

# UMKHOMAZI WATER PROJECT PHASE 1

## ENVIRONMENTAL IMPACT ASSESSMENT

PUBLIC MEETING – 23 OCTOBER 2013

Baynesfield Club, 10h00







# WELCOME & INTRODUCTION

# AGENDA

1 Welcome & Introduction

2 Purpose & Rules of the Meeting

3 Presentations:

3.1 *Project Background & Motivation* DWA/AECOM

3.2 *uMWP-1 - Raw Water Component* AECOM

3.3 *uMWP-1 - Potable Water Component* Knight Piésold

3.4 *Environmental Impact Assessment* Nemaï

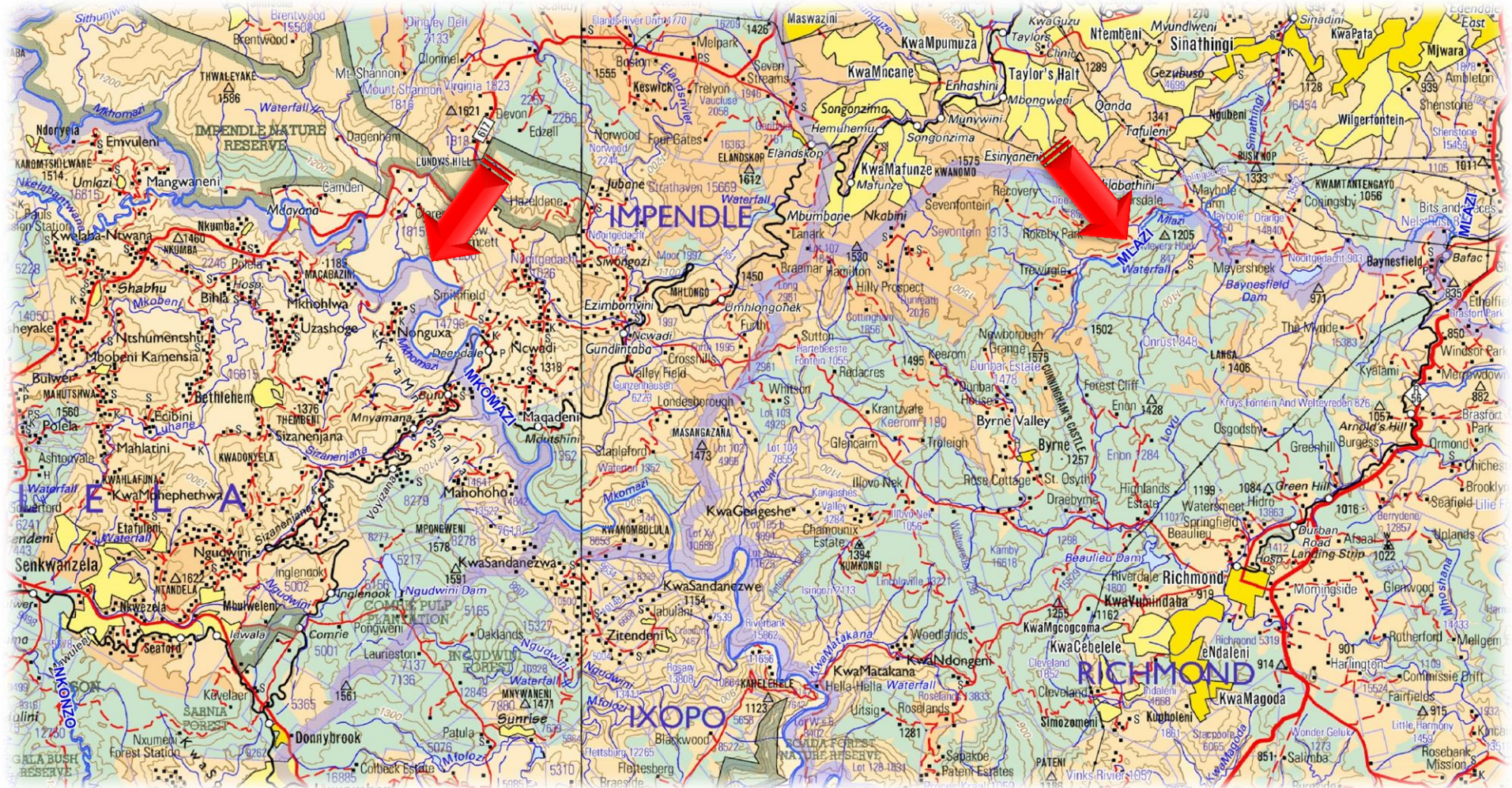
4 Discussion

5 Way Forward / Close



# PROJECT TEAMS

## uMWP-1 Components

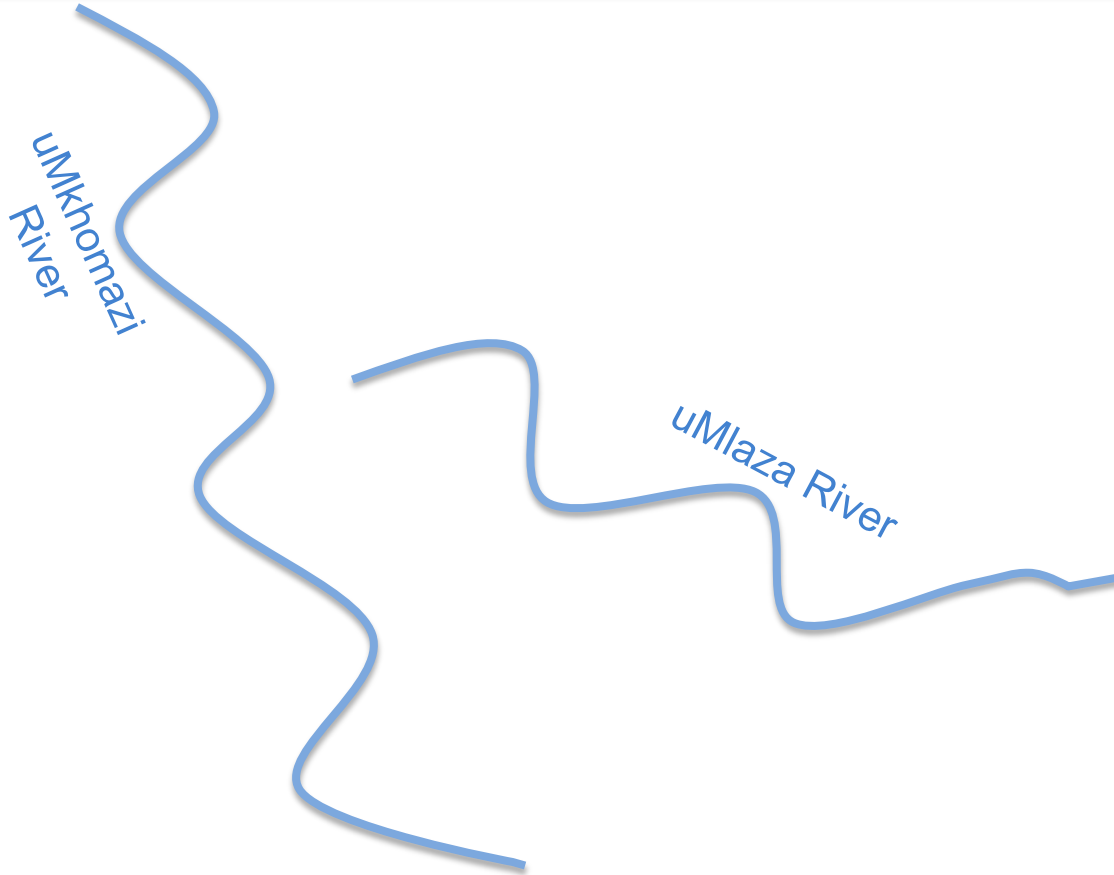




# PROJECT TEAMS

## uMWP-1 Components

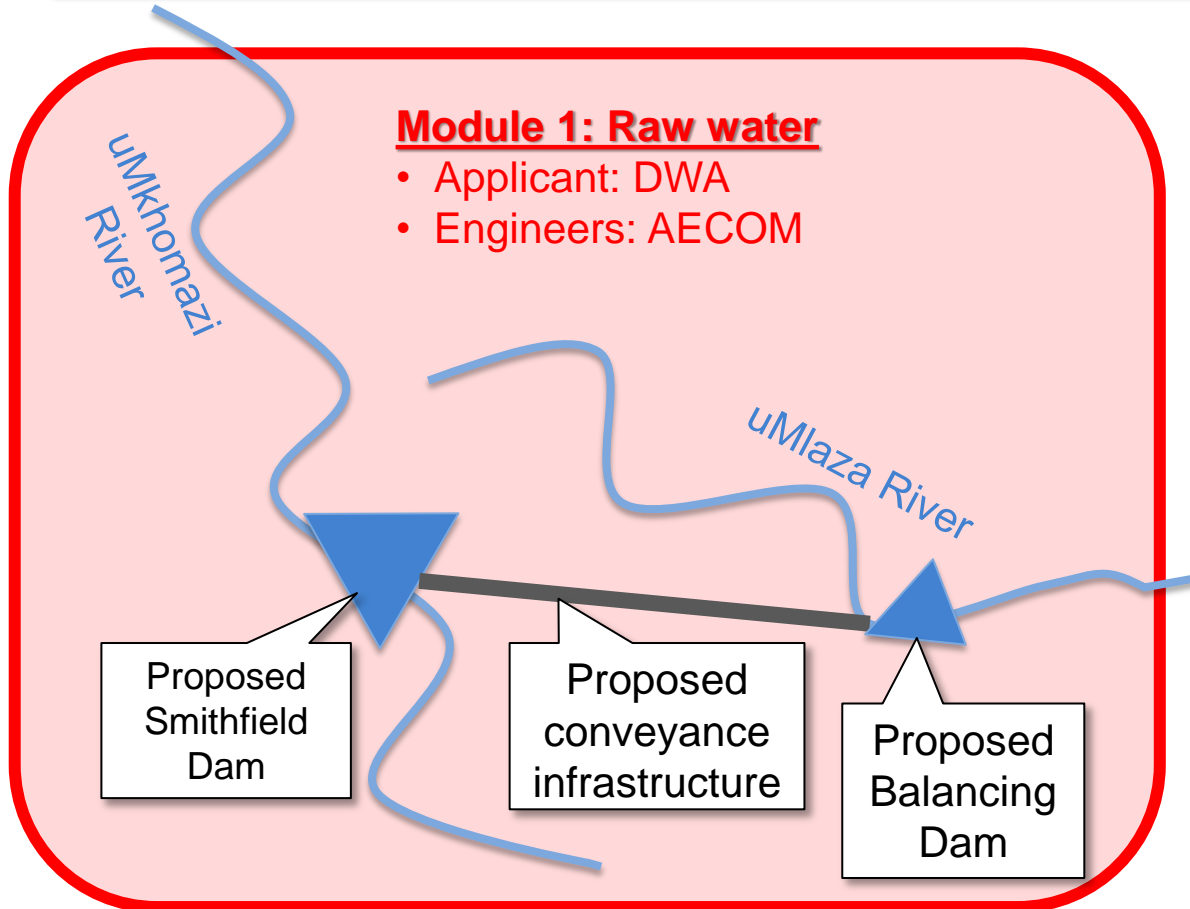
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# PROJECT TEAMS

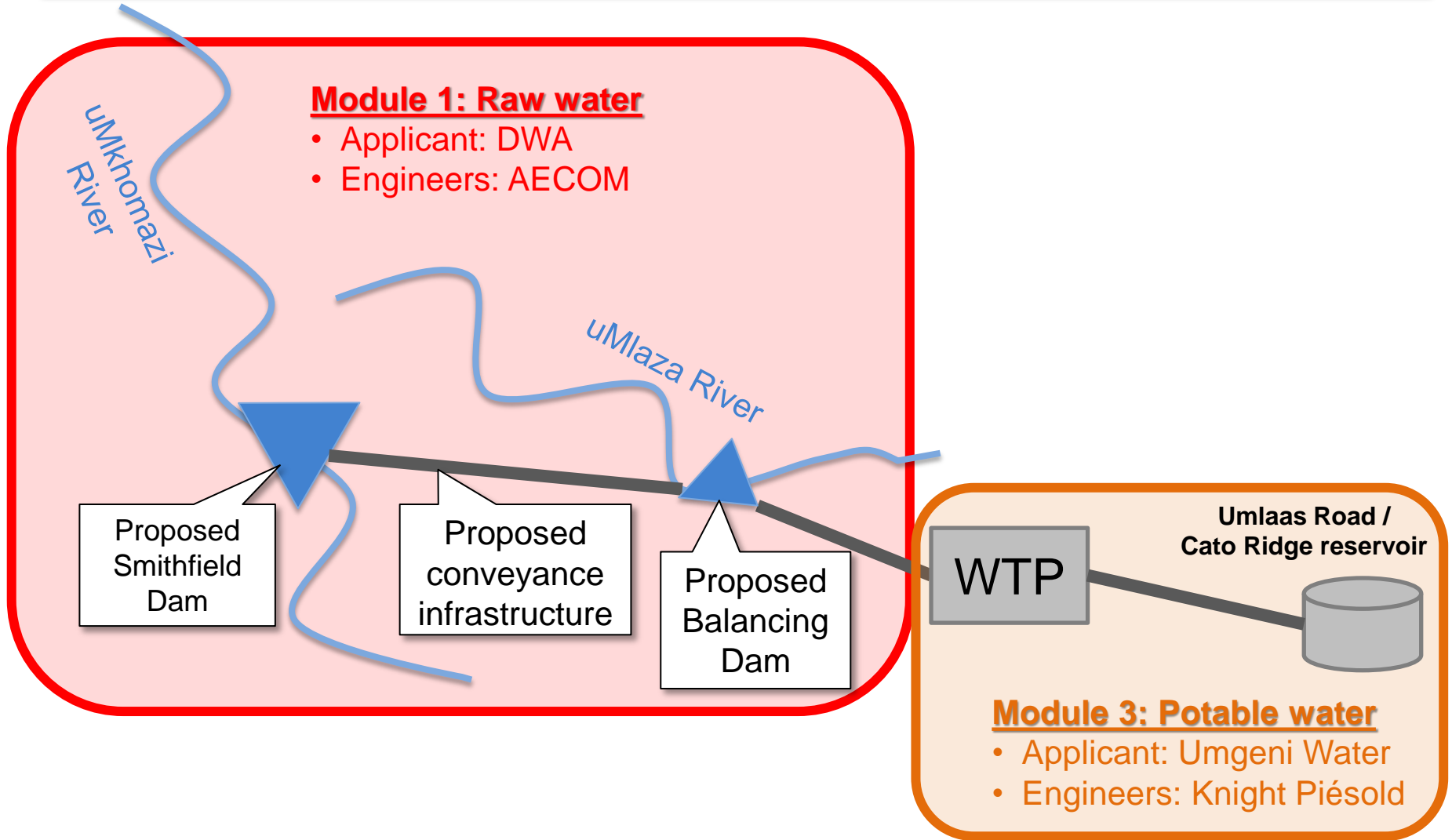
## uMWP-1 Components





# PROJECT TEAMS

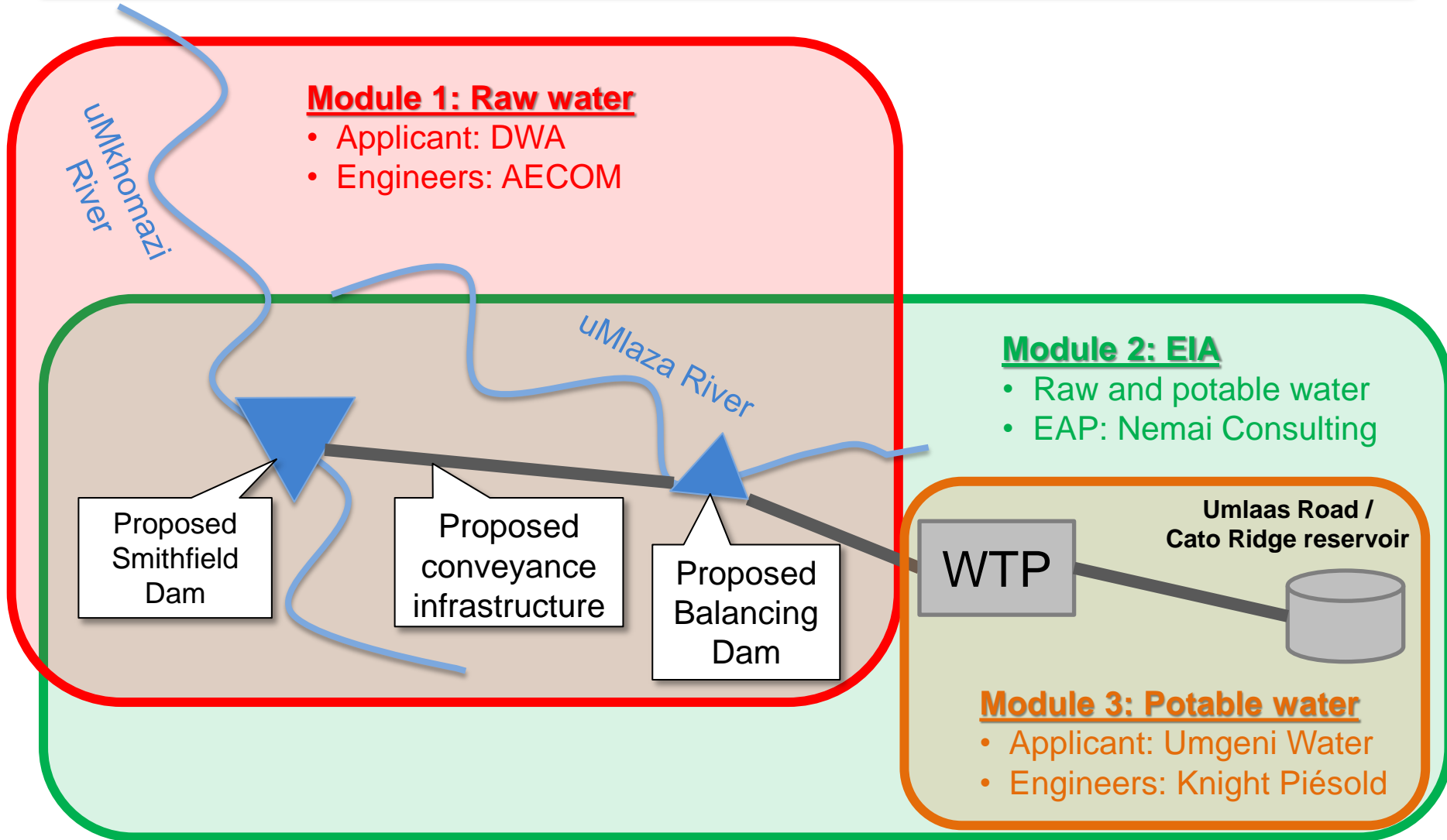
## uMWP-1 Components





# PROJECT TEAMS




## uMWP-1 Components





# PROJECT TEAMS

## uMWP-1 Raw Water Component


Project Role	Affiliation	Representatives
Project Proponent	Department of Water Affairs	<ul style="list-style-type: none"> <li>➤ K. Bester</li> <li>➤ S. Moodley</li> </ul> 
Engineering Feasibility Study	AECOM	<ul style="list-style-type: none"> <li>➤ H. Pieterse</li> </ul> 
Environmental Assessment Practitioner	Nemai Consulting	<ul style="list-style-type: none"> <li>➤ D. Henning</li> <li>➤ R. Maharaj</li> </ul> 

# PROJECT TEAMS

## uMWP-1 Raw Water Component

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## uMWP-1 Potable Water Component

Project Role	Affiliation	Representatives
Project Proponent	Umgeni Water	<ul style="list-style-type: none"> <li>➤ L. Archer</li> <li>➤ G. Subramanian</li> </ul> 
Engineering Feasibility Study	Knight Piésold	<ul style="list-style-type: none"> <li>➤ A. Doorgapershad</li> <li>➤ G. Lempert</li> </ul> 
Environmental Assessment Practitioner	Nemai Consulting	<ul style="list-style-type: none"> <li>➤ D. Henning</li> <li>➤ R. Maharaj</li> </ul> 





# PURPOSE & RULES OF THE MEETING

# PURPOSE OF THE MEETING

1. To introduce the project
2. To provide an overview of the Environmental Impact Assessment process
3. To provide a platform for project-related discussions
4. To obtain input into the Scoping Phase





# RULES OF THE MEETING

1. Questions to relate to project at hand
2. Opportunities for seeking clarification at end of presentations
3. Address project team through facilitator
4. Identify yourself before asking a question
5. Meeting closing time
6. Cell phones off, please



# PROJECT BACKGROUND & MOTIVATION

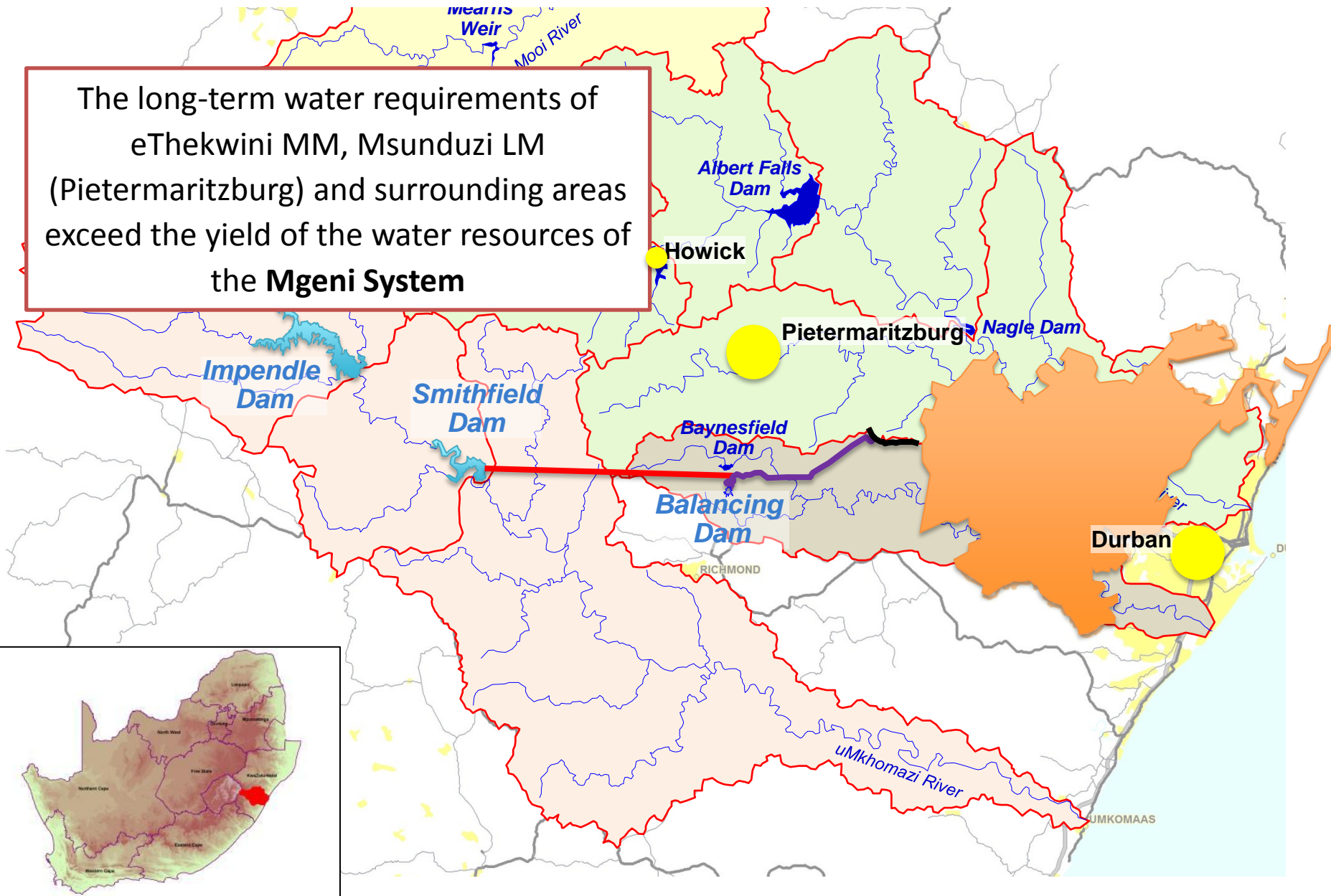


A wide-angle landscape photograph showing rolling green hills under a clear blue sky. A winding river flows through the valley. In the foreground, there are some trees and a fence line. The overall scene is bright and scenic.

