STANDBY PAPER 2

# REIMAGINING WASTEWATER FOR DIRECT POTABLE REUSE – A JUDICIOUS PPP APPROACH

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## ABSTRACT

The Government Technical Advisory Centre on behalf of the eThekwini Municipality has contracted PPP transaction advisory services for the proposed direct potable reuse (DPR) water plants at the existing Northern and KwaMashu wastewater treatment works. Each DPR plant is planned to generate 70 Ml/d of potable water and distribute to surrounding communities by tying into the existing municipal bulk water infrastructure north of the Umgeni River. The recycling of wastewater for potable use, collected from households and industrial customers located predominantly within the Phoenix, Inanda and Greater Durban North areas, has been identified in the Water Reconciliation Strategy as an important potential water resource for the eThekwini Municipality to enhance water security.

The Transactional Advisory (TA) team has delivered a comprehensive feasibility study that will enable the Municipality to determine the preferred technical, legal, financial, and socio-economic options for structuring the Project. This will also include technical and legal due diligence; full project life cycle costs; affordability limits; risks and their costs; and optimal value-for-money methods for the delivery of the Project. The current technical options analysis includes for key treatment technologies with various multi-barrier stages to ensure compliance with drinking water standards (SANS 241:2025) and address potential concerns related to Contaminants of Emerging Concerns (CECs) and Endocrine Disrupting Chemicals (EDCs).

Should the approval of the Feasibility Study be achieved then the procurement phase of the Project shall commence which includes stages such as bid documentation, bid assessment and a PPP agreement management plan. Following Treasury approval, then ultimately the PPP agreement contract is entered into between the public and private partners.

## INTRODUCTION

The eThekwini Metropolitan Municipality (Municipality), located on the east side of the KwaZulu-Natal province, is the third-largest municipality in South Africa. It has an estimated population of approximately 4 million people (eThekwini, 2023). eThekwini Water and Sanitation (EWS), a unit within the Municipality, has the mandate to ensure an adequate availability of potable water supply to residents in the eThekwini region.

Water services are provided to approximately 1,159,300 consumers via 448 storage facilities, greater than 14,500 km of pipelines, 34 pump stations, and 5 purification works (National Treasury, 2023-2026). EWS purchases almost 98% of its water supply from uMngeni-uThukela Water (UUW), with the remainder supplied from water treatment works owned and operated by EWS.

The investigation of alternate water supply sources emanating from the Municipality's Integrated Development Plan (IDP), informed by various studies and documents such as the KZN Reconciliation Strategy, and Security of Supply Plan (EWS, 2017-2027) was identified as a key mitigant to balance the Municipality's water supply in the short to medium term. The reuse of treated effluent (TE) to potable standards from the KwaMashu Wastewater Treatment Works (WWTW) and the Northern WWTW was identified as a key project to assist the Municipality in enhancing the security of water supply to their customers.

The KwaMashu WWTW is located to the east of the Phoenix Industrial area, and its geographic coordinates are 29°43'45.41"S, 31°00'29.02"E. The Northern WWTW is situated in the Sea Cow Lake area and is situated at geographic coordinates 29°47'44.64"S, 30°59'52.14"E.

The Municipality intends to procure this project as a Public-Private Partnership (PPP) and therefore, initiated the Feasibility Study to investigate the design, construction, financing, operations, and maintenance of new water production plants (NWP) at the KwaMashu WWTW and the Northern WWTW (the Project). Accordingly, on 9 May 2012, the Municipality applied to the National Treasury for the registration of the Project in terms of the Municipal Service Delivery and PPP Guidelines and was subsequently registered as a potential PPP by the National Treasury under the project number M084.

A tender for the appointment of a Transaction Advisor (TA) was advertised in the Government Gazette by the Government Technical Advisory Centre (GTAC) on 27 September 2021. The TA would be appointed to provide a Feasibility Report in respect of the Project and would ultimately assist the Municipality with the Procurement Stages of the Project subject to council approval of the Feasibility Study. GTAC and the TA entered a transaction advisor contract, who began work on 02 May 2023.

The TA is made up as a collective of professionals including PPP specialists, financial, technical, legal, socio-economic, environmental and B-BBEE consultants. The status of the Feasibility Report at the time of writing this paper, is complete in all respects and pending Treasury approval.

### Motivation for the Project

The Municipality's water supply challenges are well documented, with the DWS, the Municipality, and UUW issuing a joint statement (DWS, 2024) on 26 January 2024 to inform the affected communities of the underlying causes and mitigation measures and interventions being put in place to address the water supply challenges. The root cause of the problem was identified as demand exceeding supply in the affected communities with deteriorating/leaking infrastructure further aggravating the problem.

Further, UUW, abstracts raw water from the uMgeni Water Supply System (uMWS), has reached its abstraction limits placed on it from DWS and therefore unable to supply any additional bulk water to the Municipality. These limits are set to ensure the continuous supply of water to all users of the system even during drought periods.

EWS, together with DWS and other stakeholders, formulated the KZN Reconciliation Strategy of 2017 to ensure the security of the water supply in the KwaZulu-Natal province. The report was undertaken as a response to the current economic growth in the province, improved water supply services, urbanisation of the population (from rural KZN to metros such as eThekwini), and the expansion of residential and other developments being implemented in the province (specifically along the coastal areas).

