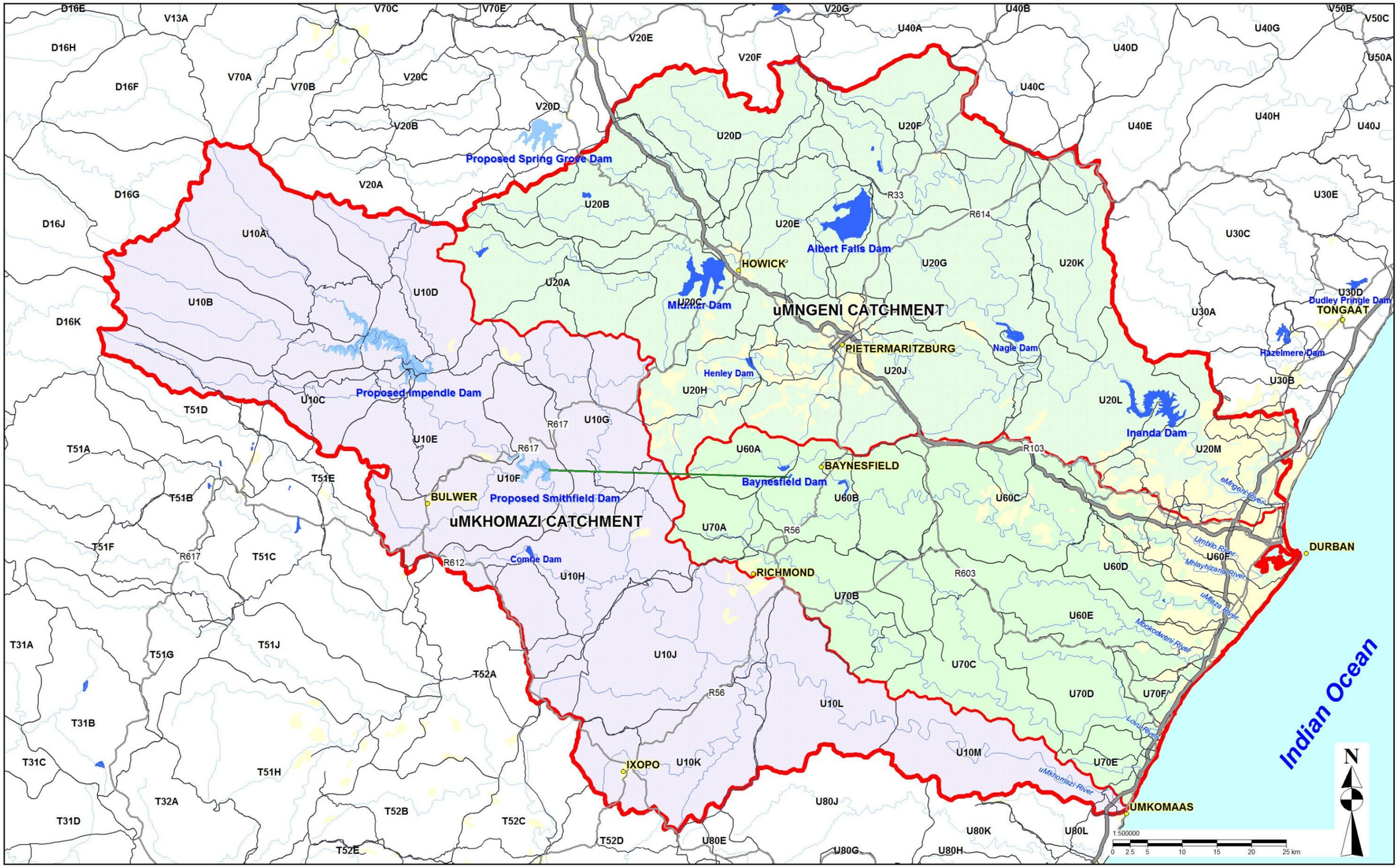
Appendix A
Maps



water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

AECOM

Project Name :

uMkhomazi Water Project Phase 1: Module 1:
Technical Feasibility Study: Raw Water (uMWP1-1/RW)
Locality map - Study area (2)