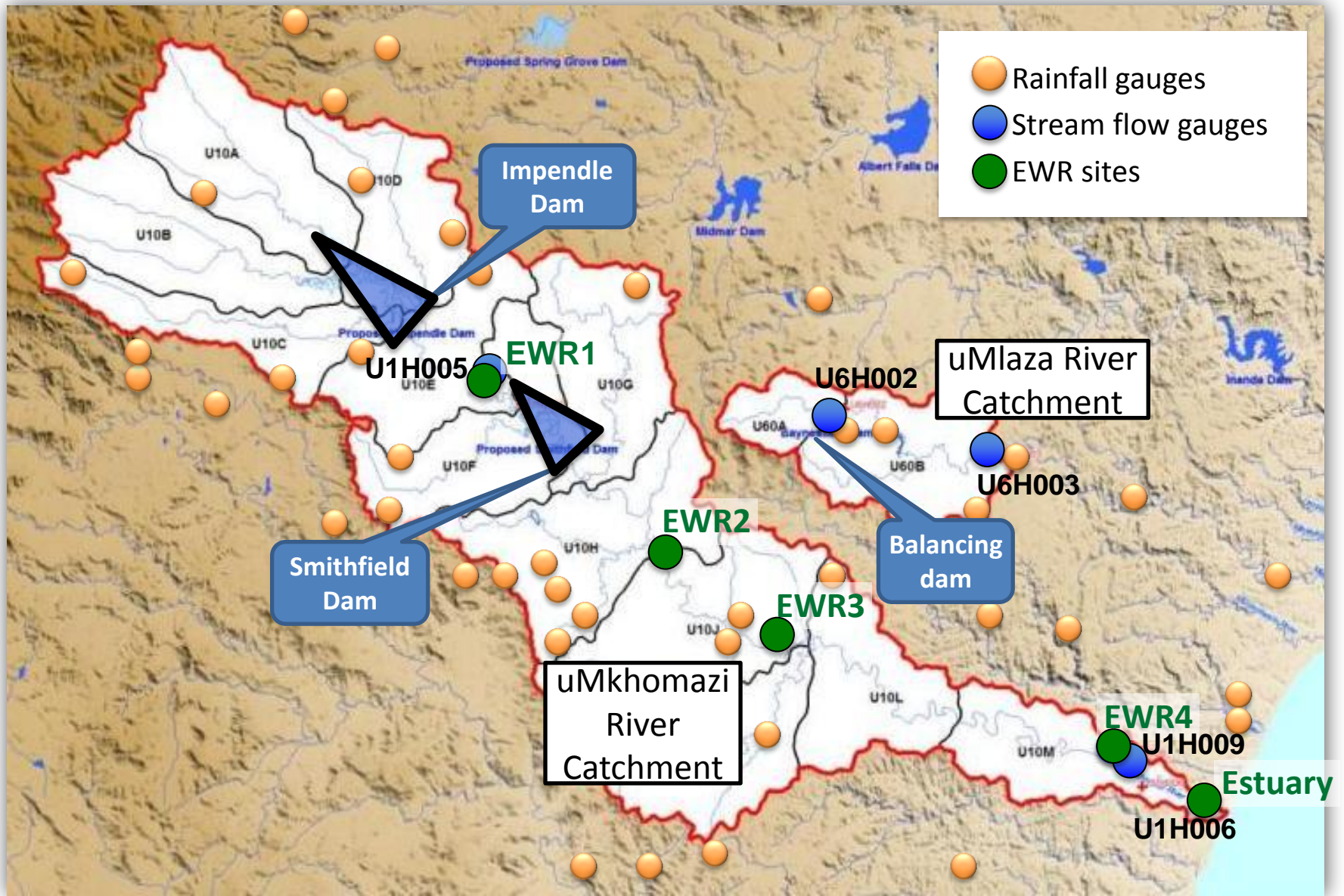


# Background to the project

The long-term water requirements of eThekweni MM, Msunduzi LM (Pietermaritzburg) and surrounding areas exceed the yield of the water resources of the **Mgeni System**

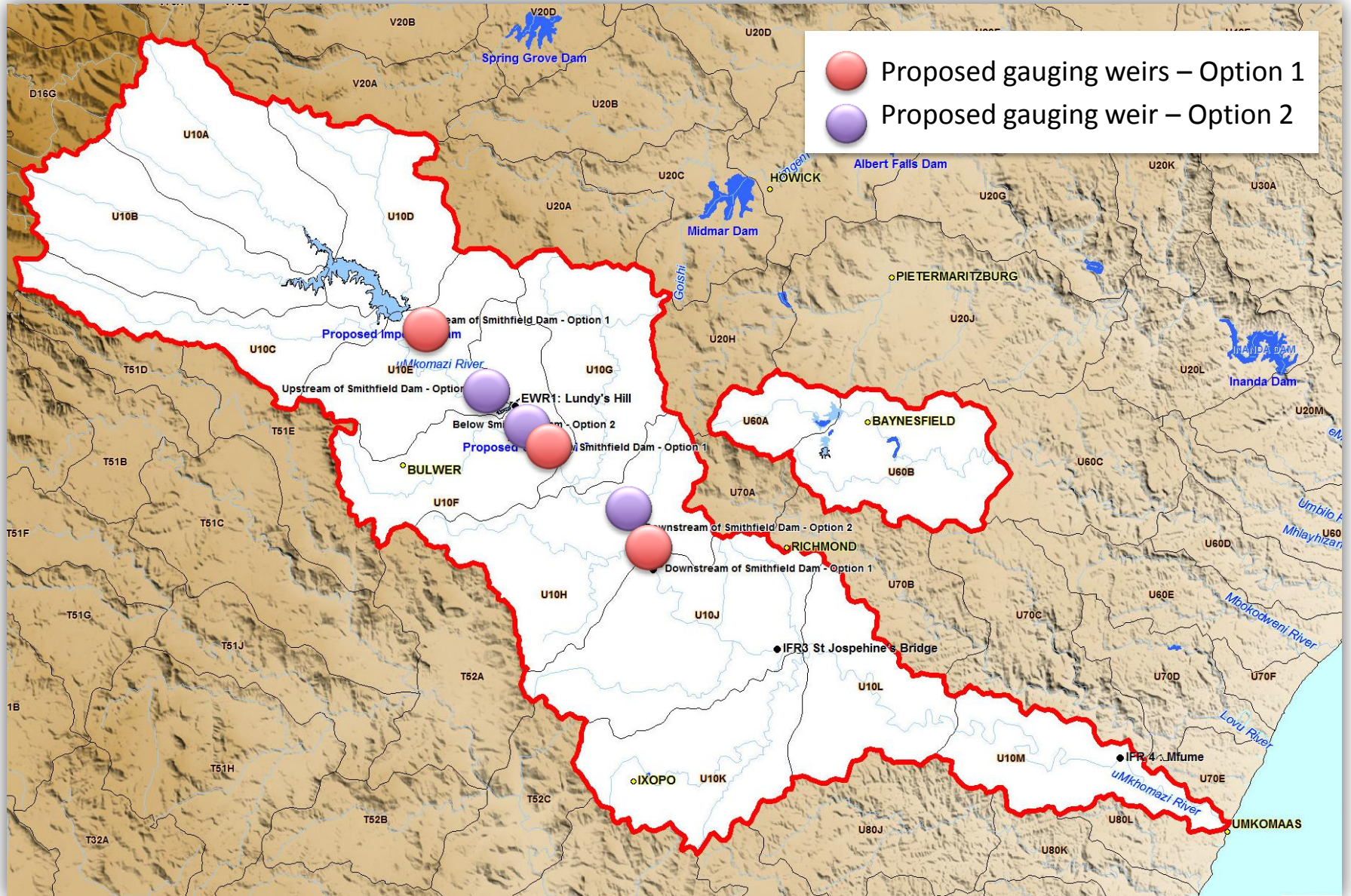


# Water resource focus area (1)



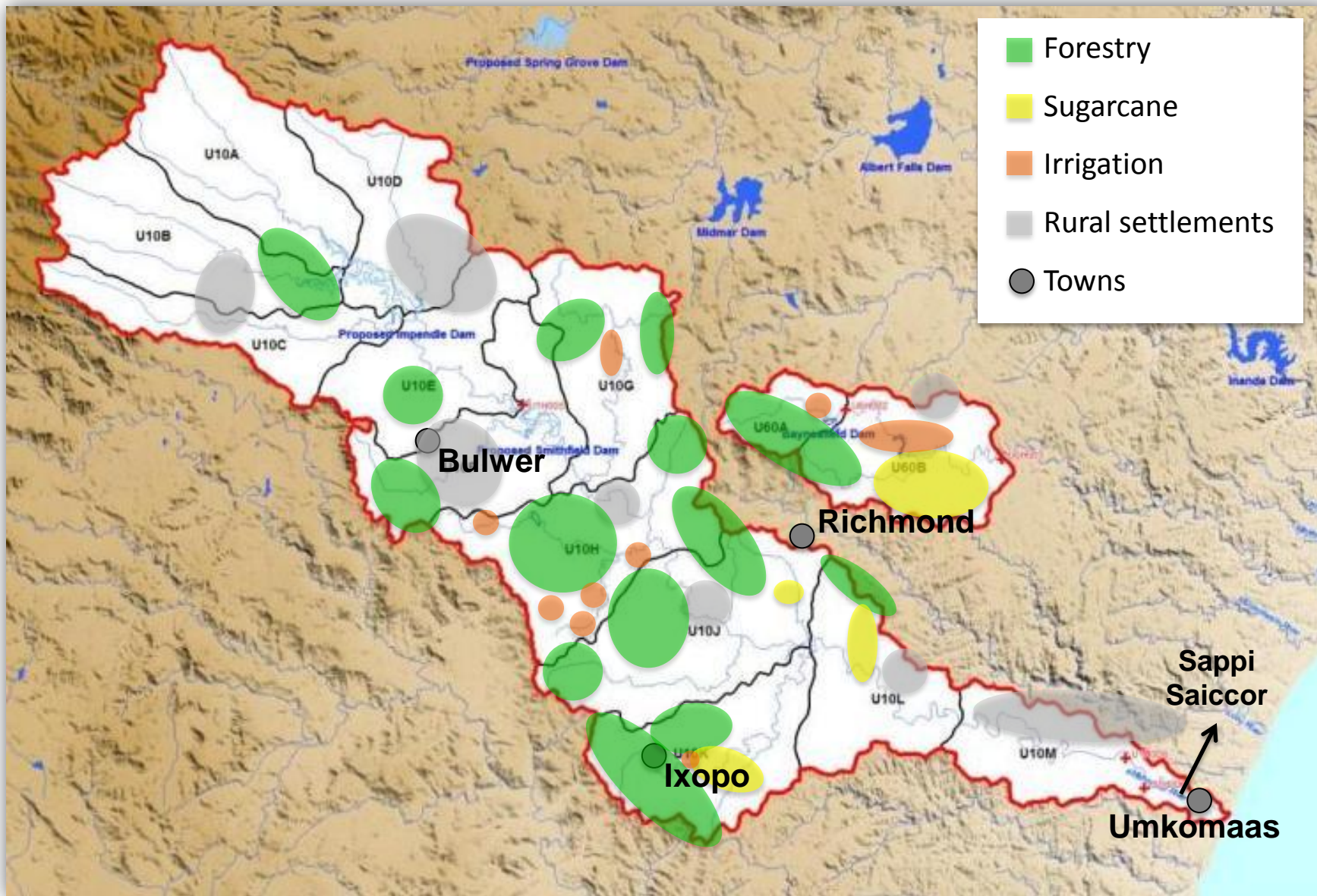


# Water resource focus area (2)

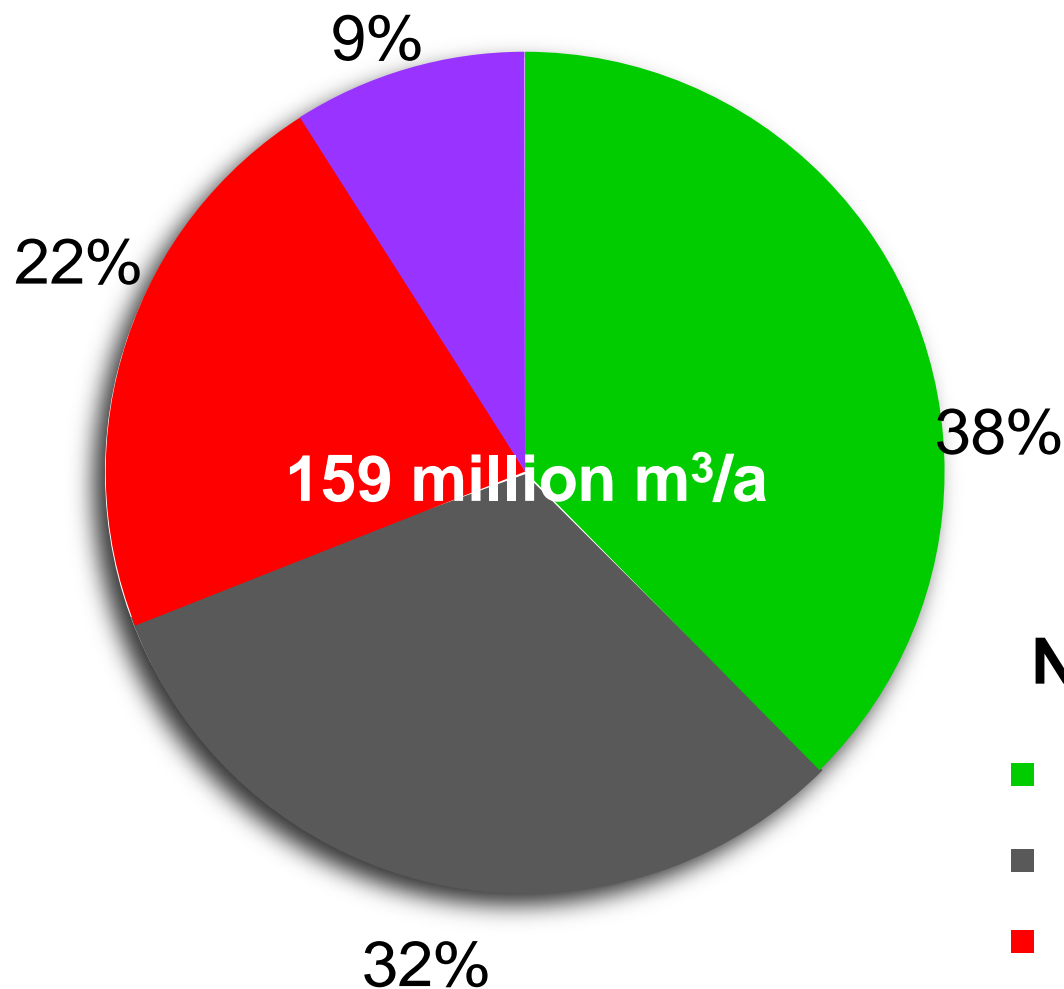




# Land use



# Net water use in the uMkhomazi Catchment

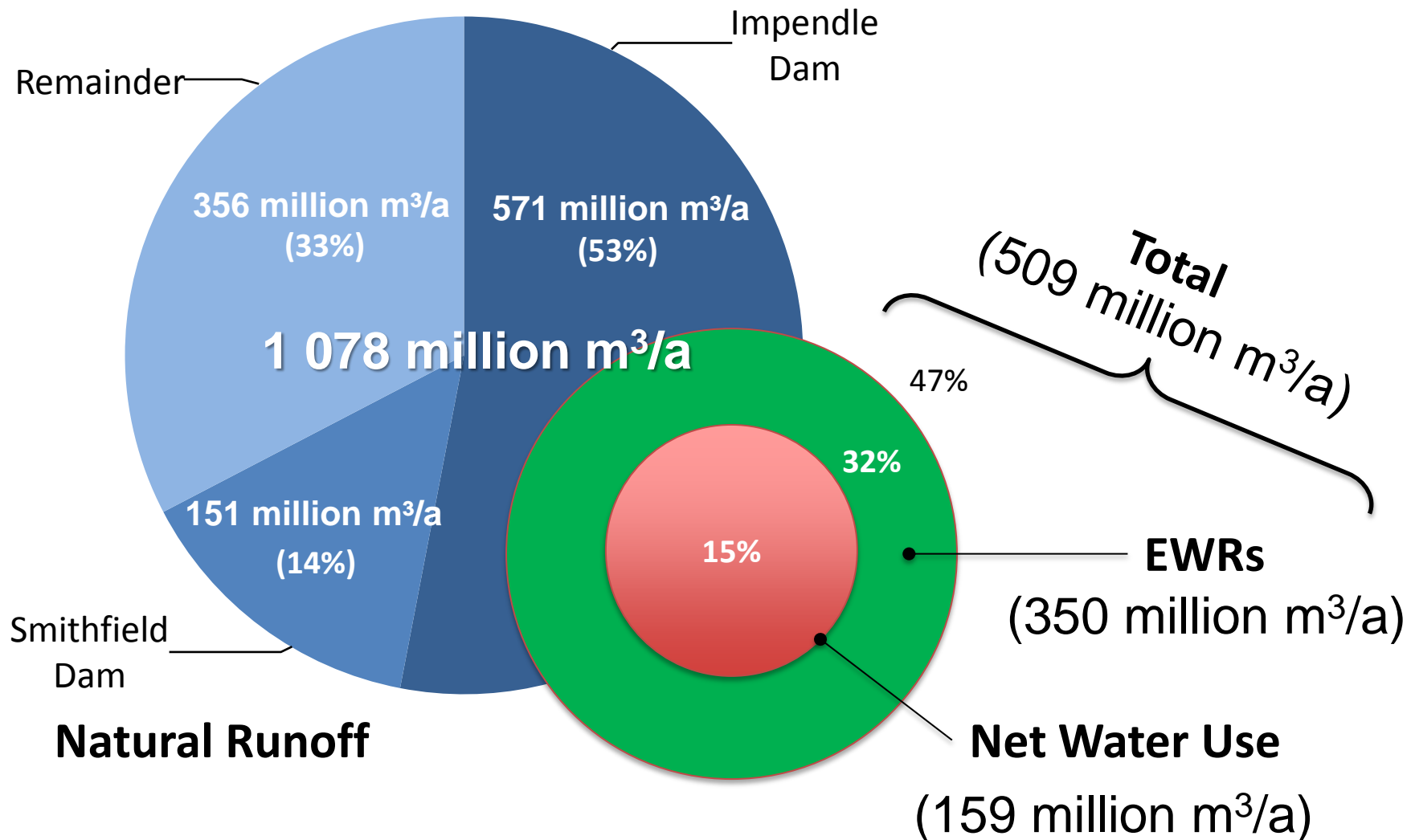


## Net water use

- Commercial forestry
- SAPPi-SAICCOR
- Irrigation
- Other (incl domestic)

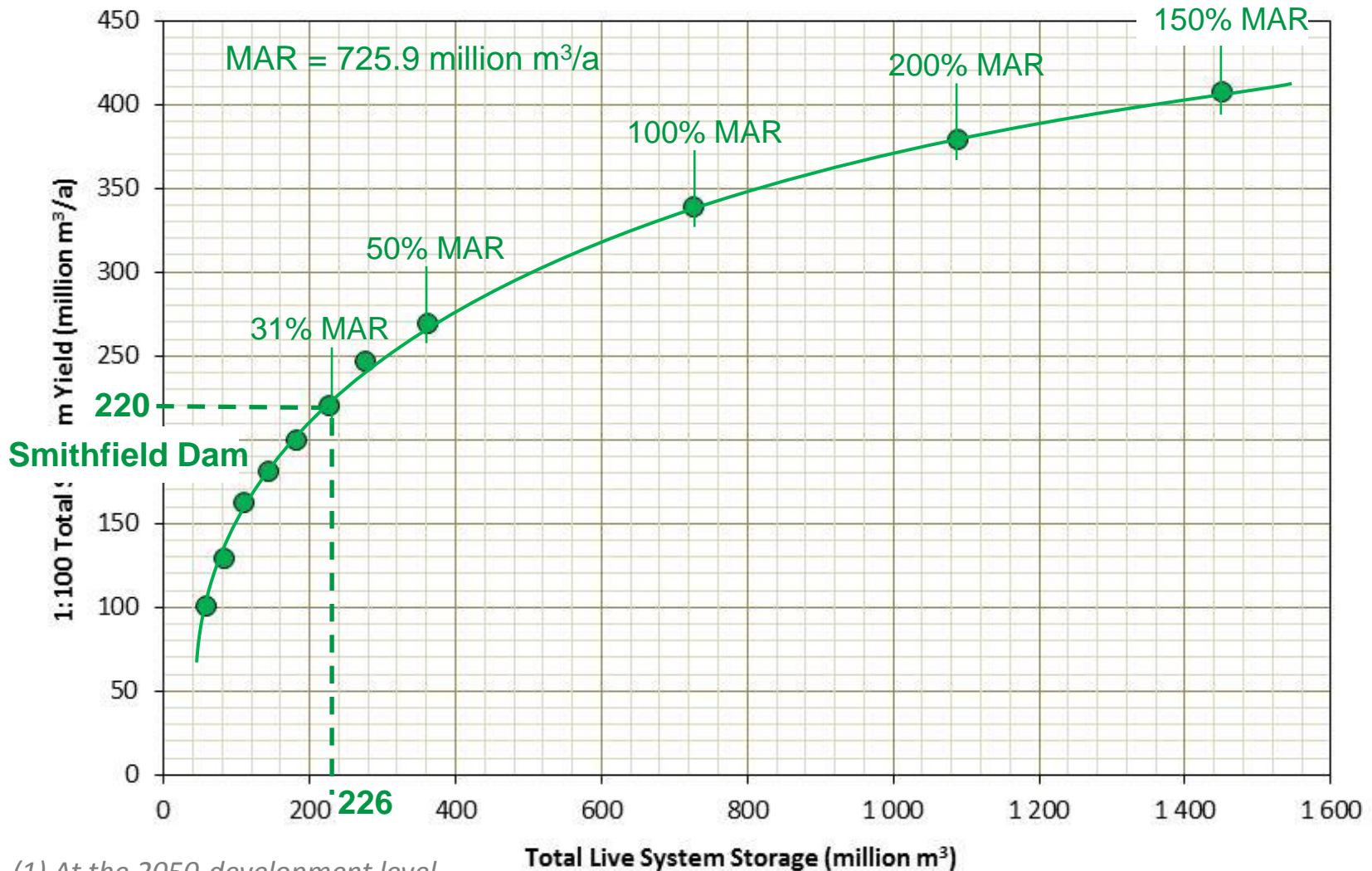
# Hydrology of the uMkhomazi River Catchment