The report identified a medium-term water supply concerns and identified potential interventions to close the water supply gap.

In response to this, the Municipality set out in its IDP a water service development plan highlighting, amongst other matters, its initiatives to address the security of water supply, and proposed infrastructure interventions to address its obligations as a water service authority (eThekwini, 2023). To complement and inform its water planning initiatives, the Municipality prepared two more detailed planning documents, namely, the Security of Supply Plan and the Water Conservation and Water Demand Strategy and Business Plan (EWS, Water Conservation & Water Demand Management Strategy & Business Plan - Final, June 2017). These documents set out the adequacy of the water resources, the proposed initiatives to address the water supply gap as well as measures to promote water conservation and demand management. The figure below illustrates the current and future water balance with key mitigation measures.

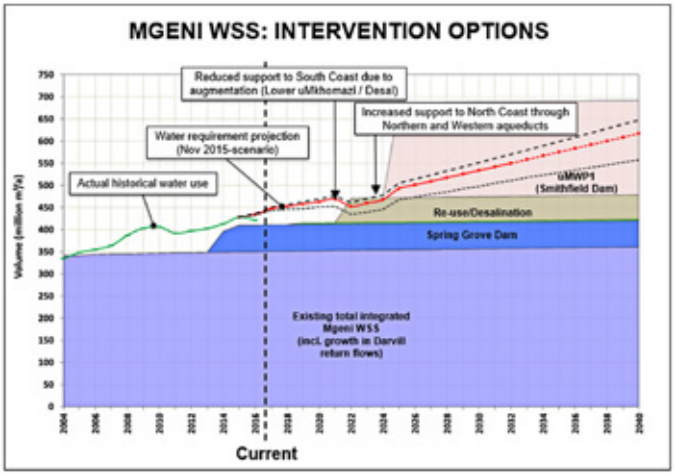



**FIGURE 1:** *EWS water balance graph*

The justification for the Project is to address the medium-term water supply gap identified in the KZN Reconciliation Strategy and currently forecast in EWS water balance graph above and to ensure the security of the water supply in the eThekwini region. Further, alternate water supply sources are necessary to augment the water supply from UUW to ensure the security of the water supply. To address the issue, EWS has been proactive in investigating alternate sources of water for treatment to a potable standard. The options that have been considered and explored by EWS were as follows (eThekwini, 2023):

i. The installation of a demonstration remix plant providing approximately 6.25 Ml/day with the possible ultimate scenario of 100 Ml/day where 50% seawater is mixed with 50% sewage.
ii. Pumping effluent from Phoenix WWTW to Hazelmere Dam for indirect use, including releases to the environment.
iii. Indirect reuse from Tongaat WWTW through pumping to a furrow, from where water is abstracted and treated at Tongaat Water Treatment Plant.
iv. Indirect reuse through pumping of the Amanzimtoti and Kingsburgh WWTW effluent to blend with the incoming raw water at the Toti Water Treatment Plant.
***v. New water Plants (NWP) - Reuse of the treated effluent from the KwaMashu and Northern WWTWs.***
vi. Durban Water Recycling Plant where 47.5 Ml/day of municipal wastewater is treated to near potable standard for direct reuse in industrial processes.
vii. Treating borehole water to potable standards.

It should be noted that approximately 500 Ml/day of wastewater is disposed of daily within the Municipality, and therefore, the reuse of treated effluent is seen as a key measure to balance the water supply in the short to medium term. The commissioning of the Smithfield Dam (one of the key interventions by UUW to enhance the security of water supply in the eThekwini region) is only expected to provide the first water by 2033 (UUW, 2022). This further highlights the urgent need to reuse treated effluent in the short to medium term to balance the water supply. The Project will also assist EWS in achieving its strategic goal of obtaining at least 20% of its water supply from sources other than bulk purchases from UUW by 2030.

**Objective of the feasibility report**

The objective and main deliverable of the Feasibility Study is to obtain approval for a detailed assessment that combines key technical, institutional, environmental, legal, financial, and socio-economic factors. The study will identify key project risks and challenges, assess potential revenues, costs, and returns for a Private Party responsible for the design, construction, financing, operation, and maintenance of the NRW over the project lifecycle, and determine the Project's total lifecycle costs. It will also develop a suitable payment mechanism and financial model to test different revenue and cost scenarios, assess risks and value for money outcomes, provide a risk allocation matrix and risk-adjusted financial model, and outline a clear, fair, transparent, competitive, and cost-effective procurement process.

**Approach to the feasibility study**

The approach to the Feasibility Study followed the process prescribed by the PPP Regulations and the Municipal Service Delivery and PPP Guidelines. Accordingly, the Feasibility Study consists of two stages, namely Stage 1A and Stage 1B, which are illustrated by the following figures.

The supply of potable water falls within the definition of a municipal service as defined in the Municipal Systems Act. When an existing municipal service or part of that municipal service provided by the Municipality is to be significantly upgraded, extended or improved, section 77(b)(iii) of the Municipal Systems Act obliges the Municipality to review and decide on the appropriate mechanism to deliver this municipal service. It is anticipated that the Municipality's infrastructure for the supply of potable water will be significantly upgraded (through the supply of additional potable water). Therefore, a section 77 review of the delivery mechanisms to deliver this extended service under the Project is required.

