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Water Reconciliation Strategy for Richards Bay and Surrounding Towns

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DEPARTMENT OF WATER AND SANITATION

Directorate: National Water Planning

Water Reconciliation Strategy for Richards Bay and Surrounding Towns

INCEPTION REPORT

Final: June 2014

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Department of Water Affairs
Directorate: National Water Resource Planning

WATER RECONCILIATION STRATEGY FOR RICHARDS BAY AND SURROUNDING TOWNS

APPROVAL

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1 Introduction

1.1 Background

Richards Bay is the economic centre of the uMhlathuze Local Municipality, comprising Empangeni, Ngwelezana, Nseleni, Esikhaleni and a number of rural villages.

Richards Bay is one of the strategic economic hubs of the country and was designated an Area of National Economic Significance. It has the largest coal export terminal in the world, the second largest port in South Africa and has several large export oriented strategic industries (existing multi-nationals who have invested in the area include, inter alia, BHP Billiton, Richards Bay Minerals (RBM), Mondi Business Paper and Tronox).

Recently, Government designated a purpose built and secure industrial estate in Richards Bay - an "Industrial Development Zone" - with the aim of developing a world-class industrial park. The intention is to attract investments in the field of aluminium products, beneficiating aluminium from the existing aluminium smelter plant, and heavy metal plants utilising the products (titanium and iron) of the RBM mining company. Other perceived potential investments are in cement manufacturing, renewable energy projects, agro-processing projects, rubber recycling and granite processing, as well as a dry dock and ship repair supporting services.

The coal export terminal with a current capacity of 91 million tonnes per year will be expanded to a capacity of 108 million tonnes per year.

Though the water resources available to the uMhlathuze Local Municipality are currently sufficient to cater for the existing requirement, should the above-mentioned new development materialise, the resource may come under stress. Considering the strategic importance of the area, planning such augmentation, which will take many years to implement, must be done now in order to be ready to respond at short notice to the demands of any new development.

1.2 Need for the study

In 2004 the then Department of Water Affairs (DWA) then Directorate: National Water Resource Planning (NWRP) embarked on a series of reconciliation strategy studies for the metropolitan areas and larger cities in the country. These studies were followed by four studies aimed at developing similar reconciliation strategies for all other towns in the four planning regions (North, East, Central and South). The purpose of the studies was to gather information about the bulk water balance situation of all towns in the country, to select the towns that are most in need of comprehensive strategies for the reconciliation of water availability and future water requirements, and to identify the most appropriate series of interventions that will form part of such strategies.

In order to determine the towns for which comprehensive reconciliation strategies are to be developed in the East Planning Region, a process was followed to identify and prioritise towns on the basis of a number of factors including, among others, population and anticipated population growth rate, current water supply and water requirement balance situation and socio-economic development of the town.

From this prioritisation process Richards Bay emerged as one of the towns in urgent need of a comprehensive strategy to identify reconciliation options for meeting the growing demands in the area.

1.3 Objectives of the study

The objective of the study is to develop a strategy that will set out a course of action to ensure adequate and sustainable reconciliation of future water requirements of the uMhlathuze Local Municipality with available supply, especially Richards Bay and its significant industries, as well as some smaller towns, for at least 25 years.

The strategy should be based on recent extensive studies in the study area and should take full cognisance of all uncertainties by examining various scenarios. The strategy will not necessarily conclude with specific options to be developed. It will rather identify potential options, or groups of options, which will form reconciliation scenarios, each of which could potentially be implemented. It will also identify the degree of information (and the time frames) required to give effect to the strategy.

The Reconciliation Strategy is required to assist the Department of Water and Sanitation (DWS), the water service providers (WSPs) and the water service authorities (WSAs) to determine future water requirement scenarios, and to identify or confirm the interventions that need to be investigated further, as well as the scope and the timing of these investigations. The strategy should document the selection processes followed so that these can be reviewed and updated at regular intervals in the future.

Other issues, such as those that might affect the efficient operation of the systems, information requirements for planning purposes, and co-operative governance should also be documented. The necessary actions to address these issues must be determined and the responsible authorities identified.

1.4 Study area

Richards Bay is an established town with well-developed industries, commercial areas and business centres. Significant industries include Mondi Richards Bay, RBM, Tronox, Foskor, Hillside and Bayside Aluminium and the Richards Bay Coal Terminal. Significant development is currently taking place in the town, particularly in the industrial zone, adjacent to the Richards Bay harbour. Richards Bay is the economic centre of the uMhlathuze Local Municipality, comprising Empangeni, Ngwelezana, Esikhaleni and a number of rural villages.

In the study area, water is sourced from the Mhlatuze River, various natural lakes in the catchment, augmented by the Thukela River and the Mfolozi River. High growth in water requirements has been experienced in recent years, and this trend is expected to continue.

The study area is shown on the following page (**Figure 1.1**).

