



WP 10543  
REPORT NO. RDM/WMA16/00/CON/0113

# RESERVE DETERMINATION STUDIES FOR THE SELECTED SURFACE WATER, GROUNDWATER, ESTUARIES AND WETLANDS IN THE GOURITZ WATER MANAGEMENT AREA

PROJECT REPORT 1

INCEPTION REPORT

September 2013

Department of Water Affairs  
Chief Directorate: Resource Directed Measures



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## DOCUMENT INDEX

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**Reports as part of this project:**

INDEX NUMBER	REPORT NUMBER	REPORT TITLE
<b>Report Number 01</b>	RDM/WMA16/00/CON/0113	<b>Inception Report</b>
Report Number 02	RDM/WMA16/00/CON/0213	Desktop EcoClassification Report
Report Number 03, Volume 1	RDM/WMA16/00/CON/0313, Volume 1	Delineation Report, Volume 1 (Groundwater, Estuaries and Wetlands)
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Report Number 14	RDM/WMA16/00/CON/1413	Study Closure Report

**Bold** indicates this report

## APPROVAL

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## REPORT SCHEDULE

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<b>Version</b>	<b>Date</b>
First draft	September 2013
Second draft	February 2014
Final report	April 2014

## EXECUTIVE SUMMARY

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### **Background**

The DWA, through the Chief Directorate: Resource Directed Measures (CD: RDM), subsequently decided via Project No WP 10543, titled *Reserve Determination Studies for Selected Surface Water, Groundwater, Estuaries and Wetlands in the Gouritz Catchment* to undertake Reserve determination studies for the respective components of the water resources in the Gouritz Water Management Area (WMA). The resultant higher levels of confidence in the Reserve determination results will assist the DWA to make informed decisions regarding the authorisation of future water use and the magnitude of the impacts of the proposed developments. This study will hereafter be referred to as the *Gouritz Reserve Determination Study (GRDS)*.

The requirement for detailed Reserve studies in the Gouritz WMA became apparent for the following reasons (DWA, 2011):

- Various license applications in the area
- The conservation status of various resources in the catchment and impacts on them
- Development pressures and associated impacts on the availability of water

The resultant higher levels of confidence in Reserve results will assist the DWA in making informed decisions regarding the authorisation of these developments.

The GRDS is focused on the Gouritz WMA, and is situated on the south coast of the Western Cape with a surface area of approximately 530 000 km<sup>2</sup>. It consists of primary drainage region J (approximately 90 quaternary catchments) and part of primary drainage regions K (K1 to K7) and H (H8 to H10). All of these are clearly depicted on Figure 1.1. The WMA consists of five sub-areas, i.e. the (1) Groot River (secondary catchment J1), (2) the Gamka River (secondary catchment J2), (3) the Olifants River (secondary catchment J3), (4) the Western Coastal Rivers (secondary catchments H8, H9 and J4) and (5) the Eastern Coastal Rivers (Secondary Catchments K1, K2, K3, K4, K5, K6 and K7). The WMA therefore consists of approximately 100-105 quaternary catchments.

It is important to note that it comprises a large dry inland area that is comprised of the Karoo and Little Karoo, and a smaller humid strip of land along the coastal belt. The **main rivers** are the Gouritz and its major tributaries, the Buffels, Touws, Groot, Gamka, Olifants and Kammanassie rivers, with smaller coastal rivers draining the coastal belt. All the inland rivers drain via the Gouritz into the Indian Ocean.

## **Structure of the study**

The proposed study has been structured into two main components, i.e. Project Management and Technical (Reserve determination studies). For the purposes of this study these will hereafter be referred to as the Project Management Component and the Technical Component.

The study is divided into three phases, namely:

- Phase 1: Study Initiation and Design
- Phase 2: Study Implementation
- Phase 3: Study Termination

## **Roles and responsibilities**

AECOM SA (Pty) Ltd (AECOM), formerly called BKS (Pty) Ltd at tender stage, were initially appointed with Londoloza Environmental and Conservation Management Solutions cc (Londoloza), as the Professional Service Provider (PSP) responsible for the Project Management Component of the GRDS. However, Mr Eugene Matthews resigned from Londoloza and Bea Whittaker from Milkwood Communications will now assist AECOM as the Public Communications task leader in the Project Management Component. The Project Management Component assignment is to assist the DWA CD: RDM with the coordination of all the activities required to achieve the objectives of the Reserve determination study.

Scherman, Colloty and Associates (SC&A) was appointed as the lead consultant responsible for the Technical PSP to undertake the Reserve determination studies for the various water resource components. Dr Patsy Scherman was assigned to be the Technical Study Team Leader for this component.

Several Specialist Advisors / External Reviewers are included as part of the Project Management PSP team to provide technical support. These include:

- Dr A Paterson - Specialist Advisor on estuaries
- GEOSS (Mr J Conrad) - Specialist Advisor on groundwater
- Southern Waters Ecological Research (Dr C Brown) - Specialist Advisor on rivers
- Freshwater Consulting Group (Dr G Ractliffe) - Specialist Advisor on wetlands
- AECOM (Mr J Rossouw) - Specialist Advisor on Yield Modelling and Systems Analysis

*The Technical Component is aimed at the actual co-ordination and execution of the Reserve determination tasks to be undertaken for each water resource component for each sub-system.*

*A Project Management Committee (PMC) will be responsible for the effective and efficient formulation, execution and conclusion of the project. It will also represent the project in interactions with other projects and organisations. The PMC will consist predominantly of representatives of the DWA, along with members of the Project Management PSP and the Project Leader of the Technical Component. Technical Task Leaders and Specialist Advisors may be required to attend specific PMC meetings as the study progresses.*

### **Objectives of the study**

*This study will focus on the preliminary Reserve determination and strives to be a comprehensive and integrated study of selected surface (rivers, estuaries and wetlands) and groundwater resources in the Gouritz WMA. The Reserve process is a scenario-based approach and thus the overall outcome of the GRDS is envisaged as a series of Reserve scenarios that will be provided to the DWA with the associated ecological and socio-economic consequences at the end of the study.*

*This will enable the DWA to make informed decisions regarding the management of selected water resources. This is done in terms of the authorisation of future water use and the magnitude of the impacts of the proposed developments. Once a particular Ecological Category (EC) has been selected by the DWA, Ecological Specifications (EcoSpecs) can be drafted. These provide input to the Resource Quality Objectives (RQOs) and are associated with the relevant Ecological Category (EC).*

*The resultant higher levels of confidence in the Reserve determination results will assist the DWA to make informed decisions regarding the authorisation of future water use and the magnitude of the impacts of the proposed developments.*

### **Overall Study Programme**

*The work programme of the Project Management Component is to a large extent determined by the schedule of activities of the Technical Component. The Technical Component has progressed to a point where the work programme is known with relative confidence. Based on this, a Draft Integrated Master Study Programme has been compiled. Provisional dates for Project Management Committee (PMC) and Project Steering Committee (PSC) meetings are included in the programme. The GRDS is envisaged to last for about 24 months. The integrated Master Study Programme is still to be finalized, but the different study phases are not entirely independent and will overlap with each other, depending on the different technical approaches. At present the work programme of each study stage in the overall assignment is anticipated as:*

*Initiation and Design : June 2013 – February 2014*

*Implementation : December 2013 – January 2015*

*Termination : February 2015 – May 2015*

### **Project Monitoring and Audit System**

*The project will be managed along strict project control guidelines. These will be based on the concept of “critical path management” which will ensure that the project is managed in order to achieve all objectives on time, within budget and as per the stipulated briefs. The general approach adopted by the Project Management Team (PMT) is to set standard protocols and by monitoring progress to ensure that required deliverables are provided. This contribution will, however, not detract from the responsibility of the Technical Team to themselves manage the activities within their assignment.*

*Regular communication between the PMT and the Technical Team will provide for regular feedback to the DWA. Status and Progress Reports will provide the basis for discussions at PMC meetings. Issues that need discussion and direction will be referred to potential special meetings with the DWA. The PMT will keep close contact with the Technical Team with the aim to regularly monitor the Technical Component.*

*A provisional management framework for monitoring and control purposes is provided below. This framework provides information related to communication arrangements, change control, reporting, documentation control, invoicing procedures, timeframes of meetings/workshops, deliverables and milestones, etc.*

*A set of clear and concise briefs detailing their programme of work, budget and schedule of deliverables will be sent out by the Technical Study Leader to all Technical Task Leaders once the Inception Report has been finalised. Performance reporting by the Technical Team will be done through performance feedback based on Status and Progress Reports to be submitted to the PMT on a monthly basis and one week prior to PMC meetings, respectively. Nine PMC meetings are set at specific project milestones with the aim of the presentation of deliverables. Risk identification and control measures are to be defined and submitted to the PMT.*

### **Quality and Financial Control**

*If the PMT, or any Specialist Advisor delegated by the PMT, or the responsible Technical Team identifies an area of specific action or procedure impacting on the quality of work by the Technical Team or its sub-consultant(s)/specialist(s), the item, activity, procedure, etc. is to be brought to the attention of the PMT and the DWA CD: RDM.*

*The Technical Team and sub-consultant/specialist need to discuss with the PMT any corrective action necessary. A date by which corrective measures will be completed for re-inspection purposes needs to be committed. The Technical Team Study Leader needs to sign off an approval thereof and inform the PMT.*

*Since the GRDS is envisaged to be completed in about 24 months, various meetings, including nine PMC meetings, integration meetings and workshops are envisaged. In addition, general discussions will continue on a regular basis. The control of all the discussions and decisions taken is therefore of utmost importance. In order to do so, separate Decision and Issue/Action Registers are proposed to be maintained by the PMT in terms of the overall project management function. In support of populating such registers, it is proposed that the Technical Team progress reports to be submitted prior to each PMC meeting include such control registers.*

*The Technical Team are to submit monthly invoices to the PMT. Invoicing for work done in a specific month is to be done at the end of the same month to reach the PMT not later than the 7<sup>th</sup> of the following month. Invoices received by the PMT will be checked for confirmation that the costs incurred are realistic in relation to the work done and variances are identified and explained, as well as corrected, if necessary. In addition, all claims for disbursements will be verified against proof provided. Invoices will then be forwarded to the DWA CD: RDM Project Administrator/Coordinator for detailed checking, certification and payment. The PMT will maintain detailed records of expenditure, which will be reported on at PMC meetings.*

### **Budgetary Aspects**

*The total GRDS budget as per the Tender Proposal, excluding approval of variation orders and time-based fees' escalation, comprises of the following (VAT inclusive):*

•	<i>Project Management Component:</i>	<i>R3 689 427.60</i>
•	<i>Technical Component:</i>	<i>R8 698 815.60</i>
		<hr/>
	<i>Total</i>	<i>R12 388 731.20</i>

*As stated before the GRDS duration is 24 months and will cover the financial periods 2013/14 and 2014/15.*

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## ACRONYMS AND ABBREVIATIONS

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3D	Three-Dimensional
AECOM	AECOM SA (Pty)Ltd
AGES	Africa Geo-Environmental Services
BBM	Building Block Methodology
BHN	Basic Human Need
BHNR	Basic Human Needs Reserve
BID	Background Information Document
BOCMA	Breede Overberg Catchment Management Agency
CD: RDM	Chief Directorate: Resource Directed Measures
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DAP	Diatom Assessment Protocol
DAWC	Department of Agriculture Western Cape
DEADP	Department of Environmental Affairs and Development Planning (Western Cape)
D:GWRR	Directorate: Groundwater Reserve Requirements
D: RR	Directorate: Reserve Requirements
D: RQS	Directorate: Resource Quality Services
D:SWRR	Directorate: Surface Water Reserve Requirements
DWA	Department of Water Affairs
EAPs	Environmental Assessment Practitioners
EC	Ecological Category
EcoSpecs	Ecological Specifications
EHI	Estuarine Health Index
EH	Ecological Importance
EI	Ecological Importance
EIS	Ecological Importance and Sensitivity
ERM	Ecological Reserve Methodology
EWR	Ecological Water Requirement
FEPA	Freshwater Ecosystem Priority Areas
FRAI	Fish Response Assessment Index
FSR	Flow Stressor Response
GAI	Geomorphological Driver Assessment Index
GDP	Gross Domestic Product
GEOSS	Geohydrological and Spatial Solutions International (Pty) Ltd
GIS	Geographic Information Systems
GRDS	Gouritz Reserve Determination Study
GRUs	Groundwater Resource Units
GYMR	Groundwater Yield Model for the Reserve
HDI	Historically Disadvantaged Individual
HGM	Hydrogeomorphic
HSFR	Habitat Flow Stressor Response
IHI	Instream Habitat Integrity
ISP	Internal Strategic Perspective
IWR	Institute for Water Research
Londoloza	Londoloza Environmental and Conservation Management Solutions

MIRAI	Macro invertebrate Response Assessment Index
MIS	Management Information System
MRUs	Management Resource Units
NFEPA	National Freshwater Ecosystem Priority Areas
NGA	National Groundwater Archive
NGDB	National Groundwater Database
NMMU	Nelson Mandela Metropolitan University
NWA	National Water Act (Act No 36 of 1998)
ORDS	Outeniqua Reserve Determination Study
PAI	Physico-chemical Driver Assessment Index
PES	Present Ecological State
PMC	Project Management Committee
PMT	Project Management Team
PSC	Project Steering Committee
PSP	Professional Service Provider
R	Rand
RC	Reference Condition
RDRM	Revised Desktop Reserve Model
REC	Recommended Ecological Category
RU	Resource Unit
R/hr	Rand per hour
RQO	Resource Quality Objective
RQS	Resource Quality Service
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks Board
SC&A	Scherman Colloty & Associates cc
SCI	Socio Cultural Importance
SPATSIM	Spatial and Time Series Information Modelling
SPSC	Standard Professional Services Contract
SWRR	Surface Water Resource Requirements
TMG	Table Mountain Group
ToR	Terms of Reference
TPC	Threshold of Potential Concern
VAT	Value Added Tax
VEGRAI	Vegetation Response Assessment Index
WCS	Wetland Consulting Services
WE	Water Ecosystems
WMA	Water Management Area
WRC	Water Research Commission
WReMP	Water Resources Modelling Platform
WRCS	Water Resource Classification System
WRYM	Water Resources Yield Model
WR2000	Surface Water Resources of South Africa (2000)
WFA	Water for Africa
WRUI	Water Resource Use Importance
WUL	Water Use License
WULA	Water Use Licence Application

## 1 INTRODUCTION

### 1.1 Background to study

The National Water Act (Act No 36 of 1998) (NWA) is based on the principle that National Government, through the Department of Water Affairs (DWA), has overall responsibility for and authority over water resource management for the benefit of the public, without affecting the functioning of the natural environment and in order to ensure that the environment will be able to deliver the goods and services to society in a sustainable manner. In order to achieve this objective, the NWA (Section 3) provides for the protection of and sustainable use of water resources, including groundwater resources, through the determination and implementation of the Reserve for these resources.

The NWA Section 3 requires that the Reserve be determined for water resources, i.e. the quantity, quality and reliability of water needed to sustain both human use and aquatic ecosystems, so as to meet the requirements for economic development without negatively impacting on the long-term integrity of ecosystems. The Reserve is one of a range of measures aimed at the ecological protection of water resources and the provision of basic human needs (i.e. in areas where people are not supplied directly from a formal water service delivery system and thus directly dependent on the resource according to Schedule 1 of the NWA). The Chief Directorate: Resources Directed Measures (CD: RDM) within DWA is tasked with the responsibility of ensuring that the Reserve is considered before water allocation and licensing can proceed.