At the end of Stage 1A, the Municipality is required to decide whether to deliver the Project through an internal or external mechanism as required under the Municipal Systems Act. The Act provides a framework for the provision of Municipal Services. A municipality may provide a municipal service through (a) an internal mechanism, or (b) an external mechanism.

An internal mechanism may be a department or other administrative unit within its administration, or a business unit within the Municipality operating under the control of the council, such as EWS.

An external mechanism may be concluded by entering into a service agreement with (i) a municipal entity, (ii) another municipality, (iii) an organ of state, (iv) a community-based organisation or non-governmental organisation, or (v) any other entity legally competent to deliver the service. It is noted in the Needs Analysis that the provision of potable water to communities with the eThekwini Municipal area is an exclusive competence of the Municipality as the Water Services Authority.

When the Municipality is deciding whether to deliver the Project through an internal or external mechanism the Municipality it must first assess:

i. the direct and indirect costs and benefits associated with the Project if it is delivered by the Municipality through an internal mechanism,

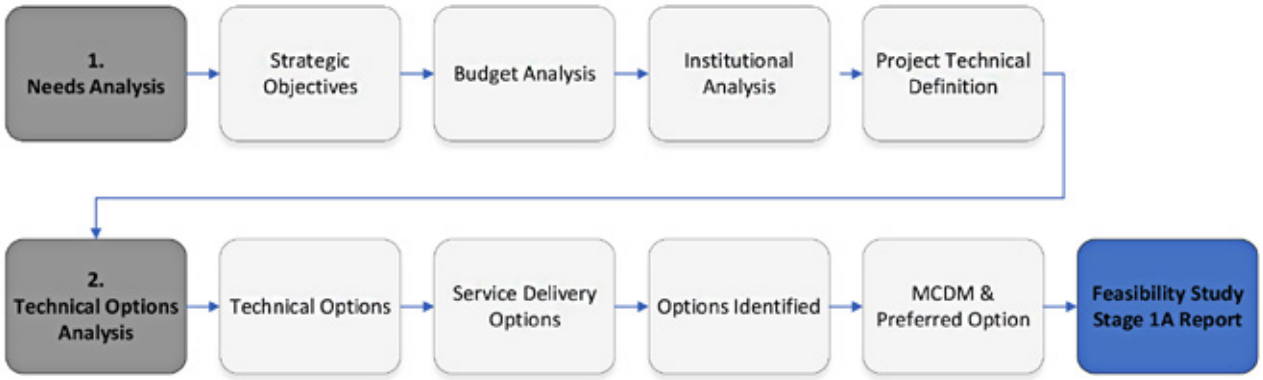



**FIGURE 2:** *Feasibility Study – Stage 1A*

including the expected effect on the environment and on human health wellbeing and safety.

ii. its capacity and potential future capacity to furnish the skills, expertise and resources required to deliver the Project.

iii. the extent to which the reorganisation of its administration and the development of its human resource capacity within that administration as provided for in sections 51 and 68 of the Municipal Systems Act could be utilised to deliver the Project.

iv. the likely impact on development, job creation and employment patterns in the Municipality.

v. the views of organised labour.

After making the assessment referred to above, the Municipality may, before it decides on an appropriate internal mechanism, explore the possibility of providing the service through one of the external mechanisms listed in section 76 (b) of the Municipal Systems Act.

Should the Municipality decide to explore a preferred external mechanism in greater detail, the Feasibility Study will proceed to Stage 1B, as depicted in the figure below, and must follow section 78(3) of the MSA.

Section 78(3) of the MSA requires that the Municipality is required to give notice and engage with the local community and affected staff/labour of its intention to explore the delivery of the Project through an external mechanism.

After the above requirements are observed, the Municipality must decide on an appropriate internal or external mechanism, considering the requirements of section 73 (2) of the Municipal Systems Act in achieving the best outcome.