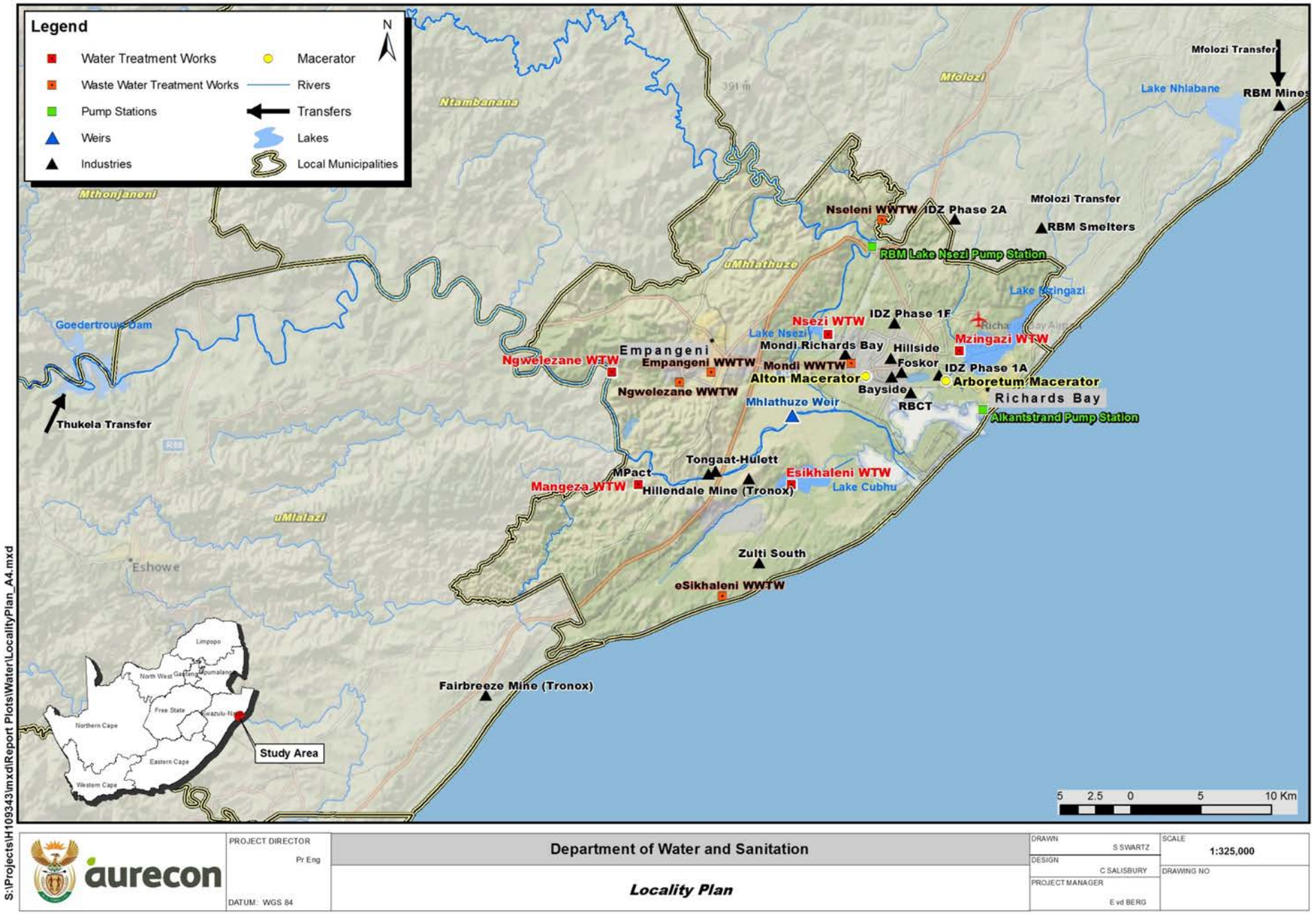

Figure 1.1 | Locality Map of the uMhlathuze Local Municipality

1.5 Appointment of Consultant

Aurecon South Africa (Pty) Ltd submitted a proposal to the DWS for the procurement of services to assist with the Development of Water Reconciliation Strategy for Richards Bay and Surrounding Towns study; DWS bid no WP 10720, in November 2012, in response to an open bid tender request. An appointment was made in September 2013 and the project got under way during late October 2013.

1.6 The Study Team

The contribution of each of the participating firms or specialist advisers / reviewers is shown in Table 1.1.

Table 1.1 | Contribution of participating firms

Firms	Task Allocations
Aurecon	Study Management and Review and Leadership of the following Tasks: - Inception Phase - Water Requirements - Water Availability and Balance - Interventions - Water Development Scenarios and Final Strategy Development - Reconciliation Strategy Report - Training
Institute of Natural Resources	Task responsibility for the Mhlatuze Resource Classification Review
Geomeasure	Task responsibility for groundwater resources
Nemai Consulting	Stakeholder Participation and Co-ordination

Aurecon provides engineering, management and specialist technical services for public and private sector clients globally. Aurecon provides a comprehensive range of water services, including resource management, bulk conveyance and water services, irrigation, dams, reticulation and storage, and complementary services.

The **Institute of Natural Resources** (INR) contributes to the effective management of natural resources. They are a non-profit, public benefit company and an Associate Institute of the University of KwaZulu-Natal. The INR promotes the wise use and management of natural resources for the good of the environment and society.

The **Geomeasure Group** (Pty) Ltd is a company with a multidisciplinary team of specialist professionals, focusing on the development and maintenance of water resources combined with the preservation of the environment, as the key focus areas of the group. They provide a wide range of geohydrological, project management and environmental services and solutions.

Nemai Consulting is an independent, specialist environmental, social and site services consultancy. Nemai Consulting employs environmental engineers, scientists, sociologists, psychologists, economists and analysts.

2 Proposed Approach and Methodology

2.1 Background and Introduction

2.1.1 General approach to the study

The study will be undertaken by an experienced and diverse team of professionals that are knowledgeable about the study area and well experienced in all aspects relating to the scope of work for this study. Specialists in particular fields will provide input at specific points in the study. Development of aspects of the strategy and action plan will generally be done by utilising a workshopping approach with a diverse team, initially at study team level.

2.1.2 Study phases and tasks

The study will be undertaken in two Phases, namely:

Phase 1: Inception, comprising evaluating all information and the study proposal in close collaboration with DWS, culminating in an Inception Report.

Phase 2: Development of the Reconciliation Strategy, including evaluating water requirements; water availability and balance; water resource development scenarios; interventions, inclusive of their timing; and assessing environmental constraints, with significant stakeholder participation and co-ordination.

The methodology and approach, as detailed in the following sections, will be followed in undertaking this study.

2.1.3 Differences between Proposal and Inception Report

The differences between the proposal and Inception Report mainly pertain to:

a) The omission of the Value of Water Assessment Task. It was concluded that similar assessments have been carried out many times before and that repeating it will add very little value to the study.
b) The focus of the Stakeholder (previously Public) Participation and Coordination Task has changed from liaising with the public to primarily liaising with the stakeholders of the Mhlatuze Catchment Management Forum, and key water users. Some allowance for further stakeholder engagement has been retained.
c) Changes in proposed study personnel, due to resignations or current unavailability, owing to the delay in appointment of the consultant;
   The most significant change in personnel is the inclusion of Mr Graham English in the study team, as Task Leader for Water Requirements and Interventions, to replace Mr Shaw who has left Aurecon and Dr Cullis, who is currently not available. Ms Louise Dobinson will become the

Task Leader for the Water Availability and Balance task. As she was already included as the main resource for this task, this would entail a limited change. A few other team members are no longer available and have been replaced, or additional personnel to be used have been included;

d) Changes in the study progress meetings, with the proposed Project Steering Committee Meetings and Project Management Committee Meetings being replaced by Study Stakeholder Committee meetings;

e) While the total estimated study cost and study duration remains unchanged, there are variations in task budgets (compared with the proposal) as a result of an improved understanding of what is required per task.

2.2 Inception

2.2.1 Assemble and assimilate information

The study team will obtain and study the range of relevant background documents from completed and current studies as required, have discussions with relevant DWS representatives, consultants and key stakeholders where necessary and assemble information relevant to the study.

2.2.2 Inception meeting

The study proposal, programme and budget will be reviewed. An Inception Meeting with the Client would be held to ensure clarity on objectives, methodology and deliverables. This will also be the opportunity for DWS to provide specific feedback on the proposal, and for the study team to discuss issues of concern.

2.2.3 Prepare GIS mapping

GIS Mapping, in the form of shape files, will be prepared as needed, during the Inception Phase and also during Phase 2, and may include environmental conservation areas, existing bulk water infrastructure and other GIS layers deemed necessary as support material for the remainder of the study. During the study, GIS shape files will be updated as required and mapping will be produced to support decision-making processes, as needed.

2.2.4 Inception Report

The study team will draft the Inception Report in close co-operation with the Client. It will be based on this study proposal which will be expanded and modified where required to provide a clear and concise description of how the study will be undertaken, what deliverables will be produced, and in which sequence. It will further provide detailed financial information (including an updated human resource schedule, study programme, budget and cash flow projection, as well as other requirements). All items identified as possible problem areas as well as suggested additions to the study, will be included in the Inception Report, where appropriate.

Phase 2: Development of the Water Reconciliation Strategy is described in Sections 2.3 to 2.9.

2.3 Water Requirements

2.3.1 Urban and industrial use

High, Medium and Low growth scenarios were developed in the All Towns Reconciliation Strategy, which however only partially addressed the scope of water requirements to be addressed in this evaluation.

There is significant development currently taking place in Richards Bay, particularly in the industrial zone, adjacent to the Richards Bay harbour. The average increase in raw water abstraction has been nearly 2.5% p.a. since 2006. It is anticipated that water requirements in the Richards Bay Water Supply Scheme area will continue to increase, principally driven by the need to meet the improving level of service, and associated urban development in the town, due to industrial and commercial growth.

The data on which this evaluation will be based will be census data, data received from the local authorities, Richard's Bay industrial development zone (IDZ) or other sources, water master plans and other available sources of information, notably available specialist studies on forecast population growth and economic growth, and will include a projection both with and without water demand management. The significance of including other municipalities within the study area will be assessed.

Figure 2.1 presents the key surface water abstraction points for the domestic and industrial sectors within the W12 catchment and their respective supply areas.