Legend

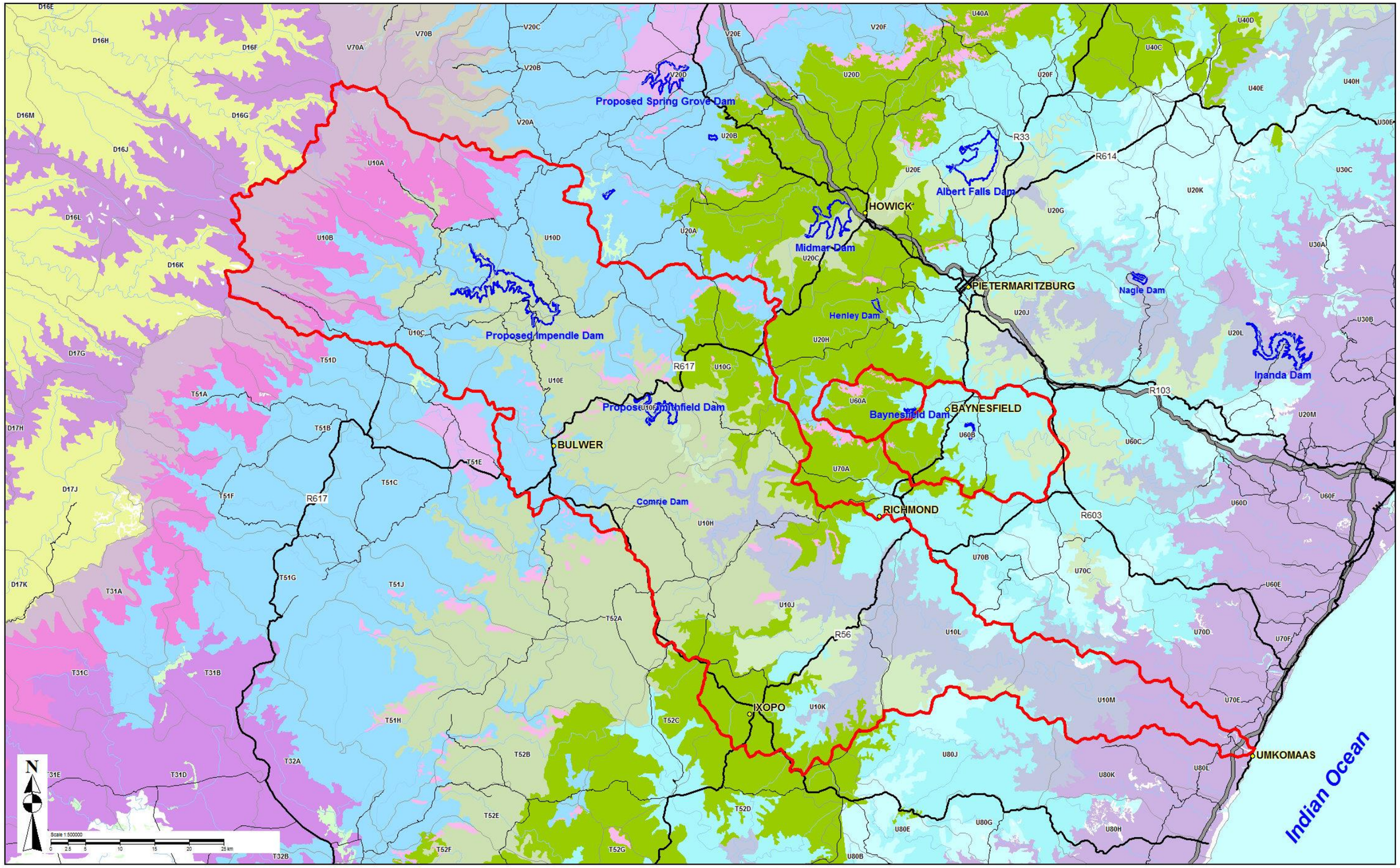
- Quaternary Catchments
- Project Area
- Towns
- Existing Dams
- Proposed Dams
- Rivers