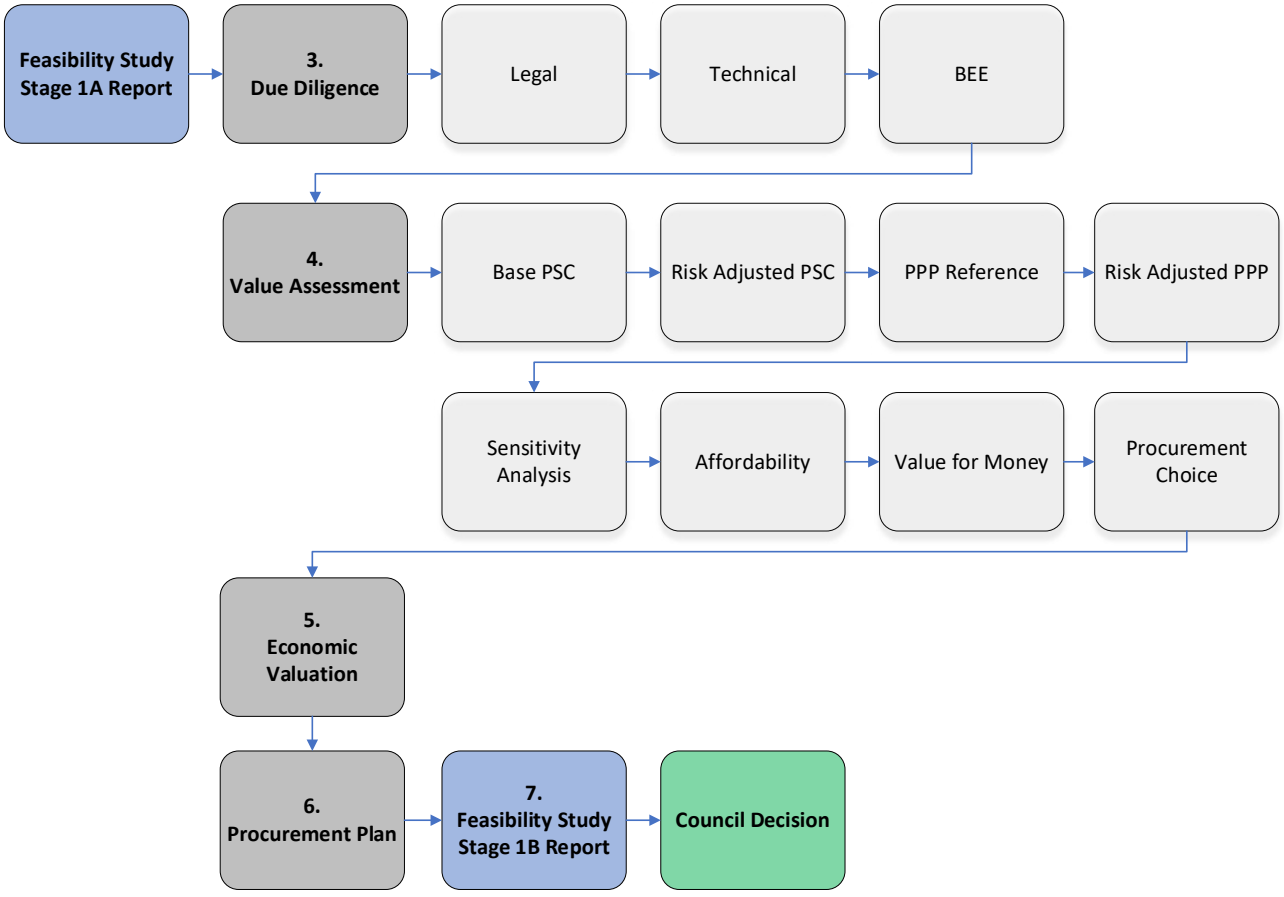



**FIGURE 3:** *Feasibility Study – Stage 1B*

Stage 1B of the Feasibility Study will commence upon the selection of the preferred technical and service delivery option by the Municipality. A thorough Due Diligence will be carried out on the preferred technical option, followed by a Value Assessment to investigate the Project's affordability, risk transfer, and value for money. An Economic Valuation, including a cost-benefit analysis, will then be completed. Based on the recommendation of the procurement choice from the Value Assessment, the Transaction Advisor will prepare the Procurement Plan, outlining the procurement process for the Project.

Stage 1B is completed after the Due Diligence, Value Assessment and then the Economic Valuation have been completed. Then, based on the outcomes of Stage 1B, the Municipality must decide whether to proceed with the procurement of the Project through an external mechanism in accordance with section 80 of the Municipal Systems Act (MSA).

## NEEDS ANALYSIS

The Needs Analysis is the first step and foundation of the Feasibility Study as it defines the scope of the Project and is the basis on which the remaining components of the Feasibility Study are prepared. The Needs Analysis incorporates the requirements of the Municipal PPP Guidelines and is structured to include institutional assessment, project technical definition and output specifications.

### Institutional assessment

The alignment of the Project to the Municipality's mandate and strategic objectives emanates from the Constitution, which enacts various components of legislation which then give effect to the Municipality's own mandate and function. The relevant legislations and Municipal mandate are incorporated in documents such as: The Constitution, National Water Act (NWA), Water Services Act (WSA), National Water Resources Strategy (NWRS), KZN Reconciliation Strategy, Municipal Mandate and Function, Integrated Development Plan (IDP), Security of Supply Plan and the Water Conservation & Water Demand Strategy & Business Plan (WC&WDM Plan).

In terms of the Municipal Public Private Partnership Regulations (MPPP Regulations), it is required that the Needs Analysis should demonstrate the Municipality's commitment and capacity to manage, evaluate, negotiate, and implement the Project should a PPP be the preferred procurement choice. This is undertaken through setting out the resourcing and capacity of the Project team and the TA, a discussion of the project management process and governance structure and a listing of key stakeholders, highlighting their participation in the Project.

There are two sets of stakeholders in the PPP process, namely: the Municipality and the TA. To facilitate and manage the interaction between the Municipality and the Transaction Advisor and ultimately to have an integrated Project, a Project Steering Committee (PSC) has been established. The PSC consists of the Project Officer, EWS representatives, GTAC, DBSA and members of the TA. Through establishment of the PSC, the Project Team and appointment of the Project Officer, the Municipality can manage, process, evaluate, negotiate and implement the Project. There is a clear line of decision-making, capacity and plans for addressing skills transfer.