The study will provide high and low reconciliation scenarios for at least the next 25 years, likely up to 2040. A range of factors to be considered includes:

- the start date for forecasting;
- requirements for water linked to population growth;
- water use patterns (residential/non-residential);
- planned developments; and
- migration patterns.

The focus of this evaluation will, however, be on the water requirements of the major industries which utilise about four times the water requirements of Richards Bay town. Actual future urban water requirements on the water supply system remain subject to many potential permutations and the most likely, or planning scenario remains only a best estimate. Only through on-going monitoring will it be possible to determine which water requirement curve is actually unfolding. The sensitivity of the requirements will be assessed, using the above criteria.

2.3.2 Irrigation use

An overview assessment will be made of the irrigation water use in the catchment. Reduced irrigation use provides opportunities for urban and industrial water users. Many recently settled historically disadvantaged individuals (HDI) sugarcane farmers have reverted to subsistence farming, but a further shift away from sugarcane irrigation could severely compromise the viability of the Felixton Sugar Mill. The recent verification and validation and current compulsory licensing process will provide the latest information on irrigation water allocations. The team will liaise closely with the DWS Regional Office, as the process will result in decreased allocations, freeing up unutilised water, thus improving the water balance.

2.3.3 Other uses

Expansion of commercial forestry will be considered.

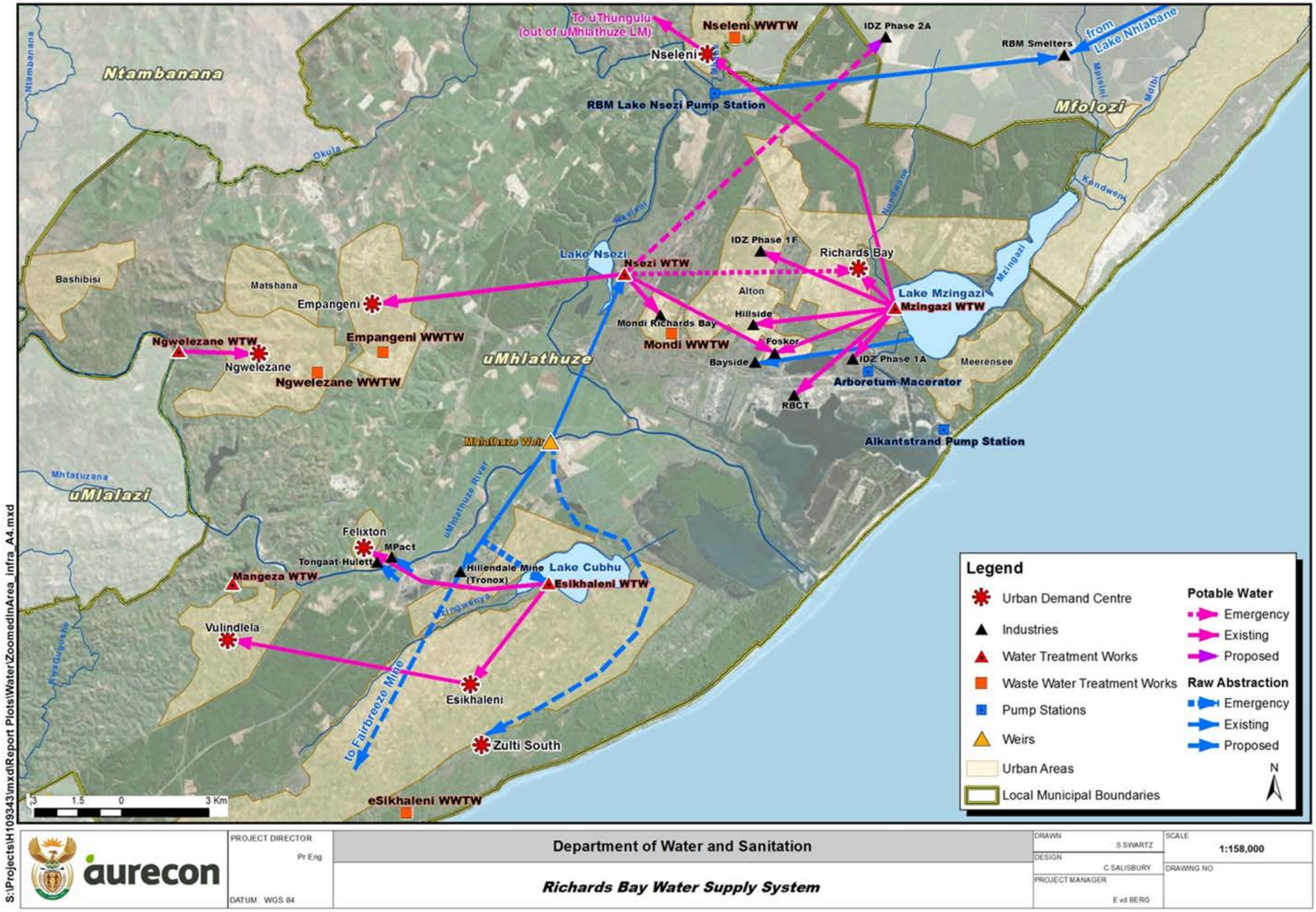

Figure 2.1 | **Water Treatment Works and Urban / industrial demands**

2.3.4 Water requirements workshop

The water current water uses and future water requirement estimates and other potential water uses will be used to produce "planning" water requirement scenarios up to 2040.

A technical water requirements workshop will be arranged, to be attended by the relevant DWS staff, Mhlathuze Water, uMhlathuze Local Municipality, uThungulu District Municipality, Mondi, RBM, Tronox, Foskor, BHP Billiton, Tongaat-Hulett Sugar and other key water users if required. At the workshop, the different stakeholders will provide feedback and comment on the information presented, and discrepancies and inconsistencies will be resolved. Agreement will be reached on the future water requirements scenarios to be developed. The study team will, before the workshop, prepare and disseminate informative documentation to timeously inform stakeholders and support the decision-making.

2.3.5 Reporting

A report will be prepared on historical and existing water use and future water requirements scenarios. Informative supporting data will be documented.

2.4 Water Availability and Balance

2.4.1 Water availability

The *Mhlathuze Water Availability Assessment Study* and other relevant documentation will be reviewed and an assessment will be made of the current resources and water available to the Mhlatuze Local Municipality. Emphasis will be placed on the water supply to Richards Bay and its industries. The provision of water at alternative assurances of supply will be considered, in consultation with the client and key stakeholders.

Information will be gathered regarding the status of ecological water requirements (EWR) determination and implementation in the study area. The EWR in the lower Mhlatuze River has not yet been implemented and the Mhlatuze Weir is operated to limit spills to a minimum. The potential reduction in system yield as a result of the implementation of EWRs for the Mhlatuze River and/or Thukela River or the lakes will be considered.

Past groundwater resource assessments will be studied and an assessment of groundwater availability will be documented.

2.4.2 Water Balance

The water balance will be assessed by updating the water resources planning model with the updated water requirements. Some new water demand nodes may need to be included in the model. The water balance will be determined for current water use as well as for the case where allocations are fully used.

2.4.3 Reporting

Water availability will be documented as a chapter of the Reconciliation Strategy Report.

2.5 Interventions

2.5.1 Identify and evaluate potential interventions

Information sources include existing reports, current studies, specialist contributions, contributions from DWS officials, key water users and other key stakeholders. Information contained in previous studies will be reviewed. This will be augmented with other published information and summarised for each intervention. Preliminary information gaps and data requirements will be identified for each intervention.