The Reserve is one of a range of strategies aimed at the protection of aquatic ecosystems and a measure to calculate the water required to remain in the system to provide for basic human needs. **Reserve requirements have priority over any other water use in terms of the Act, and the Reserve has to, for example, be determined before licensing applications can be processed, particularly in water-stressed catchments.**

The need to undertake detailed Reserve determination studies for various priority water resources in the Gouritz Water Management Area (WMA) became apparent due to:

- Numerous Water Use Licence applications in the WMA;
- The conservation status of various resources in the catchment area and potential land use impacts on these resources;
- Specific development pressures in the catchment area including forestry, farming activities, alien vegetation, poorly functioning waste water treatment works etc., which lead to impacts on both water quality and the availability of water;
- Associated impacts of these developments on the availability of water; and
- Gaps that were identified in the completed Outeniqua Reserve Determination Study (ORDS).

The DWA, through the Chief Directorate: Resource Directed Measures (CD: RDM), subsequently commissioned, via Project WP 10543, the **Reserve Determination Studies for Selected Surface Water, Groundwater, Estuaries and Wetlands in the Gouritz WMA** to undertake preliminary Reserve determinations for the selected rivers, wetlands, estuaries and groundwater resources in the Gouritz WMA on various levels of detail. This study will hereafter be referred to as the **Gouritz Reserve Determination Study** (GRDS).

## 1.2 Purpose of the study

This study will focus on the preliminary Reserve determination and strives to be a comprehensive and integrated study of selected surface and groundwater resources, estuaries and wetlands in the Gouritz WMA. Note that the term “preliminary” merely refers to the Reserve before formalization through the Water Resource Classification System (WRCS) process. The Reserve process is a scenario-based approach and thus the overall outcome of the GRDS is envisaged as a series of Reserve scenarios that will be provided to the DWA with the associated ecological and socio-economic consequences at the end of the study. Proposed trade-offs related to different systems in terms of development and protection will be provided to aid interms of future development priority areas vs. protection areas.

This will enable the DWA to make informed decisions regarding the management of selected water resources. This is done in terms of the authorisation of future water use and the magnitude of the impacts of the proposed developments.

Once a particular Ecological Category (EC) has been selected by the DWA, Ecological Specifications (EcoSpecs) can be drafted. These provide input to the Resource Quality Objectives (RQOs) associated with the relevant Ecological Category (EC).

## 1.3 Overview of study area

The GRDS focuses on the Gouritz WMA, which falls predominantly within the Western Cape Province, with small portions in the Eastern Cape and the Northern Cape Provinces. The Gouritz WMA is the largest WMA in the Western Cape with a total surface area of approximately 53 000 km<sup>2</sup>. It consists of primary drainage region J (approximately 90 quaternary catchments) and part of primary drainage regions K (K1 to K7) and H (H8 to H0). The WMA consists of the following five sub-areas (refer to **Figure 1.1**):

- Groot River (secondary catchment J1);
- Gamka River (secondary catchment J2);
- Olifants River (secondary catchment J3);
- Western Coastal Rivers (secondary catchments H8, H9 and J4); and
- Eastern Coastal Rivers (Secondary Catchments K1, K2, K3, K4, K5, K6 and K7).

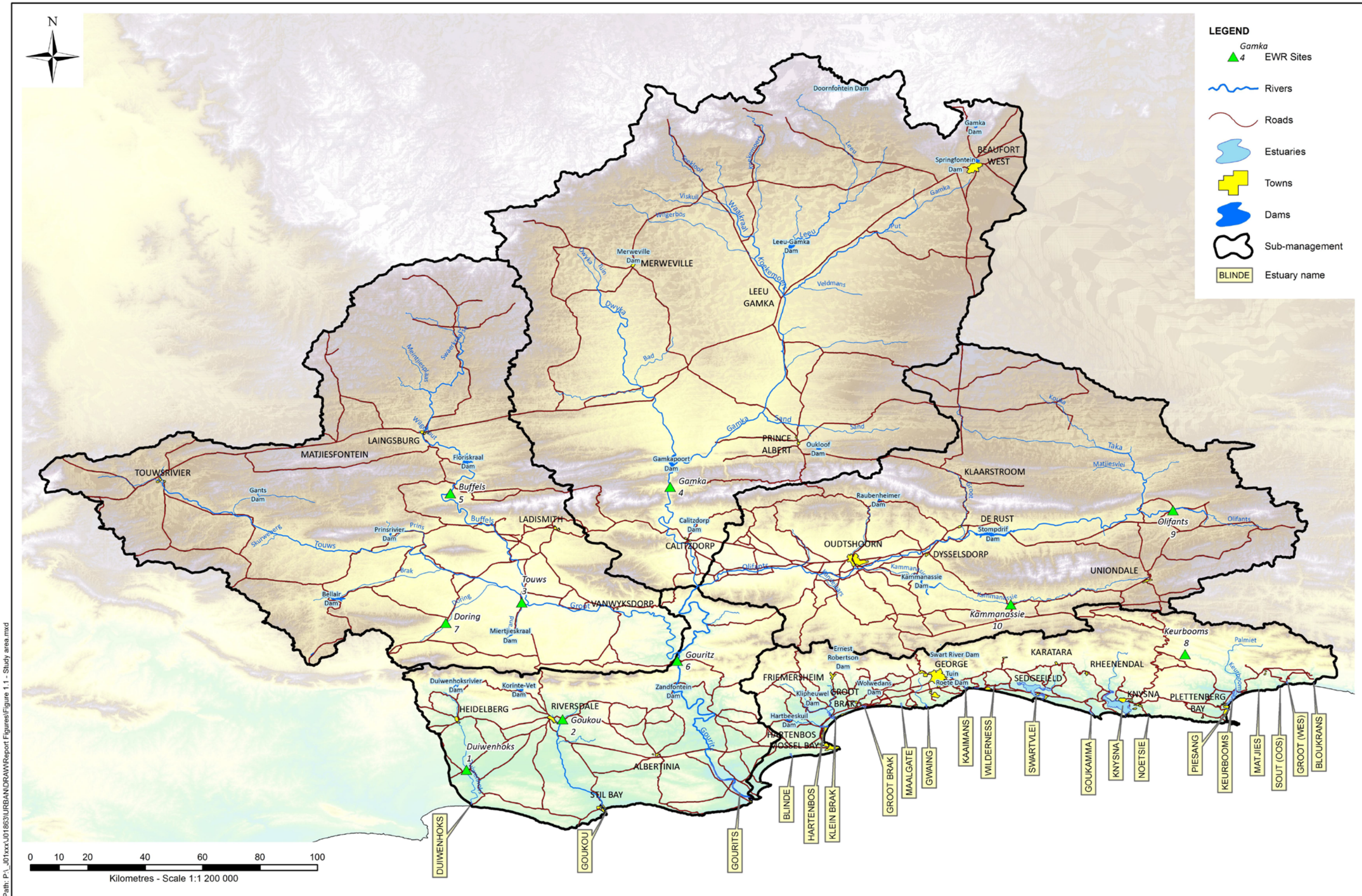


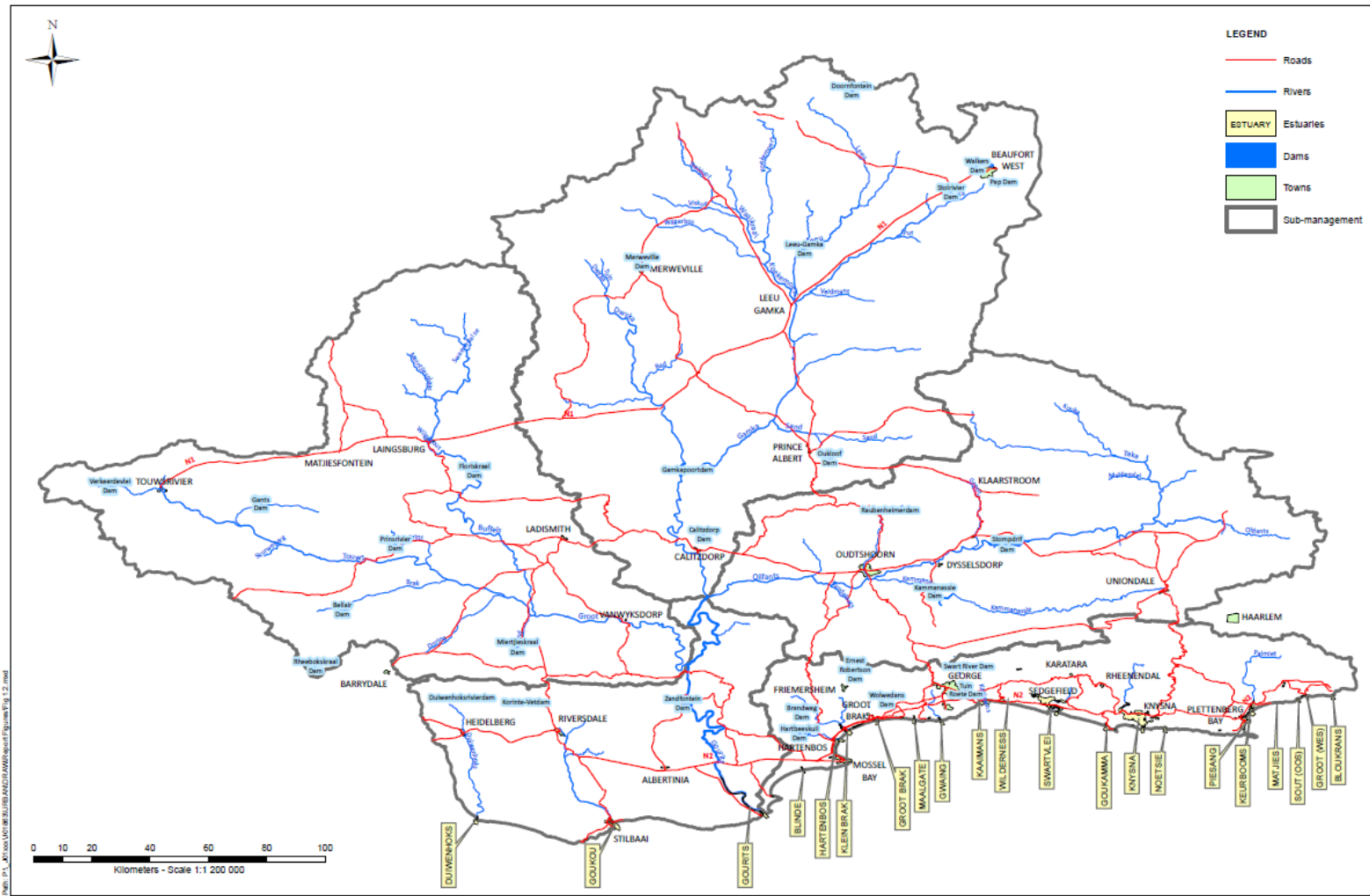
Figure 1.1 : Study Area

The Gouritz River is controlled by several dams in its tributaries, including Kammanassie, Stompdrift, Koos Raubenheimer, Leeu-Gamka, Gamkapoort and Floriskraal dams (refer to **Figure 1.2**). Several dams have been constructed on the coastal rivers, the largest of which being the Wolwedans Dam. The Duiwenhoks River Dam supplies 1.1 million m<sup>3</sup>/a to the Duiwenhoks Rural Water Supply Scheme, of which 0.7 million m<sup>3</sup>/a is transferred into the Breede WMA to supply farmers. There are no inter-basin transfers into the Gouritz WMA and approximately 70% of the available water is surface water.

The GRDS excludes the majority of the coastal catchment areas that were covered by the **Outeniqua Reserve Determination Study** (ORDS) and other Reserve studies done previously (e.g. Oudtshoorn (Olifants River and tributaries), Sout and Matjies), and therefore only covers the Groot, Gamka, Olifants and Gouritz catchment areas as indicated in **Figures 1.1** and **1.2**.

Forestry and agriculture are the two primary activities in the WMA. Most of the afforestation on the coastal belt, primarily in the Plettenberg Bay / Knysna area (K1 – 7) is indigenous forestry. Most irrigation is opportunistic and lucerne is predominantly grown. Grapes and apples are also grown in the Langkloof area with significant ostrich farming near Oudtshoorn, whilst stock-farming is primarily undertaken in the remainder of the WMA.

The coastal belt boasts extensive eco-tourism, with the WMA also having several areas that are ecologically sensitive and important. These include the upper river reaches of the Dwyka, Leeuw and Gamka Rivers in the interior and the Keurbooms River and the Knysna and South Cape Coastal system rivers, along the coast. Many of the wetland and estuary systems in the area have not been studied in detail.





 RESERVE DETERMINATION STUDIES FOR SELECTED SURFACE WATER, GROUNDWATER, ESTUARIES AND WETLANDS IN THE GOURITZ WMA
 
 WATER MANAGEMENT AREA 16:  
 LOCALITY MAP
 
FIG 1.2

Figure 1.2 : Locality Map

The study area includes 21 estuaries (refer to **Figure 1.2**). A summary of each of the systems is indicated in **Table 1.1**, which provides an indication of what level of Reserve has been determined for the relevant system previously. Depending on current and future water demands on a system, a higher level Reserve determination may be required. The importance rating / conservation status information comes from the CAPE conservation Plan and Water Resource Classification System (WRCS) Biodiversity Plan.

**Table 1.1: Status of estuaries in WMA 16 (as at 2011)**

System	Prelim RDM completed	Importance rating - protection status	PES	REC	EcoSpecs	Monitoring plans?
Duiwenhoks	-	Very important				
Goukou	-	Very important - Marine Protected Area (MPA)				
Gourits	-	Important - National priority (Partial)				
Blinde	-	Average importance				
Hartenbos	-	Important				
Klein Brak	-	Average importance				
Groot Brak	intermediate	Important	D	D	Yes	Yes
Maalgate	desktop	Average importance	B	B	No	No
Gwaing	desktop	Average importance	C	C	No	No
Kaaimans	desktop	Average importance – National priority (Full)	B	B	No	No
Touw/Wilderness	-	Very important - SANParks (Partial)				
Swartvlei	rapid	Very important - SANParks (Partial)	A/B	A	Yes	Yes
Goukamma	rapid	Important – CapeNature provincial (Full)	A/B	A	No	No
Knysna	intermediate	Very important – SANParks (Partial)	B	B	Yes	Yes
Noetsie	desktop	Average importance – Provincial priority (Full)	B	A	No	No
Piesang	-	Important – National priority (Partial)				
Keurbooms	rapid	Very important - Local reserve	A/B	A	No	Yes
Matjies	intermediate	Average importance	B	B	No	No
Sout (Oos)	intermediate	Average importance - SANParks (Full)	A	A	No	No
Groot (Wes)	-	Important - SANParks (Full)				
Bloukrans	-	Average importance - SANParks (Full)				

Groundwater is of major importance as a source of water supply in the Gouritz WMA, particularly in the drier inland region where more than half of the water used in some sub-areas is abstracted from groundwater. Groundwater is the primary source of water for rural domestic supplies and stock watering, as well as for several Karoo towns such as Beaufort West, Laingsburg, Prince Albert, etc. Most of the groundwater abstracted in the Gamka and Groot sub-areas, as well as a sizeable portion in the Olifants sub-area, is used for irrigation. Over-exploitation of groundwater occurs in the vicinity of the Leeu-Gamka Dam, with heavy utilisation of the resource in the Olifants River catchment. Little use is made of groundwater along the high rainfall coastal strip. It is therefore important to provide a holistic overview of the role of groundwater as water source in the WMA, particularly so that its role as a baseflow for Ecological Water Requirement (EWR) is explicit.