The available budget for the Project is required to be ascertained. In the approach to identifying the available budget for the Project, the TA first reviewed the Municipality's overall capital and operating budget and then the capital and operating budget of the EWS unit over the 2023/2024 to 2025/2026 Medium-Term Revenue and Expenditure Framework (MTREF) financial years. It is expected that any budget allocations for the Project will come from within the budget of the EWS unit. EWS will only make budget commitments based on the outcomes of this Feasibility Study if it decides it is feasible to proceed with the Project. The Project will generate additional revenue through the sale of potable water to customers which will assist EWS to cover the costs of the Project. An affordability assessment was undertaken during the Value Assessment stage of the Feasibility Study.

### Project technical definition

The ToR called for an NWP of at least 70 Ml/d per day per site (annual average dry weather flow). After analysing the current and future catchment sewage flows, including lands/houses in areas without water-borne sanitation and potential future developments, it was determined that both sites have the potential to reach inflows exceeding 70 Ml/d. The Northern WWTW catchment has the potential to reach sewerage inflows of approximately 89.73 Ml/d, while the KwaMashu WWTW could potentially reach 79.44 Ml/d.

The Northern WWTW currently can treat sewage inflows of 70 Ml/d, while the KwaMashu WWTW can treat 65 Ml/d, based on their hydraulic treatment capacities. However, both sites have the potential to achieve higher sewage inflows as mentioned above. The future augmentation of both WWTWs is planned between 90 to 110 Ml/d.

Currently, the sewage inflows to both sites are below the required 70 Ml/d, primarily due to damage to bulk infrastructure caused by the April 2022 KZN floods and the presence of under-developed and undeveloped areas without water-borne sanitation. It was therefore necessary to consider a phased implementation of the Project, allowing sewage inflows at each site to increase over time as municipal remedial measures are completed. The optimal phasing will be developed during the Value Assessment.

The Project's battery limits required to be defined at this stage as it would have a bearing on the scope of the Feasibility Study and transfer of risk to the private party. Therefore, the battery limits were defined as follows:

**TABLE 1:** *Project battery limits*[1]

| Description | Entity Responsible |
|---|---|
| Bulk infrastructure upstream of WWTW | EWS |
| WWTW and feedstock quantum and quality | EWS |
| NWP-WTW and by-products | Private sector |
| NWP-WTW Bulk Potable Storage Reservoir | Private sector |
| Bulk Potable Water Infrastructure to Off takers | EWS and private sector |
| NWP Post-Treatment Blend with Potable Water (Bulk Water Infrastructure)[1] | EWS and private sector |

### Output specifications

High-level Output Specifications are required at this stage to determine the follow determinands:

**Minimum flow outputs:** Critical for safe yields to be confirmed for the feasibility study.

**Minimum standards:** The minimum standards for the output water quality are currently aligned to SANS 241 drinking water standard and will therefore need to be revised to an enhanced SANS 241 specification taking into consideration the potential presence of CEC's and industrial wastes.

[1] *To transport the product water from the project sites to the existing potable water storage reservoirs within the EWS's northern areas water distribution system, new bulk water infrastructure (BWI) needs to be installed. Currently, there is no existing infrastructure for this purpose. While the BWI falls outside the battery limits of the Project, EWS intends for a private sector company to build and hand over the BWI to EWS at the commissioning stage. EWS will thereafter be responsible for the operation and maintenance of the BWI. It is EWS's intention to include the output specifications for the BWI in the RFP for the Project*

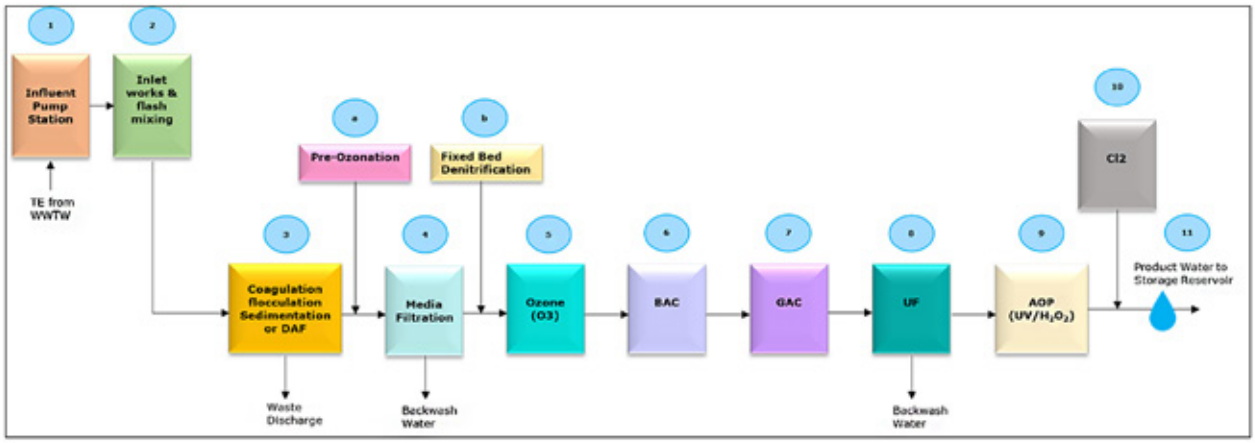



**FIGURE 4:** *Modified Ozone-BAF Process*

The appropriate standard applicable to the final output quality needs to be developed considering the International Water Quality Standards, in addition to CECs.