The categories of options to be investigated include urban water use efficiency, surface water, groundwater, re-use of treated effluent, desalination of sea water, and reallocation. Other influences on yield or programming, such as e.g. implementation of the Reserve and the possible effects of climate change will also be identified.

Pertinent information on technical, financial, ecological and social aspects will be assembled or generated and where necessary, improved at desktop level. In so doing, available information (without undertaking further study) from many disparate sources and levels of confidence will be brought to a more common level of understanding, in a standard format.

The yield determination will be run for specific future water development scenarios and for specific potential interventions to determine the yields of interventions.

A field visit may need to be undertaken, to ensure adequate understanding of the technical aspects of potential schemes, and their environmental, social and heritage context. The information gathered during the literature review and field trip will provide the environmental constraints.

Specific interventions that will be addressed are the following:

a. Water use efficiency

The evaluation of the potential to reduce future water requirements through water use efficiency measures would need to be evaluated in close co-operation with uMhlathuze Local Municipality. Their Water Efficiency Plan will be obtained and evaluated. The total system losses in the supply area of the various water treatment works are estimated at approximately 31% of the treated water production. The range of water efficiency measures that would be evaluated would inter-alia include the reduction of water use through the extension of consumer metering and implementing a well-designed increasing block tariff structure; water balance assessment on district metering areas; as well as pressure and leakage management, among the wide range of potential measures to potentially be introduced.

b. Water from the Thukela River

An increase in the capacity of the Thukela-Mhlathuze Transfer Scheme, which augments the Mhlathuze River System from the Thukela River, will be evaluated. The transfer scheme was originally planned for a 10 m^3/s capacity, while the current pumping capacity is only 1.2 m^3/s. In order to increase the capacity of the transfer scheme, the link pipeline, replacing the tunnel, would have to be augmented by means of an additional pipeline and pumps, or the tunnel would need to be constructed.

There is also potential to develop a second water transfer scheme from the lower Thukela River, along the coast, into the Mhlathuze River catchment, over and above the Middledrift Transfer scheme. Mhlathuze Water has an unexercised licence for the abstraction of 47.3 million m^3/a, from the Thukela River at Mandeni, which, if not fully utilised by the time of the second 5-yearly review, due in 2015, the volume may be curtailed by DWS. The potential to move the point of abstraction for this allocation to the Middledrift Weir will be evaluated.

Allowance has not been made to model the Thukela River System, and available information will be used to evaluate further abstraction from the Thukela River.

c. Water from the Mfolozi River

Richards Bay Minerals has authorisation to abstract a maximum of 21 million m^3/a from the lower Mfolozi River. Water is pumped into their Sokhulu reservoir and is used in their mining operation. The imported water is not permitted to enter the Nhlabane River or Lake.

A study was conducted by DWS in the late 1980s, as to the feasibility of augmentation of the Mhlathuze River System from the Mfolozi River. The findings indicated that with the sporadic flows, unless major storage was provided on the Mfolozi, the Mhlathuze River System would ultimately have to be augmented from the Thukela River. The discounted cash flows indicated that in the long term, it would thus be cheaper to build the Thukela Transfer Scheme from the start. This however needs to be revisited to determine if such a scheme would be more feasible now or in future.

It will be determined if the ACRU model set up for the St Lucia Alternatives Study can be utilised to evaluate the yield of a scheme/s from the Mfolozi River.

d. Groundwater

A desktop level geohydrological assessment will be undertaken. A database would be prepared for the production of GIS maps (ArcGIS). The relevant tasks would include:

- Identification of any existing contamination sources, including landfill sites, graveyards, sewage or package treatment works, waste water treatment works etc.;
- Obtaining available geohydrological data from the regional DWS offices, including registered and licensed borehole data;
- A desktop study of the study area, to identify any mapped geological structures contained on Geomeasure's in-house database, as well as the identification of possible geological lineaments from available aerial photography which could represent preferential flow paths;
- Preparation of a reporting contribution detailing the findings of the desktop groundwater study.

e. Re-use of water

The City of uMhlathuze applies very limited treatment of wastewater before discharge into the sea. The two sea-outfall pipelines are owned and operated by Mhlathuze Water. The total volume of discharge through the sea-outfall system is estimated to be 11.5 million m^3/a, which may present an opportunity for re-use, although the quality may pose a challenge. There is potential for reuse of the treated effluent from the Mondi Richards Bay waste water treatment works, in addition to the effluent from the town, particularly by industries such as Foskor, Bayside and Hillside Aluminium, for cooling purposes. The Mondi Richards Bay plant is capable of treating 20 million m^3 of effluent per annum. Reuse of treated effluent would require treatment to a tertiary level, if it is to be used by various users in the Richards Bay area. A desktop evaluation will be made of reuse opportunities and the characteristics and costs of the required reuse facilities will be described, taking previous investigations into account.

f. Desalination of sea water

Desalination is regarded as the eventual source of water for coastal cities and towns. A desktop evaluation will be undertaken to consider the possible locations for a seawater desalination plant, the scope of the required desalination, storage and distribution infrastructure and intake/outfall requirements. Aspects to be considered include energy supply, environmental impacts and potential co-location with power plants, wastewater treatment plants and other facilities with water intake or outfall structures. It is expected that the location of the harbour may provide an opportunity to limit costs.

g. Potential water reallocation

DWS is busy finalising the water allocation schedule following the compulsory licensing process followed. Allocations to especially irrigation will be significantly reduced. Potential reallocation, albeit now regarded as very limited will be considered in light of the ongoing process of water reallocation. The study team will liaise closely with the DWS Regional Office in this regard.

h. Improvement of operational efficiency

It may be prudent to consider operational aspects that could be addressed, that could lead to the saving of water.

2.5.2 Documentation of interventions

The salient features of the various interventions will be documented in a standard format. Two to three pages of summary data per intervention, in a standard format, will be written, containing at least the following information:

- Short description of the intervention;
- Locality map, where relevant;
- Savings or yields (with implementation of the Reserve);
- Financial costs (capital and operating costs and URVs);
- Potential socio-economic and ecological constraints/impacts;
- Development timeframes.

2.5.3 Interventions Workshop

A technical interventions workshop will be arranged, to be attended by the relevant DWS staff, Mhlathuze Water, uThungulu District Municipality, uMhlathuze Local Municipality, Mondi, RBM, Tronox, Foskor, BHP Billiton and other key water users or stakeholders, where the interventions will reviewed. The study team will prepare and disseminate informative documentation before the workshop to aid the decision-making.

2.5.4 Reporting

The suite of interventions will be described in a supporting report.

2.6 Water Development Scenarios

2.6.1 Scenario planning

A scenario planning evaluation will be done for a pre-agreed range of planning scenarios, using the Water Resource Planning Model, to identify the most favourable interventions or groups of interventions that could be implemented to meet the potential supply shortfalls for the various water requirement scenarios. No significant changes to the Planning Model have been allowed for in this proposal, or in the associated costing. A short starter document will be written on the scenario planning evaluation.

Key DWS national and regional staff and potentially stakeholders from Mhlathuze Water, the City of uMhlathuze Municipality and other key stakeholders, along with the study team, will attend a technical workshop to evaluate and agree on the most favourable interventions and actions. Additional scenarios that are identified at the workshop would be evaluated and included after the workshop.

Should it be needed, the study team can make use of the Reconciliation Planning Support Tool for scenario planning presentation. The Tool offers significant flexibility, and is especially useful in a workshopping environment.

Possible actions (e.g. feasibility studies) and responsibilities will be identified at the Scenario Planning Workshop, while timing for such actions will be discussed. Following the workshop a Draft Action Plan would be documented and circulated for comment and refinement.