Limited verified information is available about the aquifer characteristics and the extent of inter-dependence between groundwater and surface water flows (including possible recharge by irrigation return flows). However, indications are that significant quantities of water could be abstracted from the deep fractured rock aquifers of the Table Mountain Group (TMG) geological formations in the Oudtshoorn area. These aquifers, which also extend westward to adjacent WMAs, drain directly to the ocean and have less connectivity to surface flows than the shallower aquifers.

Given the vast area covered by the Gouritz WMA, it is envisaged that groundwater holistically impact on the baseflow, i.e. contributes to it, as far as the baseflow in terms of the EWR. The equantification thereof is, however, still to be determined.

#### 1.4 Structure of the study

The GRDS is structured into two main components, namely:

- Project Management Component, and
- Technical Component (Reserve determination studies).

The scope of work of the overall study, including both the Project Management and Technical Components, is divided into three sequential phases, namely:

- Phase 1 : Study Initiation and Design;
- Phase 2 : Study Implementation; and
- Phase 3 : Study Termination.

The Inception Phase consists of the study initiation and design. Budgets are to be confirmed and all uncertainties regarding the scope of work are to be clarified during this stage.

The Study Implementation Phase comprises of the implementation of the project plan developed during the Inception Phase and the undertaking of the Technical Component(s) of the ecological Reserve determination study.

The Study Termination Phase is an administrative stage, during which the project will be finalised and completed.

The Standard Professional Services Contract (SPSC) between the DWA and the PSP stipulates a contractual project commencement date of 7 May 2013 and Contract Period of two years.

## 1.5 Purpose of this report

This document represents the overall study Inception Report and summarises the relevant scope of work, proposed methodology to undertake this work as well as an overall project programme and responsibilities.

The purpose of this document is to provide an overview of all aspects of the study and a consolidated point of reference for overall study execution. Aspects formulated in this Inception Report will serve as a benchmark from which progress will be monitored, evaluated and controlled against defined goals and performance measures. These are to be followed in order to ensure that the specified deliverables are of good quality, within the timeframe and allocated budget.

Contained and discussed in this Inception Report are information detailing :

- Objectives of the overall study;
- Change to scope of work and associated risks;
- Roles and responsibilities related to the overall study:
  - Client representatives
  - Study team(s), including changes to composition
  - Project Steering Committee;
- Defined stakeholders;
- Scope of work and approach;
- Master study programme with deliverables and milestones;
- Management framework;
- Reporting procedures and review mechanism; and
- Budgetary aspects

## 1.6 Structure of this report

The Inception Report has, for ease of reference, been structured as follows:

**Section 1** entails a general introduction to the DWA Project WP 10543, i.e. the GRDS.

**Section 2** describes the roles and responsibilities at project and task management level of the overall GRDS as well as changes to the different study teams.

**Section 3** refers back to the Scope of Works set out by the DWA on pre-commencement of the GRDS, the appointment of the Professional Service

Providers and the Terms of Reference.

**Section 4** contains the proposed methodology to undertake the scope of work related to the Project Management Component.

**Section 5** contains the proposed methodology to undertake the scope of work related to the Technical Component Approach.

**Section 6** discusses details of the proposed project monitoring and audit system.

**Section 7** elaborates on the proposed study programme for the GRDS.

**Section 8** contains an overview of the financial aspects of the project including budget, invoicing and cashflows.

**Section 9** provides feedback on empowerment and capacity building/ training aspects of the GRDS

**Section 10** describes the project termination strategy.

**Section 11** concludes the report.

The following supporting documentation are attached:

- Appendix A** Terms of Reference
- Appendix B** Background Information Document
- Appendix C** Minutes of Project Inception Scoping Meeting and Project Initiation Meeting
- Appendix D** Master Study Programme
- Appendix E** Detail Cash Flow per Deliverable
- Appendix F** Project Team Contact Details

## 2 STUDY RESPONSIBILITY

### 2.1 Study arrangements

Based on an official tender process which took place in September 2011, AECOM SA (Pty) Ltd (AECOM) was appointed as the lead Professional Service Provider (PSP) responsible for the execution of the study on behalf of the DWA. Given the structure of the study, AECOM, as Lead PSP, will lead the Project Management Component, assisted by Milkwood Communications on project communication related matters, while Specialist Advisors will provide specialist input where required to oversee the technical compliance of the work undertaken by the Technical Component. Reference to this team is hereafter made to as the Project Management Team (PMT).

In addition, Scherman, Colloty and Associates cc (SC&A) will provide support in leading the Technical Component in determining the Reserve for the various water resource components. In terms of the Technical Component requirements, SCA will be supported by various specialists.

The original Terms of Reference (ToR) for the GRDS are included in **Appendix A** whilst the Scope of Works and associated approach to undertake it is included under **Sections 3, 4 and 5**.

A Project Inception Scoping Meeting was initially held at the DWA Offices, Pretoria, on 3 May 2012, followed with a Project Initiation Meeting on 6 June 2013 at the AECOM Offices, Bellville. The minutes of both meetings are included in **Appendix C** of this report.

The study responsibilities in terms of managerial, technical and coordination functions are discussed in **Section 2.2**, while details of the study team composition are provided in **Section 2.3**. Project milestones and associated deliverables are discussed in **Section 5.3**.

### 2.2 Study management

A study responsibility structure is provided in **Figure 2.1**, while managerial and coordination roles and functions are described below:

#### 2.2.1 Client

##### 2.2.1.1 Departmental responsibility

The DWA is the Client with the Directorate: Reserve Requirements (D:RR) within the CD:RDM responsible for the execution of the overall GRDS and administrating the study.

### 2.2.1.2 Project Manager

The study resides under the responsibility of Mr Yakeen Atwaru, Director D:RR while Mrs Barbara Weston, Scientific Manager: Surface Water Reserve Determination (SWRR) acts as the DWA Project Manager. The Project Manager is, inter alia, responsible for:

- Managing the study;
- Coordinating inputs from other DWA directorates;
- Approving of additional study team members, invoices and Variation Orders;
- Relaying the results and recommendations from the study to the DWA Management; and
- Signing off of Study and Technical reports.

### 2.2.1.3 Project Coordinator

Mrs Thapelo Machaba is assisting the DWA Project Manager as the DWA Project Coordinator. She assists with the coordination and administration of the study from the DWA's perspective and will be responsible for administrative liaison with the PSP. Direct administrative matters and all correspondence to the DWA is to be directed to her, whilst copied to Mr Atwaru and Mrs Weston.

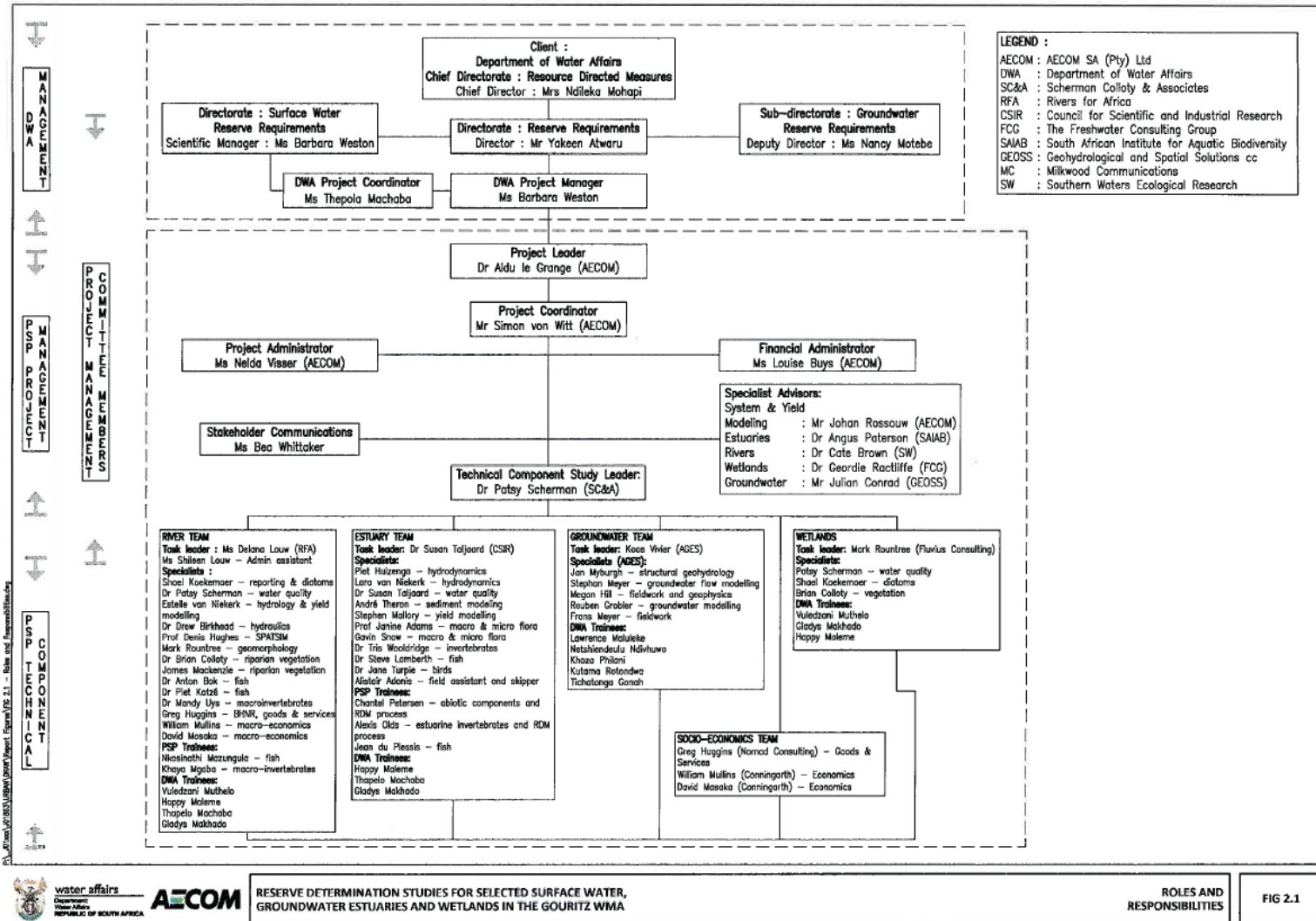


Figure 2.1: Roles and responsibilities

## 2.2.2 Professional Service Provider

### 2.2.2.1 Project Management Team

At Tender Stage Londoloza Environmental and Conservation Management Solutions cc (Londoloza) was proposed to assist AECOM on project management related matters. Mr Eugene Matthews of Londoloza, however, informed AECOM on 30 April 2012 that he would join the George Municipality on a permanent basis and that Londoloza could not be part of the proposed Project Management Component study team anymore. Considering various options, Milkwood Communications was identified as the preferred partner as a replacement for Londoloza to assist AECOM.

The role of the PMT is that of an ancillary to the DWA: CD: RDM to ensure that the study is undertaken in an efficient and timeous manner within allocated budget and framework of DWA requirements. The review, monitoring and follow up on reports, invoices, approval of additional members, cash flows and submission of variation orders all form part of the PMT's duties.

The PMT will be responsible for the following project management and administrative functions :

- Study secretariat and coordination;
- Work programme coordination;
- Stakeholder communication;
- Financial administration;
- Administrative progress reporting; and
- Reports and interpretation of the results.

The PMT will record the proceedings of Project Management Committee (PMC)/ Project Steering Committee (PSC) meetings and make presentations as required. The PMT will also keep an up-to-date record of all decisions taken during the execution of the study, identifying issues raised, findings of the investigations and decisions taken. This will be done through maintaining a Decision and Issue/Action Register.

Given the defined Scope of Work, Milkwood Communications will assist with the following defined public awareness activities:

- Stakeholder identification and database compilation and maintenance;
- Compilation of a Background Information Document and the distribution thereof;
- Obtaining current knowledge about stakeholder attitudes, values and expectations towards water resources in the catchment; and
- Presentation of the various scenarios and consequences to the public and obtaining their feedback to be included in the final study documentation.

#### 2.2.2.2 Study Leader

Dr Aldu le Grange from AECOM is the PSP Study Leader responsible for overall study coordination between the DWA, the PMT and the Technical Team, monitoring and performance control of the PSP Team. In addition, he will be responsible for study and financial management, the day-to-day execution of the study, concentrating on the compliance of the work undertaken with the ToR or as amended by the Inception Report, co-ordination of the PSP team and study administration to ensure coordinated output at key milestone dates.

On the technical side he will be supported by Dr Patsy Scherman from SCA as the Technical Study Leader, whilst administrative support will be provided by Mr Simon von Witt, the PSP Study Coordinator.

#### 2.2.2.3 Study Coordinator

Mr Simon von Witt from AECOM will act as the PSP Study Coordinator and will be responsible for the day-to-day study coordination and administration from the PSP's perspective, assisting with liaison with the DWA and the Technical Team. This will include arranging of meetings, recording of the proceedings of meetings, distribution of agendas and minutes, maintaining the Decision and Issue/Action Registers, data and document control, provision of feedback to the DWA and other related administrative tasks. In addition, he will also be responsible for the review process of technical reports.

#### 2.2.2.4 Study Administration

Study operational support will be provided by Ms Louise Buys and Ms Nelda Visser, who will respectively be responsible for the financial and administrative tasks, Whilst Ms Buys will concentrate on the invoicing and cashflow aspects of the project, Ms Visser will be responsible for the arrangement of PMC meetings, workshops, invoice compilation and submission as well as cash flow reconciliation.

#### 2.2.2.5 Technical Team

The Technical Team, leading by SC&A, is responsible for the Reserve determination studies for the various water resource components, i.e. rivers, wetlands, estuaries and groundwater, and the associated specialist studies.

As Technical Study Team Leader, Dr Patsy Scherman of SC&A is responsible for the technical coordination and management of the specialist studies, compilation of technical reports, coordination of specialist workshops, and technical feedback at PMC/PSC Meetings as well as to the DWA.

The composition of the Technical Team is provided in **Section 2.3.2**.

### 2.2.3 Project Management Committee

The study will be carried out under the guidance of a PMC, comprising representatives from the DWA CD:RDM and other DWA directorate/department representatives nominated from time to time, as well as the PMT and the Technical Study Leader, as summarised in Table 2.1. Technical Task Leaders and PMT Specialist Advisors will be invited to attend specific PMC meetings where relevant.

**Table 2.1: PMC Members**

Names	DWA Affiliation
Ndileka Mohapi	CD: Water Ecosystems (WE)
Yakeen Atwaru	D: Reserve Requirements (RR)
Barbara Weston	D: Surface Water Reserve Requirements (SWRR)
Nancy Motebe	D: Ground Water Reserve Requirements (GWRR)
Thapelo Machaba	D: SWRR
Wietsche Roets	D: Water Abstraction and Instream Use
Shane Naidoo	D: Water Resources Classification (WRC)
Vusi Mema	D: Resource Directed Measures Compliance (RDMC)
Manelisi Ndima	D: GWRR
Isa Thompson	DWA: National Planning
Pieter Viljoen	DWA: Water Quality Planning
Mennard Mugumo	DWA: Options Analysis
Fanus Fourie	DWA: Planning Groundwater
Nadene Slabbert	DWA: Resource Quality Services (RQS)
Neels Kleynhans	DWA: RQS
Gerhard Cilliers/ Nolu Jafta	DWA: RQS
Rashid Khan	DWA Western Cape (WC): Regional Director
Wilna Kloppers	DWA WC : Resource Protection
Andrew Gordon	DWA WC : Resource Protection
Bertrand van Zyl	DWA WC : Operations
John Roberts/ Hester Lyons	DWA WC : Gouritz Catchment Manager
Frans Mouski	DWA WC : Hydrology
Mike Smart	DWA WC : Geo-Hydrology
Aldu le Grange	AECOM
Simon von Witt	AECOM
Patsy Scherman	SC&A

The PMC will undertake the general management of the study and will be responsible for the effective and efficient formulation, execution and conclusion of the study. It will also represent the project interactions with other projects and organisations. Envisaged responsibilities of the PMC are as follows :

- Assessing the scope of work and objectives of the project;
- Monitoring and assessing project progress;
- Monitoring the project budget and expenditure against deliverables produced;
- Evaluating all reports, including the format and scope of reports as agreed on as per the Inception Phase;
- Address issues that require the attention of the DWA; and
- Give recommendations on various aspects of the project where required

In total nine (9) PMC meetings are envisaged.