Roads

- National Route
- Roads
- Secondary Road
- Proposed Conveyance Structure

MAP A

Drawn:	LC Gallagher
Checked:	A Combrinck
Approved:	H Pieterse
Date:	2013-04-18
Map Ref:	uMkhomazi.map
View Ref:	Locality Map - Study area (2)
Project No:	J01763



water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

AECOM

Project Name :

uMkhomazi Water Project Phase 1: Module 1:
Technical Feasibility Study: Raw Water (uMWP1-1/RW)
Vegetation Map

Legend

- uMkhomazi Catchment & U60A
- U60B
- Quaternary Catchments
- Proposed Dams
- Existing Dams

Vegetation

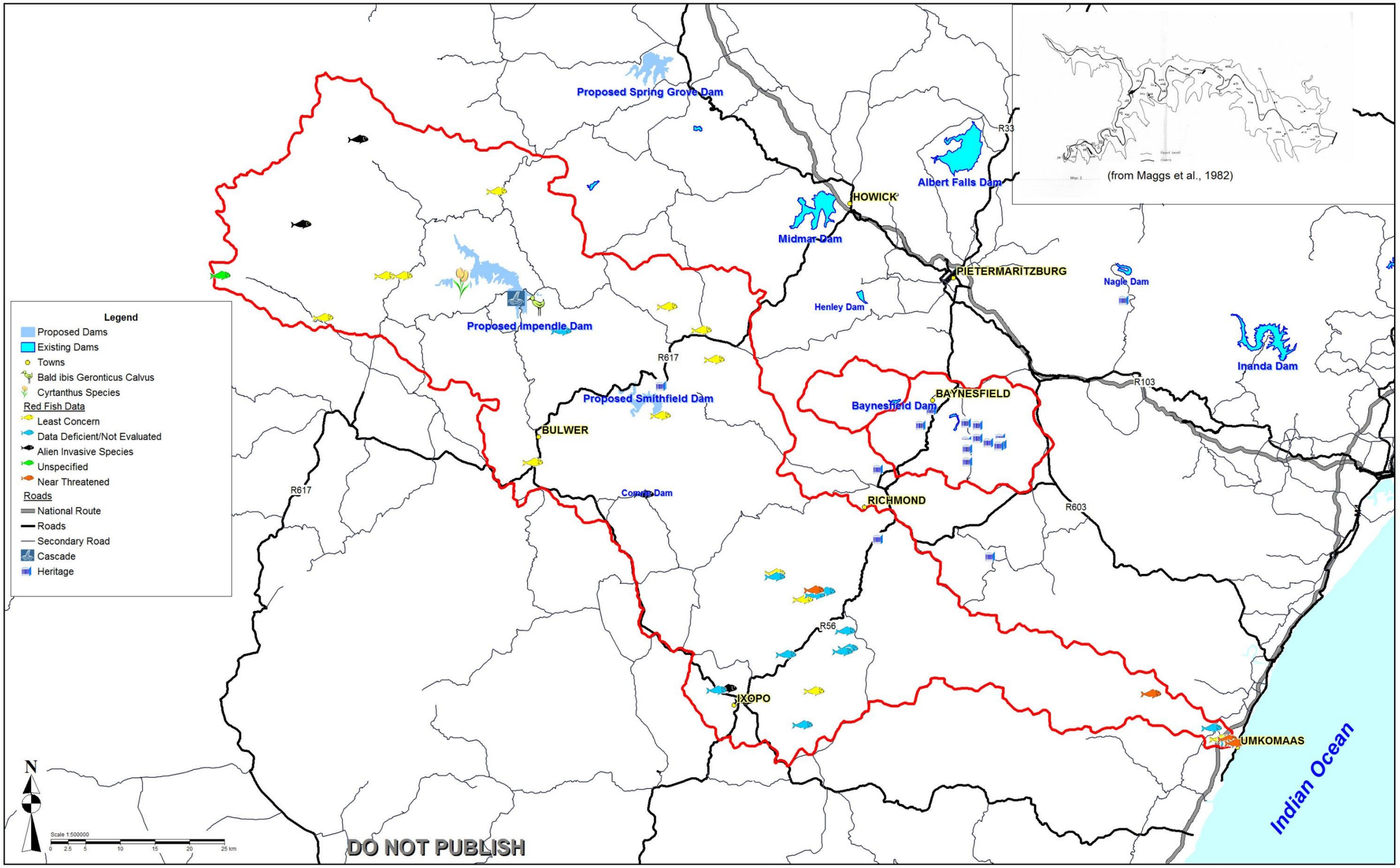
- Drakensberg Afroalpine Heathland
- Drakensberg Foothill Moist Grassland
- East Griqualand Grassland
- Eastern Temperate Freshwater Wetlands
- Eastern Valley Bushveld
- KwaZulu-Natal Coastal Belt
- KwaZulu-Natal Hinterland Thornveld
- KwaZulu-Natal Sandstone Sourveld
- Lesotho Highland Basalt Grassland
- Midlands Mistbelt Grassland
- Mooi River Highland Grassland
- Ngongoni Veld
- Northern Afrotemperate Forest
- Northern Drakensberg Highland Grassland
- Southern Drakensberg Highland Grassland
- Southern KwaZulu-Natal Moist Grassland
- Southern Mistbelt Forest
- uKhahlamba Basalt Grassland
- Towns