2.6.2 Reporting

The scenario planning and associated recommendations will be documented as a chapter of the Reconciliation Strategy Report.

2.7 Reconciliation Strategy Report

2.7.1 Strategy formulation

Following the water balance scenario development and evaluation, a set of interventions will be recommended for implementation or further study. Selection processes followed will be documented and supporting activities or actions will be described. Other issues such as e.g. the efficient operation of the system will be addressed and documented. An Action Plan will be incorporated, which details implementation actions, relevant responsible organisations and timelines.

Monitoring needs will be identified, in order to effectively implement the interventions identified in the Reconciliation Strategy, as well as for relevant information management. This will include the comparison of projected water use (short and long term) with actual use, compliance monitoring, actual water availability, scheme operation and budgeting for water efficiency implementation.

2.7.2 Strategy Report

Planning of the content of this report will be done early on to ensure that the various findings can be seamlessly integrated. The Reconciliation Strategy Report will be compiled, incorporating the various chapters already written. Additional strategy needs will be identified and incorporated. A layman-friendly Executive Summary will be included.

2.8 Environmental Considerations

2.8.1 Resource classification review

The approach followed will be to consider the gaps in the available information and the need for determination of the environmental flow requirements and the classification of the water resource. Extensive work has already been done to determine the Ecological Reserve for the Mhlatuze River, but the classification of the resource that was done was not in keeping with the published Water Resources Classification System (DWS, 2006). It is further noted that DWS is presently undertaking a full Classification which will include a revision of the Reserve for the Mhlatuze – but this contract is “on ice” and so it will not be able to provide the information required.

This project will undertake to establish the situation with regard to the above as follows:

- Knowledge of the ecological condition of the Mhlatuze River will be assessed particularly in terms of its suitability for the implementation of RDM policy.
- The Reserve determination referred to in the ToR will be reviewed, to assess its fitness in relation to more recent Reserves that have been done. Gaps in the Reserve information will be described.

- The information needed to undertake the Water Resources Classification and to determine the Management Class of the Mhlatuze River will be reviewed in relation to the information that already exists and information that will be collected in the execution in other parts of this project. Gaps in this information will be described.
- Working with the RDM Directorate, the need for the refinement of the classification and Reserve will be assessed.
- The necessary work that needs to be done to reach a desired Management Class will be described in a short report.
- This sub-task will focus on the Mhlatuze River (not the other systems that feed Richards Bay), particularly that section of the Mhlatuze River below Goedertrouw Dam. The Reserves of wetlands, groundwater and coastal lakes will not be addressed.

2.9 Stakeholder Participation and Co-ordination

In order to increase the stakeholder acceptance of the process and its outcomes, opportunities for stakeholder comment and engagement should be provided. This will be achieved by means of engagement at stakeholder meetings and potentially providing newsletters.

The focus of this task will be on liaison with the Mhlathuze Catchment Management Forum, and keeping them informed on the study and on progress. The study team will be responsible for providing technical input and responses to stakeholder enquiries as necessary.

Provision has been made for progress presentations at two to three meetings of the Mhlathuze Catchment Management Forum, at least:

- At the commencement of the Development of the Reconciliation Strategy, to present the study and process to stakeholders;
- Following the completion of the Draft Reconciliation Strategy, to present the Strategy and recommendations, and to invite comment on recommendations and on strategy implementation.

In addition the Forum will be kept informed of progress between presentations.

Provisional allowance has been made for a newsletter to be compiled and distributed towards the end of the study. Should this be required, the study team would draft the content, ensuring review and updating. It has been assumed that the DWS Regional Office will make the required copies or arrange printing and will distribute the newsletter if needed.

A chapter will be compiled on the stakeholder participation process followed, including material developed during the strategy compilation. This will provide a record of the stakeholder process followed.

3 Study administration

3.1 Client

The Client is the DWS. Mr Niel van Wyk will be the Client's Representative and the study will be managed by Ms Zimkitha Peteni-Kave.

3.2 Study management

The success of a project of this nature is dependent on sound technical input and proper project management and financial control. Aurecon has approved quality management systems in place to run its projects. The study team will provide advice and make recommendations and the Client, with support from key stakeholders will make major decisions. Approval for such decisions will be obtained through the Client's nominated representative. In summary, the following tasks will be undertaken under project management:

- Co-ordination of technical aspects, issuing of progress reports, budgets, and other administrative matters, including management and other intermediate meetings;
- Ensuring review of specialist outputs, and reviewing of draft reports; and
- Team meetings to monitor progress and to provide guidance.
- Budget preparation, monitoring and other administrative matters;
- Making all arrangements and keeping minutes of study meetings;
- Preparing a final study presentation which DWS can present to their Management.

3.3 Stakeholder Management Meetings

A Stakeholder Management Committee, chaired by Mr Niel van Wyk of DWS, will provide strategic guidance to the management of the Study. These meetings will be held in Richard's Bay at approximately three-monthly intervals. Progress and expenditure will be reported and monitored against programme and budget. These meetings will offer opportunities to discuss and clarify issues that may arise and allow for the issuing of supplementary brief directives if necessary.

These meetings would be held back to back with study technical workshops, as well as focussed technical or other meetings, where possible. Up to ten meetings have been allowed for, inclusive of the inception meeting. The Study Team will arrange these meetings, distribute agendas and minutes, and undertake other administrative-related tasks.

Besides the study team these meetings will be attended by representatives from:

- DWS: Directorate: National Water Planning (NWP, the Client);

- DWS: KZN Regional Office;
- Other relevant DWS Directorates;
- Mhlathuze Water;
- uMhlathuze Local Municipality;
- Industrial Development Zone or business presentation;
- Other key stakeholders.

The last Steering Committee meeting could potentially be used for the constitution and first meeting of the Strategy Steering Committee.

3.4 Study Team Composition

3.4.1 Team Composition

The study team is led by Aurecon South Africa (Pty) Ltd. In addition to the firms in association, a number of sub-consultants and individual specialists are utilised on specific technical tasks.

The organogram of the project team is as shown in **Figure 3.1**.

The project organogram for the study is included hereunder and shows the staff for the key positions such as the study leadership, task leadership, and reviewers:

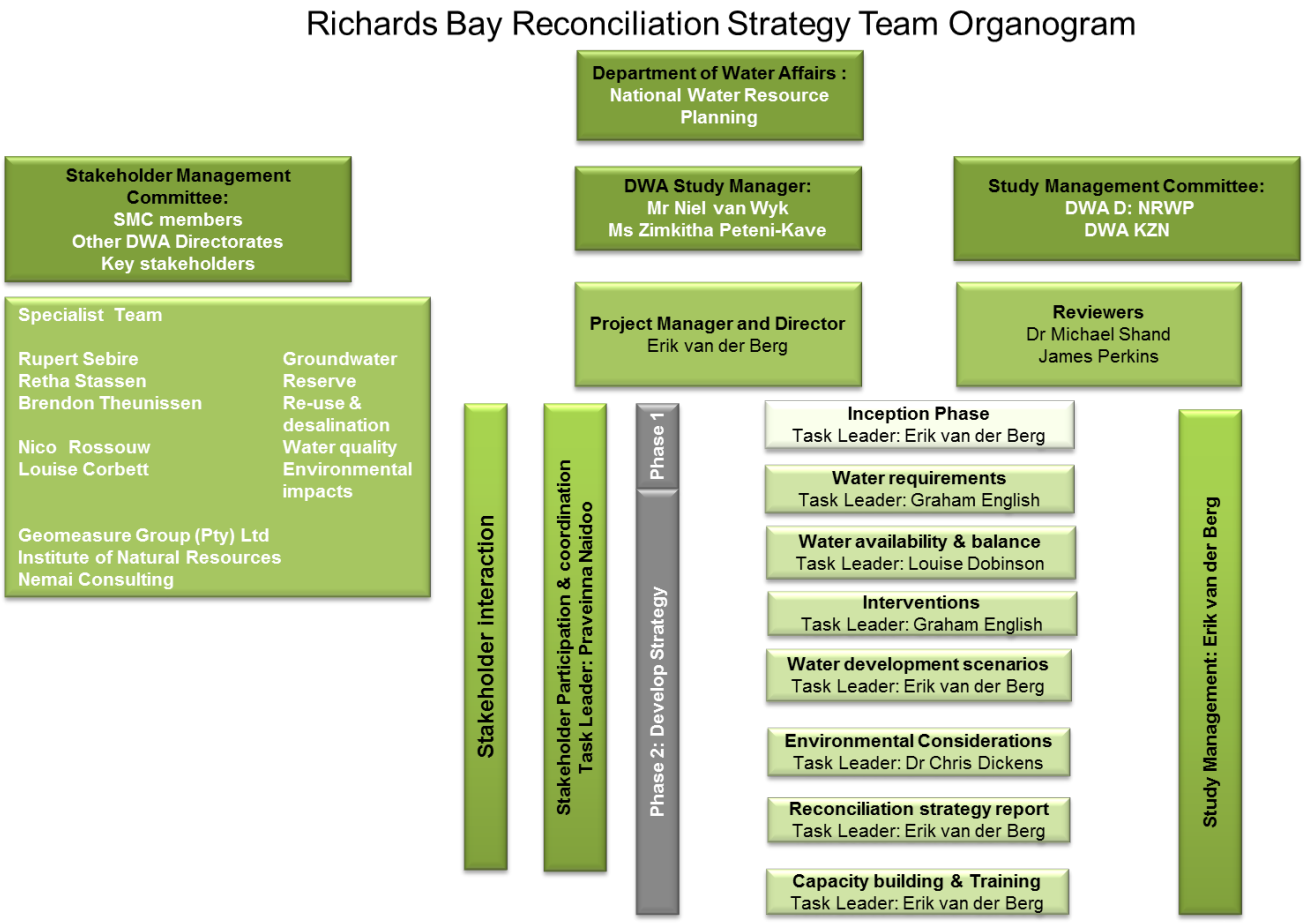

Figure 3.1 | Team Organogram

3.4.2 Study Leadership

Mr Erik van der Berg from Aurecon is the Study Leader. He will manage the Inception Phase, Water Development Scenarios and the writing of the Strategy Report.

3.4.3 Specialists and Reviewers

The Study team supports the concept of peer review, which should take place, not only at the end of the technical evaluation, but regularly throughout the study, to be able to guide the study team. Dr Mike Shand will provide strategic input, regarding interventions and review deliverables, as needed. James Perkins understands the catchment issues very well and will, inter-alia provide strategic contributions.

The following specialists and reviewers will be utilised as required, as shown in **Table 3.1**:

Table 3.1 | Specialists and Reviewers

Specialists/Reviewers
Dr Mike Shand (Aurecon): Infrastructure Reviewer
James Perkins (Aurecon): Water Resources Specialist
Nico Rossouw (Aurecon): Water Quality Specialist
Brendon Theunissen (Aurecon): Re-use and desalination
Ms Louise Corbett: (Aurecon): Environmental

3.4.4 Task Leadership

The Task Leaders will manage the various tasks. They are responsible for directing and co-ordinating the personnel working on each task, as well as ensuring technical correctness and applicability. They will ensure that each task is completed within budget and time, to acceptable standards. Their responsibility is also to provide timeous and adequate warning of any problems encountered, which can either delay the study or result in budget overruns. The Task Leaders are listed in **Table 3.2**.

Table 3.2 | Task Leaders

Task Leaders
Graham English: (Aurecon) Water requirements and Interventions
Ms Louise Dobinson (Aurecon): Water availability and balance
Dr Chris Dickens (INR): Environmental considerations
Ms Manogrie Chetty (Nemai): Stakeholder participation and co-ordination

3.4.5 Deliverables

3.4.5.1 Reports

The deliverables of the Study will include the Inception Report and typically a report per technical task. Some specialists are expected to provide loose-standing reports. Hard copies of reports will be provided as prescribed in the required format and a number of CDs containing reports in pdf format.

Envisaged stand-alone reports to be produced for the Study include:

- Inception;
- Water requirements;
- Interventions;
- Scenario evaluation;
- Reconciliation Strategy; and
- Resource Classification of the Mhlatuze River Review (short report).

3.4.5.2 Other deliverables

Other envisaged study deliverables include:

- Progress Reports and presentation material;
- Cash flow projections and financial reports;
- Newsletters and press release (if required);
- Minutes of meetings;
- GIS mapping;
- Other supporting data;
- Final presentation in PowerPoint.

3.5 Capacity Building and Training

Building capacity of HDIs in the fields of water resource planning and development, and environmental management, is viewed as an integral part of this study. Capacity building entails giving HDIs the requisite practical exposure and background training to be able to participate meaningfully in the study, and to enhance their capabilities.

Capacity building and training will be done for designated interns and/or technicians of DWS KwaZulu-Natal Regional Office or other relevant organisations within the scope of compiling reconciliation strategies for Richard's Bay and surrounding towns.

Training in the following aspects of compiling reconciliation strategies for Richard's Bay and surrounding towns is envisaged:

- Overview of reconciliation strategies, with examples;
- Focus on the Richards Bay Reconciliation Strategy;
- Water requirements methodology (aligned with the water requirements workshop);
- Water availability: approach and interpretation of results;
- Identification and evaluation of demand-side and supply-side interventions: range of options, technical aspects, environmental aspects and costing (aligned with the interventions workshop);
- The reconciliation approach and water balance scenarios (aligned with the scenarios workshop); and
- Stakeholder participation and the value of the public process.

Training would take the form of training sessions to be conducted before study milestones. An example is e.g. the envisaged Water Requirements Workshop. An afternoon training session the day before the workshop will entail working through the training material with the participants, with the aid of a presentation and examples. Should they then attend the workshop the following day, it would be very valuable for them to understand the process well.

The people to be trained will be identified by DWS and other key stakeholders.

3.6 Project Work Programme

The indicative programme is based on work commencing in late October 2013 and concluding in October 2015. The prescribed programme is an Inception Phase of 3 months and a Main Study of 21 months. The proposed Project Work Programme to complete all the Tasks is shown in **Figure 3.2**.

	2013		2014												2015									
STUDY TASKS	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**
1. INCEPTION PHASE																								
Assemble and assimilate information																								
Inception meeting & review of approach / deliverables	◆																							
Prepare Inception Report								■																
2. STRATEGY DEVELOPMENT PHASE																								
2.1 WATER REQUIREMENTS																								
Water use and future requirements evaluation								■																
Water requirements workshop							◆																	
2.2 WATER AVAILABILITY AND BALANCE										■														
2.3 INTERVENTIONS																								
Identify and assess interventions														■										
Interventions Workshop													◆											
2.4 WATER DEVELOPMENT SCENARIOS																								
Scenarios identification and evaluation																								
Scenarios workshop																	◆							
Finalise scenarios																		■						
2.5 RECONCILIATION STRATEGY REPORT																								
Strategy formulation incl. Draft Action Plan & Recommendations																								
Draft Strategy																					■			
Final Strategy																								■
3. ENVIRONMENTAL CONSIDERATIONS																								
Classification review												■												
4. STAKEHOLDER PARTICIPATION																								
Ongoing stakeholder engagement																								
Newsletter (provisional)																						■		
Presentations to MCMF meetings							◆															◆		
STUDY MANAGEMENT																								
General study management and on-going support																								
Stakeholder Management Meetings				◆			◆			◆			◆			◆			◆		◆			◆

◆ Meetings or workshops ■ Deliverables

Figure 3.2 | Study Programme

4 Cost Estimate

4.1 Commercial Arrangements

The commercial arrangements for the study are the following:

4.1.1 Form of agreement

The following commercial arrangements are applicable:

- The standard DWS form of agreement is the legal binding document between the Client and Consultant;
- Costing has been provided for the required deliverables, including all related disbursements such as travel, administration, printing and distribution of all related materials as required;
- Invoices for the study will be submitted monthly;
- Payment will be required within thirty calendar days of submission.