## Natural runoff, water use and EWRs





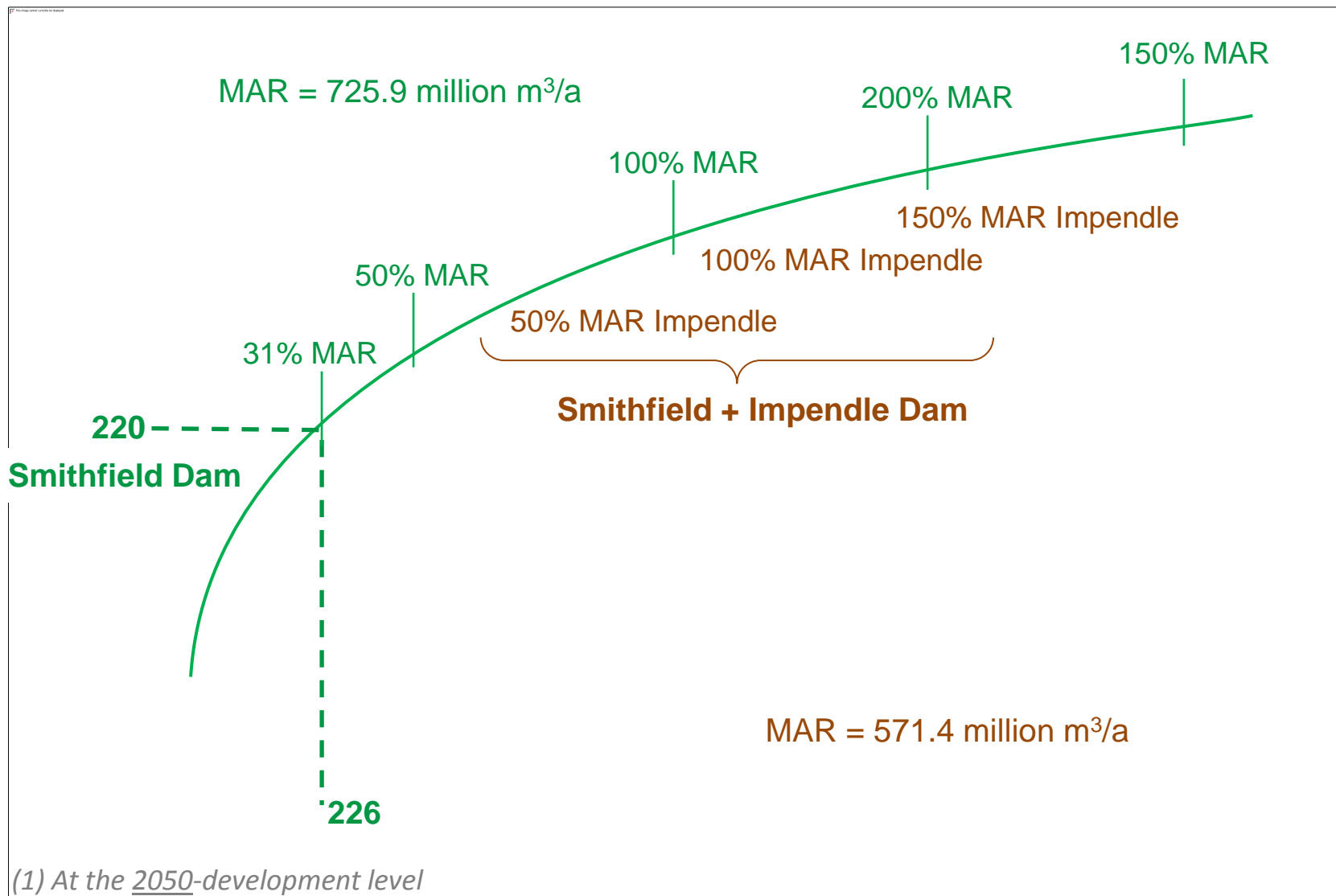
# Summary of yield results



(1) At the 2050-development level

(2) All with EWRs based on Pre-feasibility (IWR, 1998)

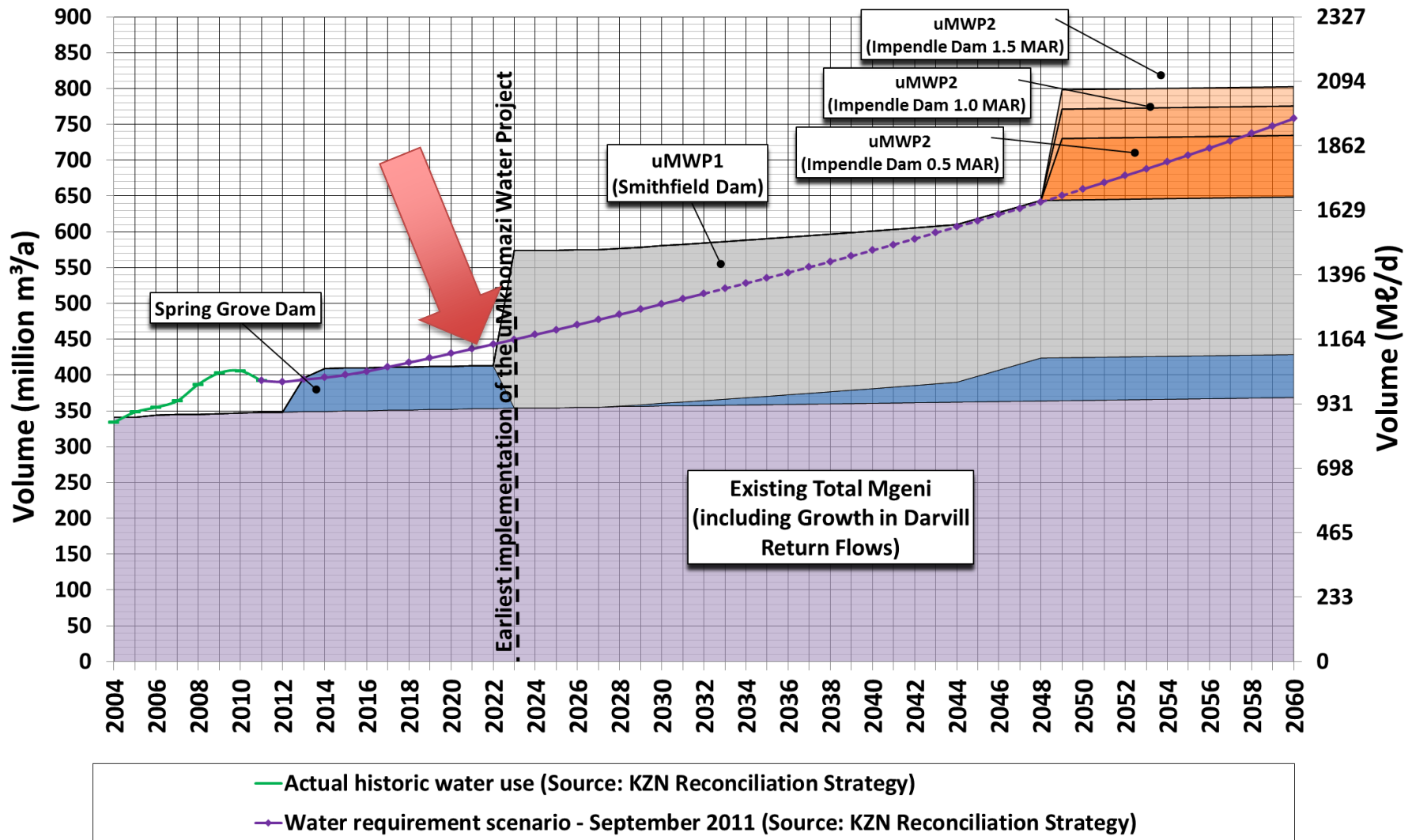
# Summary of yield results





# Water balance uMWP-Mgeni Transfers

## Water requirement projection for the integrated Mgeni System

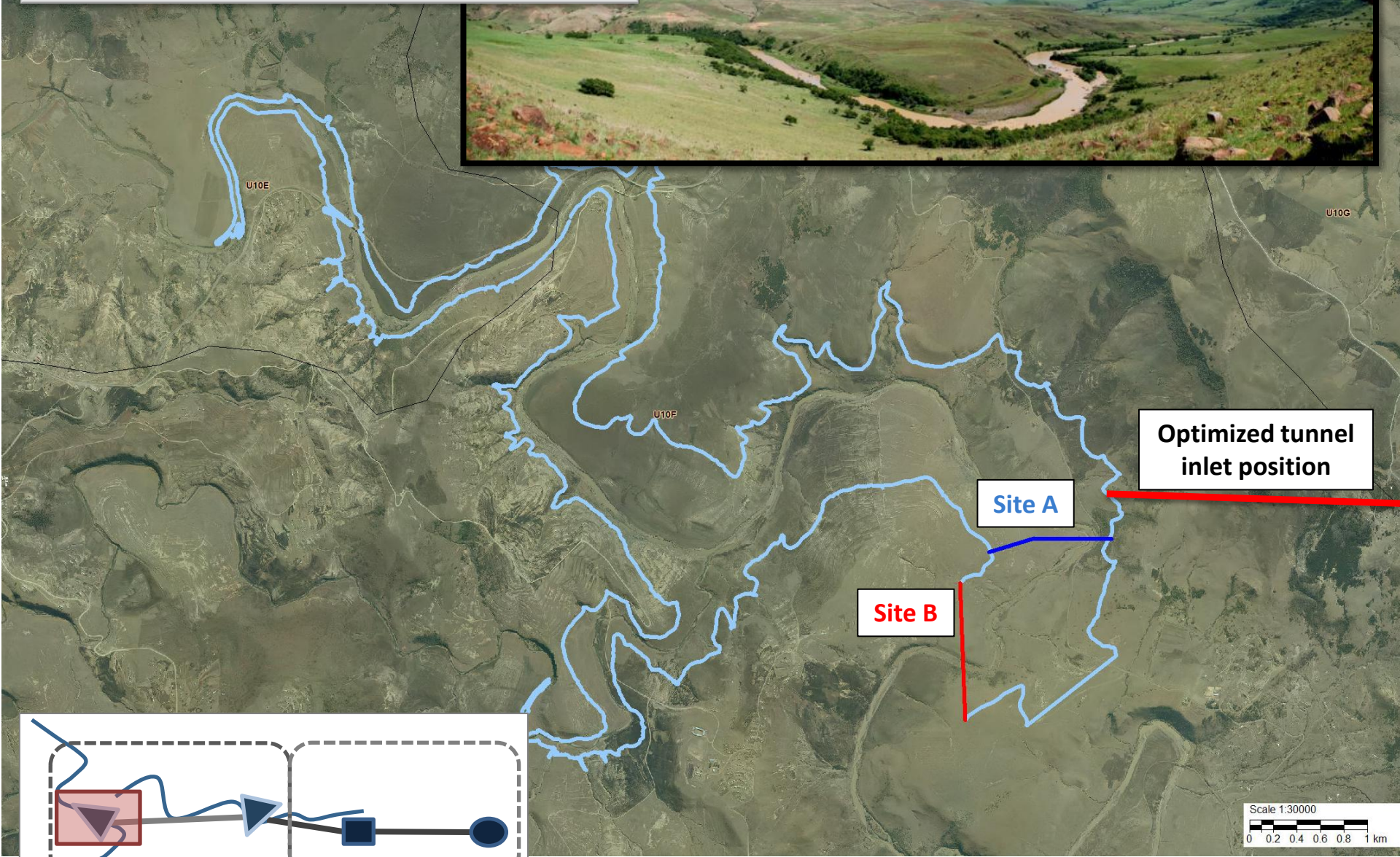


# uMWP-1 - RAW WATER COMPONENT





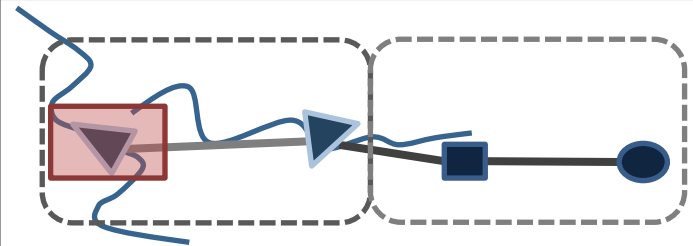
# Proposed Smithfield Dam



Optimized tunnel inlet position

Site A

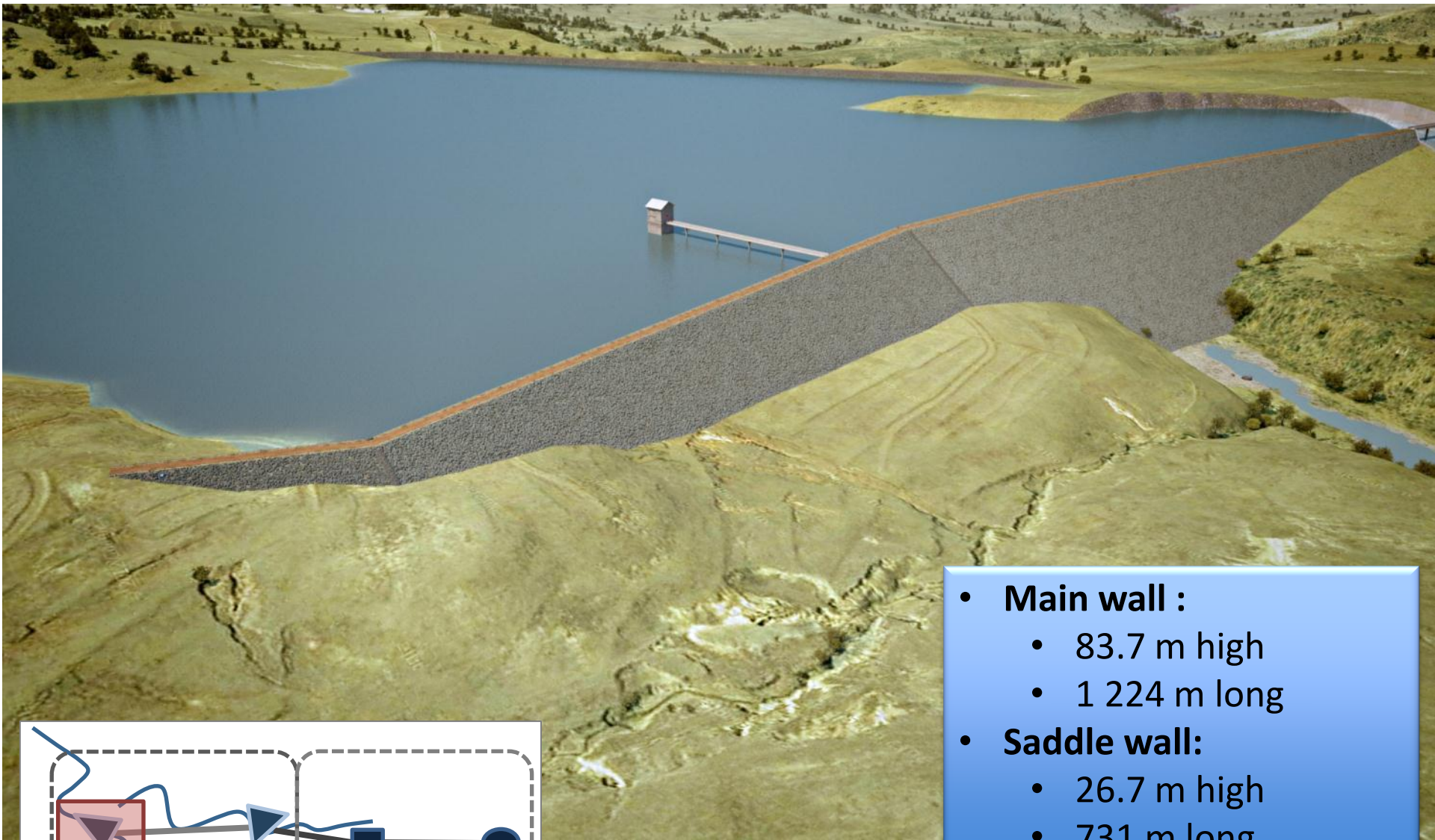
Site B



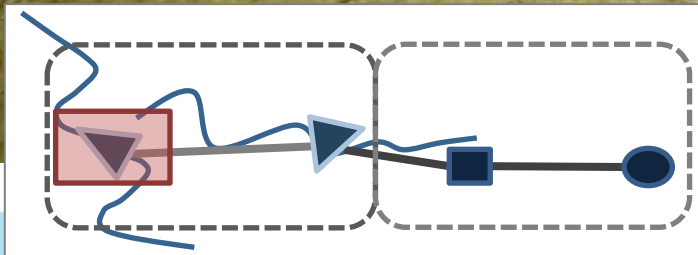
Scale 1:30000  
0 0.2 0.4 0.6 0.8 1 km



# Smithfield Dam: Draft artist impression (1)

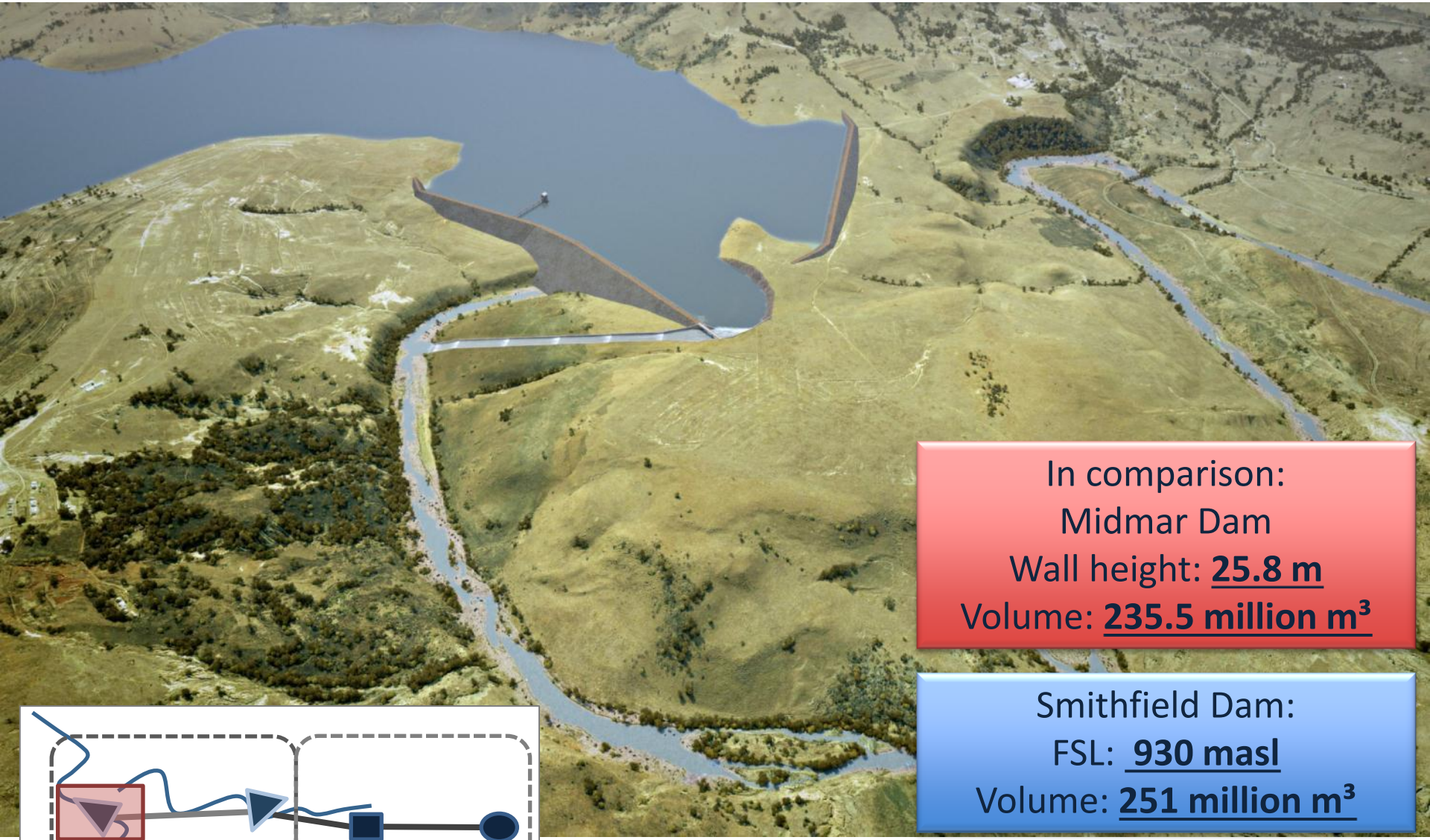


- **Main wall :**
  - 83.7 m high
  - 1 224 m long
- **Saddle wall:**
  - 26.7 m high
  - 731 m long