**Identification of B-BBEE objectives and specifications:** B-BBEE is a key component of South African PPP projects. In compliance with the PPPFA (The 2017 Regulation) and considering the amendments to the PPPFA in 2022, the B-BBEE component of a PPP bid will constitute 10% of the bid evaluation weighting (10 points out of 100 points). B-BBEE in the PPP bid will be evaluated against a PPP B-BBEE Balanced Scorecard designed for the project aligned to the Municipal Service Delivery and PPP Guidelines.

Note that the Output Specifications will be further developed by the TA into a more comprehensive document that will be issued with the Request for Proposal (RFP) at the Procurement Stage. The detailed output specification will cover the requirements for the Service Provider to operate the new water reuse plants and to supply into the bulk water municipal infrastructure with a potable water product that is in accordance with the required standards. The Output Specifications further defines the functional/development requirements and management throughout the term of the concession, design and construction, operational requirements, maintenance, lifecycle and finally the handback of the assets necessary for the concession contract.

## TECHNICAL OPTIONS ANALYSIS

In its approach to identifying appropriate technical solutions for the Project, the TA considered only proven technologies, that can eliminate the harmful chemicals, provide final drinking water at the legislated standard (currently SANS 241:2025) and, where possible, solutions that can accommodate the stricter limits on the ammonia and nitrate/nitrite concentrations (in combination shall not exceed 10 mg/l) and remove total dissolved salts (TDS).

Based on the above approach, the TA identified two process configurations for the Project namely the ozone-biological activated filtration (Ozone-BAF) treatment process and the reverse osmosis (RO) treatment process. These two treatment processes employ well-researched, recognized, and internationally accepted unit processes that are also recommended by the WHO as guidelines for Potable Reuse (WHO, 2017).

These treatment processes are combined into treatment trains that include sufficient multiple barriers to ensure that the product water produced is always safe for drinking purposes. Both processes can achieve product water of a quality that conforms to the legislated SANS 241:2025 standard for potable standard water.

It should be noted that of the two treatment processes, the Ozone-BAF does not reduce TDS, while the RO treatment process does remove TDS but produces an additional waste discharge (brine stream) that needs to be disposed of appropriately. Further, the Ozone-BAF cannot accommodate ammonia and nitrate/nitrite concentrations at the General Limit Values (GLVS) and therefore, the treated effluent (TE) from the existing WWTWs must either adhere to the stricter limits as mentioned above, or additional pre-treatment to deal with the higher concentrations of ammonia and organically bound nitrogen found within the TE be introduced at the NWP.

The Modified Ozone-BAF which included pre-ozonation and a fixed denitrification bed process was selected as the preferred technical option.

New bulk water distribution infrastructure is required to transport the product water from the Project Sites to the existing potable water storage reservoirs within the EWS's northern areas water distribution system. Two options were considered, namely:

**Option 1**: Pumping directly to reservoirs fed via the branch mains off the Northern Aqueduct pipeline system.

**Option 2**: Pumping into branch mains which supply several reservoirs, fed via the Northern Aqueduct pipeline system.

Option 2 was the preferred option for implementation taking into consideration the following factors:

i. The extent of the supply area that will receive and benefit from the additional source of water supply is substantially greater by some 50%, as compared to the supply area for Option 1.
ii. For Option 2, should the actual demand from the receiving reservoirs be lower than the estimated 70 Ml/d proposed to be produced by the Project at each Project Site, the increased potential water demand for the extended supply area would ensure utilisation of the available DPR water.
iii. Option 2 would allow blending of the DPR water with potable water from Durban Heights waterworks.

The above-mentioned benefits of the increased supply area and the flexibility to utilise all of the product water produced from the Project at each Project Site are considered to be beneficial overall, however this is subject to the Municipality's affordability as Option 2 is more expensive than Option 1 from a capital perspective.

## DUE DILIGENCE

The Project Due Diligence thoroughly evaluates the legal, technical and B-BBEE aspects of the Project to identify any fatal flaws and issues that may impact the Project. Potential issues and/or risks to the Municipality are analysed with a recommendation to mitigate such risks, typically these are the type and extent of any further investigations or studies that Municipality is required to undertake prior to procurement of the Project.

**Legal due diligence**

Various Acts and legalisation were considered, such as The Constitution, municipal acts, procurement law, national environmental acts and labour relations act. The Project was reviewed in accordance with each act/law and the outcomes assessed with potential issues or 'red flags' raised.

A potential public acceptance risk has been identified in relation to the introduction of potable water produced through the reuse process. This risk will need to be managed through early, transparent, and inclusive stakeholder engagement to build understanding of the treatment process, water quality safeguards, and compliance with potable water standards.

A robust public participation process will be required, and such process commenced early to avoid or minimise any delays to the procurement of the Project.