The PMT will provide secretarial and administrative support to the PMC by venue arrangement, preparing meeting agendas, inviting attendees and compiling meeting minutes as well as the distribution thereof. In addition, the Technical Team will prepare and present progress reports for each PMC meeting.

#### 2.2.4 Project Steering Committee

Although not defined by the original ToR, the need for a separate Project Steering Committee (PSC) was discussed during the Project Initiation Meeting of 6 June 2013. It was decided that for the purposes of the PSC, the PMC be enlarged to be representative of the major stakeholders such as:

- The municipalities in the Gouritz WMA (Beaufort West, Laingsburg, Prince Albert, Oudtshoorn, George, Knysna, Bitou, Mossel Bay, Hessequa, Eden District and Central Karoo)
- Breede Overberg Catchment Management Agency (BOCMA)
- South African National Parks Board (SANParks)
- CapeNature
- Department of Agriculture Western Cape (DAWC)
- Department of Environmental Affairs and Development Planning of the Western Cape (DEADP)
- South African National Botanical Institute (SANBI)
- Agricultural Research Council
- Agri-Western Cape
- Department of Land Affairs
- Endangered Wildlife Trust
- Jonkersberg Plantation
- Marine and Coastal Management
- Marine Protected Area and Estuary Management

It is envisaged that there will be in the order of four (4) to five (5) PSC meetings and that these will follow PMC meetings on the same or following day.

The proposed composition of the PSC is indicated in **Table 2.2**:

**Table 2.2: PSC members**

<b>Names</b>	<b>Affiliation</b>
Ndileka Mohapi	CD: Water Ecosystems (WE)
Yakeen Atwaru	D: Reserve Requirements (RR)
Barbara Weston	D: Surface Water Reserve Requirements (SWRR)
Nancy Motebe	D: Ground Water Reserve Requirements (GWRR)
Thapelo Machaba	D: SWRR
Vuledzani Muthelo	D: RR-SWRR
Gladys Makhado	D: RR
Happy Maleme	D: RR
Wietsche Roets	D: Water abstraction and instream use
Shane Naidoo	D: Water Resources Classification
Vusi Mema	D: Resource Directed Measures Compliance (RDMC)
Boitumelo Sejamoholo	D: RDMC
Manelisi Ndima	D: GWRR
Isa Thompson	DWA: National Planning
Pieter Viljoen	DWA: Water Quality Planning
Mennard Mugumo	DWA: Options Analysis
Fanus Fourie	DWA: Planning Groundwater
Nadene Slabbert	DWA: Resource Quality Services (RQS)
Neels Kleynhans	DWA: RQS
Gerhard Cilliers/ Nolu Jafta	DWA: RQS
Rashid Khan	DWA Western Cape (WC): Regional Director
Wilna Kloppers	DWA WC : Resource Protection
Andrew Gordon	DWA WC : Resource Protection
Bertrand van Zyl	DWA WC : Operations
John Roberts/ Hester Lyons	DWA WC : Gouritz Catchment Manager
Frans Mouski	DWA WC : Hydrology
Mike Smart	DWA WC : Geo-Hydrology
Andre Roux	Department of Agriculture Western Cape (DAWC)
Danie Swanepoel Francois Naude	Department of Environmental Affairs and Development Planning of the Western Cape (DEADP)
Ian Russell/ Dirk Roux	South African National Parks Board (SANParks)
Greg Palmer Andrew Turner Pierre de Villiers	CapeNature
Heidi Nieuwoudt	South African National Botanical Institute (SANBI)
Jannie van Staden	Breede Overberg Catchment Management Agency (BOCMA)
Vernon Gibbs-Halls	Eden District Municipality
Harold Basson	George Municipality
Albertus Killian	Oudsthoorn Municipality
Roy Parry	Knysna Municipality
Johan du Preez	Mossel Bay Municipality
Pikkie Lombard	Bitou Municipality
Reggie Wesso	Hessequa Municipality
Louw Smit/Christopher Wright	Beaufort West Municipality
Richard Fransen/Heinrich Mettler	Prince Albert Municipality
Jannie Venter	Laingsburg Municipality
Aldu le Grange	AECOM
Simon von Witt	AECOM

Names	Affiliation
Patsy Scherman	SC&A
C Bester	Agricultural Research Council
Carl Opperman	Agri-Western Cape
Barry Levinrad	Department of Land Affairs
Alwyn Lubbe	Endangered Wildlife Trust
Connie Jonker	Jonkersberg Plantation
Ayanda Matoti	Marine and Coastal Management
Alan Boyd	Marine Protected Area and Estuary Management

## 2.3 Study teams

Senior and key staff members of the respective Project Management and Technical Components' study teams are defined in **Sections 2.3.1** (Project Management Component) and **2.3.2** (Technical Component) and summarised in **Figure 2.1**.

### 2.3.1 Project management team

Details of members of the PMT in terms of name, organisation and associated study responsibility are provided in **Table 2.3**:

**Table 2.3: Project management team members**

Team Member	Organisation	Role
<b>Management Team:</b>		
Aldu le Grange	AECOM	Study Leader
Simon von Witt	AECOM	Study Coordinator
Louise Buys	AECOM	Financial Controller
Nelda Visser	AECOM	Study Administrator
<b>Specialist advisors/external reviewers:</b>		
Johan Rossouw	AECOM	Yield modelling and system analysis
Cate Brown	Southern Waters Ecological Research	Rivers
Julian Conrad	Geohydrological and Spatial Solutions cc (GEOSS)	Groundwater
Angus Paterson	South African Institute for Aquatic Biodiversity (SAIAB)	Estuaries
Geordie Ractliffe	The Freshwater Consulting Group	Wetlands

### 2.3.2 Technical Component Team

The Technical Component of the study will be managed by Dr Patsy Scherman of SC&A as the overall study Technical Leader. However, although the technical Reserve determination studies are undertaken under the management of SC&A, various individual specialists form part of the overall larger Technical Team.

The Technical Component comprises four sub-studies related to rivers, estuaries, groundwater and wetlands. The relevant study teams for each of these are summarised in **Tables 2.4 to 2.7** included in **Sections 2.3.2.1 to 2.3.2.4**. The DWA trainees (head office and regional) as indicated in **Tables 2.4 to 2.7** have been identified by DWA for training on the Reserve study.

### 2.3.2.1 River team

The river study team is listed in **Table 2.4**.

**Table 2.4: Technical Component River Team**

Team member	Organisation	Role
Delana Louw	Rivers for Africa	Rivers Task Leader; habitat integrity and EWR integrator
Shael Koekemoer	Koekemoer Aquatic Services	Reporting and diatoms
Patsy Scherman	SC&A	Water quality
Estelle van Niekerk	AECOM	Hydrology and yield modelling
Denis Hughes	Institute for Water Research (IWR), Rhodes University	SPATSIM
Andrew Birkhead	Streamflow Solutions	Hydraulics
Mark Rountree	Fluvius Consulting	Geomorphology
Brian Colloty	SC&A	Riparian vegetation: Rapid sites
James Mackenzie	Mackenzie Environmental Development Solutions	Riparian vegetation: Intermediate sites
Pieter Kotzé	Clean Stream Biological Services	Fish: Intermediate sites
Anton Bok	Anton Bok Aquatic Consultants	Fish: Rapid sites
Mandy Uys	Laughing Water: Macroinvertebrates	Invertebrates
Greg Huggins	Nomad Consulting	BHNR, Goods & Services
William Mullins	Mosaka Consulting	Macro-economics
David Mosaka	Mosaka Consulting	Macro-economics
Kagiso Kwele	AECOM	Hydrology and yield modelling
Khaya Mgaba	IWR	Trainee: Invertebrates
Nkosinathi Mazungula	South African Institute for Aquatic Biodiversity (SAIAB)	Trainee: Fish
Thapelo Machaba	DWA	Trainee
Happy Maleme	DWA	Trainee
Vuledzani Muthelo	DWA	Trainee
Gladys Makhado	DWA	Trainee

### 2.3.2.2 Estuaries team

The estuaries study team is listed in **Table 2.5**.

**Table 2.5: Technical Component Estuaries Team**

Team member	Organisation	Role
Susan Taljaard	Council for Scientific and Industrial Research (CSIR)	Estuaries Task Leader and water quality
Lara van Niekerk	CSIR	Hydrodynamics
Piet Huizenga	Private	Hydrodynamics
Stephen Mallory	IWR Water Resources	Yield modelling
Andre Theron	CSIR	Sediment modelling
Janine Adams	Nelson Mandela Metropolitan University (NMMU)	Macro- and micro flora
Gavin Snow	NMMU	Macro- and micro flora
Steve Lamberth	Department of Agriculture, Forestry and Fisheries (DAFF)	Fish
Jane Turpie	Anchor Environmental	Birds
Tris Wooldridge	NMMU	Invertebrates
Alistair Adonis	CSIR	Field Assistant and skipper
Chantel Petersen	CSIR	Assistant: abiotic components & RDM process
Alexis Olds	Cape Nature	Trainee: Estuarine invertebrates & RDM process
Jean du Plessis	Cape Nature	Trainee: fish
Thapelo Machaba	DWA	Trainee
Happy Maleme	DWA	Trainee
Gladys Makhado	DWA	Trainee
Vuledzani Muthelo	DWA	Trainee

### 2.3.2.3 Groundwater team

The groundwater study team is listed in **Table 2.6**.

**Table 2.6: Technical Component Groundwater Team**

Team member	Organisation	Role
Koos Vivier	Africa Geo-Environmental Services (AGES)	Groundwater Task Leader and modelling
Jan Myburgh	AGES	Structural geology & geohydrology
Stephan Meyer	AGES	Groundwater flow modelling
Megan Hill	AGES	Field work and geophysics
Reuben Grobler	AGES	Groundwater modelling
Frans Meyer	AGES	Fieldwork
Lawrence Maluleke	DWA	Trainee
Netshiendeulu Ndivhuwo	DWA	Trainee

Team member	Organisation	Role
Khoza Philani	DWA	Trainee
Kutama Rotondwa	DWA	Trainee
Tichatonga Gonah	DWA	Trainee

### 2.3.1.1 Wetlands team

The wetlands study team is listed in **Table 2.7**.

**Table 2.7: Technical Component Wetlands Team**

Team member	Organisation	Role
Mark Rountree	Fluvius Consulting	Wetlands Task Leader and EcoClassification
Patsy Scherman	SC&A	Water quality
Shael Koekemoer *	Koekemoer Aquatic Services	Diatoms
Brian Colloty	SC&A	Vegetation
Vuledzani Muthelo	DWA	Trainee
Gladys Makhado	DWA	Trainee
Happy Maleme	DWA	Trainee

\* Ms Koekemoer is currently completing a Ph D in wetlands and the use of diatoms for assessing water quality

Groundwater-dependent wetlands will be managed by the groundwater specialist team, as is advocated by the DWA RDM manual for the Rapid Reserve methods for wetlands. Wetlands only reflect the surface expression of the groundwater resource in cases of groundwater-dependent wetlands. They could therefore be used to monitor the condition of the groundwater resource, but detailed groundwater studies should ensure the management of the groundwater resource so as to preserve wetlands.

## 2.4 Changes to study teams

Some changes to the respective Project Management and Technical Team Component study teams were proposed to the DWA since the project commencement. A summary of these changes and the associated reasons are provided in **Table 2.8**.

## 2.5 Project contact details

The contact details of the overall project team are included in **Appendix F**.

**Table 2.8: Changes to study teams**

Study component	Team responsibility level	Team member		Replacement details				Reason for replacement/addition
		Proposed at Tender Stage	Replacement	Organisation	HDI Status	Hourly tariff (R/hr – VAT excl)	Responsibility level	
Project Management Component	PSP Deputy Study Leader	Yes, Mr Eugene Matthews	Ms Bea Whittaker (but as <b>Public Communications Task Leader only</b> )	Milkwood Communications	White female	R650-00	Task Leader: D	Mr Matthews took up a permanent position with the George Municipality and as a result his company closed down
	Specialist Advisor/Reviewer	Yes, Ms Retha Stassen	Dr Cate Brown	Southern Waters Ecological Research and Consulting	White female	R825-00	Senior Specialist: E	Dr Brown is more appropriate to fulfil the role as PMT Specialist Advisor/Reviewer as she has an in-depth knowledge of a large part of the study area due to previous involvement
	Study Administrator	Yes, Ms Annalene Pause	Ms Mathabo Ntumba (but as Public Communications consultant)	Milkwood Communications	Black female	R400-00	Key Support: C	Mr Matthews took up a permanent position with the George Municipality and as a result his company closed down.
	Study Administrator	Yes, Ms I Wille	Ms N Visser	AECOM	White female	R300-00	Support: B	Ms Wille resigned from AECOM and Mrs Visser replaced her during March 2013.

**Table 2.8 (continued)**

Study component	Team responsibility level	Team member		Replacement details				Reason for replacement/addition
		Proposed at Tender Stage	Replacement	Organisation	HDI Status	Hourly tariff (R/hr – VAT excl)	Responsibility level	
<b>Technical Component</b>	Riparian vegetation (rivers)	No	Mr James Mackenzie	Mackenzie Environmental Development Solutions	White male	R650-00	Senior specialist: E	Recent experience on vegetation of non-perennial systems
	Trainee: fish, rivers	Yes, but name not confirmed at proposal stage	Mr Nkosinathi Mazungula	SAIAB	Black male	R 200-00	Trainee	Name had not been confirmed at proposal stage
	Trainee: invertebrates, rivers	Yes, Mr Human	Ms Khaya Mgaba	IWR, Rhodes University	Black female	R 200-00	Trainee	Mr Human has left the IWR
	Yield modelling	No	Mr Stephen Mallory	IWR Water Resources	White male	R800-00	Senior specialist: E	Recent work on modelling of estuaries in the study area for a WRC project
	Trainee: estuarine invertebrates	Yes, Ms K Thwala	Ms Alexis Olds	CapeNature	White female	n/a	Trainee	Ms Thwala has left CapeNature
	Fieldwork and geophysics, groundwater	Ms Kriek	Ms Megan Hill	AGES	White female	R680-00	Field work: D	Ms Kriek is no longer available for the study
	Fieldwork, groundwater	Mr J Myburgh	Mr Frans Meyer	AGES	White male	R600-00	Field work/specilaist: D	Mr Myburgh is no longer available for the study
	Economist	Ms Riekie Cloete	Mr David Mosaka	Conningarth Economists	Black male	R 550-00	Specialist: D	Ms Cloete has left Conningarth Economists
	Financial Manager	Ms van der Waal	Ms Jacqui Sauer	SC&A	White female	R 230-00	Administrator: C	Ms van der Waal was incorrectly represented at Tender Stage, whilst Ms Sauer has extensive financial management experience.
	Administrative assistant, rivers	No	Ms Shileen Louw	Rivers for Africa	White female	R 230-00	Administrator: B	An assistant is required to work with the Rivers' Task Leader

### 3 OBJECTIVES OF THE STUDY

#### 3.1 Terms of Reference

The Terms of Reference (ToR) for the GRDS is attached in **Appendix A**. This ToR contains the Scope of Work for both the Project Management and Technical Components of the GRDS. The ToR provides a clear description of the work to be undertaken and the expected deliverables. However, based on scope of work discussions during the Inception Phase, the Inception Report will form the contractual basis upon which work will be undertaken.