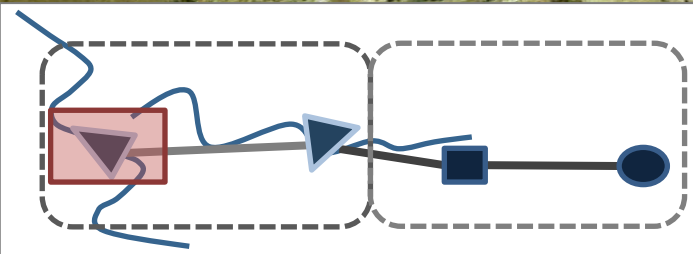


# Smithfield Dam: Draft artist impression (2)



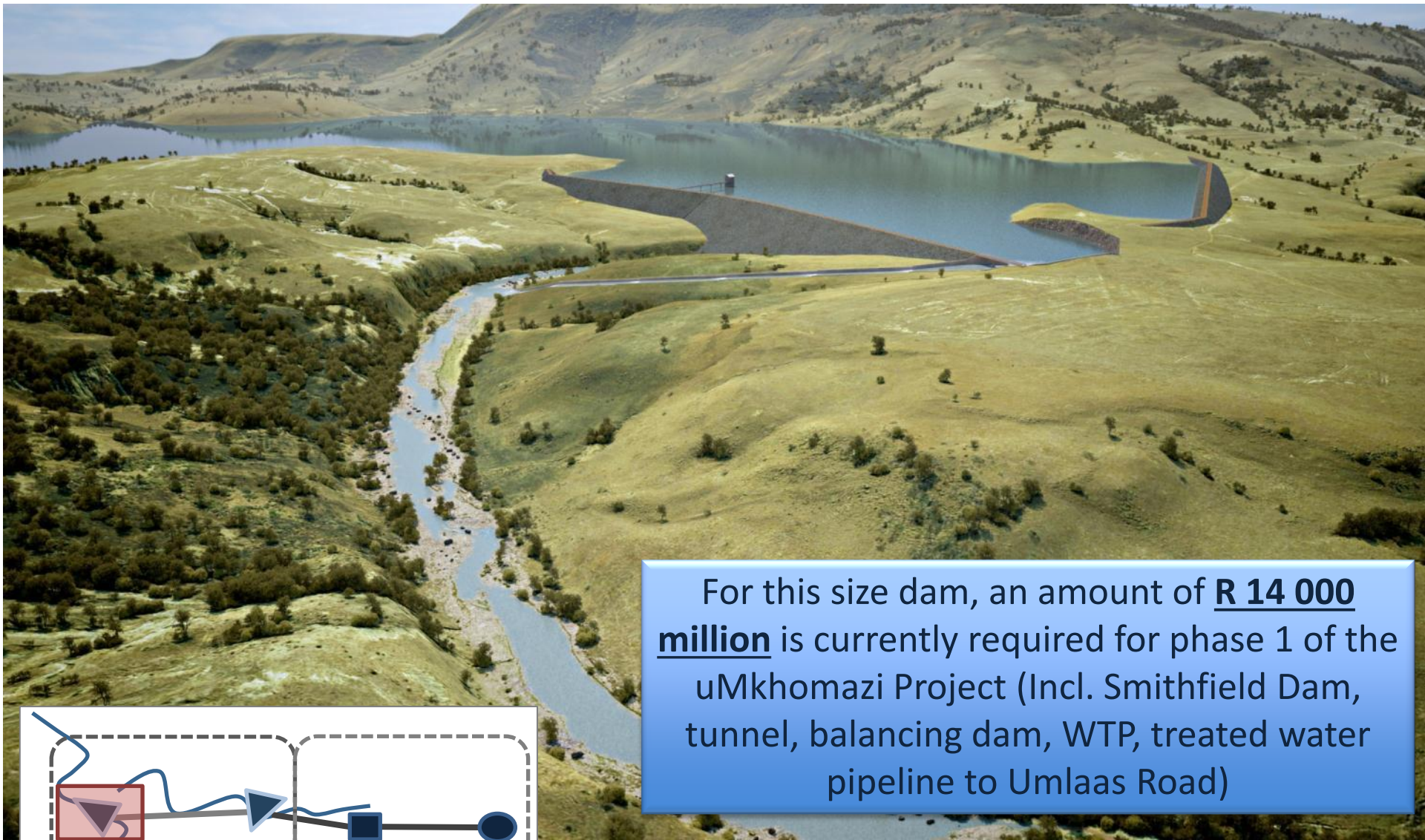
In comparison:  
Midmar Dam  
Wall height: 25.8 m  
Volume: 235.5 million m<sup>3</sup>

Smithfield Dam:  
FSL: 930 masl  
Volume: 251 million m<sup>3</sup>

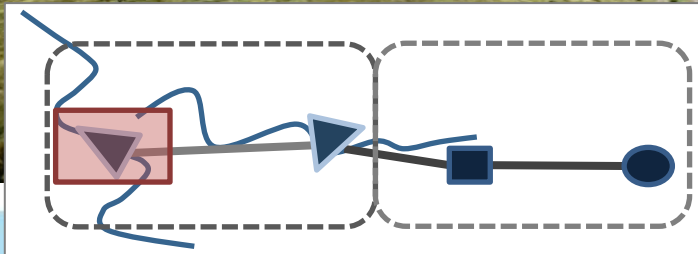




# Smithfield Dam: Draft artist impression (3)

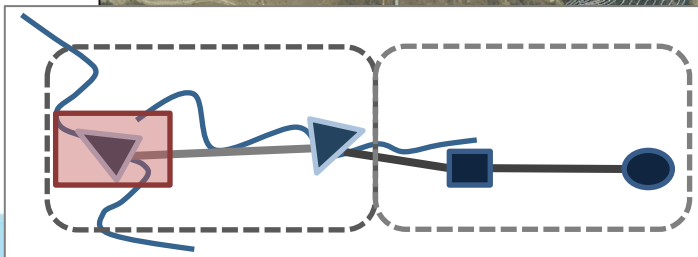
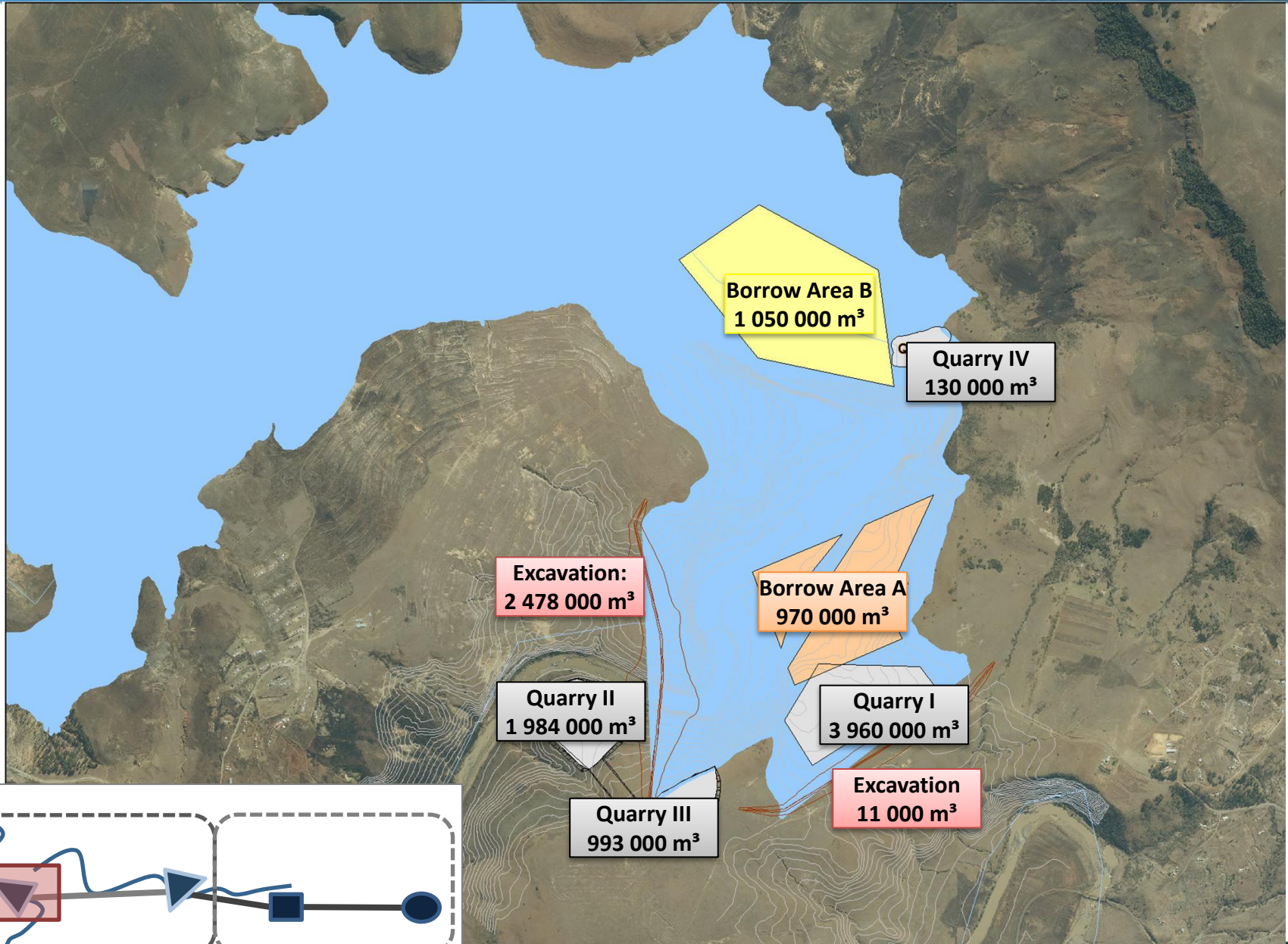


For this size dam, an amount of **R 14 000 million** is currently required for phase 1 of the uMkhomazi Project (Incl. Smithfield Dam, tunnel, balancing dam, WTP, treated water pipeline to Umlaas Road)





# Smithfield Dam: Quarry and Earthfill Borrow Areas

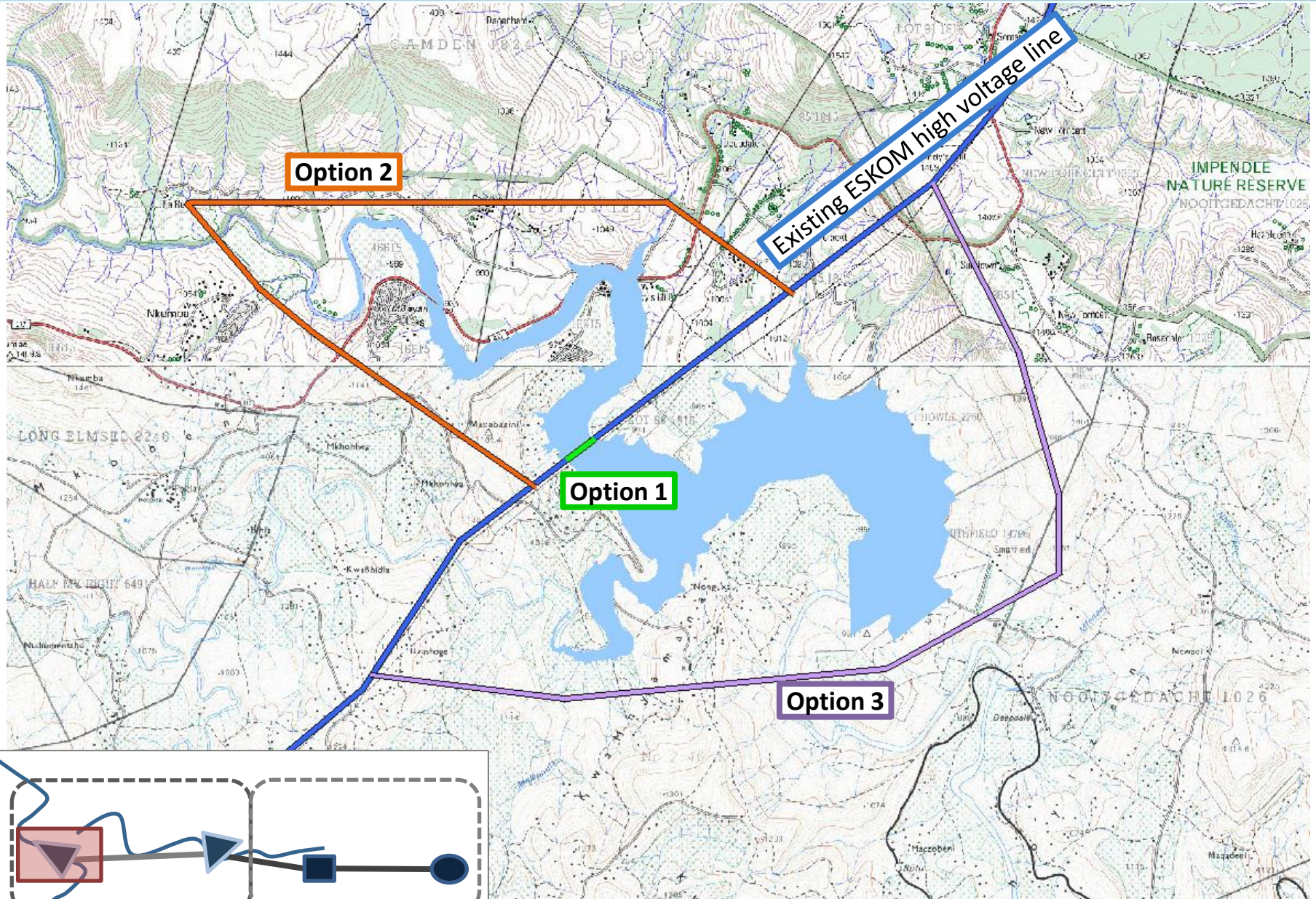






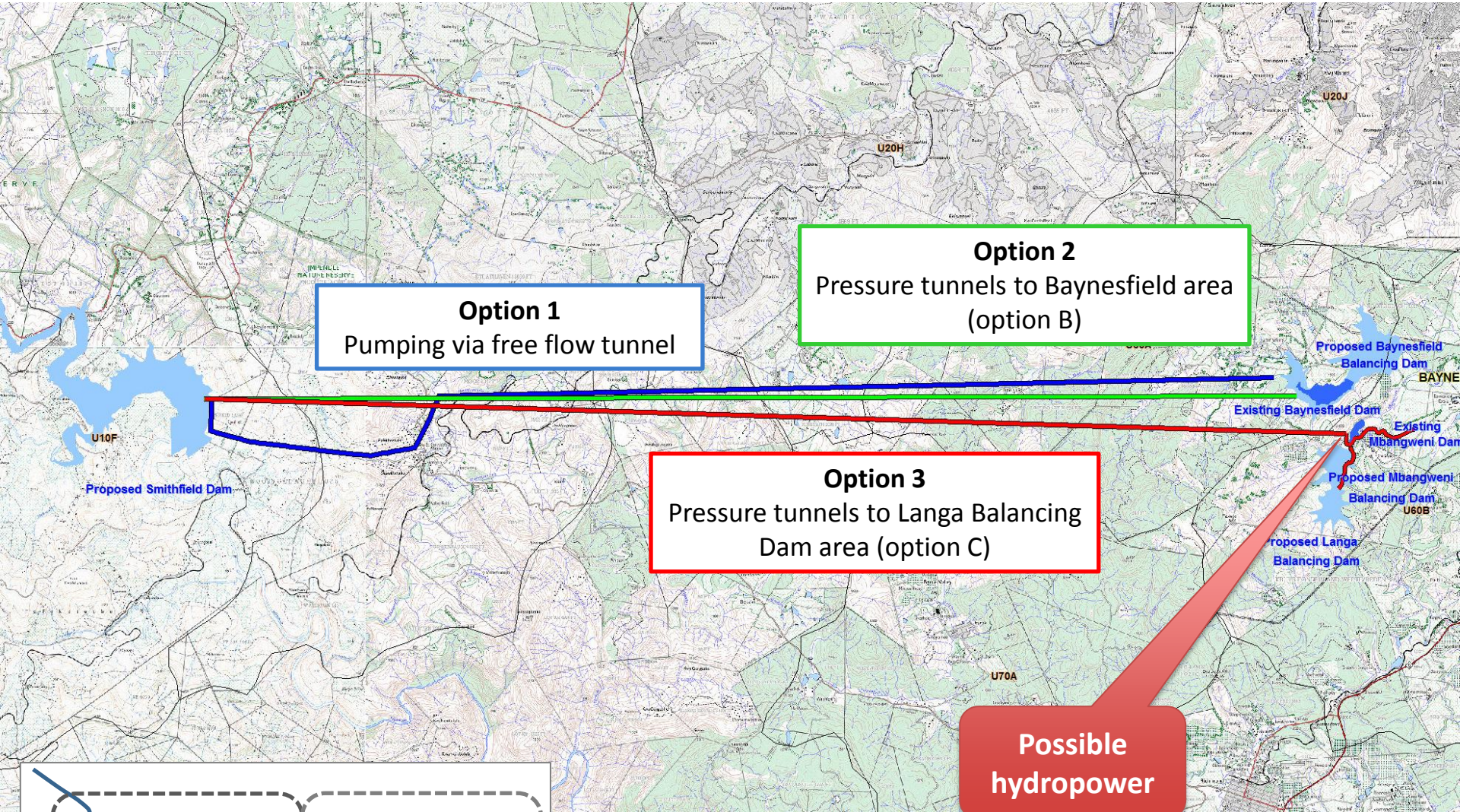


# Smithfield Dam: Eskom infrastructure





# Raw water conveyance infrastructure (tunnel)

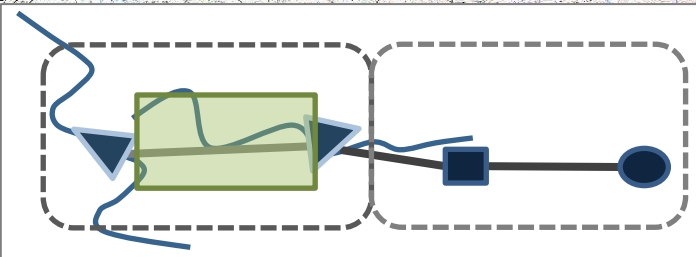


**Option 1**  
Pumping via free flow tunnel

**Option 2**  
Pressure tunnels to Baynesfield area (option B)

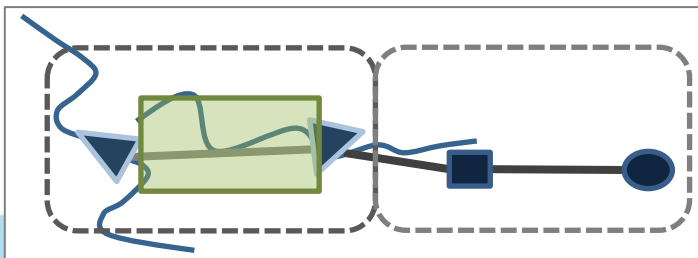
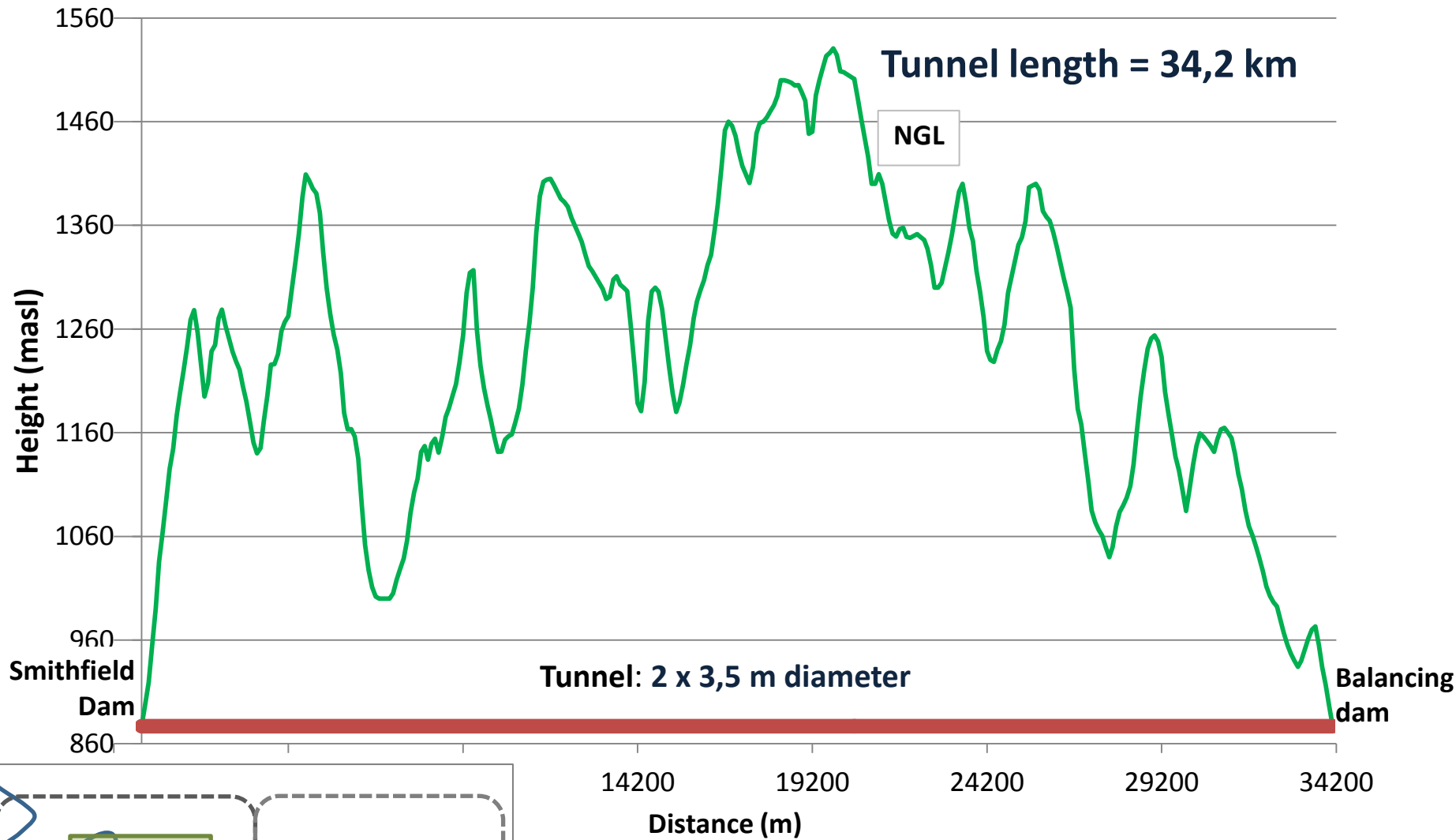
**Option 3**  
Pressure tunnels to Langa Balancing Dam area (option C)