Roads

- National Route
- Roads
- Secondary Road

MAP B

Drawn:	LC Gallagher
Checked:	B le Roux
Date:	2013-04-22
Map Ref:	uMkhomazi.map
View Ref:	Vegetation Map
Project No:	01763



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Water Affairs
REPUBLIC OF SOUTH AFRICA

AECOM

Project Name :

uMkhomazi Water Project Phase 1: Module 1:
Technical Feasibility Study: Raw Water (uMWP1-1/RW)
Sensitivity Map

Legend

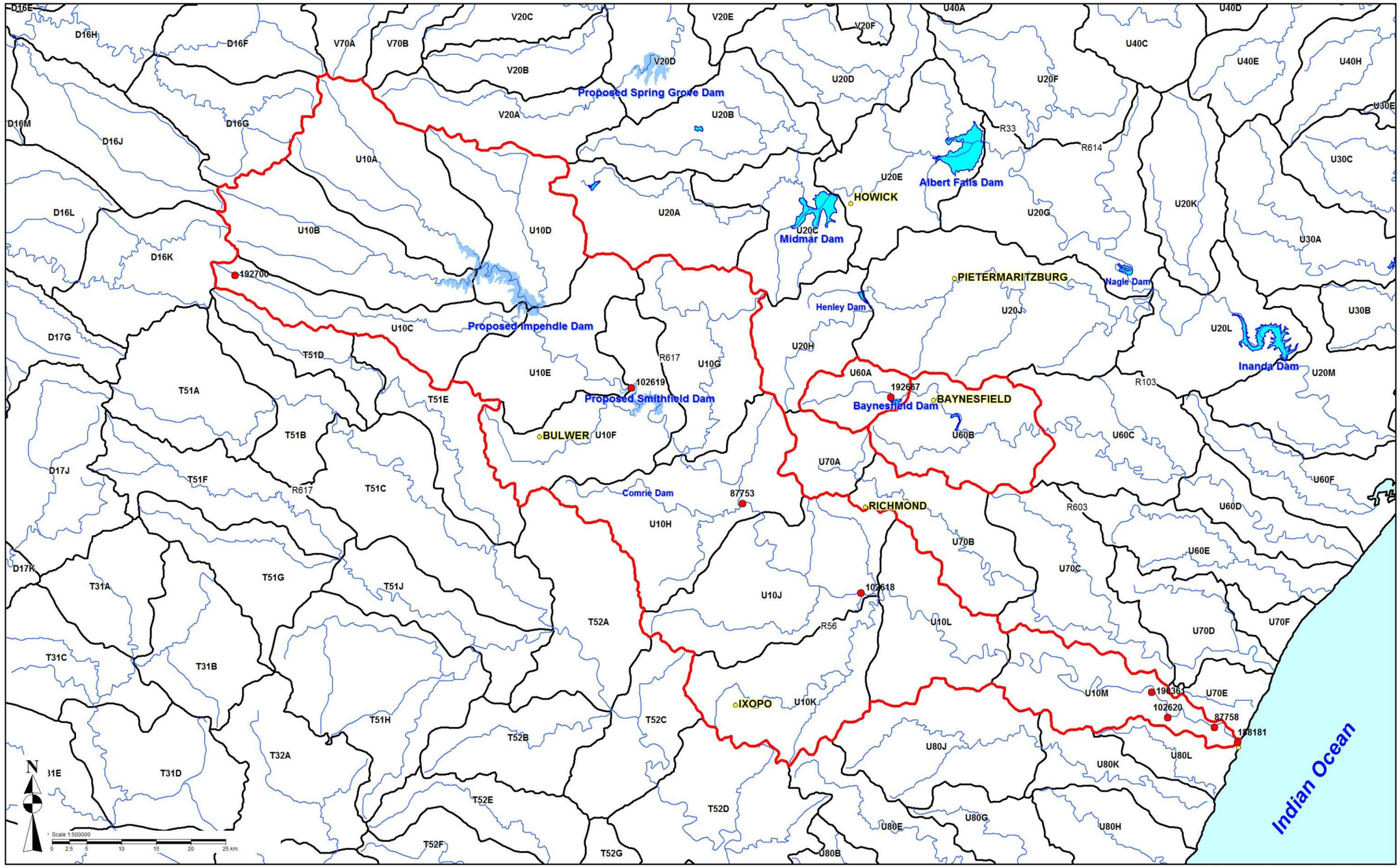
Proposed Dams
Existing Dams
Towns
Bald ibis Geronticus Calvus
Cyrtanthus Species