**Technical & environmental due diligence**

Technical due diligence includes the assessment of key municipal support components such as the quantity and quality of treated wastewater, bulk electricity supply, telecommunications, potable water and hazardous landfill sites.

Although the current safe yields from both WWTWs do not meet the mandated yields of 70Ml/d each, the future catchment developments, upgrades and the April 2022 flood-damaged remedial works are able to generate future flow quantities. This will be further enhanced through the current remedial works on the damaged bulk sewerage infrastructure upstream of the WWTWs. The Project is planned to be constructed in phases to accommodate the progressive increase in flows.

With respect to treated effluent quality, current operating conditions at both WWTWs require improvement, particularly in relation to certain quality parameters that may be affected by hydraulic loading and ageing mechanical and electrical infrastructure. The Municipality is addressing these matters through planned remedial and refurbishment works at both WWTWs, which are currently underway.

The bulk electricity demand for the Project is estimated to increase the overall demand at each site by approximately 5.2 to 5.5MVa. The Electricity Planning Department confirmed that the bulk power supply to the Northern NWP Site requires upgrading and that the application for the upgrade was in process for the Springfield Park substation. Confirmation from Electricity Planning for the KwaMashu NWP site application confirmed that the future required power is currently available to serve the NWP. However, it is noted that that there are existing developments in the catchment that are currently seeking an upgrade for their power supply, such as Bridge City, which may well impact on the available power for the future NWP. Bulk power supply may not be reserved for future requirements. Servitudes for the new bulk power infrastructure will be required and have historically experienced delays up to 18 months to acquire. This will be factored in the phased upgrade of the NWP.

It is a key requirement that the Municipality undertake thorough geotechnical investigations at each site prior to the procurement stage to ensure that there is sufficient information for the bidders, and to obviate each bidder carrying out their own ground investigations.

It is important to note that the sites for the Project were selected by the Municipality, which is located within 1:100-year flood plains. Key components (e.g., electrical substations and motor control centre buildings) of the NWP may be constructed on elevated infrastructure. Key components should be built at higher elevations to minimize the risk of damage during floods. This may ensure that the critical infrastructure remains operational even during flood events. It is recommended that the existing 1:100-year flood lines should be re-calculated for both the KwaMashu and Northern WWTW sites within the uMhlangane River by the Municipality and become available to the bidders at the onset of the procurement stage.

The NWP facility is located within the existing WWTW footprint. Main access to both the WWTW and NWP facility shall be common, as there are no alternative entry points that are accessible due to the topography and locality of the sites.

Environmental legislative review, screening and authorisations for the NWP: An application for both Environmental Authorisation (EA) and Water Use Licenses (WUL) have been made to the relevant authorities.

All treatment technology options will generate a sludge by-product that will need to be further managed on site to meet legislated requirements (i.e. Waste Management Act) and then disposed of at a registered landfill site. There are currently two hazardous landfills within the eThekwini Municipality, namely Dolphin Coast (North Coast) Landfill and Shongweni Landfill. Both sites contain restrictions (pH, liquid content, etc.) that need to be evaluated prior to permitting disposal. In terms of additional treatment, Shongweni Landfill will be able to blend wherein any waste can be stabilised and treated prior to disposal.

## VALUE ASSESSMENT

The objective of the Value Assessment is to set out the detailed analysis used to determine which procurement option (i.e., either the internal mechanism or the external mechanism by the private sector) best demonstrates Affordability and Value for Money of the preferred technical option recommended as an outcome of the Technical Options Analysis (TOA) report. The Value Assessment also identifies an appropriate payment mechanism and financial solution considering whole lifecycle costs, which are composed of direct capital costs, major maintenance costs, direct operating costs, private party costs, direct BEE costs and indirect costs.

As part of the Needs Analysis report, the Project was defined as an NWP with at least 72 Ml/d capacity (allowing for losses to reach the mandated 70Ml/d) at the Northern WWTW site and the KwaMashu WWTW site. The TOA report proposed that the Project be constructed in three equal phases, each with a capacity of 24 Ml/d, to achieve the safe yields. However, as part of the Value Assessment, the phasing of the Project was refined to include two phases: an initial phase of 48 Ml/d at each site and an expansion phase of 24 Ml/d for the Northern WWTW site to be completed during 2036 and 2042 for the KwaMashu WWTW site.

Two models were assessed, namely the Base Public Sector Comparator (PSC) Model and the External Reference Model. The base PSC Model represents the cost to the Municipality of procuring the Project through the conventional public-sector procurement approach (i.e., the internal mechanism). Under this approach, it is assumed that the Municipality would appoint an experienced EPC contractor to construct the NWP and, following commissioning, undertake the operations and maintenance. The Municipality is responsible for funding the construction of the NWP.

The External Reference Model is referred to as the "shadow" bid. It is a hypothetical private sector bid representing the TA's best estimate at costing the Output Specifications as if the TA were an informed private sector bidder. The External Reference Model (herein referred to as the PPP Model), once adjusted for the cost of risk as identified from the Risk Matrix, is compared to the risk-adjusted PSC Model to provide an indication of the initial Value for Money of the Project to the Municipality.