4.1.2 Value added tax (VAT)

All fee and cost items shown in this report exclude VAT, except where otherwise indicated.

4.2 Professional Fees

A breakdown of the fees associated with each study task is presented in **Table 4.1**.

Table 4.1 | Professional Fees (excl. VAT)*

Task	Cost estimate (Rand)
Inception	R 104,892
Water requirements	R 232,219
Water availability and balance	R 92,440
Interventions	R 634,318
Water development scenarios	R 236,004
Environmental considerations	R 66,400
Reconciliation strategy report	R 144,881
Stakeholder participation and co-ordination	R 233,439
Capacity building and training	R 78,218
Project management	R 420,853
TOTAL EXCLUDING VAT	**R 2,243,664**

** (at October 2012 rates)*

4.3 Disbursements

All external invoices will be recoverable at cost. The total estimated disbursements are as listed in **Table 4.2**.

Table 4.2 | Total Disbursements Cost Estimate (excl. VAT) *

Item	Total cost
Flights	R 137,600
Travel by private vehicle	R 48,000
Car hire	R 12,500
Accommodation & subsistence	R 24,000
Miscellaneous expenses	R 10,224
Printing	R 8,550
Copying	R 4,000
Hire of overhead projector	R 3,750
Total (excl. VAT)	**R 248,624**

** (at October 2012 estimated costs)*

4.4 Sub-Consultants Fees

Table 4.3 depicts the share of the overall fees for Aurecon and the sub-consultants.

Table 4.3 | Breakdown of costs within the Study Team (excl. VAT) *

Company	Professional fees	% of total
Aurecon	R 1,981,714	88.3%
Institute of Natural Resources	R 66,400	3.0%
Nemai Consulting	R 107,700	4.8%
Geomeasure	R 87,850	3.9%
TOTAL	**R 2,243,664**	**100.0%**

** (at October 2012 rates)*

4.5 Total Study Cost

The estimated total cost of the study is shown in **Table 4.4**.

Table 4.4 | Total Cost Estimate

Item	Cost estimate (Rand)
Professional Fees	R 2,243,664
Disbursements	R 248,624
Total excluding VAT	**R 2,492,288**
VAT @ 14%	R 348,920
TOTAL INCLUDING VAT	**R 2,841,208**

** (at October 2012 rates/estimated costs)*

4.6 Cash Flow

The cashflow schedule for the study, inclusive of fees, disbursements and VAT, in accordance with the study programme, and the study commencing in November 2013, is shown in **Table 4.5**. Invoicing will be done monthly. It has been assumed that cash flow would be one month later than work undertaken.

Table 4.5 | Cash flow projection

Year	Month	Cash flow (R1000)
2013	D	67
2014	J	62
2014	F	67
2014	M	119
2014	A	161
2014	M	175
2014	J	110
2014	J	154
2014	A	169
2014	S	187
2014	O	246
2014	N	185
2014	D	185
2015	J	113
2015	F	145
2015	M	178
2015	A	140
2015	M	46
2015	J	32
2015	J	65
2015	A	89
2015	S	63
2015	O	53
2015	N	28

4.7 Human Resources and Time Schedule

The Human Resources and Time Schedule is shown in **Table 4.6**.

Table 4.6 | Human Resources and Time Schedule (excluding VAT)

Name	Firm	HDI Status	Position in Team	Person Hours	Value of Work
Erik van der Berg	Aurecon	Non-HDI	Study Leader	689	R 802,685
James Perkins	Aurecon	Non-HDI	Water resources specialist	76	R 91,200
Dr Mike Shand	Aurecon	Non-HDI	Infrastructure Reviewer	24	R 28,800
Graham English	Aurecon	Non-HDI	Task Leader: Water Requirements/Interventions	140	R 216,720
Anton Sparks	Aurecon	Non-HDI	Modelling specialist	35	R 31,785
Ms Louise Dobinson	Aurecon	HDI	Task Leader: Water Availability	342.5	R 199,205
Ms Ceri Salisbury	Aurecon	HDI	Project support engineer	1001	R 389,389
Ms Reina Zastron	Aurecon	Non-HDI	Assistant Study Manager	94	R 54,520
Brendon Theunissen	Aurecon	HDI	Re-use and desalination	8	R 9,600

Name	Firm	HDI Status	Position in Team	Person Hours	Value of Work
Joy Larsen	Aurecon	Non-HDI	Report writing support	36	R 30,773
Nico Rossouw	Aurecon	HDI	Water Quality Specialist	27	R 23,858
Ms Louise Corbett	Aurecon	Non-HDI	Environmental impacts	61	R 31,663
Ms Candice Manning	Aurecon	HDI	Environmental impacts	69	R 22,185
Ms Matty Brand	Aurecon	HDI	Reports editor & study support	32.5	R 11,262
Ms Sheena Swartz	Aurecon	HDI	GIS practitioner	67	R 30,949
Ms Cheryl Beuster	Aurecon	HDI	GIS practitioner	25.25	R 7,121
Dr Chris Dickens	INR	Non-HDI	Resource classification review	40	R 40,000
Ms Retha Stassen	INR	HDI	Reserve specialist	40	R 26,400
Ms Michele Vrdoljak	INR	HDI	Public participation	150	R 52,500
Ms Pravienna Naidoo	Nemai	HDI	Public participation	102	R 51,000
Ms Shandre Williams	Nemai	HDI	Public participation	12	R 4,200
Rupert Sebire	Nemai	Non-HDI	Groundwater	20	R 15,400
Taryn Swales	Geomeasure	HDI	Groundwater	66	R 37,950
Kent Gravelet-Blondin	Geomeasure	Non-HDI	Groundwater	60	R 34,500

4.8 Participation of historically disadvantaged individuals

The estimated HDI participation rate in the project (based on professional fees) is 42%.

Building capacity of HDIs in the fields of water resource planning and strategy development is viewed as an integral part of this study. Capacity building entails giving HDIs the requisite practical exposure and background training to be able to participate meaningfully in the study, both within the team and during interaction with Client staff and stakeholders. Transfer of skills and capacity building will happen throughout the study, as opportunities allow and according to identified needs.

In this project 2098 hours have been allocated to HDI staff, whilst 1119 hours have been allocated to non-HDI staff. HDI fees amounts to R 949,117.

4.9 Hourly rates

4.9.1 Proposed rates (October 2012)

Hourly rates (October 2012) of project personnel included in the proposal, with negotiable rates above R830/h are shown in **Table 4.7**. Note that some of the staff are not available any more.