**Possible hydropower**





# Raw water conveyance infrastructure (tunnel)

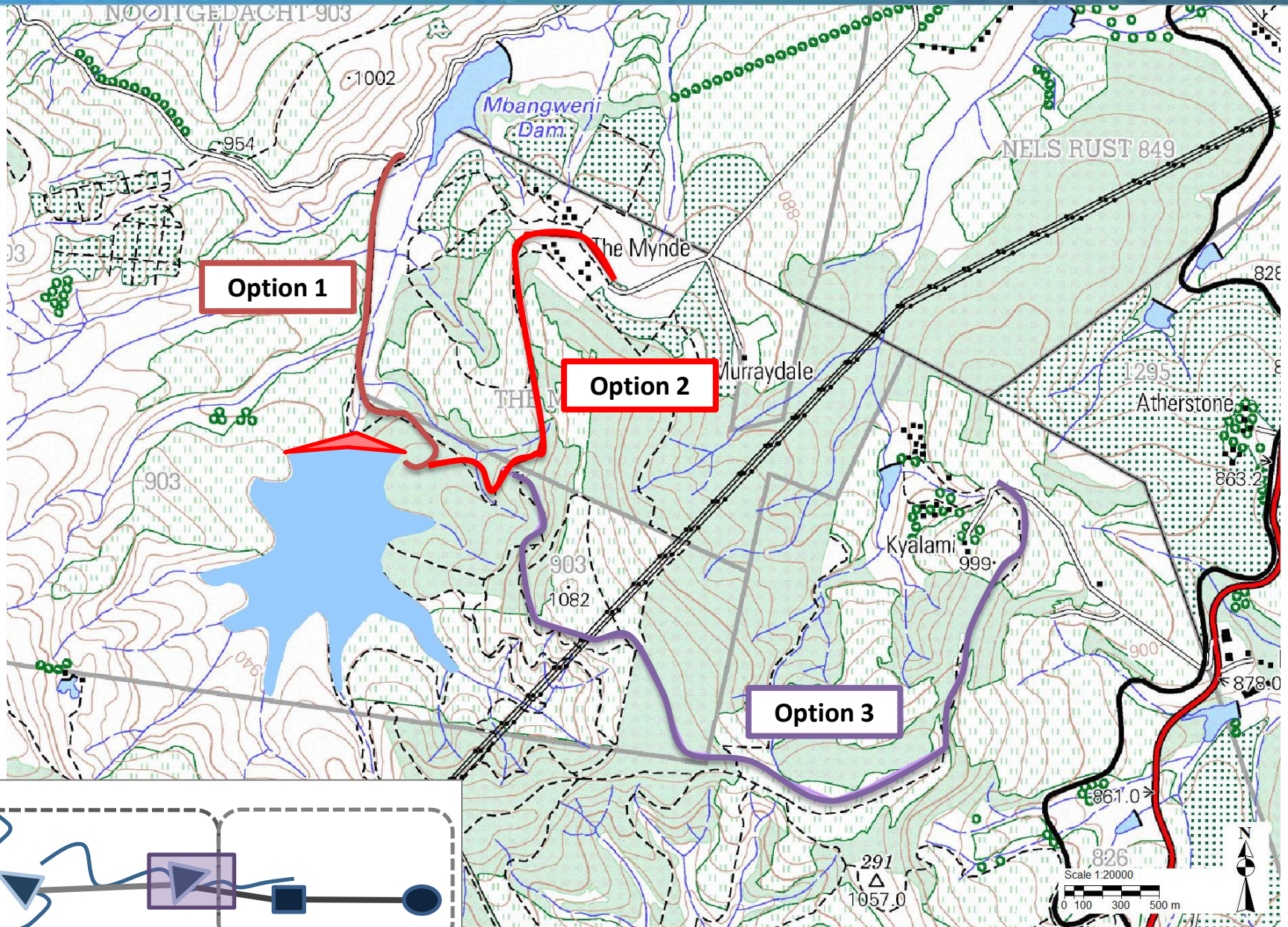






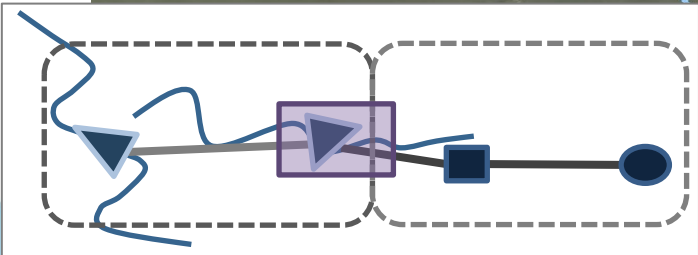
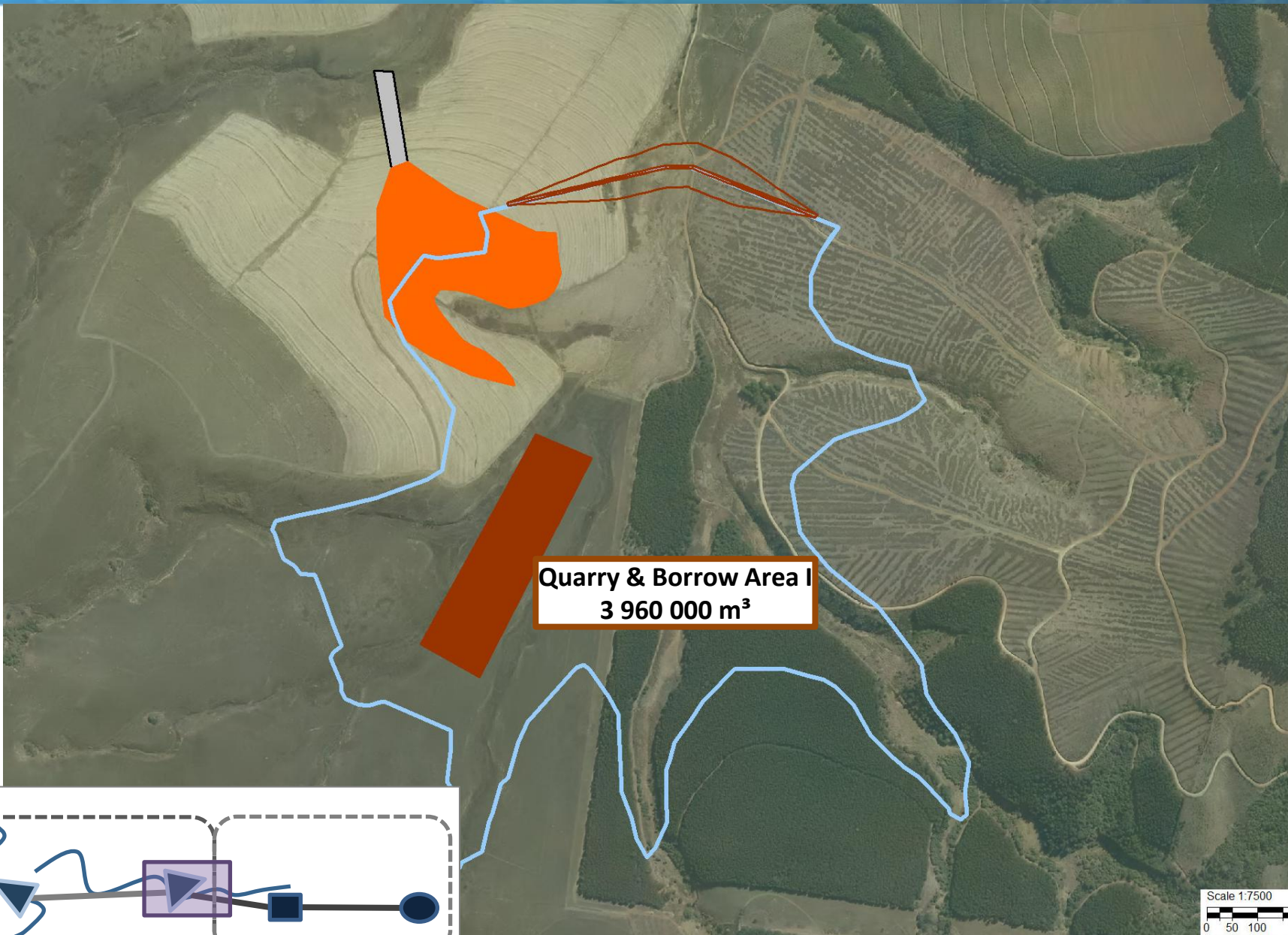


# Langa Balancing Dam: Roads



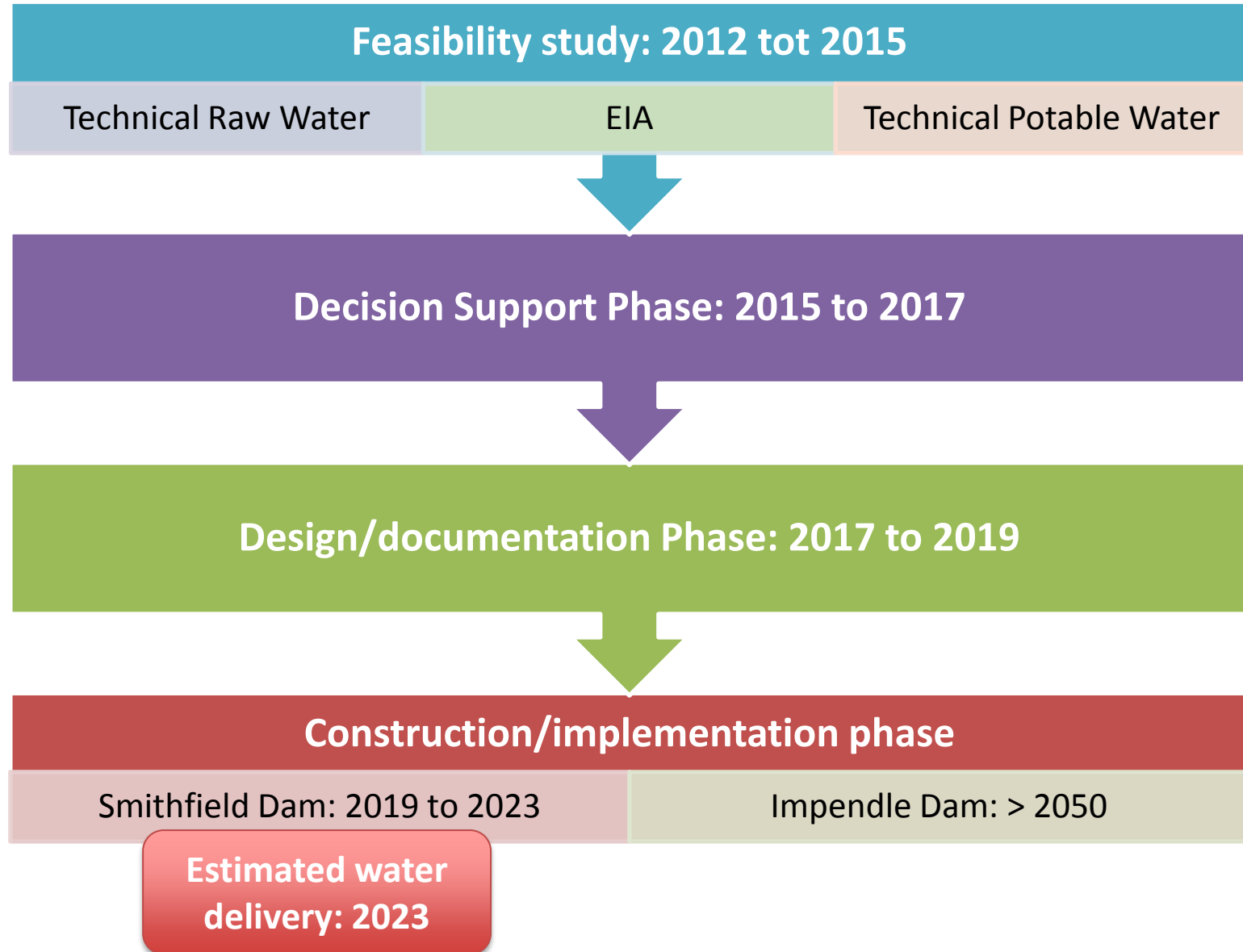


# Langa Balancing Dam: Quarry and Earthfill Borrow Areas





# Project programme



# Web page

**water affairs**  
Department: Water Affairs  
REPUBLIC OF SOUTH AFRICA

Tirhano imigogo e ka tšire gore re bokoKe metsi a mantsi

Home | Project Overview | EIA Process | Stakeholder Engagement | Documents and Reports | Newsletter | Contacts

## Introduction to the uMkhomazi Water Project, Phase 1 (uMWP1)

The uMWP1 is a feasibility study for the transfer of water from the undeveloped uMkhomazi River to the existing Mgeni system to further augment water supply to the Durban and Pietermaritzburg areas. It is a multi-disciplinary project, undertaken conjunctively by the Department of Water Affairs (DWA) and Umgeni Water (UW).

Phase 1 of the uMkhomazi Water Project (uMWP1) comprises three modules: a raw water module developing the resource and the transfer infrastructure (module 1), a treated water module (module 3) and an environmental impact assessment module (module 2).

The modules have been and will be assigned to professional services providers to address the following aspects related to a major water development:

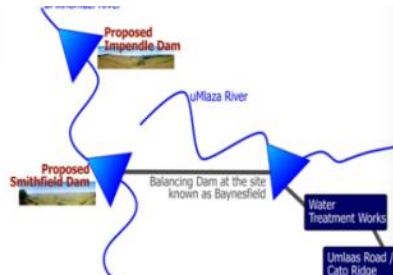
- Water resources: uMkhomazi, uMlaza and uMgeni River catchments;
- Water requirements: Water users in the uMkhomazi and uMgeni River catchments;
- Engineering investigations: Proposed dams at Impendle (only for costing purposes) and Smithfield; the raw water conveyance infrastructure from Smithfield Dam via the proposed balancing dam at Baynesfield to the Water Treatment Plant; and potable water conveyance infrastructure to the Umlaas Road/Cato Ridge reservoir;
- Environmental impact assessment: Smithfield Dam to Umlaas Road/Cato Ridge reservoir, including all conveyance infrastructure; and

**Announcements**  
In December 2011, the DWA appointed BKS (Pty) Ltd in association with three sub-consultants Africa Geo-Environmental Services, MM&A and Urban-Econ to undertake the

http://www.dwa.gov.za/Projects/uMkhomazi/default.aspx

Department of Water Affairs  
Project Leader: Willem Booysse

<http://www.dwa.gov.za/Projects/uMkhomazi/default.aspx>



**ALUM** **Module 1: Technical Feasibility study: Raw Water**  
Study Leader: Herman Pieterse  
012 421 3500  
herman.pieterse@dwa.gov.za


**NEMA CONSULTING** **Module 2: Environmental Impact Assessment:**  
Study Leader: Dinevan Henning  
011 761 1720  
dinevan@nemaconsulting.co.za

**RIGHT PEOPLE CONSULTANTS** **Module 3: Technical Feasibility study: Potable Water**  
Study Leader: Ian Watson / Anil Doorgapershad  
011 276 4660  
ianwatson@rightpeople.com / anil.doorgapershad@rightpeople.com

Classification, Comprehensive Reserve and Resource Quality Objectives of significant water resources in the Mvoti to Umzimkulu Water Management Area

<http://www.dwa.gov.za/Projects/uMkhomazi/default.aspx>





**“...Once completely developed, phase 1 and 2 of the uMWP will be the largest water transfer scheme in South Africa, comparable to the Lesotho Highlands Water Project in terms of volume and tunnel lengths and diameters...”**



# uMWP-1 - POTABLE WATER COMPONENT





# MODULE 3 – POTABLE WATER

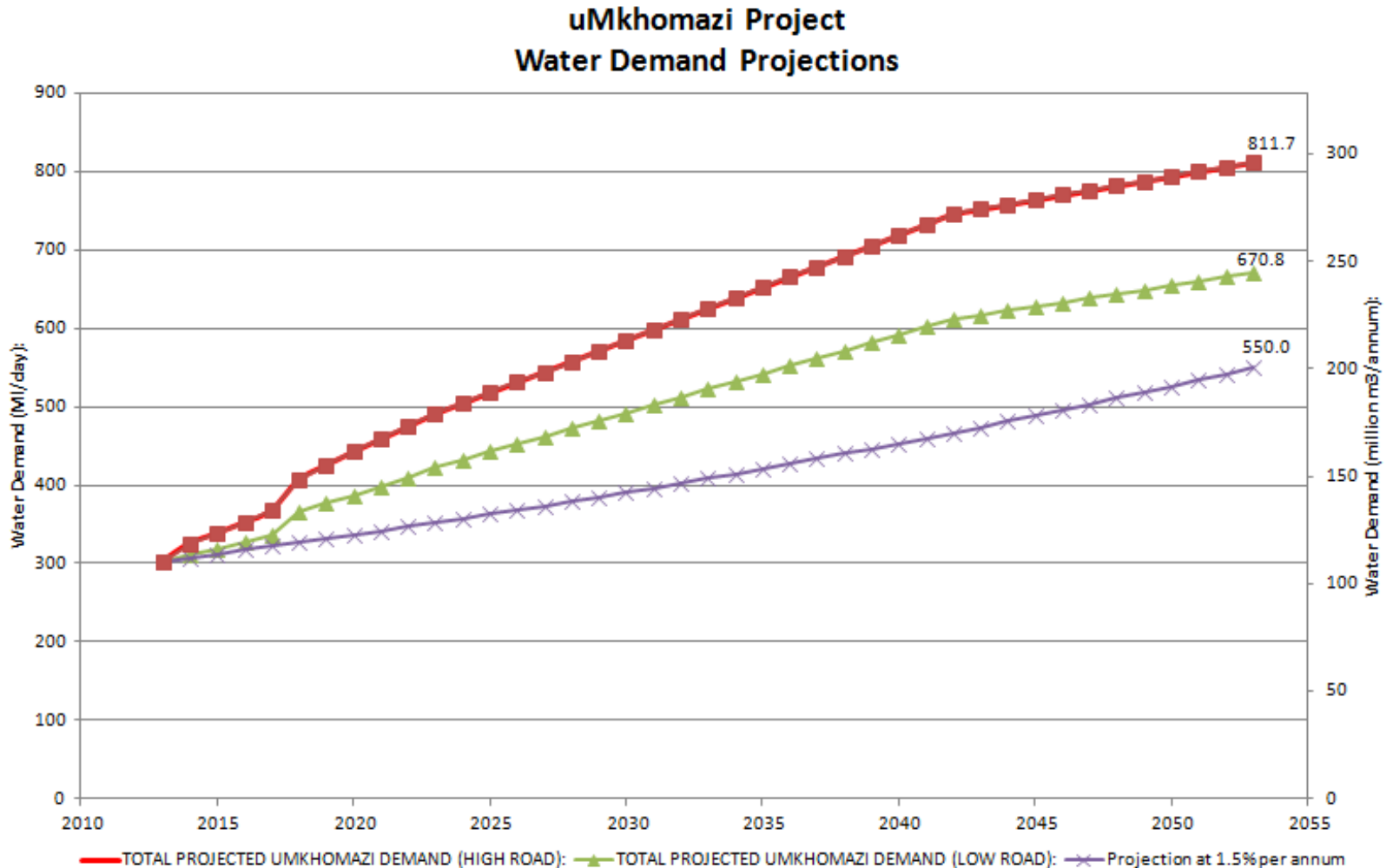
## Project Team:

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- **Client:** Umgeni Water
- **Lead Consultant:** Knight Piésold Consulting
- **Water Treatment Works:** Veolia Water
- **Geotechnical Investigations:** Knight Hall Hendry
- **Engineering Survey:** J C Martin Surveys

# MODULE 3 – POTABLE WATER

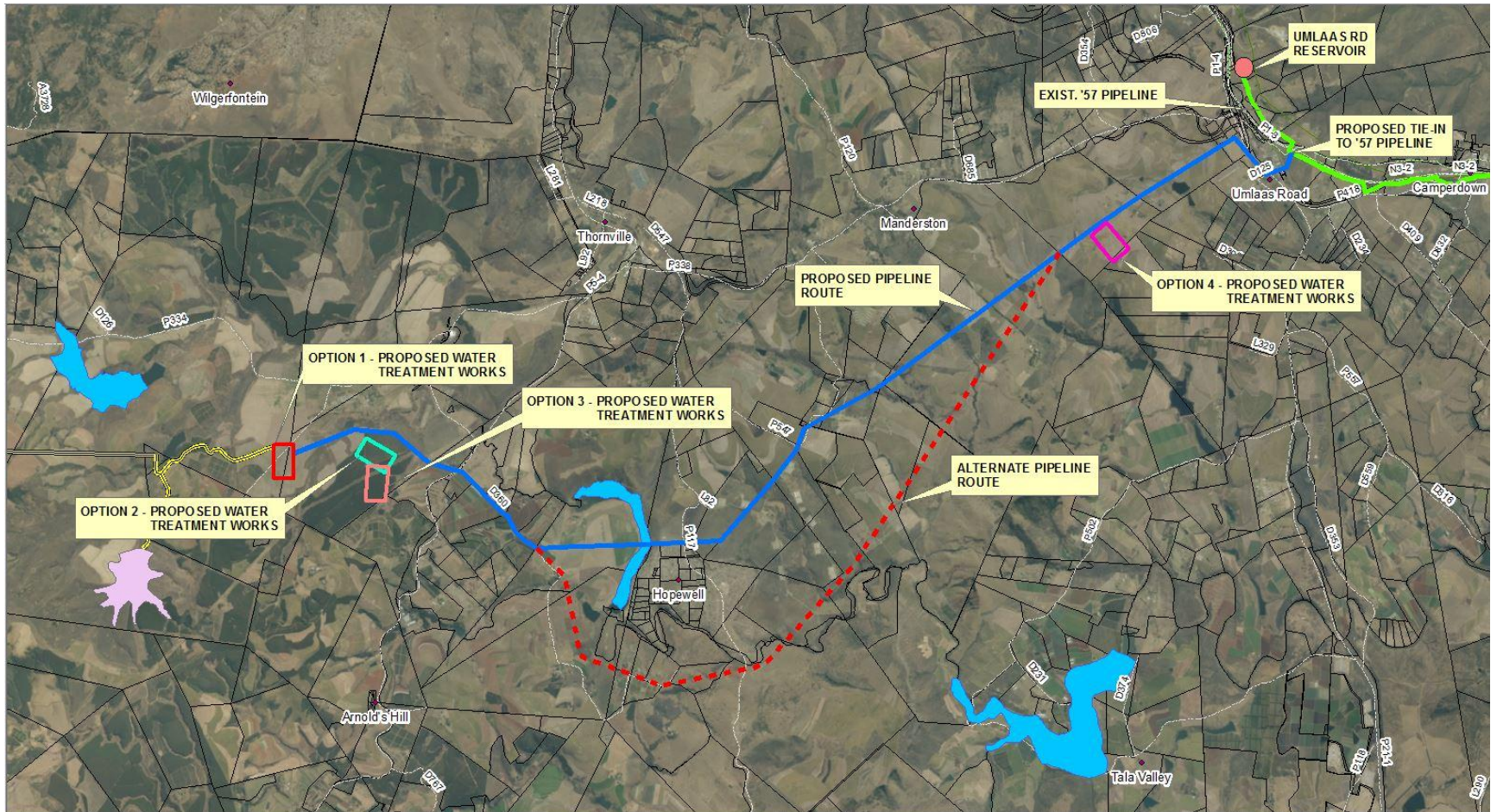
## Water Demand Projections:





# MODULE 3 – POTABLE WATER

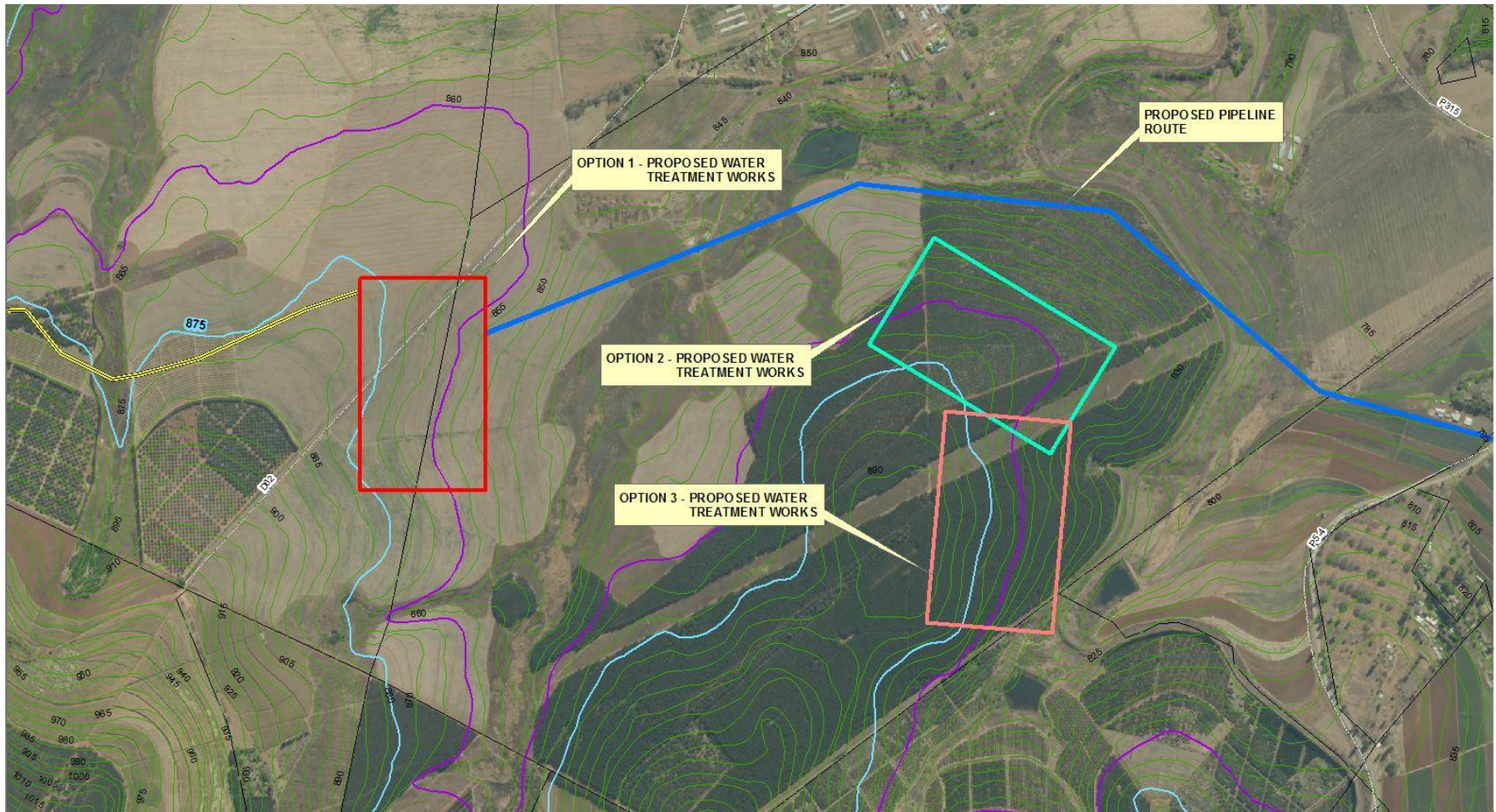
## Pipeline Routing





# MODULE 3 – POTABLE WATER

## Proposed WTW sites at Baynesfield





# MODULE 3 – POTABLE WATER

## Pipeline Details

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- Gravity potable water pipeline to Umlaas Road
- Links into existing '57 Pipeline – Western Aqueduct
- Routing avoids high elevations to maintain gravity flow
- DN2100 (2.1 metre diameter) thin-walled steel pipeline/s
- Total length: 21.3 km (24.5 km alternate route)
- Pipeline depth: approximately four metres to invert
- Pipeline capacity: 350 MI/d each (phased as needed)
- Primary corrosion protection: External coating operating in unison with induced current and sacrificial anodes
- Internal lining for protection against internal corrosion

# MODULE 3 – POTABLE WATER

## Tasks to date

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- Water demand forecasts
- WTW location and preliminary process design
- Pipeline sizing and routing

## Current and Upcoming Tasks

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- Engineering survey (commenced)
- Geotechnical investigations (November 2013)
- Final costing
- Final reports



# MODULE 3 – POTABLE WATER

## Pipeline Design

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Questions?

# MODULE 3 – POTABLE WATER

## Water Treatment Works

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### Process & Layout

Dr. Günter Lempert

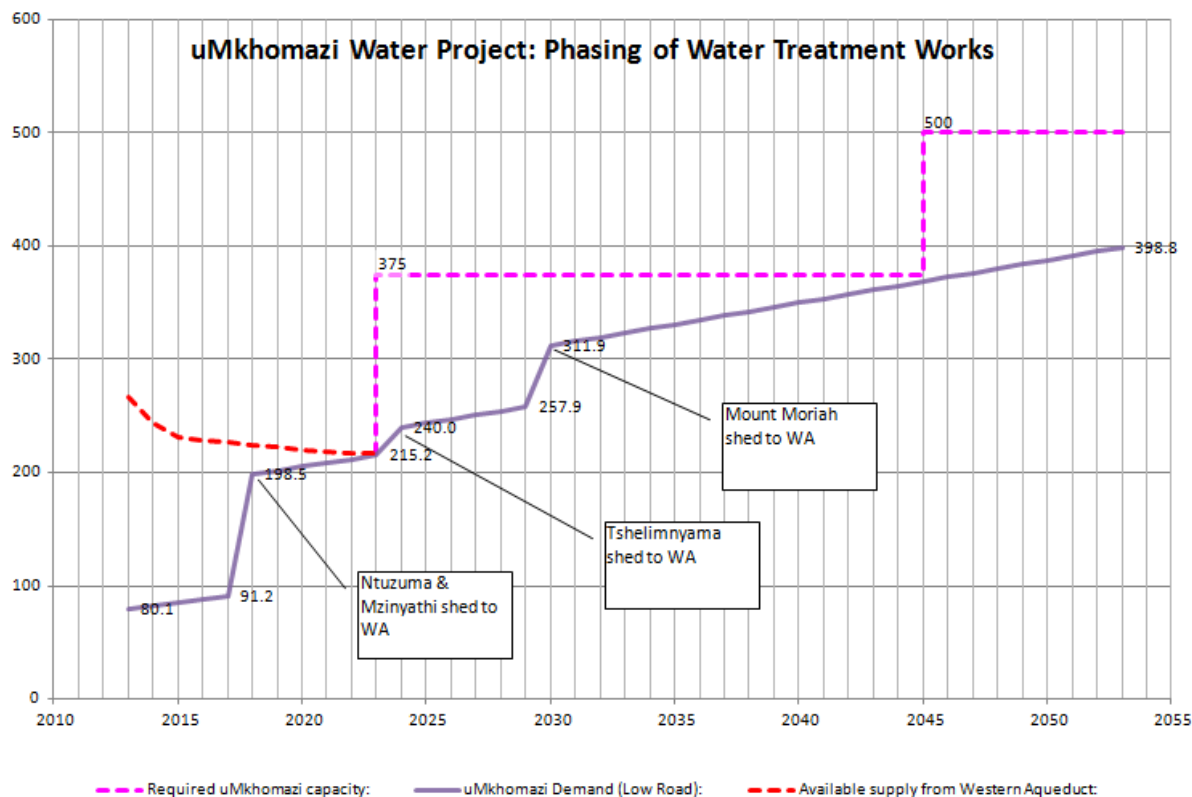


# MODULE 3 – POTABLE WATER

## 1. Phased Implementation

Two Major Milestones:

- Phase 1: 2023 must have ca 375 MI/d available
- Phase 2: 2045 must have ca 500 MI/d available
- Logical size would be trains in multiples of 125 MI/d



# MODULE 3 – POTABLE WATER

## 2. Process Technology

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### 2.1. Main Process Considerations

- Turbidity
- Soft water
- Fe
- E-Coli / Organics (future increases)
- THM's (due to pre-chlorination)
- Light floc
- Sludge / Waste minimization



# MODULE 3 – POTABLE WATER

## 2. Process Technology

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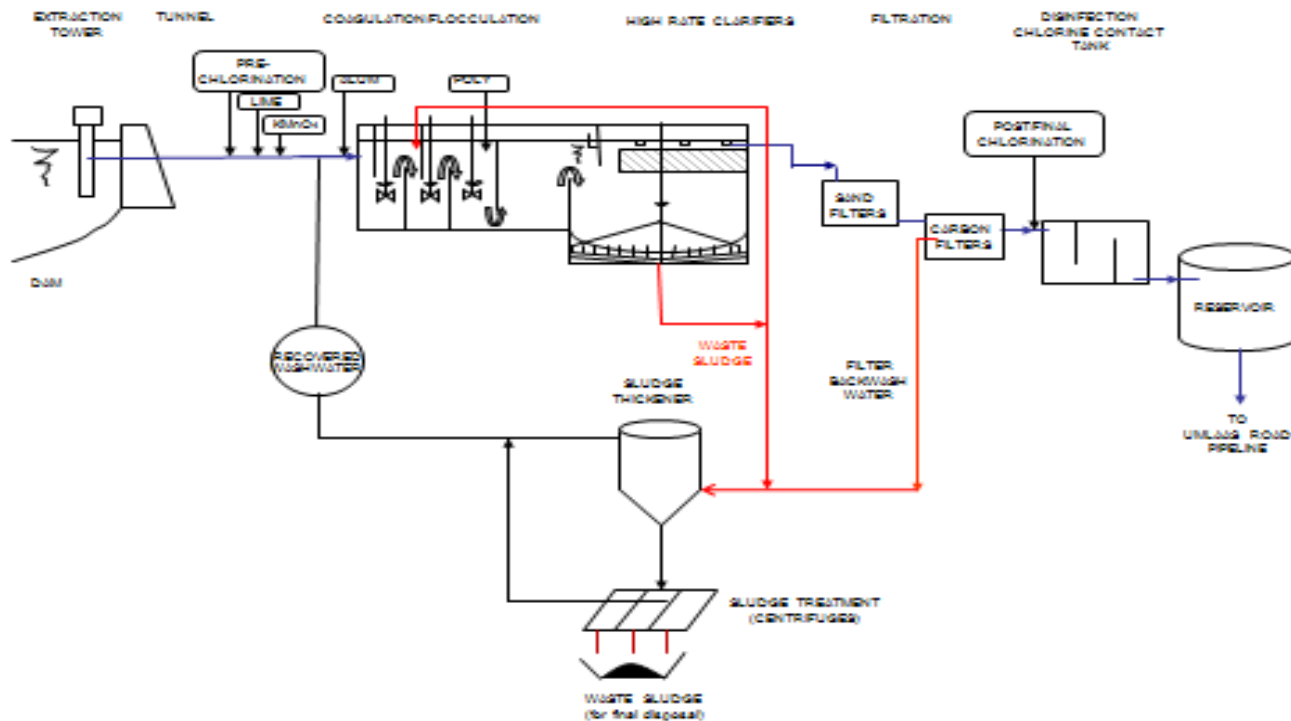
### 2.2. Basic Process Design Philosophy

- Employ known/proven unit processes
- “Manageable” units/trains
- Easy duplication (for future expansion)
- Flexibility to change chemicals
- Gravity flow as far as possible
- Small footprint

# MODULE 3 – POTABLE WATER

## 2. Process Technology

### 2.3 Treatment Process Envisaged





# MODULE 3 – POTABLE WATER

## 2. Process Technology

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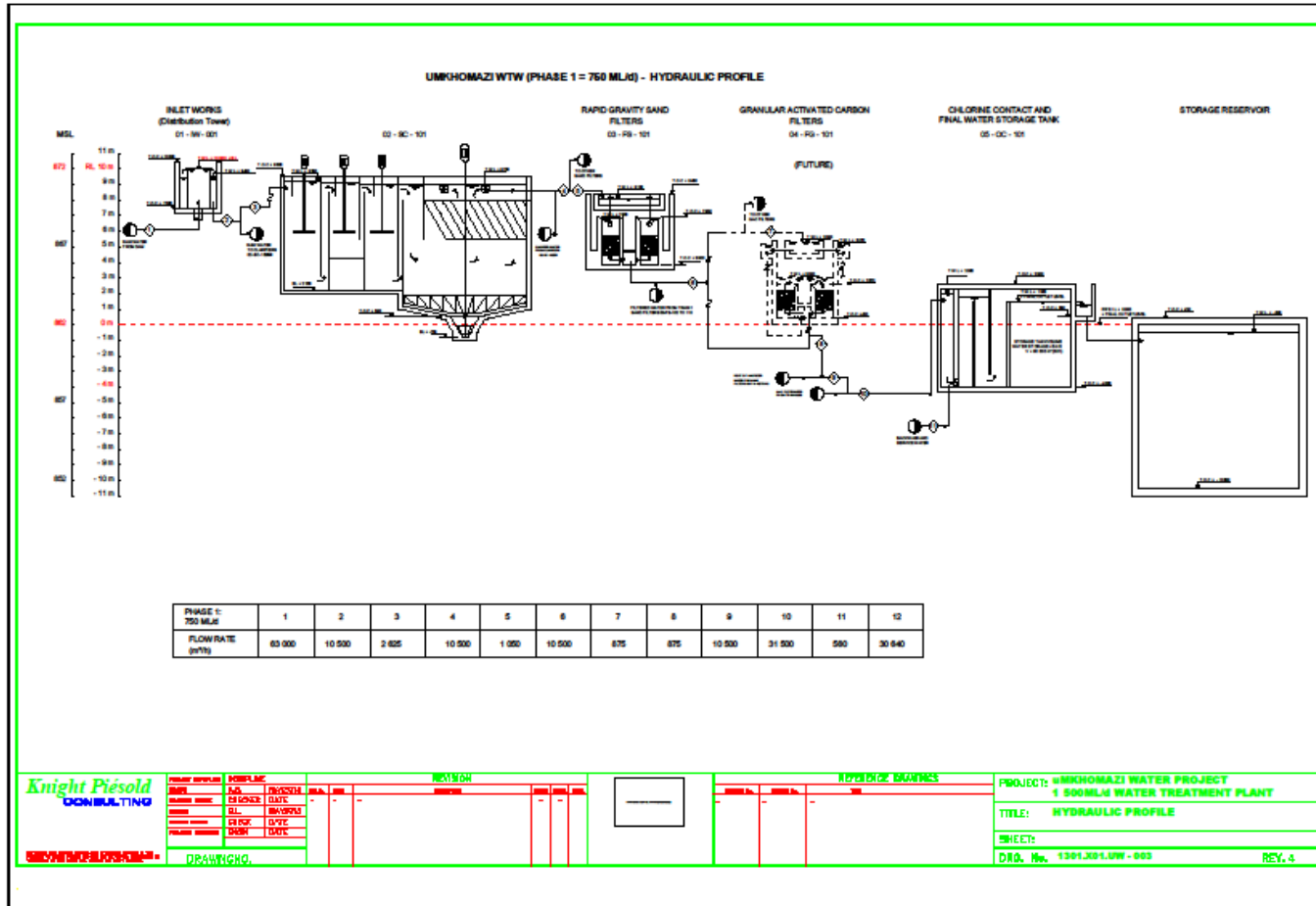
### 2.3. Basic Treatment Process Chosen

- Coagulation and Flocculation
- Sludge Blanket Clarifier
- Rapid Gravity Filters
- Granular Activated Carbon (GAC) Filters (future)
- Disinfection (Chlorination)
- Final Water Storage Reservoir – 6 h
- Sludge handling

# MODULE 3 – POTABLE WATER

## 2. Process Technology

### 2.4. Hydraulic Profile





# MODULE 3 – POTABLE WATER

## 3. Conclusions

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1. Total treatment capacity in phases of 125 MI/d:
  - 250 MI/d required by 2023
  - Phase 1 = give 375 MI/d – will last till 2045
  - Thereafter as required up to 1 250 MI/d
2. Conventional treatment process for dam water proposed;
3. BUT use high-rate unit processes to reduce area/footprint reqd;
4. Envisaged process has been presented.

# ENVIRONMENTAL IMPACT ASSESSMENT



Raw Water

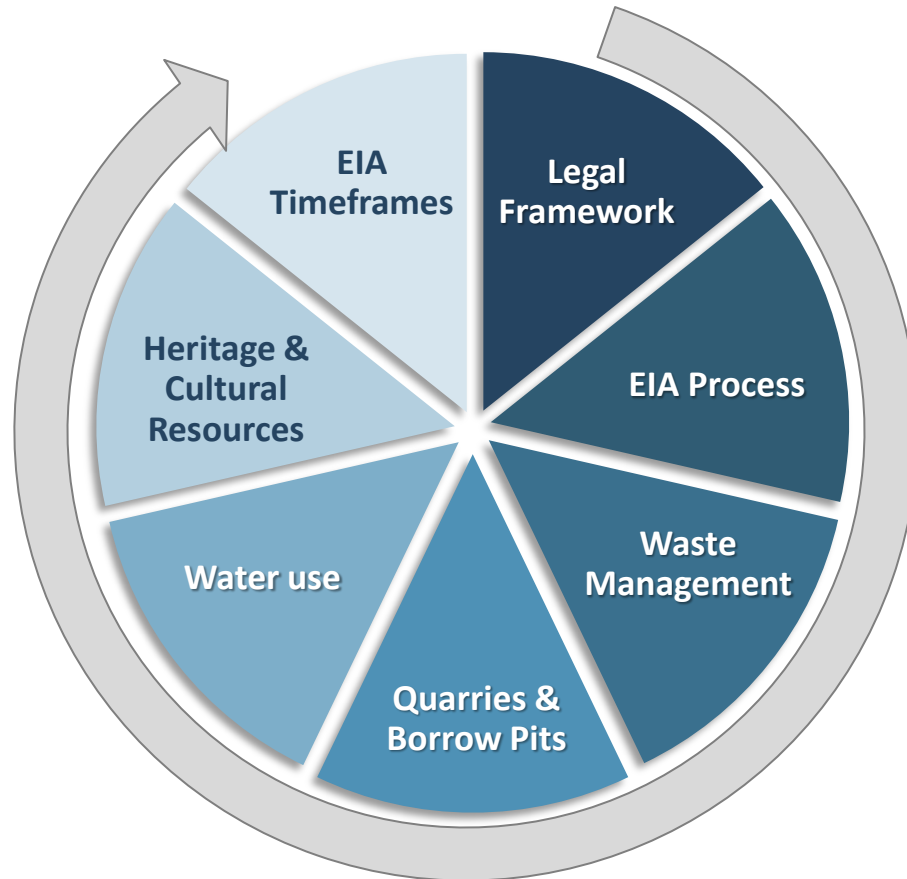


Potable Water





# PRESENTATION OUTLINE



# LEGAL FRAMEWORK



Constitution of the Republic of South Africa, (No. 108 of 1996)



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



### EIA Regulations

- GN No. R. 543 of 18 June 2010
- GN No. R. 544 of 18 June 2010
- GN No. R. 545 of 18 June 2010
- GN No. R. 546 of 18 June 2010



## National Water Act (Act No. 36 of 1998)

Environment Conservation Act (Act No. 73 of 1989):

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

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

National Environmental Management: Protected Areas Act (Act No. 57 of 2003)



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

National Forests Act (No. 84 of 1998)



## Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)

Occupational Health & Safety Act (Act No. 85 of 1993)



## KZN Heritage Act (Act No. 04 of 2008)

Conservation of Agricultural Resources Act (Act No. 43 of 1983)

Kwazulu-Natal Planning and Development Act (Act No. 06 of 2008)

KwaZulu-Natal Nature Conservation Management Act (Act No. 09 of 1997).

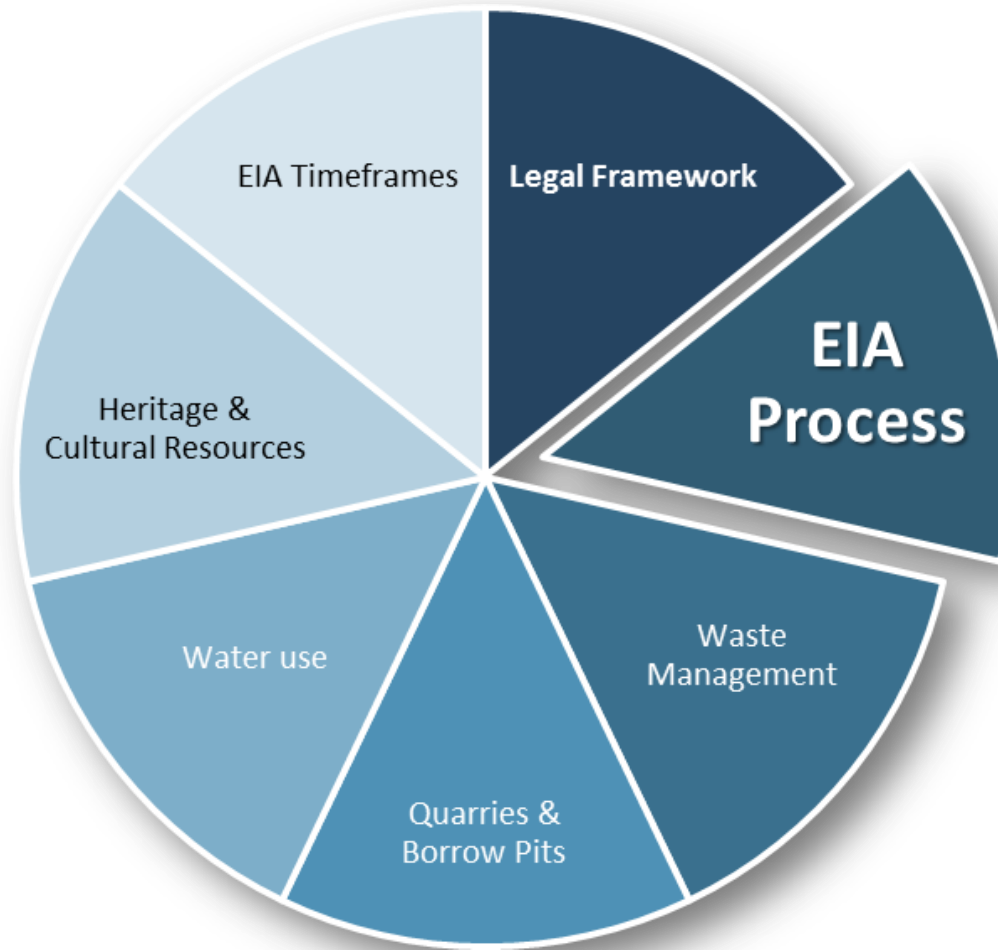
Integrated Coastal Management Act (Act No. 24 of 2008)

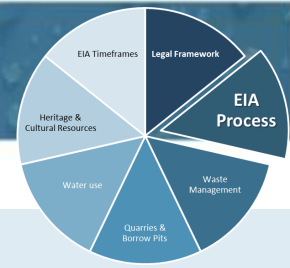
National Road Traffic Act (Act No. 93 of 1996)

Other...