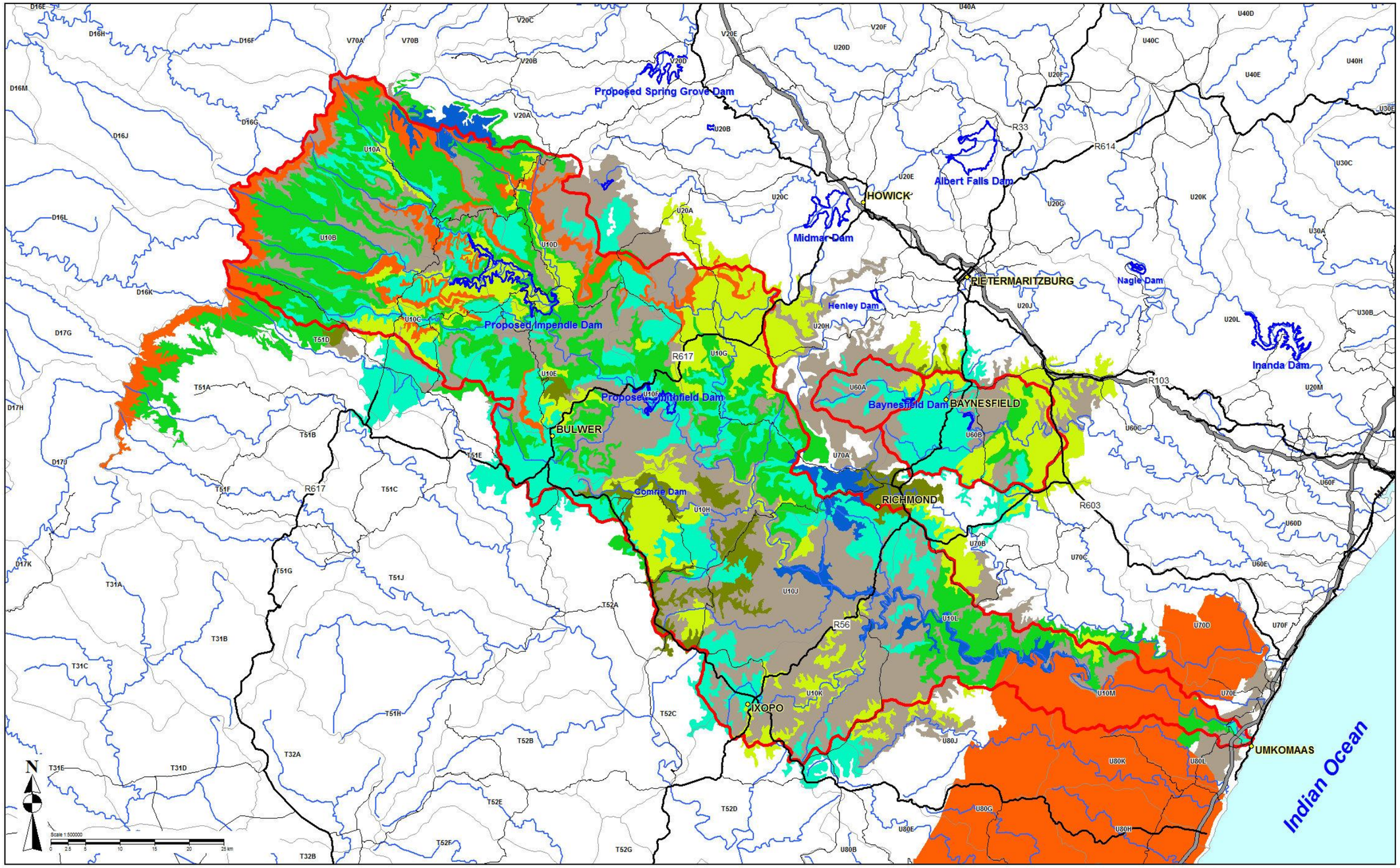
Red Fish Data
Least Concern
Data Deficient/Not Evaluated
Alien Invasive Species
Unspecified
Near Threatened