It is important to note that the Needs Analysis results indicated that there is currently no capital expenditure budget, and no operating expenditure budget allocated to the Project within the EWS budget for the next three financial years. It was established that EWS would utilise revenue from water sales (domestic and non-domestic) to pay for the Project. Accordingly, to

assess Affordability, the project revenue is compared against the cost of the Project under the PPP Model.

It is a key requirement of the Value Assessment stage that a sensitivity analysis be undertaken. The report examines the PPP Model across various scenarios. The analysis assesses the impact of changes to key input assumptions on the tariffs payable while separately evaluating Affordability (including scenarios for reducing NRW and capital contributions) and bankability (separate procurement).

## ECONOMIC VALUATION

The objective of the Economic Valuation is to assess the economic viability of the proposed Project. Economic viability is different from financial viability. The focus of financial viability is whether the projected revenues would support the costs to the eThekwini Municipality. The financial viability (indicative) is addressed as part of the Value Assessment. The purpose of an Economic Valuation is to determine whether the benefits to society exceed the social costs. Society, in this case, is defined as the whole of South Africa.

The economic analysis showed that the Project was not only economically efficient but also very robust. There are significant economic benefits to be unlocked from the NWPs. There would also be major macroeconomic and empowerment gains. The most important and all-encompassing macroeconomic impact is the contribution to GDP. It was estimated that the Project would contribute R 1,256m to GDP in 2026, increasing to R 2,116m at the height of construction in 2027. The contribution would then increase further to R 14,102m in 2030 once operations commence and eThekwini businesses are able to leverage the water for productive purposes.

One way of mitigating the impact on the Municipality is to investigate mechanisms for transferring some of the significant benefit to broader South African society to the Municipality. National Treasury could consider transferring some of its tax gains to the Municipality. It was shown that the PV of tax receipts alone were approximately four times the loss to the Municipality. The Municipality could also improve its position by reducing the amount of NRW and by quantifying the maintenance savings the Project would have on its reticulation network.

## PROCUREMENT PLAN

The objective of the Procurement Plan is to demonstrate whether the Municipality has the necessary capacity and budget to manage and deliver the procurement of the Project. The procurement process shall be carried out via a single stage Request for Proposal (RFP) which shall be an evaluation of the pre-qualified bidders' proposal in terms of risk transfer, Value for Money and Affordability.

The RFP will incorporate a qualification step requiring bidders to meet specific technical, financial, and B-BBEE standards for their proposals to be considered. This approach will give the market a clear view of the bidders' standard of expertise and experience, which the Municipality wants to consider for a long-term project agreement. This ensures that only qualified, experienced service providers participate in the RFP process.

## CONCLUSIONS

The Technical Options Analysis identified various technical options and service delivery options capable of delivering the required service.

Following completion of the MCDM process, the Feasibility Study recommends the Modified-Ozone BAF process as the preferred technical option and the external mechanism by the private sector as the preferred service delivery option for further consideration by National Treasury.

The findings of Stage 1B of the Feasibility Study indicate that the legal requirements for developing the Project can be met, with no fatal flaws identified in respect of the Project Sites. The assessment further indicates that the Project's B-BBEE and local socio-economic objectives are achievable, and that the economic analysis demonstrates substantial potential economic benefits associated with the NWPs.

The Feasibility Study further indicates that the Municipality has the necessary institutional arrangements to manage a PPP procurement process, should the required approvals be obtained. A Project Officer has been appointed to manage the planning, procurement and implementation processes on behalf of the Municipality, and a contract manager is expected to be made available within the Business and Commercial Branch following procurement to manage the project agreement during construction and operations.

Subject to National Treasury approval, Council approval and any other applicable statutory requirements, the procurement phase is expected to take approximately two years. If pursued, the process would be undertaken in accordance with the MFMA, PPPFA and Treasury Regulations, and would be required to ensure fairness, transparency, competitiveness and cost-effectiveness.

The design, construction and commissioning of the first phase of the new water production plant was estimated at three years.

## RECOMMENDATIONS

Through the Due Diligence process, it is seen that potential issues can be addressed through undertaking certain specialist studies, following due processes and applications for approval by and engagement with the relevant authorities. Recommendations have been made for the Municipality to commence with the necessary next steps on issues identified at this stage.

Whilst no fatal flaws regarding the Project Sites were identified, it must be noted that the Project Sites are located within 1:100-year flood plains. Key components of the NWP should be built at higher elevations to minimize the risk of damage during floods. This may ensure that the critical infrastructure remains operational even during flood events. Alternatively, it is proposed that the entire NWP be constructed on an elevated platform. The elevated platform shall be constructed above the 1:100 flood level with additional freeboard.

There is currently no existing infrastructure to transport the product water from the Project Site to existing potable water storage areas with the Municipality's northern areas water distribution system. Based on an assessment of the bulk water infrastructure options, Option 2 (pumping into branch mains which supply several reservoirs, fed via the Northern Aqueduct pipeline system) was recommended as the preferred bulk water distribution infrastructure option for implementation.

The Value Assessment indicates that a PPP procurement approach has the potential to achieve appropriate risk transfer and Value for Money. On this basis, the Feasibility Study recommends that the PPP procurement option be considered further, subject to the required National Treasury and Council approvals and the assessment of affordability.

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