#### 3.2 Purpose of the Project Management Component

The ToR defines the primary purpose of the Project Management Component assignment as to assist the DWA CD: RDM, i.e. the Client, with the coordination of all the activities required to achieve the objectives of the Reserve determination study. A secondary purpose is to integrate the results as provided by the Technical Component. In summary, the scope of the Project Management Component professional services to be provided are defined as :

- Assistance with the overall study management functions to the DWA CD: RDM and the dissemination of information to serve their requirements;
- Responsibility for all day-to-day management activities of the study as set out in the ToR, and amended in the Inception Report;
- Establishment and maintenance of an information framework;
- Integration of technical results;
- Ensuring that all deliverables are produced on time and within budget; and
- Support with reporting and communications to stakeholders.

The Scope of Work of the Project Management Component remains more or less the same as that envisaged in the ToR and at Proposal Stage. The approach to the assignment is outlined in **Section 4**.

#### 3.3 Purpose of the Technical Component

The ToR defines the Technical Component as aimed at the actual coordination and execution of the Reserve determination tasks to be undertaken for each water resource component for each sub-system. The specific objectives and outcomes of the Reserve determination for the different aquatic ecosystems are summarised as :

- Conduct desktop EcoClassification (rivers) on a sub-quaternary scale to determine preliminary Present Ecological State (PES), Ecological Importance and Sensitivity (EIS), Recommended Ecological Category (REC), causes and sources and identify hotspots;
- Conduct a reconnaissance survey and together with the output of desktop EcoClassification, select EWR sites;
- Determine the Reference Condition (RC) and PES for each relevant section of the rivers, estuary, wetland and groundwater. Incorporate issues such as Socio-Cultural Importance (SCI);
- Recommend Ecological Categories (ECs) for each relevant section of river, estuary, wetland and groundwater;
- Identify alternative ECs and provide implications / consequences of meeting these categories;

- Asses Ecological Water Requirement (EWR) scenarios for each of these ECs.
- Select operational scenarios for consideration. Note that these scenarios are provided to the consulting team;
- Determine the impact of scenarios on the allocatable yield and, based on the impacts, devise additional scenarios to optimise the allocatable yield;
- Determine the ecological consequences of each of these additional scenarios;
- Determine the socio-economic consequences of these scenarios on a qualitative level for the rivers and estuaries, including impacts on Ecological Goods and Services;
- Provide the ecological specifications associated with the selected EC. This information can be used to develop a river monitoring programme when necessary;
- Design an estuary monitoring programme to ensure compliance to the estuary objectives;
- Provide DWA with all information relevant to the ECs and other issues, to enable DWA to recommend a scenario that will become the EC. Also summarise all the technical information and provide to DWA;
- Provide DWA with all data, equipment, maps, photo's, etc., generated in an organised and clearly marked manner as agreed between DWA and PMT;
- Provide CD: RDM with the information required to prepare the Reserve templates, including draft templates, for authorization by the Director-General of the DWA; and
- Train selected DWA D: RR staff, students and specialist trainees in specific tasks relating to Reserve determinations.

Operational constraints and catchment requirements are to be incorporated into yield scenario modelling, and catchment activities impacting on ecology are to be considered when determining Resource Units. The levels of assessments at which various river and estuarine systems are to be evaluated, are indicated where relevant. It is acknowledged that the confidence in results will mostly be related to the data available, particularly hydrological data.

### 3.4 Assumptions and provisos

#### 3.4.1 *General aspects related to the methodology to be applied*

It is to be noted that, unless otherwise agreed by the DWA CD: RDM and the PSP, the methodology described in **Section 5** to undertake the Technical Component is subject to the following assumptions:

- The focus of the GRDS is to determine the ecological water requirements of resources in the study area. It is assumed that scenario and economic steps of the process will only focus on major developments in the catchment. Note that both these components were originally included in the 7-step Reserve process in the absence of Water Resource Classification. Now that Classification is underway in South Africa, and when undertaken for WMA16, both economics and scenarios will be assessed at a high level of detail.
- The level of detail at which a study can be undertaken is dependent on the data available. The detail at which the ecological template for a specific system is determined depends on the availability of appropriate data. The more data available on a particular system, the more accurate the REC, the ecological

flows (Ecological Reserve), as well as Ecological specifications (Ecospecs) can be set. However, in instances where the lack of certain data sets poses uncertainties, a precautionary approach is adopted, i.e. the RECs, Ecological Reserves and Ecospecs are set conservatively. For example, in setting the ecological requirements for the Keurbooms Estuary in 2008, lack of certain important data sets (e.g. reliable river inflow measurements on both the Keurbooms and Bitou rivers) required the REC and Reserve to be set conservatively. Also, a range of remedial actions was recommended to improve the ecological state.

- An off-channel dam is currently proposed on the Keurbooms system. However, since the 2008 study, the required important remedial actions, and more accurate river inflow measurements on the Bitou River have not transpired. As a result it is considered unlikely that the REC or Ecological Reserve can be further refined from the 2008 study within the timeframe of this Gouritz WMA study. The dam development, therefore, will need to be assessed against the current Ecological Reserve signed off by DWA, to minimize any risk to the estuary. Refinements can best be considered following long-term monitoring. For this reason, it was decided to focus the effort of this study on key, stressed systems within the WMA for which no requirements of the ecological template has been set to date. For example, the Keurbooms Estuary Reserve was done at a Rapid level in 2008 due to the data available. Despite a proposed dam on a tributary of the Bitou, which may impact on the Keurbooms Estuary, no additional data have been collected so as to facilitate conducting a Reserve at a higher level of confidence.
- The Touw/Wilderness estuarine system was highlighted as a priority in the previous Outeniqua EWR study for which an REC and Ecological Reserve had to be set urgently. The system is therefore included in the list of priority estuaries as part of this study. However, the estuary and its associated lake systems are very complex compared with others in the WMA. It will require long-term detailed data sets (e.g. nutrients, invertebrates and sediments) for an accurate assessment which will not be possible to achieve within the time frame of this study. In addition, high resolution, complex numerical modelling would also be required at significant higher cost to the study to reduce uncertainty with limited validation data available for calibration at this stage. As a result the REC and Ecological Reserve will most likely be set conservatively until such time as long-term monitoring allows refinement.
- EWR Rivers task: Only two river specialist workshops will take place due to budgetary constraints, i.e. one for the Intermediate sites and one for the Rapid sites. Note that all attempts will be made to obtain variable flow data, however, this cannot be guaranteed in an area with highly variable rainfall and lack of clear wet and dry season. EWR will therefore be set with the best flow information available to the study. Loggers will be placed in selected rivers in an attempt to get high flow data.
- Socio-economic study: Socio-economic changes will be assessed under different operational flow scenarios at a qualitative level only, probably mostly pertaining to the estuaries.
- River EcoSpecs: River EcoSpecs and associated Thresholds of Potential Concern (TPCs) will be provided in the Monitoring Report. A detailed monitoring

programme will not be developed as part of this study. It is assumed that a specialist will be assigned to develop a monitoring programme when required by DWA and other responsible organizations. EcoSpecs and TPCs will be available for use in such a monitoring programme.

### 3.4.2 Coverage of EWR sites

The coverage of the proposed EWR sites for the GRDS study area for rivers and estuaries are provided in **Table 3.1**. River sites will be finalized once the results of the Desktop EcoClassification are available and the river reconnaissance surveys have been undertaken in January and February 2014.

**Table 3.1: Coverage of EWR sites**

Catchment	Components	Level of detail	Study name
Noetsie	River	Rapid II	ORDS
Knysna and Gouna	River	Intermediate	ORDS
	Estuary	Intermediate	ORDS
Goukamma	River	Intermediate	ORDS
	Estuary	Rapid (detailed)	ORDS
Swartvlei (Karatarata, Diep)	River	Rapid III → Intermediate *	ORDS
	Estuary	Rapid	ORDS
Silver (Kaaimans tributary)	River	Rapid II	ORDS
Kaaimans	River	Intermediate	ORDS
	Estuary	Desktop **	ORDS
Swart (Kaaimans tributary)	River	Rapid II	ORDS
Malgas (Gwaing tributary)	River	Intermediate	ORDS
Gwaing	River	Rapid II	ORDS
	Estuary	Rapid (less detailed)	ORDS
Moeras (Maalgate tributary)	River	Rapid II	ORDS
Maalgate	River	Rapid II	ORDS
	Estuary	Desktop *	ORDS
Groot Brak	River	Intermediate	ORDS
	Estuary	Intermediate	ORDS
Moordkuil	River	Review of previous Rapid III	ORDS
Varing (Groot Brak tributary)	River	Rapid II	ORDS
Matjies (Buffels River tributary)	River	Rapid III	Sout/Matjies
	Estuary	Intermediate	Sout/Matjies
Sout (K70A; Witrivier tributary)	River	Intermediate	Sout/Matjies
	Estuary	Intermediate	Sout/Matjies
Olifants Site 1 (J31)	River	Rapid III	Oudtshoorn
Olifants Site 2 (J31)	River	Rapid III	Oudtshoorn
Grobelaars	River	Rapid III	Oudtshoorn
Le Roux	River	Rapid III	Oudtshoorn
Groot	River	Rapid III	Oudtshoorn
Gouritz	River	Intermediate - proposed	GRDS
	Estuary	Intermediate - proposed	GRDS
Goukou	River	Intermediate/Rapid III proposed	GRDS
	Estuary	Intermediate - proposed	GRDS
Four tributaries of the Gouritz (e.g. Olifants, Kammanasie)	River	Intermediate + Rapid III – proposed	GRDS
Duiwenhoks	River	Rapid III – proposed	GRDS
	Estuary	Rapid – proposed	GRDS

Catchment	Components	Level of detail	Study name
Keurbooms	River	Intermediate / Rapid III – proposed	GRDS
	Estuary	Reconnaissance survey + professional opinion	GRDS
Two additional sites in J1	River	Intermediate / Rapid III - proposed	GRDS
Klein Brak	Estuary	Rapid - proposed	GRDS
Touw/Wilderness	Estuary	Rapid - proposed	GRDS
Hartenbos	Estuary	Desktop - proposed	GRDS
Blinde	Estuary	Desktop - proposed	GRDS
Piesang	Estuary	Desktop - proposed	GRDS
Groot (Wes)	Estuary	Desktop - proposed	GRDS
Bloukrans	Estuary	Desktop - proposed	GRDS

\* Intermediate methodology followed although Rapid III requested, and no scenarios assessed.

\*\* No field surveys; desktop assessment of river EWR flows.

Note that the Desktop Reserves to be conducted for the GRDS on the estuaries is a refinement of the 2012 National Biodiversity Assessment using additional hydrology and water quality information.

Desktop data are available for present state for all sub-quaternary river and estuary catchments from the national Present Ecological State (PES) study, of which WMA16 was covered by Southern Waters Ecological Research and Consulting. Sites selected will be presented in detail at the March 2014 PMC meeting, and documented in the Delineation Report for the study. Detailed information cannot be provided in the Inception Report as site selection is a task and outcome of the study.

### 3.4.3 Recommended approach for estuaries

The study area includes 21 estuaries (refer to **Figure 1.2**). A summary of each of the systems is indicated in **Table 1.1**, which provides an indication of what level of Reserve has been determined for the relevant system previously. The *importance rating / conservation status* information comes from the CAPE conservation Plan and NBA Biodiversity Plan. Depending on current and future water demands on a system, a higher level Reserve determination may be required.

In selecting the estuaries for the various levels of EWR studies, focus was on the degree that systems were water stressed or were under major future abstractions pressure. Systems listed as protected areas or that are listed as proposed protected areas (NBA, 2011) were also rated high on the rating system used for selection. The Goukou and Gouritz estuaries were subsequently viewed as priority and therefore selected for Intermediate level. The DuivVAenhoks, Klein Brak and Touw/Wilderness estuaries were selected next for rapid level studies. Following the rating system, the Hartenbos, Blinde, Piesang, Groot (Wes) and Bloukrans estuaries were selected as desktop assessments. This approach was adopted specifically to be able to conduct this WMA study within the best realistic budget framework. (Note: Future pressure on the Piesang Estuary relates to a harbour development in the mouth area. This is not viewed as a freshwater related issue; its major impact will be destruction of estuarine habitat.)

From the 21 estuaries in the study area, eleven (11) of them have been previously addressed as part of preliminary EWR studies. However, of those 11, the following eight (8) estuaries still require the determination of ecological specifications and monitoring plans :

- Maalgate
- Gwaing
- Kaaimans
- Goukamma
- Noetsie
- Keurbooms
- Matjies
- Sout (Oos)

For the remaining ten (10) estuaries the following is proposed as indicated in **Table 3.2** as part of the GRDS:

**Table 3.2: Estuary level of assessment**

Level of assessment	Estuary name
Intermediate	Gouritz, Goukou
Rapid	Duiwenhoks, Klein Brak, Touw/Wilderness
Desktop (i.e. a refinement of the 2012 National Biodiversity Assessment using additional hydrology and water quality information)	Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans

A once-off (summer) field survey will be conducted on five (5) estuaries (Duiwenhoks, Klein Brak, Touw/Wilderness, Gourtiz and Goukou) identified as key, stressed systems within the WMA. An additional reconnaissance level survey (microalgae, invertebrates, water quality and hydrodynamics), based on professional opinion only, is proposed for the Keurbooms estuary.

#### 3.4.4 Wetlands

It is not possible to provide the same level of information detail for wetlands than for rivers and estuaries as given in **Sections 3.4.2** and **3.4.3** at Inception Stage as rating and prioritization of wetlands in the study area forms part of the study.

#### 3.4.5 Geographic Information System (GIS) database

The ToR calls for the development of a GIS information system. Every attempt will be made to collect data in a GIS framework and to conduct adequate data storage, e.g. the storage of all EWR numerical data in SPATSIM (Spatial and Time Series Information Modeling, a GIS-based model). The PSP will discuss with the Directorate: Resource Quality Studies (D: RQS) as to the most effective way of storing biological data, and with the RDM: Groundwater Reserve team regarding the storage of groundwater data. The PMC will ensure that adequate data curation and transfer to CD: RDM takes place when necessary.

### 3.4.6 Training

Although listed as an objective, the budgetary constraints imposed by the project do not allow for sufficient training opportunities. Training is therefore included as the participation of DWA and other identified trainees in workshops and field trips, as requested in the ToR. All training opportunities will include, and focus on, DWA personnel, both from the main and regional offices. In addition to the attendance of field trips and workshops, three training sessions are recommended. Training and capacity building is discussed in more detail in **Section 7** of this report.

Information sharing will be provided on a regional basis by circulating progress reports and extending invitations to attend meetings and workshops to the regional DWA offices and the DWA CD: RDM Project Coordinator (Ms Machaba).

A brief training report will be submitted as part of the final report.

### 3.4.7 Data assumed to be provided to the study team

It is assumed that the following data will be **provided to the estuary team**:

- Simulated monthly runoff scenario data (50 - 70 year period) at the head of the Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans, Duiwenhoks, Klein Brak, Touw/Wilderness, Goukou and Gouritz estuaries for the Reference Condition and Present State in required Excel spreadsheet format;
- Simulated future runoff scenario data (50 - 70 year period) for operational scenarios for the Duiwenhoks, Klein Brak, Touw/Wilderness, Goukou and Gouritz (max of 4 per estuary) in required Excel spreadsheet format;
- Scheduled dates assume that the correct hydrological scenarios for the present and reference conditions will be provided to the CSIR in the required Excel spreadsheet format by June 2014 (all estuaries) and the operational scenarios by August 2014 (Duiwenhoks, Klein Brak and Touw/Wilderness, Goukou and Gouritz);
- Where available, measured river inflow data at the head of the Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans, Duiwenhoks, Klein Brak, Touw/Wilderness, Goukou and Gouritz estuaries (DWA monitoring);
- Where available, measured water level data in the Duiwenhoks, Klein Brak, Touw/Wilderness, Goukou and Gouritz (DWA monitoring); and
- Where available, water quality data on the river systems (generated through the river component of this study) feeding into the Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans, Duiwenhoks, Klein Brak, Wilderness/Touw, Goukou and Gouritz estuaries.