# NEMA - EIA





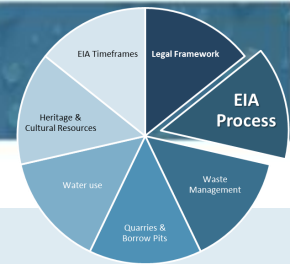
## ❖ Authorities' Meetings:

- DEA pre-application consultation meeting
- Environmental Authorities Meeting





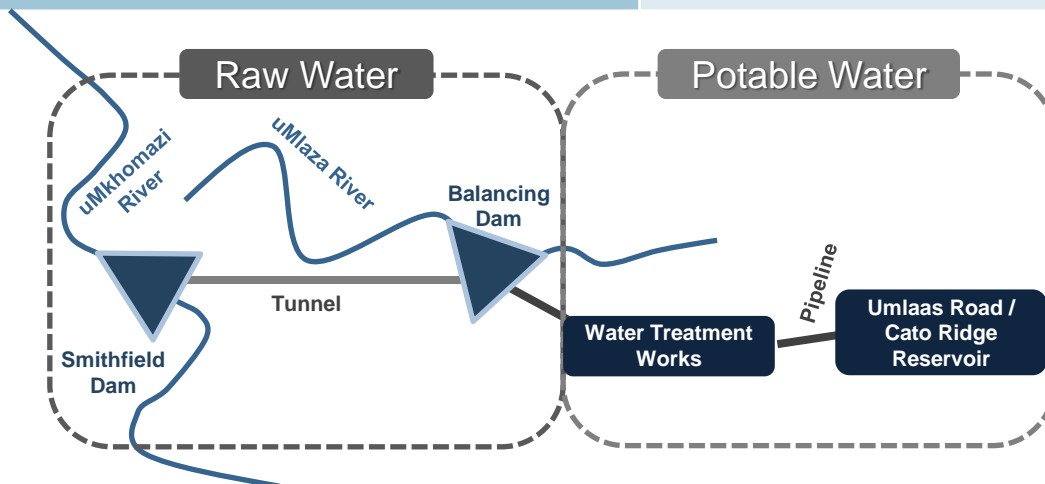
# NEMA - EIA



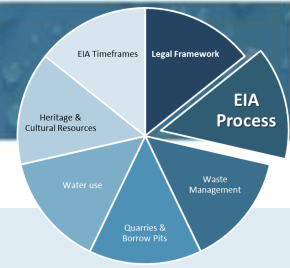
❖ Authorities' Meetings

## ❖ Separate EIAs with combined Public Participation

uMWP-1 Component	Infrastructure	Project Applicant
Raw Water	<ul style="list-style-type: none"> <li>Smithfield Dam</li> <li>Water conveyance infrastructure</li> <li>Langa Balancing Dam</li> </ul>	Department of Water Affairs
Potable Water	<ul style="list-style-type: none"> <li>Water Treatment Works</li> <li>Gravity pipeline</li> </ul>	Umgeni Water



# NEMA - EIA

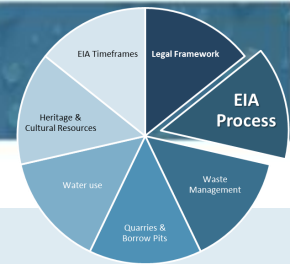


❖ Authorities' Meetings

❖ **Process** – Scoping & EIA (Listing Notices 1 – 3)



# NEMA - EIA

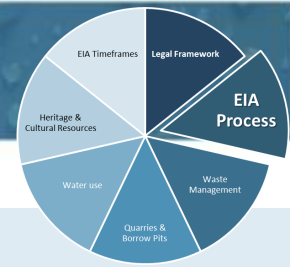


❖ Authorities' Meetings

## ❖ Process – Scoping & EIA (Listing Notices 1 – 3)

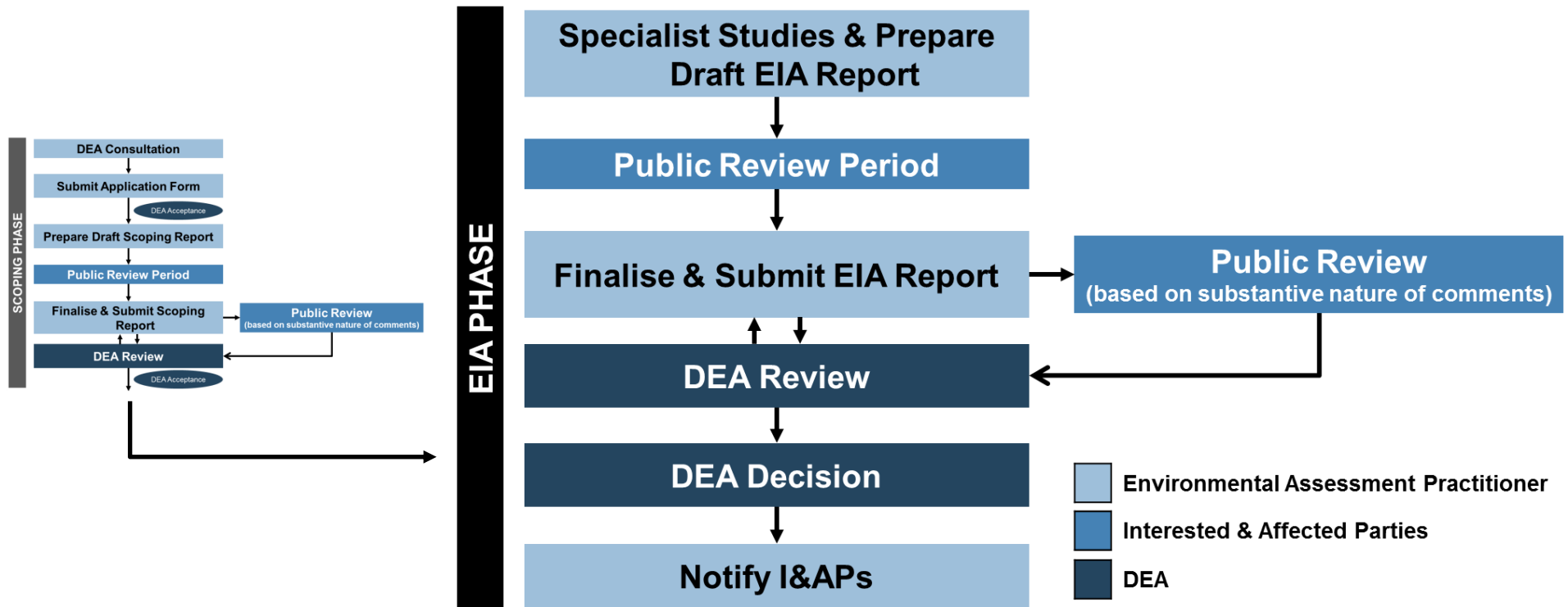


# NEMA - EIA



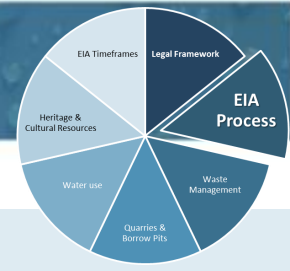
❖ Authorities' Meetings

## ❖ Process – Scoping & EIA (Listing Notices 1 – 3)





# NEMA - EIA



- ❖ Authorities' Meetings
- ❖ Process

## ❖ Feasible Alternatives –





# NEMA - EIA

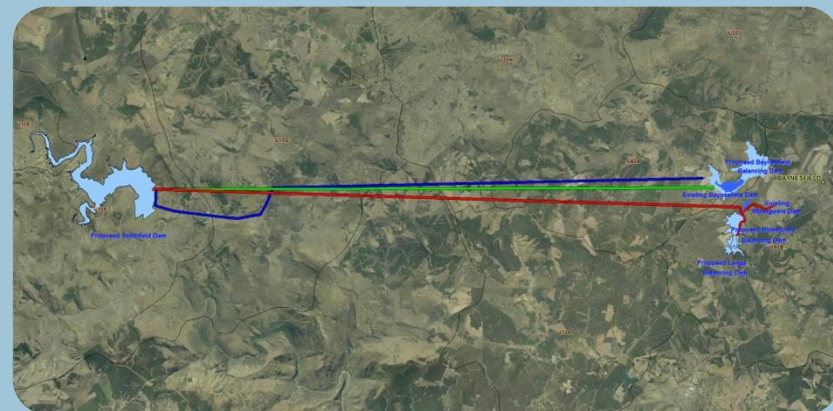


- ❖ Authorities' Meetings
- ❖ Process

## ❖ Feasible Alternatives –

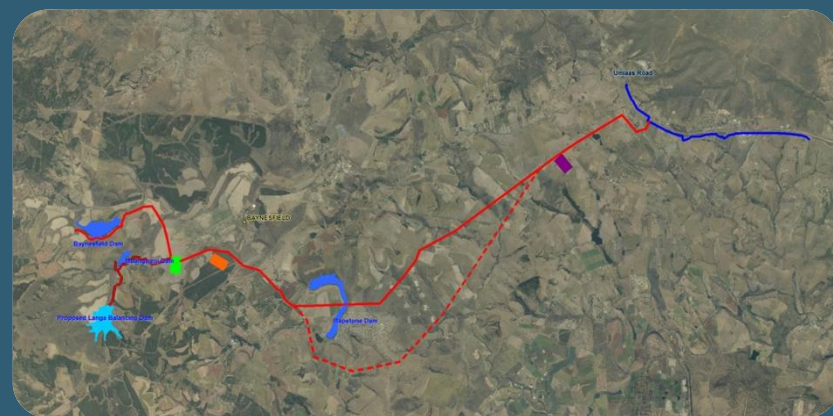
### ➤ Raw Water –

- Major storage dam (Smithfield Dam)
- Raw water conveyance infrastructure
- Balancing dam (incl. raw water pipeline)
- Gauging weirs
- Hydropower plants
- Roads
- Waste disposal sites
- Eskom transmission lines
- Quarries & borrow areas

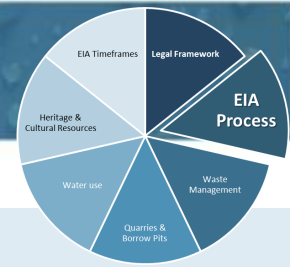


### ➤ Potable Water –

- Water treatment works
- Gravity pipeline)

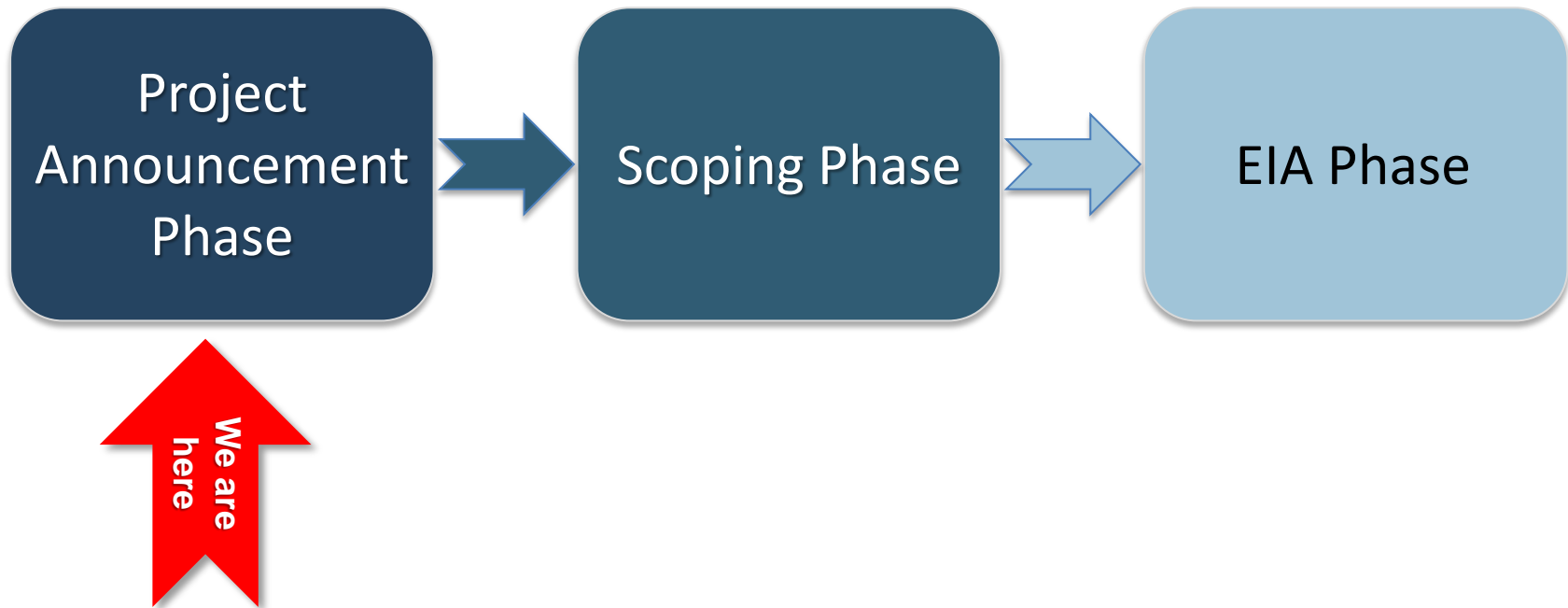


# NEMA - EIA



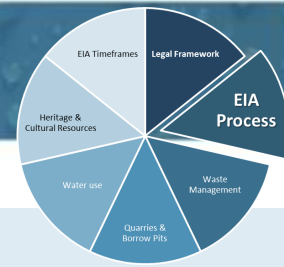
- ❖ Authorities' Meetings
- ❖ Process
- ❖ Feasible Alternatives

## ❖ Public Participation –





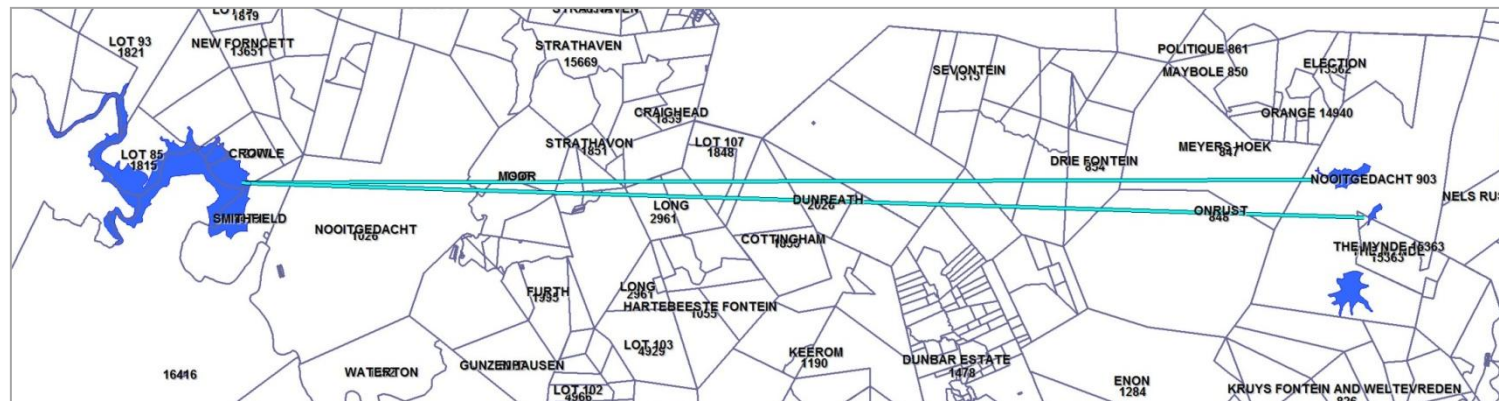
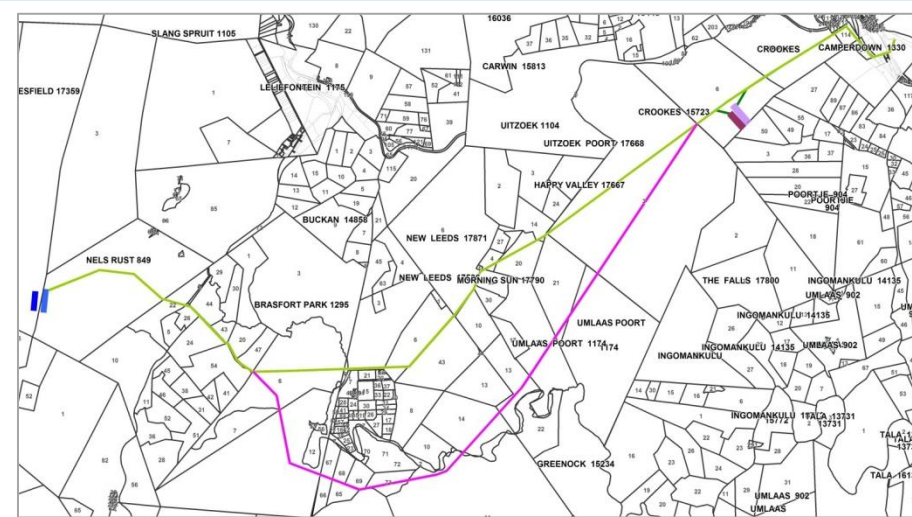
# NEMA - EIA



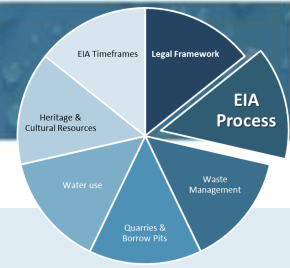
- ❖ Authorities' Meetings
- ❖ Process
- ❖ Feasible Alternatives

## ❖ Public Participation –

➤ Landowner identification



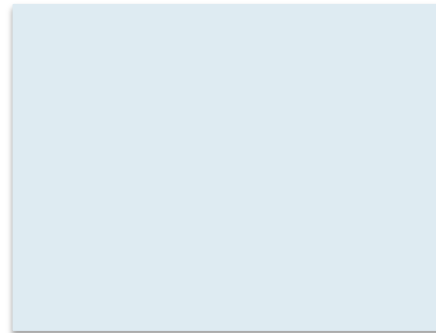
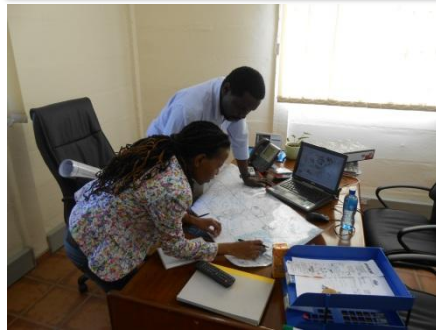
# NEMA - EIA



- ❖ Authorities' Meetings
- ❖ Process
- ❖ Feasible Alternatives

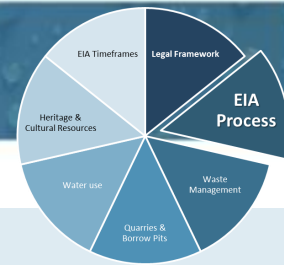
## ❖ Public Participation –

➤ Discussions with specific landowners





# NEMA - EIA



- ❖ Authorities' Meetings
- ❖ Process
- ❖ Feasible Alternatives

## ❖ Public Participation –

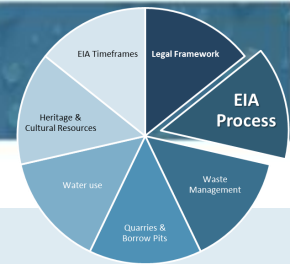
- Discussions with specific landowners

### ➤ Notification:

- Newspapers (*The Star, The Witness; Isolezwe*)
- Onsite Notices
- Background Information Documents



# NEMA - EIA



- ❖ Authorities' Meetings
- ❖ Process
- ❖ Feasible Alternatives

## ❖ Public Participation –

- Discussions with specific landowners
- Notification

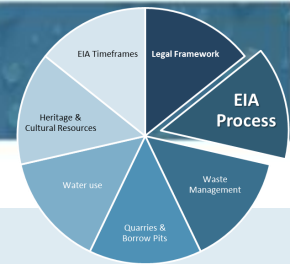
### ➤ Targeted Meetings

### ➤ Public Meetings

### ➤ Meetings with Traditional Authorities







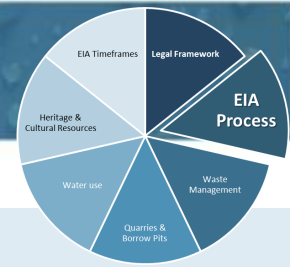
- ❖ Authorities' Meetings
- ❖ Process
- ❖ Feasible Alternatives
- ❖ Public Participation

## ❖ Scoping Phase aims –

- Prioritisation of environmental issues and impacts
- Selection of suitable & feasible alternatives to be investigated further
- Identification of relevant specialist studies
- Determine public participation requirements



# NEMA - EIA



- ❖ Authorities' Meetings
- ❖ Process
- ❖ Feasible Alternatives
- ❖ Public Participation
- ❖ Scoping Phase aims

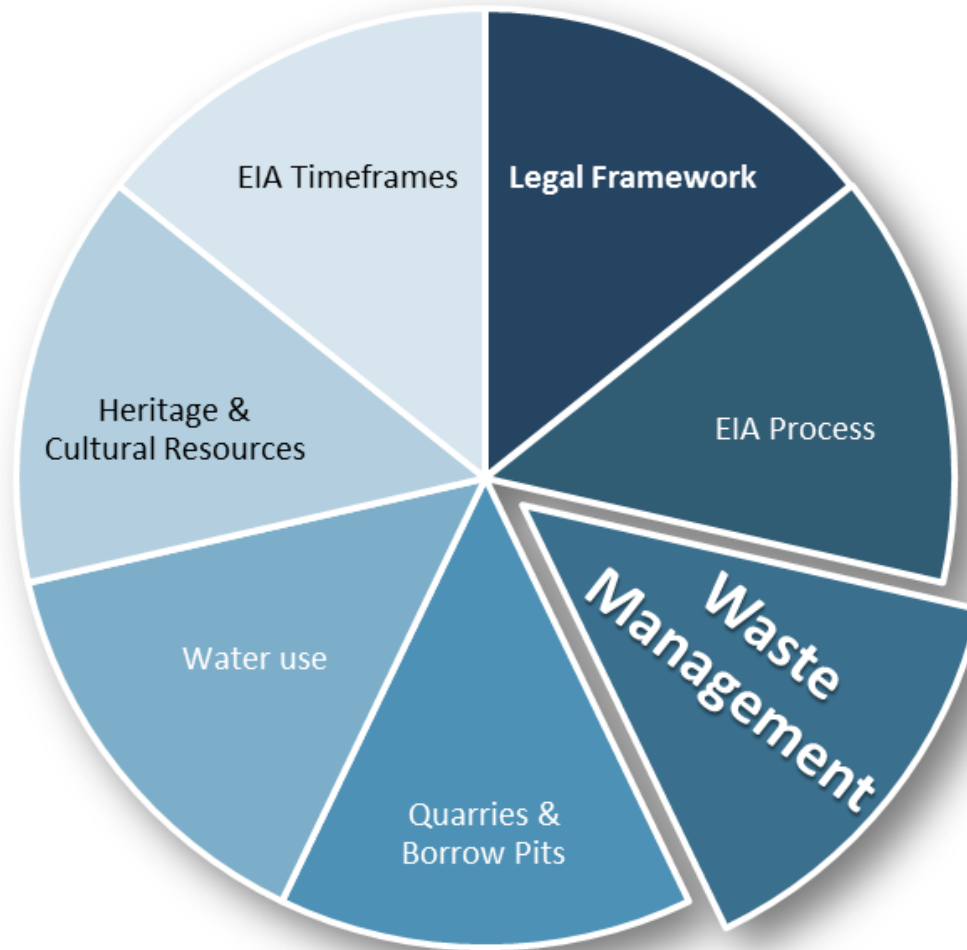
## ❖ Preliminary list of Specialist Studies (EIA Phase) –