Roads
National Route
Roads
Secondary Road
Cascade
Heritage

Map C

Drawn:	LC Gallagher
Checked:	B le Roux
Date:	2013-04-22
Map Ref:	uMkhomazi.map
View Ref:	Sensivitiy Map
Project No:	J01763


Proposed Spring Grove Dam
Albert Falls Dam
HOWICK
Midmar Dam
PIETERMARITZBURG
Nagle Dam
Henley Dam
Inanda Dam
Proposed Impendle Dam
Proposed Smithfield Dam
Baynesfield Dam
BAYNESFIELD
BULWER
Comrie Dam
RICHMOND
IXOPO
192700
102619
192667
87753
102618
190364
102620
87758
188181
Indian Ocean
Scale 1:500000
0 2.5 5 10 15 20 25 km
water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA
AECOM
Project Name :
uMkhomazi Water Project Phase 1: Module 1:
Technical Feasibility Study: Raw Water (uMWP1-1/RW)
Water Quality Monitoring Stations
Legend
eMkhomazi Catcment & U60A
Quaternary Catchments
Main Rivers
Proposed Dams
Existing Dams
Towns
Water Quality Monioring Stations
Map D
Drawn: LC Gallagher
Checked: B le Roux
Date: 2013-04-22
Map Ref: uMkhomazi.map
View Ref: Water Quality Monitoring Points
Project No: J01763



water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

AECOM

Project Name :

uMkhomazi Water Project Phase 1: Module 1:
Technical Feasibility Study: Raw Water (uMWP1-1/RW)
Land Capability Map