It is assumed that the following will be **provided to the groundwater team**:

Any existing hydrological, geohydrological and environmental reports.

- River EWR values when available;
- Baseflow per quaternary catchment. Selected catchments may require monthly baseflow volumes;
- Vegetation/ plantation water use/ land use for study area;
- Water supply shortage hotspots;
- Water demand figures for study area and currently supplied volumes were

- available; and
- Provision of individuals for capacity building.

It is assumed that the following will be **provided to the river team**:

- Rating tables for DWA gauging stations along river systems; and
- Assistance from the relevant regional office in the collection of cross-sectional data (e.g. flow measurements) if required (e.g. Frans Mouski and Niel van Wyk and Johan Knoetzen of the George DWA regional office).

## 4 PROJECT MANAGEMENT COMPONENT APPROACH

### 4.1 General

Project management entails the planning, organising, monitoring and auditing of all project related aspects in a continuous process to achieve the stated objectives. As projects are unique undertakings, they, in general, involve a degree of uncertainty and are usually divided into several phases to improve management control thereof. Each phase is marked by the completion of one or more deliverables. Work for this assignment will be conducted in three phases as defined in **Section 1.4**, i.e. Phase 1: Study Initiation and Design, Phase 2: Study Implementation and Phase 3: Study Closure. A detailed description of the objectives, tasks, activities and expected deliverables for each phase is provided in the ToR.

Based on the detailed description of the objectives, tasks, activities and expected deliverables per phase as provided in the ToR, the GRDS Project Management Component will cover scope, communications, risk, time and cost, quality and integration management activities.

The phase related tasks of the Project Management Component assignment are discussed in more detail below:

### 4.2 Phase 1: Study Initiation and Design

The objective of Phase 1 is to ensure that the Project Management PSP and the CD : RDM have a common understanding of the GRDS' background and purpose, efforts and level of management, technical coordination and integration that will be required to achieve the study objectives.

Phase 1 of the assignment will therefore be focussed on setting up the Reserve determination study in such a way that the purpose of the project can be achieved effectively and efficiently, within budget and timeously. This will require setting up a project management system and a documentation system and designing an information framework in support of all project activities, progress reporting and outcome evaluation.

The main activities/deliverables of Phase 1 include :

- Project initiation meetings (Task 1.1);
- Familiarisation with Scope of Work;
- Preparation of Background Information Document;
- Initiation of stakeholder awareness and participation;
- Familiarisation with historic and current Reserve studies;
- Resource monitoring inventory;
- Establishment of a Management Information System and framework;
- Project monitoring and control system, including initial progress reports and invoicing;
- Support to the Technical Component; and
- Compilation of Inception Report in collaboration with Technical Component.

Various Project Management Phase 1 activities have already been carried out subsequent to project commencement. These include two initial meetings with the CD : RDM, identification of and amendments to the Scope of Work, identification of

stakeholders, arrangement of the first Stakeholder Workshop and invitations thereto, compilation of sub-consultancy agreements, various discussions with the Technical Team, and compilation of the Draft Inception Report.

#### 4.2.1 Task 1.2: Familiarisation with Scope of Work

A project can only be successfully executed if the first phase has been handled comprehensively. In executing assignments, it is therefore standard approach to put emphasis on the initial stage of the project. In particular, contractual issues, which will guide the project and to a large extent determine the eventual success thereof, need to receive special attention.

Although the ToR are fairly clear on what is expected as deliverables, it was necessary to, as one of the first actions after appointment, confirm with the DWA CD: RDM the scope of work and the expected deliverables. In this regard both an initial Project Scoping Meeting and a Project Initiation Meeting, respectively, took place on 3 May 2012 and 6 June 2013. The purpose of these meetings were that the Client and key members of both the PMT and Technical Team discuss and clarify the overall Scope of Work and relevant details of the proposed project. This was to establish a record of understanding on the expectations of each party regarding the products, cooperation, responsible parties and target dates for deliverables. Minutes of these meetings are included in **Appendix C**.

#### 4.2.2 Task 1.3: Familiarisation with historic and current Reserve studies

One of the first activities during Phase 1 is the compilation of an inventory of historic and current Reserve determination studies in the Gouritz WMA and collection of related historical data. This would include studies commissioned by the DWA, Reserve studies done in-house by the DWA, and any other information obtained for studies related to the Gourits WMA. Co-operation will be requested from local government, research institutions as well as other service providers such as Aurecon in this regard. In addition, and in recognition of the impacts of development impacts on water resources in the study area, the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) has, in certain developments, instructed developers to commission independent Reserve studies. These studies are, however, assumed to be highly localised and have to be placed in context. The quality and integrity of the data will dictate the extent to which it can be integrated into the GRDS. This opportunity can also be used to determine the extent to which the information supplied to the Environmental Assessment Practitioners (EAPs) case officers is accurate.

Very little information related to historic and/or current Reserve determination studies has, however, thus far been obtained, and further work in this regard is required. It is proposed to extend such inventory to also include an inventory of historic and/or current water resources studies related to the Gouritz WMA.

As there is a reliance on the National Groundwater Database (NGDB) and other local databases for groundwater information, an effort must be made to obtain broader site-specific quality data to meet the objectives of the study and to update the database of information already available. Note that this is of particular importance considering the proposed fracking activities in the area. Setting a good benchmark for future groundwater comparison is therefore important.

#### 4.2.3 Task 1.4: Resource monitoring inventory

It is proposed to compile an initial inventory of wetlands, rivers and estuaries within the study area in liaison with the CD: RDM and the Technical Team to determine the management information requirements of achieving resource monitoring and protection objectives. The initial inventory provided in **Table 3.2** is to be expanded.

#### 4.2.4 Task 1.5: Management framework : project monitoring and control

A provisional management framework for project management and control is included in **Section 6** and includes the following protocols:

- Communication arrangements;
- Template for reporting;
- Reporting of work completed;
- Reporting standards;
- Invoicing format;
- Budget expenditure and cash flow;
- Intervention measures to prevent or minimise risk; and
- Monitoring and control arrangements.

The process of quality control is of critical importance in terms of maintaining technical integrity. A means of applying quality control is to have checks in place at various critical stages of the information flow process. These checks typically include format and quality when taking receipt of information. The final component in the quality control process is data storage, ensuring that the data is appropriately stored and referenced for future use/ dissemination.

In addition, experience has shown that the compilation, editing, review and finalisation of technical reports requires more time and effort than anticipated. The PMT will therefore, at an early stage, direct the Technical Team to compile reporting frameworks for each specialist study and task milestones in their work programme. Reporting formats will in consensus be consistent throughout the project while documents will be archived for later transfer to the CD : RDM.

An invoicing format and protocol will also be introduced. This will ensure that all project invoices are compatible for ease of handling and administration.

A typical project monitoring and control system as applied during the ORDS is provided in **Section 4.2.6**.

#### 4.2.5 Task 1.6: Establishment of an Information Management System

An information management system, of which the format is to be agreed with DWA CD: RDM, is proposed to manage the collection, quality and version control, storage and dissemination of all data during the project.

In terms of the collection methodology the emphasis will be on the format that data is received. This typically relates to whether data is supplied in narrative or tabular format as well as whether the document's electronic storage format is appropriate, i.e. PDF, MSWord, MSEXcel.

The information storage component consists of two major storage media, namely electronic and hardcopy, comprising of a series of directories and subdirectories that will be used to accommodate the management of information. In terms of data storage, selective hard copies will be stored with the PMT (AECOM's Bellville office), while mobile storage media (of electronic data) will be made available to the CD: RDM, as required.

The proposed project related information management system set up is graphically presented in **Figure 4.1**.

No allowance is made for a Geographic Information System (GIS) for data management and mapping.

All data will be regarded as confidential and dissemination will occur on a needs basis. Where external agencies/ individuals/ companies submit requests for information such request will be reviewed internally by the PMT in liaison with the CD: RDM. Where requests for information are required for public access such requests will be forwarded directly to the CD: RDM for review. In addition, and where possible all electronic data will be saved onto one CD set.

#### 4.2.6 Task 1.7: Support to the Technical Component PSPs

Ongoing consultation with the Technical Team will enable the PMT to provide them with support. Indicators of risks associated with the completion of the Technical Component of the project will be analysed and assessed during the initial project stage. It is envisaged that these risks could include aspects related to:

- Availability of data, i.e. data required in addition to that collected by the specialists during their field surveys;
- Quality of data, e.g. insufficient hydrological data, i.e. this study is not tasked with updating insufficient hydrology;
- Setting up new yield models, i.e. this study is not tasked with setting up new yield models, but will work with what is available;
- Availability of sufficient budget to undertake any variation in scope of work requested in addition to that outlined by the original ToR or the Inception Report;
- Integration issues, e.g. groundwater / surface water Reserve, should issues arise that are outside of the scope and budget of the study;
- Liaison with stakeholders and keeping record of stakeholder issues;
- Issues highlighted by stakeholders that are outside of the scope of this study, e.g. the existence of illegal dams; and
- Project management issues, such as non-delivery of progress reports or problems encountered with invoicing and/or cash flow.

The PMT will, where appropriate, provide support to the Technical Team in overcoming these issues. The PMT will recommend measures to minimise risks and contingency plans for dealing with unfavourable events. In addition, the PMT will provide general support, where required, to the Technical Team.

#### 4.2.7 Task 1.8: Public awareness

The ToR states that the Technical Component should include limited public awareness activities. Specific reference is made to a stakeholder meeting, that should be during Study Implementation so as to involve stakeholders from the beginning of the study.

Experience gained during the ORDS indicated that an extended public awareness activity/stakeholder participation is more appropriate. The PMT will therefore assist with the following during the Study Initiation and Design Phase:

- Stakeholder identification;
- Compilation and distribution of a Background and Information Document (BID);
- Initial Stakeholder Workshop; and
- Compilation of an issues/comments and response register.

More detail related to these activities are provided below:

##### 4.2.7.1 Task 1.8.1: Identification of stakeholders

Milkwood Communications updated the ORDS stakeholder database with input from the DWA, AECOM and SCA as well as other databases relevant to previous Gouritz WMA related studies.

Members of the public and other potential stakeholders not identified yet were given opportunity via means of advertisements placed in various newspapers to register as official stakeholders in the GRDS to be able to receive study related information.

##### 4.2.7.2 Task 1.8.2: Background Information Document

In consultation with AECOM and SCA, Milkwood Communications compiled a BID, explaining the basics of the study. This was distributed to identified stakeholders to enlighten them of what is underway with respect to the GRDS and inform them of the way forward.

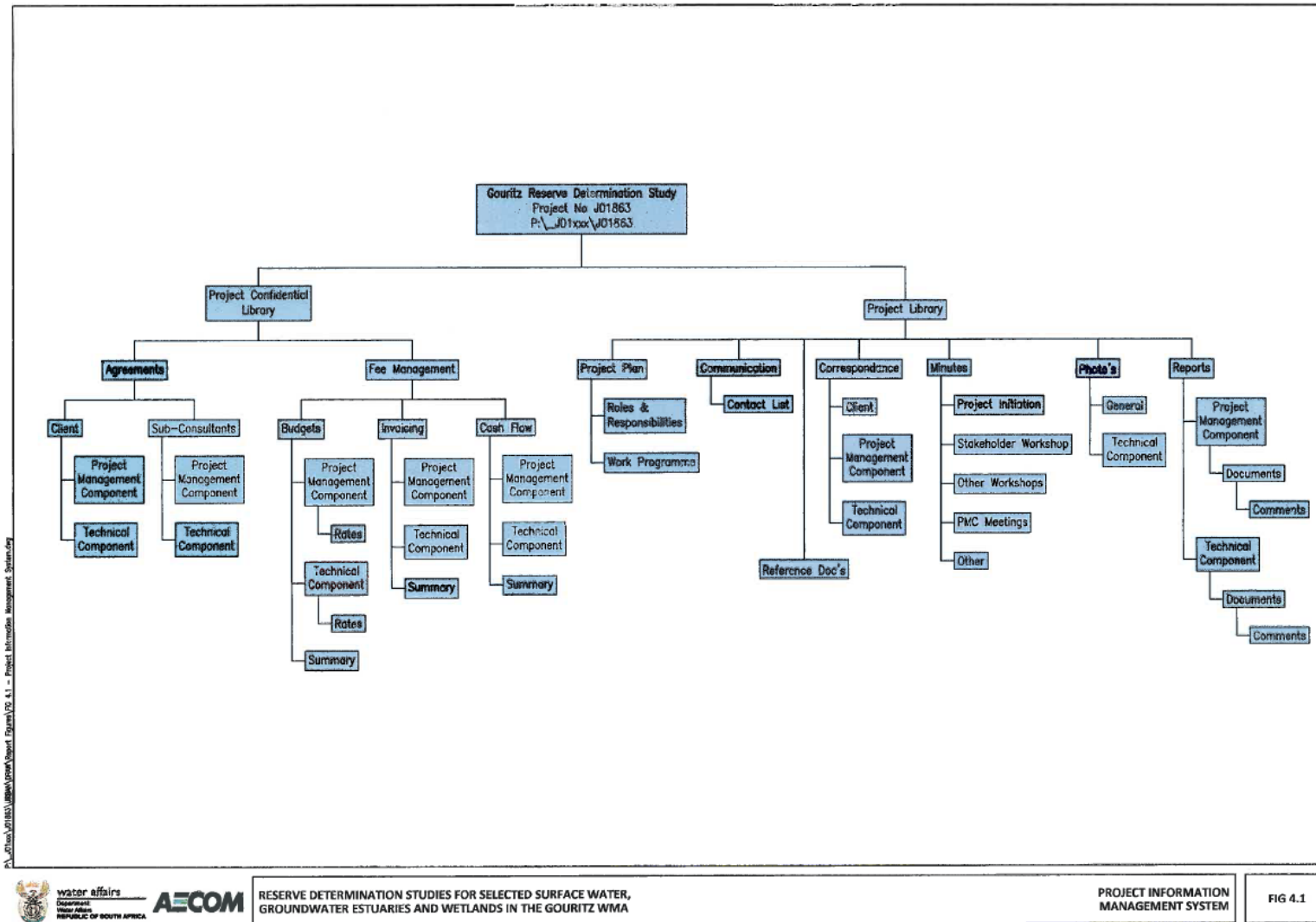


Figure 4.1: Project Information – Management Systems

#### 4.2.7.3 Task 1.8.3: Stakeholder Workshops

It is proposed that two Stakeholder Workshops be held in the GRDS to gain stakeholder input at the beginning and during the implementation phase of the GRDS.

The first Stakeholder Workshop took place on 3 October 2013 at Oudtshoorn. The purpose of the workshop was to introduce the GRDS to stakeholders, provide background on the study area, explain the process, discuss the study approach and to obtain input and comments from stakeholders that will aid the GRDS. Those stakeholders included on the provisional stakeholder list were initially invited to the workshop by e-mail on 5 September 2013. In addition, further invitations were sent to those stakeholders who registered in response to newspaper advertisements.