- Terrestrial Fauna and Flora Study
- Heritage Impact Assessment
- Aquatic and Riverine Assessment
- Agricultural Impact Assessment
- Visual Impact Assessment
- Socio-economic Study
- Social Impact Assessment
- Wetland Assessment & Delineation
- Estuarine Study
- Traffic Impact Study
- Water Quality Study
- Geotechnical Study

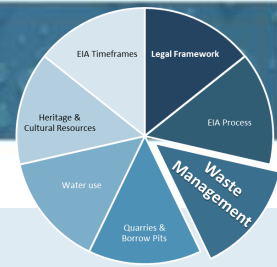




# NEM:WA – Waste Management



# NEM:WA – Waste Management

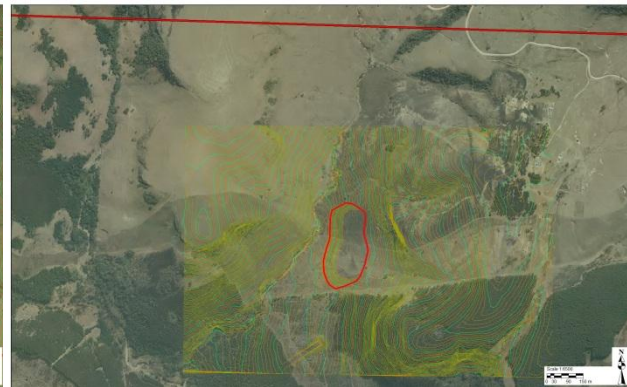
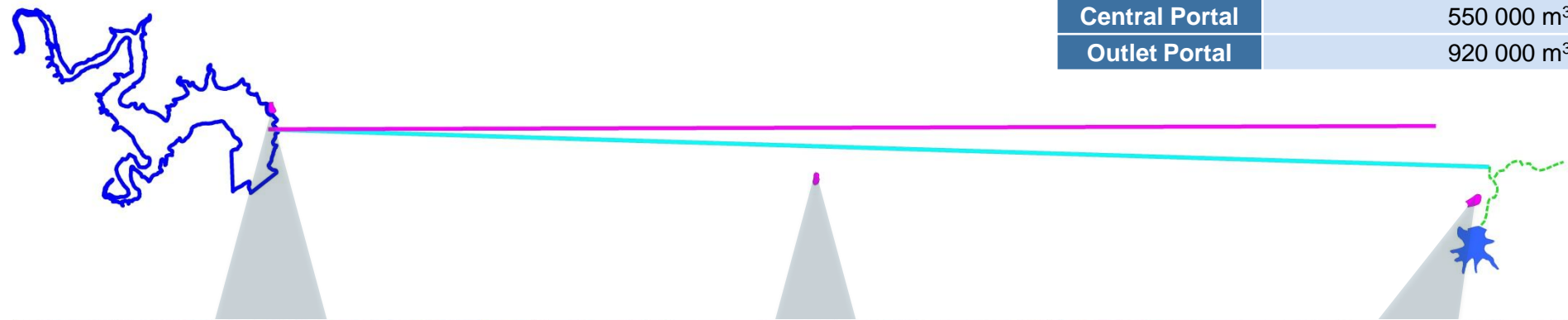


## ❖ Raw Water:

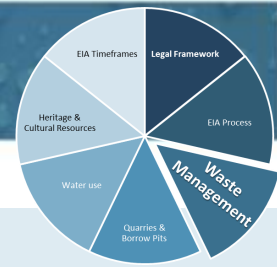
- Disposal of excess spoil material – tunnel inlet, central adit and outlet

**Excavated material (LCM)**

Inlet Portal	600 000 m <sup>3</sup>
Central Portal	550 000 m <sup>3</sup>
Outlet Portal	920 000 m <sup>3</sup>







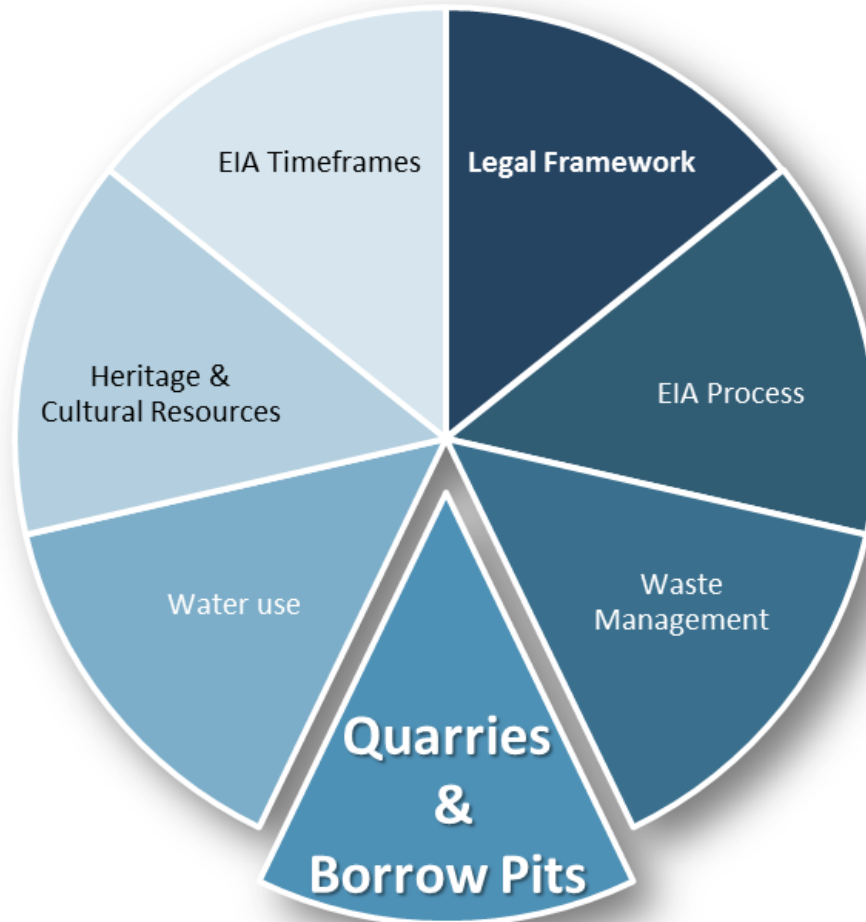
❖ Raw Water

## ❖ Potable Water:

- Sludge generation at Water Treatment Works [ $\pm 21\,780\text{ m}^3/\text{day}$ ]
- Treatment of sludge to reduce water and organic content.
- Management of sludge may include:
  - Disposal to land to support an agricultural operation
  - Disposal at a licenced landfill
  - Re-use (e.g. using it as additive for making bricks)

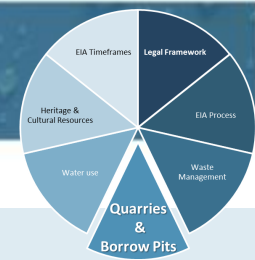


# MPRDA – Quarries & Borrow Pits

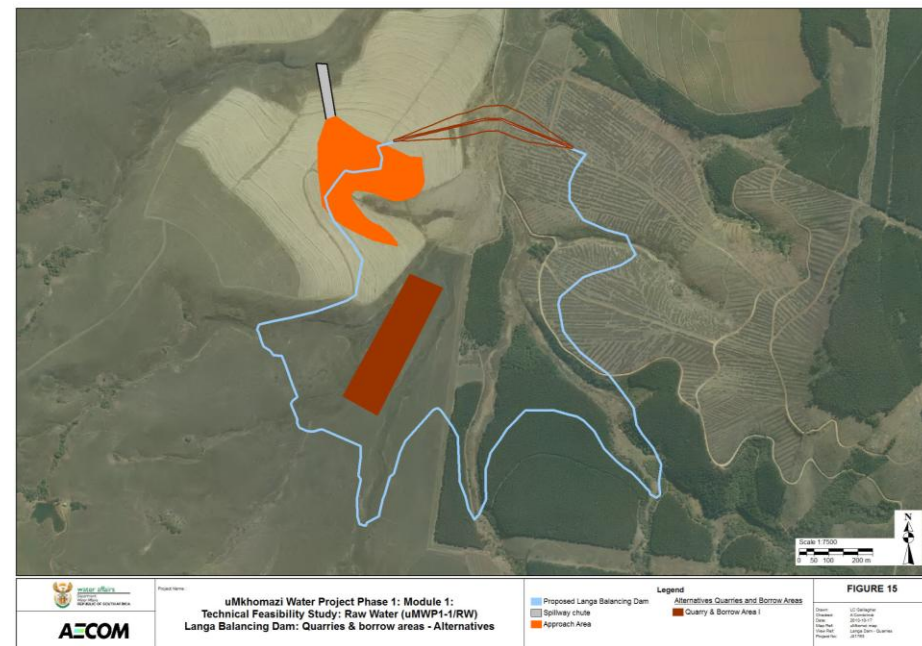
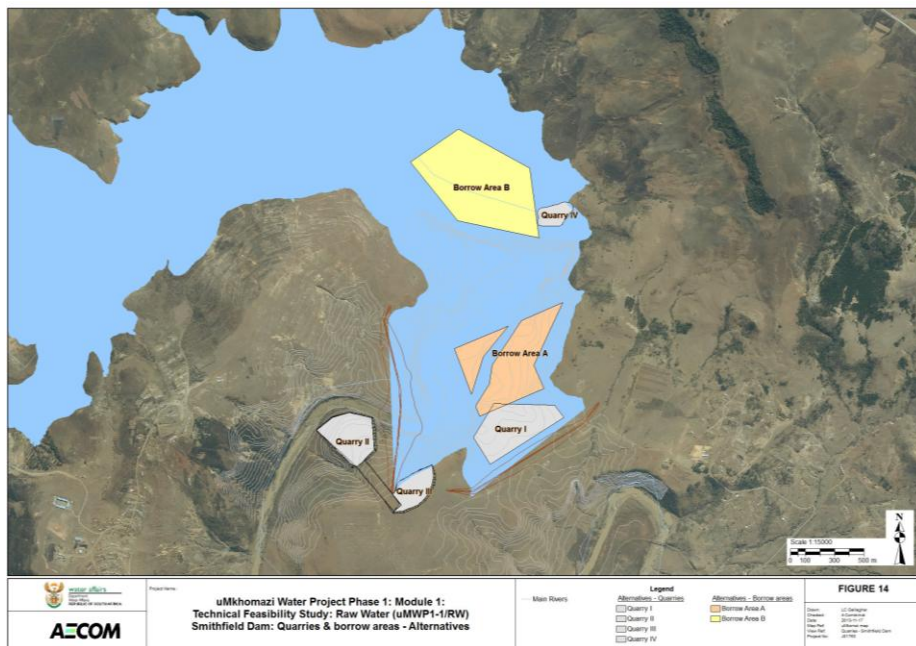




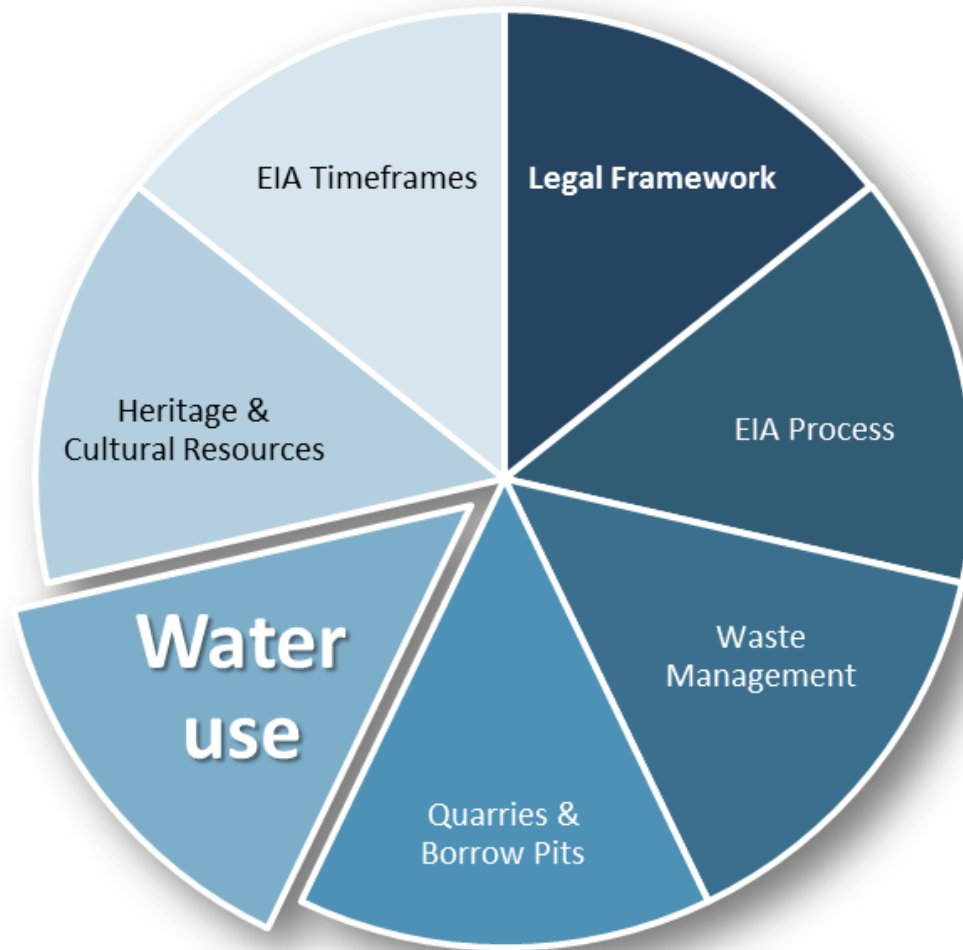
# MPRDA – Quarries & Borrow Pits



- ❖ Authority = DMR
- ❖ Sourcing of construction material
- ❖ EMPs to be submitted to DMR

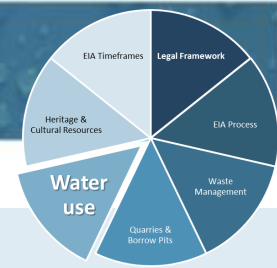


# NWA – Water Use





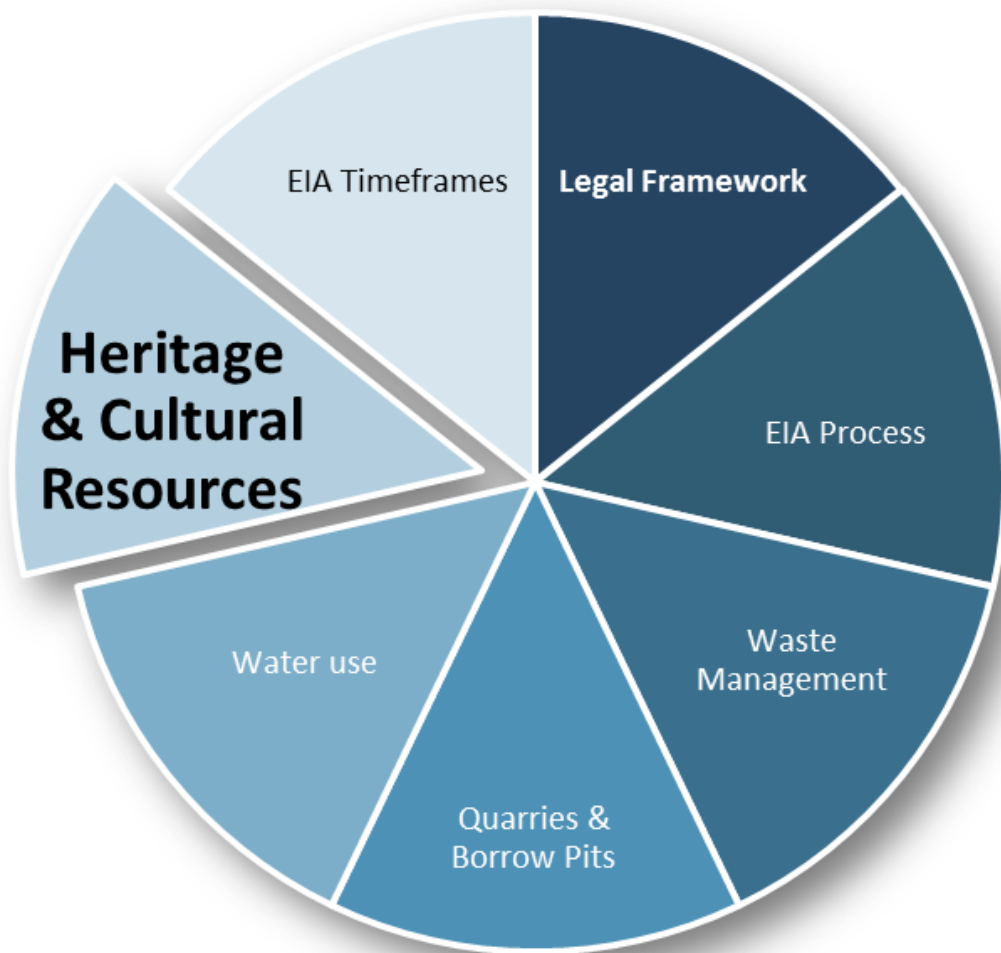
# NWA – Water Use



- ❖ Multiple water uses triggered
- ❖ EIA Report to contain information to satisfy WULA requirements
- ❖ Reserve determination



# KZN HERITAGE ACT – CULTURAL & HERITAGE RESOURCES



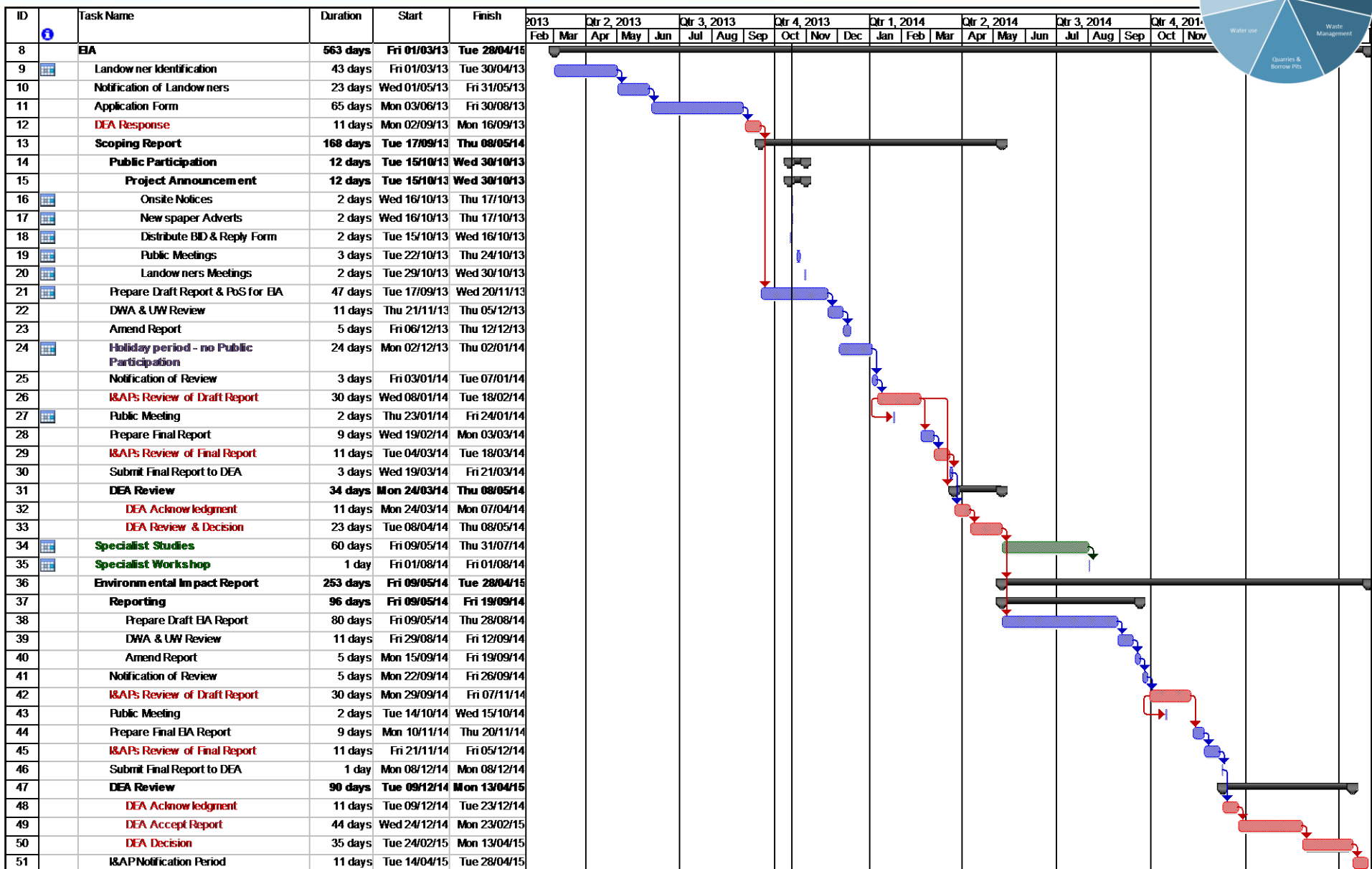
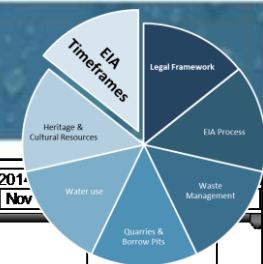




- ❖ Authority = Amafa aKwaZulu-Natali
- ❖ Phase 1 HIA
- ❖ Phase 2: Paleontological and Archaeological survey – if required



# EIA TIMEFRAMES





# Thank you