Legend

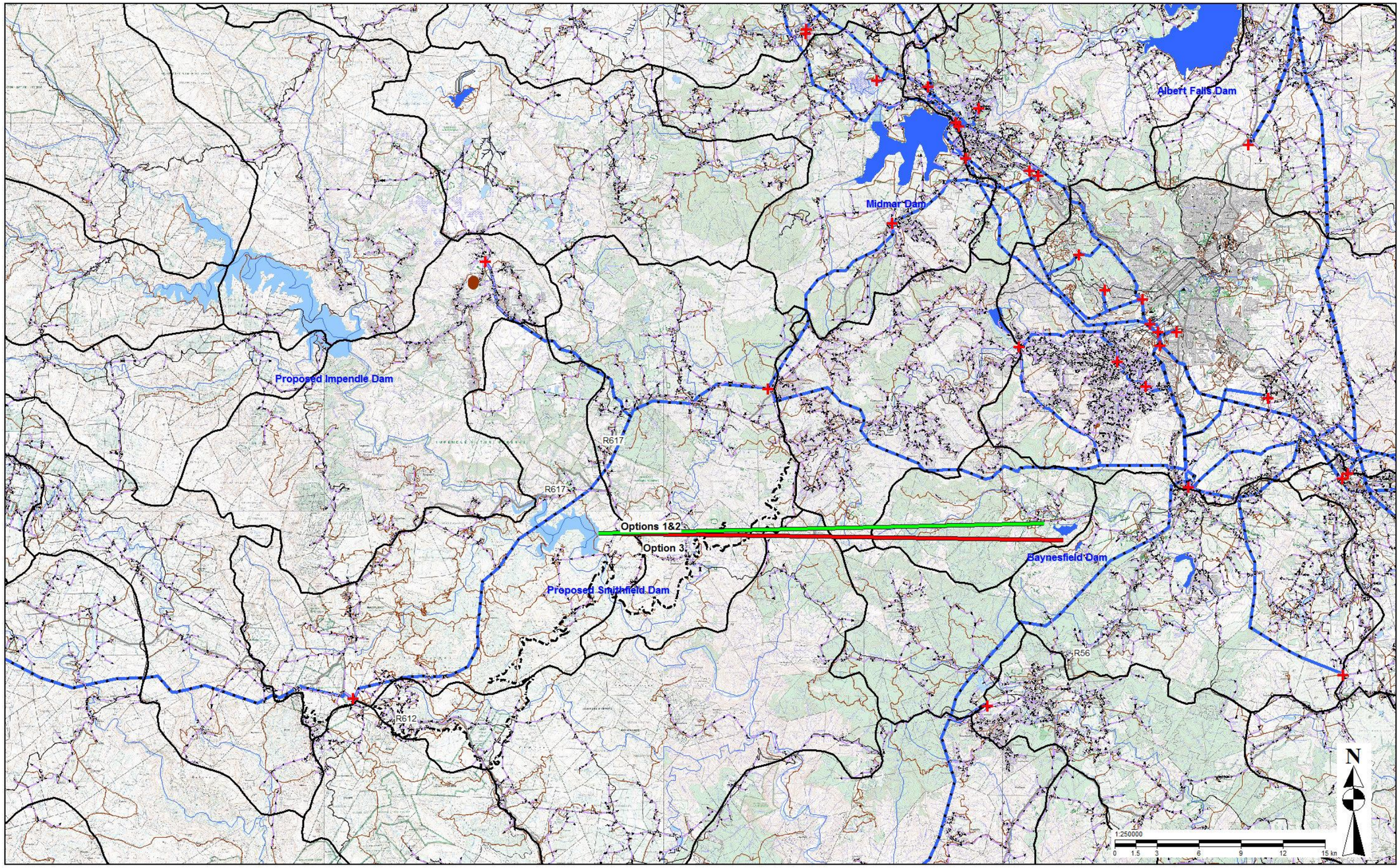
- eMkhomazi Catcment & U60A
- U60B
- Quaternary Catchments
- Proposed Dams
- Existing Dams
- Rivers

Land Capability
- 2
- 3
- 4
- 5
- 6
- 7
- 8

Roads
- National Route
- Roads
- Secondary Road
- Towns

Map E

Drawn:	LC Gallagher
Checked:	B le Roux
Date:	2013-04-22
Map Ref:	uMkhomazi.map
View Ref:	Land Capability Map
Project No:	J01763



water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

AECOM

Project Name :

uMkhomazi Water Project Phase 1: Module 1: Technical Feasibility Study: Raw Water (uMWP1-1/RW) Infrastructure Map

Legend

- Proposed Dams
- Main Rivers

Roads
- Roads
- Secondary Roads
- Other Access Roads
- Railways

Eskom
- Power Stations
- HV Lines_clip
- MV lines
- Furrows

SPOT 5 LAND USE DATA
- Mines and quarries

Tunnel Transfer Options
- Option 1
- Option 2

MAP F

Drawn:	LC Gallagher
Checked:	A Maharaj
Date:	2013-04-18
Map Ref:	eMkhomazi.map
View Ref:	Infrastructure Map
Project No:	J01763