In response to the initial Stakeholder Workshop, an issues/comments and response register is held to monitor enquiries and feedbacks.

A second Stakeholder Workshop is planned during Study Implementation, closer to the end of the study, when the various scenarios and consequences will be presented to stakeholders and their feedback and comments will be obtained.

#### 4.2.8 Task 1.9: Phase 1 Close-out : Inception Report

Based on initial project related tasks, the Inception Report is compiled to summarise initial project activities, discussions and agreements reached during the Inception Phase. In addition, the final approach the PSP intends to follow for carrying out the various study tasks related to both the Project Management and Technical Components is described as.

- Roles and responsibilities;
- Communication channels;
- Interface with the Client, PMT and Technical Team;
- Project deliverables;
- Human resourcing;
- Costs/budget;
- Invoicing procedures; and
- Reporting procedures and review mechanism.

The contents of the Inception Report will be augmented by an updated work programme (to accommodate the agreed programme for the Technical Component). This will include any changes to the manpower schedule found to be necessary and consequential budget implications.

The Inception Report will form the contractual basis between the CD: RDM and the PSP. Once the CD: RDM has approved the Inception Report, project implementation will commence.

### 4.3 Phase 2: Study Implementation

The purpose of the Implementation Phase of the GRDS is to implement the project plan developed in the Initiation and Design Phase. The critical aspect for the PMT will be to ensure the flow of information between the DWA CD: RDM, the Technical Team and all other relevant stakeholders.

Phase 2 of the GRDS, calls for by far the major part of the time and cost input required. The ToR provide a clear breakdown of the anticipated Study Implementation activities, and this study phase could be described as a monitoring and auditing stage. In view of the nature of the work to be carried out in the Technical Component, the PMT will be required to ensure focussed integration and alignment of the diverse activities with the main project activities, based on the following defined tasks:

- Responsibility for the project administration including overall co-ordination and integration of the activities of the various components, the overall programming of the execution of work and assistance with the financial control of the study;
- Providing direction and relevant information to the Technical Team in line with the DWA requirements with participation where necessary to provide guidance and monitor quality;
- Convene regular meetings for the purposes of monitoring and supervision of the project;
- Coordination and regular budgetary updates and cashflows for the DWA;
- Audit all project invoices and recommend payment against satisfactory progress;
- Maintain Decision and Issue/Action Registers; and
- Feedback reporting to the DWA and other discussion forums.

As a result, this phase of the assignment will be characterised by a series of progress monitoring, integration control of results and PMC and PSC meetings. These are scheduled to be synchronised with important events and milestones according to the Technical Component work programme. These meetings, together with formal reporting systems and other forms of documenting information, will facilitate the structured information flow between the DWA, the PMT, Technical Team and other stakeholders.

The above-mentioned activities could be grouped into the following PMT related main tasks:

#### 4.3.1 Task 2.1: Project management

The main project management function during the Implementation Phase is to monitor, evaluate and audit the activities of the Technical Component. Furthermore to assess the status of critical milestones during the study execution. The PMT will obtain on a regular basis the most recent information on the actual progress, cost, resource use and performance of the Technical Component for purposes of monitoring, evaluation and audit. The project plans agreed to for the Technical Component are regarded as the benchmarks for project management. These are in the form of tasks completed, milestones reached and rate of expenditure, on a time scale and against quality objectives for outcomes. For this purpose the PMT will, based on the Technical Component work programme compile an integrated study programme to assist with project progress monitoring. In addition, the PMT will obtain information on technical tasks on a continuous basis from feedback and progress reports. Furthermore, where relevant, attendance of project meetings of various kinds including those of the Technical Team, for purposes of monitoring and evaluation.

An important aspect of this activity will be to detect deviations from project plans as early as possible. These should be done preferably as trends and before difficulties arise and to advise the DWA CD: RDM with recommendations for corrective action.

The Technical Team will always be fully involved in this process and will be able to suggest corrective actions.

An important outcome will be to advise the CD: RDM on the attainment of milestones and on cash flow planning.

Project management activities provide a means for the PMT to coordinate all activities in the study, and to ensure integration and alignment towards the main purpose of the GRDS.

#### 4.3.2 Task 2.2: Client liaison

Client liaison during the Study Implementation Phase will be facilitated by the day-to-day study management and the convening of PMC meetings. These are scheduled to be synchronised with important events and milestones according to the Technical Component work programme. These meetings will take place under the Chairmanship of the DWA Project Manager. Not more than nine PMC meetings are envisaged (refer to **Section 2.2.3**).

#### 4.3.3 Task 2.3: Technical monitoring and support

Technical monitoring by the PMT of activities and progress of the Technical Component is the backbone of the project management function. Technical monitoring will take place largely through the attendance of Reserve specialist meetings and work sessions of the Technical Component. This will ensure that :

- The Technical Team follow the procedures set out in the RDM manuals and apply the latest methodology and thinking based on the recent high confidence Reserve completed;
- The activities of the Technical Team during the Reserve determination studies be coordinated, integrated and aligned to the primary study objectives; and
- The ecological categories (ECs) provided by the Technical Team reflect the full range of possible socio-economic and ecological goals that stakeholders may support.

Since the technical Reserve determination studies will not include focused stakeholder participation activities, the PMT will play an extended role when ECs are developed for the various resource units. The purpose will be to ensure that these categories make adequate provision for the range of scenarios that stakeholders may expect in order to accommodate their socio-economic and ecological goals for the future. For this purpose the PMT will be supported by the Specialist Advisors defined in **Section 2.3.1**. In this regard the role of Drs Cate Brown and Geordie Ractliffe will be extended to support the PMT with specialist Reserve determination technical monitoring and review of deliverables.

Reserve determination rests heavily on an understanding of the natural, present modified and future managed flow regime. Hydrological and yield modelling of the various catchments will, therefore be a very important module in the Technical Component. Although the hydrological and yield modelling for the Technical Component will be undertaken by Mrs Estelle van Niekerk from AECOM, Mr Johan Rossouw, also from AECOM, will as a member of the PMT provide support in a review role. This specialist function will focus on the integrity of the model set-up, the techniques employed and the reporting format of results.

General technical monitoring will take place through reporting at PMC and PSC meetings. The attendance of specialist meetings and work sessions of the Technical Component, where relevant. In addition to technical monitoring, the PMT will also provide general and technical support to the Technical Team. In this regard the PMT supports the idea of a single PSP responsible for the overall study related GIS co-ordination and mapping.

The PMT will also assist with the preparation and presentation of reports on the study to forums in the DWA and to other organisations with an interest in the Gouritz WMA. This could include stakeholder groups, basin organisations or conferences and *symposia*. This will, however, only be conducted on request of the DWA or if requested via the DWA. In addition, it is assumed that DWA regional representatives, who are part of the PMC, will, in general, always attend such presentations to represent the DWA.

#### 4.3.4 Task 2.4: Stakeholder participation

As a follow-up to the Phase 1 public awareness activity, the following additional activities will be undertaken by the PMT during Phase 2:

##### 4.3.4.1 Task 2.4.1: Newsletter

The aim of the first newsletter is to be compiled and distributed by the PMT (Milkwood Communications) to inform stakeholders of the GRDS scenarios to be considered during the operational and scenario phase. The ecological implications of applying those scenarios will be briefly discussed in the newsletter. The primary objective of the newsletter, however, is to discuss the recommended scenarios for future management strategies with the DWA as the client and custodian for the Reserve study.

##### 4.3.4.2 Task 2.4.2: Stakeholder Workshop

The second Stakeholder Workshop to be arranged and coordinated by the PMT is aimed at consolidating the objectives discussed at the first stakeholder workshop and to provide feedback to stakeholders on the results of the study to date. In addition, the Technical Team will present their findings.

#### 4.3.5 Task 2.5: Progress and status reports

Progress and status reports will form the basis of performance reporting and will form an integral part of a full paper trail of project progress. Status reports (refer to **Section 6.5.1**) submitted by the Technical Team with interim invoices will facilitate a performance audit on a continued basis as well as at the end of the study when the assignment must be closed. These status reports will be in the form of a feedback matrix where progress with relevant tasks can be checked against fees claimed. The primary objective would be to provide feedback in terms of progress, cashflow, Historically Disadvantaged Individual (HDI) participation and risk controls. An overall Status status report will accompany each project invoice submitted for approval to the DWA.

Progress Reports (refer to **Section 6.5.2**) are to be submitted by the Technical Team to the PMT two weeks prior to each PMC Meeting, whereafter the PMT will submit a combined Project Management and Technical Component Progress Report to DWA

one week prior to a PMC meeting. These progress reports will form the basis of the progress discussions during PMC meetings. It is envisaged that the progress reports will include detailed progress/performance feedback related to project administration, technical aspects, work programme, risks, HDI participation and activities.

#### 4.3.6 *Task 2.6: Integration of technical results*

Based on experience gained during the ORDS, the PMT advisory/review team can assist to ensure integration of the technical Reserve determination results. This could include, amongst others, and in combination with the Technical Team, the following:

- Investigation into whether the wetlands Reserve determination method can be applied to the priority wetlands;
- Inventory and ecological classification and prioritisation of estuaries;
- Categorization of the other wetlands in terms of: relative ecological importance, sensitivity and uniqueness, type of wetland and its role/function, importance relative to position, present status to assess deviation from natural;
- Compilation of a list containing the relative ecological importance and sensitivity of estuaries, ranking them in terms of their present ecological status, categorising them in terms of the relative uniqueness and type and trajectory of change to assess level of Reserve to be concluded;
- Integration of ecological requirements between rivers and estuaries; and
- Integration of ecological surface water, groundwater and wetland requirements.

#### 4.3.7 *Task 2.7: Provision of data, reports and supporting information*

The PMT will provide all data, reports and supporting information to the DWA CD : RDM as per the specifications. In doing so, the PMT will establish, capture and maintain all data relevant to the project on a database comparable with the DWA electronic database systems. If such a database does not exist in a prescribed format, the PMT will prescribe and coordinate it.

In addition, the PMT will establish and maintain a project file with all correspondence related to the project, transfer a full set of copies of the project file on a regular basis to the DWA CD: RDM representative. On completion of the assignment the complete filing system with all the relevant documentation will be transferred to the DWA CD : RDM.

### 4.4 **Phase 3: Study Termination/Closure**

An important task in the Study Termination Phase of the assignment is to document all lessons learnt by the PMT and Technical Team and to translate this knowledge into improvements in the management of future Reserve determination studies. This can only be achieved by compiling a comprehensive report on both the Project Management and Technical Components. In this the outcome of the assignment is presented in management terms and an evaluation is given of the project management procedures. This will include documentation of the history, objectives, achievements, administrative performance, organisational structure, techniques used and the successfulness thereof.

The report will also include recommendations on how to improve the project management and interaction with the Technical Component of future Reserve

determination assignments, including an improved programme to address training and capacity building of DWA officials and mentorship more effectively. .

The Study Termination Phase will also include the preparation of the required administrative letters to the DWA Western Cape, including the generic conditions and taking into consideration the Water Use Licence Applications (WULAs) at the time of completion.

The approach to the relevant PMT tasks during Phase 3 is as follows:

#### 4.4.1 *Task 3.1: Review and management of deliverables*

Technical reports by the Technical Team will be compiled according to the defined reporting framework. These reports would, after compilation by the Technical Team, be submitted to the PMT, for review. Draft technical reports will be referred to the Specialist Advisors for review, as was decided in consultation with the DWA during the Project Initiation Meeting of 6 June 2013, before being signed off as being compliant with the ToR.

Further to the above it was agreed in the Project Initiation Meeting held on 6 June 2013 that only one review period would be held for reports by PMC and PSC Members. In this regard it is noted that all PMT members are also incorporated within the PMC. It was stipulated in this meeting that both editorial and technical reviews are to be done of the reports within a three week review period. A record of Actions/Decisions is to be kept, as was done for the ORDS. This should be done as part of the minutes and also, when reviewing the reports.

In addition to a Main Technical Report on the recommended Reserve, the Technical Team will be assisted to compile a recommendation to the DWA Director General, which can be signed off as an approval of the Reserve.

A database of cost and performance measures built up in the project will be developed and populated for ease of reference later. This database will be consistent with the Information Framework and the project management protocols and reporting structure. This will include an invoice and payment audit on the overall project.

It is recognised that the review and finalisation of project reports requires considerable time and usually follows various iterations. A well-established editing, updating and numbering system (with dates) will be used to manage draft reports to finality.

#### 4.4.2 *Task 3.2: Project auditing*

The main Project Management functions in the Study Termination Phase will be to ensure that all accounts from all service providers, i.e. the Technical Team and other PMT sub-consultants, are checked, expenditure is confirmed to be within the funds authorised, all work has been completed, deliverables are accepted and accounts are certified for payment by DWA. All work orders and contracts will be terminated, obtaining a certificate confirming that all invoices have been paid.

At this point a financial report on both the Project Management and Technical Components of the assignment will be submitted to DWA as one of the final steps in

terminating the assignment.

In addition, a project management performance audit report will be compiled. This will include comments on capacity building on the overall project.

#### 4.4.3 Task 3.3: Termination strategy

It is clear from the ToR that the responsibilities and activities of the PMT will follow the work programme of the Technical Team. In addition, the PMT responsibilities and activities are also dependant on the information needs of the DWA.

The PMT will seek to clearly specify an effective monitoring and control system as indicated in **Section 6**. However, the degree to which the technical studies will be completed to plan and programme will influence effective monitoring and control as well as the timeous termination of the GRDS.

The PMT responsibility related to preparing and presenting management information is dependent on the feedback provided by the Technical Team. Although these activities are envisaged and planned in general, it is not possible to programme and schedule all activities with confidence.

The following arrangements will be made to expedite the efficient termination of the assignment:

- Signing off and submission to the PMT of each sub-consultant agreement per sub-study;
- Monthly feedback on performance progress;
- Technical presentations during PMC meetings;
- Register of issues/actions as the project progresses;
- Register of decisions as the project progresses;
- Change control protocol;
- Standard report layout;
- A schedule for reviewing and commenting on draft reports to be followed with specific return dates for comments and updating of each report; and
- A Study Closure Report consolidating the study outcomes will be compiled progressively as the project proceeds.

#### 4.4.4 Task 3.4: Newsletter

A final newsletter is envisaged to serve as the final correspondence between the study team, the DWA and stakeholders. The primary objective of this newsletter is to discuss the recommended scenarios for future management strategies with the DWA as the custodian for the Reserve study. In addition to this, scenarios considered during the operational and scenario phase will be further discussed.

#### 4.4.5 Task 3.5: Reserve Templates

In terms of the compilation of administrative documents required for the approval of the Reserve, Dr Patsy Scherman of the Technical Component will, however, provide assistance to the PMT with the preparation of templates and associated letters to the DWA Western Cape.

#### 4.4.6 Task 3.6: Feedback to DWA

As a final wrap up of the GRDS, a Feedback Presentation to the DWA is envisaged to be held a month prior to the termination of the GRDS at the DWA Offices in Pretoria. The aim of this presentation is to provide the PSP the opportunity to present their respective studies and to advise on a way forward for the GRDS.