Table 4.7 | Hourly rates (Oct 2012) of proposed project personnel above R830/h (VAT excluded)

Name	Firm	Position in Team	Rate (R/h)
Erik van der Berg	Aurecon	Study Leader	R 1,165
James Perkins	Aurecon	Water resources specialist	R 1,200
Dr Mike Shand	Aurecon	Infrastructure Reviewer	R 1,200
Anton Sparks	Aurecon	Task Leader	R 908
Duncan Shaw	Aurecon	Task Leader	R 991
Brendon Theunissen	Aurecon	Re-use and desalination	R 1,200

Name	Firm	Position in Team	Rate (R/h)
Nico Rossouw	Aurecon	Specialist/Reviewer	R 884
Ms Joy Larsen	Aurecon	Report writing support	R 855
Dr Chris Dickens	INR	Resource classification review	R 1,000

Hourly rates (October 2012) of project personnel included in the proposal, with negotiable rates below R830/h are shown in **Table 4.8**. Note that some of these staff are not available any more.

Table 4.8 | Hourly rates (Oct 2012) of proposed project personnel below R830/h (VAT excluded)

Name	Firm	Position in Team	Rate (R/h)
Dr James Cullis	Aurecon	Climate change	818.00
Ms Louise Dobinson	Aurecon	System modelling	582.00
Ms Louise Corbett	Aurecon	Environmental	520.00
Ms Candice Manning	Aurecon	Environmental support	322.00
Ms Cheryl Beuster	Aurecon	GIS	282.00
Ms Michele Vrdoljak	Nemai	Stakeholder participation	350.00
Ms Pravienna Naidoo	Nemai	Stakeholder participation	500.00
Ms Shandre Williams	Nemai	Stakeholder participation	350.00
Rupert Sebire	Geomeasure	Groundwater	770.00
Ms Taryn Swales	Geomeasure	Groundwater	575.00
Kent Gravelet-Blondin	Geomeasure	Groundwater	575.00

4.9.2 Proposed rates of additional staff

Hourly rates (April 2014) of additional proposed project personnel, with rates above R830/h, are shown in **Table 4.9.**

Table 4.9 | Hourly rates (Apr 2014) of project personnel above R830/h (VAT excluded)

Name	Firm	Position in Team	17.5c Rate (R/h)
Graham English	Aurecon	Task Leader	R 1,548.00 capped

Hourly rates (April 2014) of additional proposed project personnel, with negotiable rates below R830/h, are shown in **Table 4.10**.

Table 4.10 | Hourly rates (Apr 2014) of project personnel below R830/h (VAT excluded)

Name	Firm	Position in Team	15c Rate (R/h)
Ms Reina Zastron	Aurecon	Assistant Study Manager	R 580.00
Ms Ceridwen Salisbury	Aurecon	Project Engineer	R 389.00 capped
Ms Matty Brand	Aurecon	Reports editor	R 346.52
Ms Sheena Swartz	Aurecon	GIS practitioner	R 461.93
Ms Rheta Stassen	INR	Specialist Reserve Requirements	R 660.00

Appendix A
Study Reference Documents

APPENDIX A | STUDY REFERENCE DOCUMENTS

	Document title	Client	Author	Date
1	Development of a Reconciliation Strategy for All Towns in the Eastern Region: First Order Reconciliation Strategy for the Richards Bay WSSA	DWA	Water for Africa, with Aurecon and Water Geoscience	Jun 2011
2	Mhlathuze Water Availability Assessment Study	DWA	WRP	Nov 2009
3	Integrated Water Services Master Planning – Final Planning Report	Mhlatuze Water	Bigen Africa	Jun 2010
4	Water Reconciliation Strategy for the KwaZulu-Natal Coastal Metropolitan Areas: Executive Summary	DWA	WRP	Nov 2009
5	uMhlathuze IDP 2012-2017 + 2013/14 Review	COuM	City of uMhlathuze	
6	Mhlathuze Water – historical data 2008-2013	Mhlathuze Water	Mhlathuze Water	
7	Strategic Management Plan for the Reduction of Non-Revenue Water in the City of Umhlathuze	City of uMhlathuze	City of uMhlathuze	
8	RBIDZ Development Plans	RBIDZ	RBIDZ	
9	WSSA abstraction and treatment volumes for Mzingazi, Esikhaleni and Ngwelezane TW	City of uMhlathuze	WSSA	
10	Internal Strategic Perspective: Usutu to Mhlathuze WMA	DWAF	Tlou & Matji	Mar 2004
11	Usutu to Mhlathuze WMA: Overview of Water Resources Availability and Utilisation	DWAF	BKS	Sep 2003
12	Mhlathuze Catchment: Ecological Reserve and Monitoring Programme	DWAF	IWR	Jan 2003
13	Uthungulu District Municipality WSDP	Uthungulu DM	Aurecon (Pinetown)	2009
14	Water Allocation Plan to Guide Compulsory Licensing in the Mhlathuze Catchment - Opportunities Report	DWA	Iliso Consulting	Dec 2007
15	Water Allocation Plan to Guide Compulsory Licensing in the Mhlathuze Catchment - Regional Economy Report Final	DWA	Iliso Consulting	Dec 2007
16	Mhlathuze Catchment: Modelling Support for Licensing Scenarios Study	DWA	WRP	Dec 2012
17	First Stage Reconciliation Strategy for Middledrift WSA – Umlalazi Local Municipality	DWA	Water for Africa	Jun 2011
18	Strategic Environmental Assessment for Water Use, Mhlatuze Catchment	DWAF	DWAF	Mar 2000
19	Mhlathuze Operating Rules and Future Phasing	DWAF	BKS	Dec 2001
20	Mhlathuze River Catchment WCDM Strategy Study	DWAF	WRP	Aug 2002
21	National Water Resource Strategy		DWA	July 2012
22	Water Resources Analysis Study	Mhl. Water	Arcus Gibb	Mar 2010
23	Nsezi WTW Study Future Growth for the 2030 Planning Horizon	Mhl. Water	Nathoo Mbeyane	Apr 2010
24	Development of an Operating Rule for the Mhlathuze Weir	Mhl. Water	Royal Haskoning DHV	May 2013
25	National Water Policy Review – Water Policy		DWA	Jul 2013

	Document title	Client	Author	Date
	Positions			
26	Mhlathuze Water Annual Report 2012-2013		Mhlathuze Water	2013
27	Water Quality Planning Studies in Support of Water Quality Planning in the Mhlathuze WMA	DWA	DWA	Mar 2011
28	Summary of Available Reports, Data and Water Resource-Related Models Relating to Catchment W100	DWAF	Ninham Shand	Feb 2004
29	Thukela Mhlathuze White Paper	DWAF	DWAF	1994/5
30	Tugela transfer scheme		From Thinus Potgieter	
31	Effluent scheme			
32	Key Statistics and Information on the City of Umhlathuze		City of uMhlathuze	2011
33	uThungulu DM Population Stats 2001-2011			
34	Augmentation of Esikhawini Sewage Treatment Plant	CouM	Bigen	
35	Real Time Water Use Mhlathuze Catchment	WRC	CPH	Jul 2005
36	Esikhaleni Water Supply System	CouM		Nov 2013
37	Bulk Water Master Plan	CouM	CSIR	Feb 2014
38	City of uMhlathuze Water Consumption	CouM	CouM	2013
39	Mhlatuze Feasibility Study for reuse of effluent DRAFT	CouM	CSIR	Dec 2013
40	Revision of SDF	CouM	SiVEST Selatile Moloi	Feb 2007
41	Revision Of Umhlathuze Spatial Framework Plan: Status Quo Report	CouM	SiVEST Selatile Moloi	Feb 2007
42	uMhlathuze WSDP	CouM	CSIR	Jun 2013
43	Umkhanyakhude DM IDP Review 2013-2014	uMkh DM	uMkh DM	2013

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