#### 4.4.7 Task 3.7: Study Closure Reports

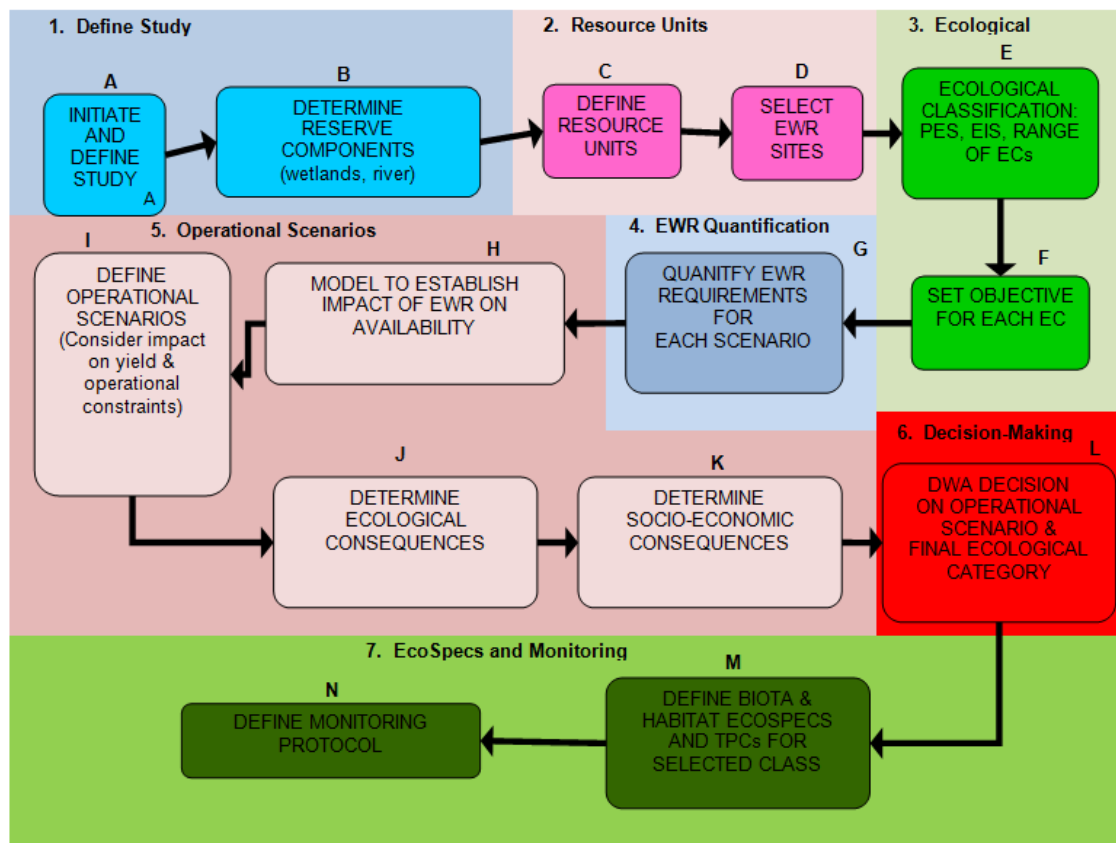
The PMT will compile and submit a Study Closure Report and an Executive Summary Report on the GRDS which will be bound separately and designed for the attention of DWA senior management and informed stakeholders.

The Study Closure Report will summarise the relevant Scope of Work, study management arrangements, financial management, reporting and study feedback, as well as a way forward for the GRDS and a reference point for future studies. The Executive Summary Report, will summarise the findings of the various technical tasks undertaken.

## 5 TECHNICAL COMPONENT APPROACH

### 5.1 General

As this is a Reserve study, the eight (8) step approach as illustrated in **Figure 5.1** will be adopted. The focus will be on the **ecological component** of the Reserve determination, although all steps will be covered.



**Figure 5.1: Diagram illustrating the 8-step Reserve process**

Methods have been widely tested and use tools such as the determination of EcoStatus for the EcoClassification step (Step 3), and Flow Stressor Response (FSR) for the flow determination step (Step 4). The objective of the EcoClassification step is to create an understanding of the Present Ecological State (PES) and ecological functioning of the river. Based on this, attainable ecological aims and objectives can be set. In Step 4 the Reserve flows are set, while Step 5 evaluates operational scenarios, i.e. the ecological consequences of flows coming past the EWR site. The process followed for the determination of low flows will be the Habitat Flow Stressor Response (HFSR) method, including a modified Building Block Methodology (BBM) approach for high flows. A range of high flows and their functions will be identified.

The HFSR method captures specialist knowledge on the relationship between flow, hydraulic parameters and the responses of instream biota, and concerns the application of a generic stress index (from 0 - no stress, to 10 - very high stress) describing the progressive consequences to the rheophilic biota of flow reduction. The relationships are then translated into a stress regime for any flow regime

scenario, in terms of magnitude, frequency and duration. The method is independent of the level of biological knowledge available, although (as with other approaches) this will affect the degree of confidence that can be placed in the flow recommendations (reference: Module A of the HFSR manual; IWR S2S, 2004).

## 5.2 Task structure

The task structure as indicated in **Table 5.1** will be adopted for the Technical Component of the GRDS:

**Table 5.1: GRDS Technical Component task structure**

<b>Task A: Project Management *</b>
Task A1: Technical team management and coordination
Task A2: Project Management Committee (PMC) meetings
Task A3: Project Steering Committee (PSC) meetings
Task A4: Financial management
Task A5: Technical team management - Rivers
Task A6: Technical team management - Estuaries
Task A7: Technical team management - Groundwater
Task A8: Presentation of study results to DWA
<b>Task B: Project Inception (Planning and Process Integration; Background Information)</b>
Task B1: Gather background information
Task B2: Design Project plan and produce Inception Report
Task B3: Mobilisation of study team
<b>Task C: Desktop Ecoclassification and Hotspot Identification: Rivers</b>
Task C1: EcoSystem services component (i.e. socio-economics)
Task C2: Rivers ecological and water quality components
Task C3: WRUI
Task C4: Desktop EcoClassification Report
<b>Task D: Reconnaissance and Cross-sectional Surveys: Rivers</b>
Task D1: Survey 1
Task D2: Survey 2
<b>Task E: Delineate Resource Units + Delineation Report</b>
Task E1: Rivers
Task E2: Estuaries
Task E3: Wetlands
Task E4: Groundwater
Task E5: Delineation Report
<b>Task F: Field Surveys</b>
Task F1: Estuary summer survey
Task F2: River biophysical survey 1
Task F3: River biophysical survey 2
Task F4: High flow surveys
Task F5: Groundwater field survey (hydrocensus + groundwater sampling)
Task F6: Wetland field survey: rapid assessment
Task F7: Wetland field survey: priority wetlands

<b>Task G: Data Analysis - Estuaries</b>
Task G1: Desktop Assessment - Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans estuaries
Task G2: Rapid Level - Duiwenhoks, Klein Brak and Touw/Wilderness estuaries
Task G3: Rapid/Intermediate Level - Goukou and Gouritz estuaries
<b>Task H: Data Analysis - Rivers</b>
Task H1: Analysis of data: EcoClassification for rivers
Task H2: Hydraulic data analysis and hydraulic modelling
<b>Task I: Data Analysis - Wetlands</b>
Task I1: Identification of priority wetlands
Task I2: Determining RC, PES, EIS
Task I3: Provide management recommendations and produce Wetland Report
<b>Task J: Rapid Reserve - Groundwater</b>
Task J1: Data collection and analysis
Task J2: Develop a conceptual groundwater model
Task J3: Short report on data gaps, groundwater sources and sinks and BHNR (groundwater)
<b>Task K: Reserve Determination of the Groundwater Component (Qualitative and Quantitative) – GRDM Method</b>
Task K1: Update groundwater conceptual model
Task K2: Conduct Reserve assessment
Task K3: Produce Groundwater Report
<b>Task L: Hydrology, Yield Modelling + Operational Scenarios</b>
Task L1: Evaluation of hydrology and compilation of flow records at all points of interests
Task L2: System modelling and yield analysis
Task L3: Water balances
Task L4: Liaison regarding scenarios + defining scenarios
Task L5: Running scenarios
<b>Task M: Estuary EWR Assessments (Workshops), including EcoSpes and Monitoring Plans</b>
Task M1: EWR workshop on the Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans, Duiwenhok, Klein Brak and Touw/Wilderness
Task M2: EWR workshop on Goukou and Gouritz estuaries
<b>Task N: River EWR Determination (Workshops), including Consequences to Operational Scenarios and Reports</b>
Task N1: Intermediate specialist meeting
Task N2: Rapid assessment
Task N3: Reports
<b>Task O: Basic Human Needs Reserve (surface water)</b>
<b>Task P: Consequences to Operational Scenarios – Rivers + Estuaries</b>
Task P1: Rivers / Wetlands
Task P2: Estuaries
Task P3: Economics
Task P4: Ecological Services
<b>Task Q: Estuary Reports</b>
Task Q1: Desktop Assessment Report - Hartenbos, Blinde, Piesang, Groot (Wes) and Bloukrans estuaries
Task Q2: Rapid Level EWR Report - Duiwenhoks, Klein Brak and Touw/Wilderness estuaries

Task Q3: Rapid/intermediate Level EWR Report - Goukou and Gouritz estuaries
<b>Task R: Ecological and Other Objectives</b>
Task R1 EcoSpecs & TPCs: Rivers
Task R2: Wetland objectives
Task R3: Groundwater objectives and monitoring programme
<b>Task S: Stakeholder Engagement</b>
Task S1: Input to advertisements, Background Information Document (BID), etc.
Task S2: Public meeting at start of study, October 2013
Task S3: Public meeting at end of study, provisionally May 2015
<b>Task T: Integrated Main Report</b>
<b>Task U: Training Workshops</b>
Task U1: Training Workshop 1 – Introduction + Rivers (East London)
Task U2: Training Workshop 2 – Estuaries + Wetlands (Cape Town)
Task U3: Training Workshop 3 – Modelling, Groundwater + Economics (Pretoria)
Task U4: Training Report – Appendix to the Main Report

\* The management of wetlands will be conducted as part of the wetland task, i.e. Task I.

### 5.3 Task Methodology

This section of the Inception Report consists of detailed information per task of the Technical Component. Task numbers in the text are aligned with those in the study programme schedule (**Section 5**). Tasks A and B present the management tasks and tasks C – U present the technical and reporting tasks, respectively, to be undertaken during the GRDS Technical Component. The following information is provided per task and/or sub-task:

- Short description;
- Task responsibility (i.e. consultant(s) undertaking the task);
- Deliverables and milestones;
- Information required (where relevant);
- Items not included in the budget (where relevant); and
- Other information as appropriate.

The approach to the Technical Component outlined in this section follows that as outlined in the SCA proposal of September 2011, with input from the Planning and Initiation Meetings held in May 2012 and June 2013, respectively

#### 5.3.1 Task A : Project management (Technical Component)

Project administration within the technical team takes place at two tiers. These are:

- **Overall technical and financial project management:**

Team leader: Dr Patsy Scherman

- **Task management:**

Rivers team leader: Delana Louw  
Estuaries team leader: Dr Susan Taljaard  
Groundwater team leader: Koos Vivier  
Wetlands: Mark Rountree

This task therefore allows for the following sub-tasks:

- Attendance of PMC meetings;
- Attendance of PSC meetings;
- Technical management;
- Financial management;
- Capacity building; and
- Presentation of study results to the DWA.

This task allows for monitoring of progress, liaison within the Technical Team, liaison with the PMT, general project management and administration, report editing and review. Possible changes to scope of work will be identified as early as possible. This will be affected via the project reporting matrix and will be brought to the Client's attention through the PMT and progress reports. All Task Leaders will be required to submit brief reports to the Technical Team Leader for inclusion in the progress reports.

Financial management will be via an overall Excel budget spreadsheet, cash flow spreadsheets and the DWA cashflow and budget reporting sheets. Progress reports will outline the budget status and cashflow.

The budget allows for the attendance of a number of project-related meetings, i.e. nine (9) PMC Meetings, five (5) PSC Meetings which will be undertaken together with PMC meetings or on days following PMC meetings, two (2) additional planning meetings, and a DWA feedback meeting. The two (2) additional meetings are Stakeholder or Public meetings listed under Task S. This is a total of **fourteen (14) meetings**.

**Task Responsibility:** P Scherman, J Sauer, D Louw, S Taljaard, K Vivier, M Rountree, other members as required.

**Deliverables:** Project management and reporting, financial management and reporting, attendance of required meetings as listed above, input to progress reports as required.

### 5.3.2 Task B: Project Inception

The objective of the project inception task consists of the following: Firstly, to produce a concise, clear and unambiguous Inception Report. This is required so that the DWA CD: RDM, PMT and Technical Team are clear as to the deliverables, timing and budget of the programme. Secondly, to ensure effective interaction and integration between key components of the study, i.e. estuaries, river, groundwater and wetlands. The collection of background information for the study is also included in this task.

**Task Responsibility:** P Scherman, D Louw, S Taljaard, K Vivier, G Huggins, M Rountree

#### **Deliverables**

- Draft I Inception Report - September 2013.
- Contracts and ToR for sub-consultants - November 2013.

- Draft II inception Report – January 2014

### 5.3.3 Task C: Desktop EcoClassification and hotspot determination - rivers

The aim of this task is desktop EcoClassification on a sub-quaternary (SQ) scale to determine PES, EIS, REC, causes and sources and hotspots, and identify EWR sites.

#### 5.3.3.1 Task C1: EcoSystem Services component

The present day socio-economic status of the whole catchment area will be described, based on the economic and social importance assessed from a literature review as well as mapping information. Where quantitative data is not available a qualitative description is to be provided. The objective of describing communities and their well-being is to:

- Highlight those areas and associated communities for whom dependence on the Ecosystem Services is likely to be important; and
- Provide the baseline against which to estimate changes in social wellbeing will be evaluated for scenarios.

This requires a description of the socio-economic conditions in these communities and constructing a measure or index of social well-being from the data collected. Communities in which EcoSystem Services are likely to be important are those that are typically rural and poor in nature.

It is important to point out that while EcoSystem Services will be identified and described in qualitative terms, a baseline value can often only be described for some of these, as the information required is not available without investing in a costly survey. As such it is therefore more practical to measure changes in EcoSystem Services values relative to a reference point rather than computing a baseline value. As such values with importance are analysed in this step. It should be noted that this assessment and evaluation applies to both rivers and estuaries.

**Task Responsibility:** G Huggins, D Mosaka , W Mullins

**Deliverables:** Input to task and completed spreadsheets - December 2013.

#### 5.3.3.2 Task C2: Rivers ecological and water quality components

A country-wide study, commissioned by DWA and the WRC has been undertaken to determine the PES and Ecological Importance (EI) – Ecological Sensitivity (ES) (PES/EI/ES) of South African Rivers at Sub-Quaternary (SQ) level. SQ reaches are delineated on the basis of hydrological changes, i.e. at tributary confluences; this data are provided by the Directorate: Resource Quality Services (D: RQS) as part of base data for the PES/EI/ES study. Each of the SQ reaches represents a Resource Unit (RU), i.e. the length of river for which a status assessment and EWR assessment will be valid for.

The PES information used as part of this process will therefore be sourced from the desktop PES/EI/ES study – WMA 16 was covered by Southern Waters. Based on the scope of work of the desktop study, the results should be accompanied by a description of the land-use activities and impacts responsible for the PES (in fact

sheet format). This information will form a crucial component of the current study as it will enable the team to derive whether the issues are flow or non-flow related.

**Task Responsibility:** D Louw; P Scherman

**Deliverables:** Spreadsheets compiled for specialists to complete - November 2013.

### 5.3.3.3 Tasks C3 and C4: Rivers and hotspot assessment

Due to the large number of SQ reaches, the process described in the Desktop EcoClassification and the identification of hotspots (Louw and Huggins, 2007) will be used to identify the hotspots and derive the level of Reserve assessment required.

The Desktop EcoClassification process used is described in **Figure 5.2** and relies on the results of the PES/EI/ES study. Once the hotspots have been identified, the different levels of Reserve assessment will be identified and motivations provided. This will provide motivation for the selection of priority RUs and the Rapid and Intermediate EWR sites.

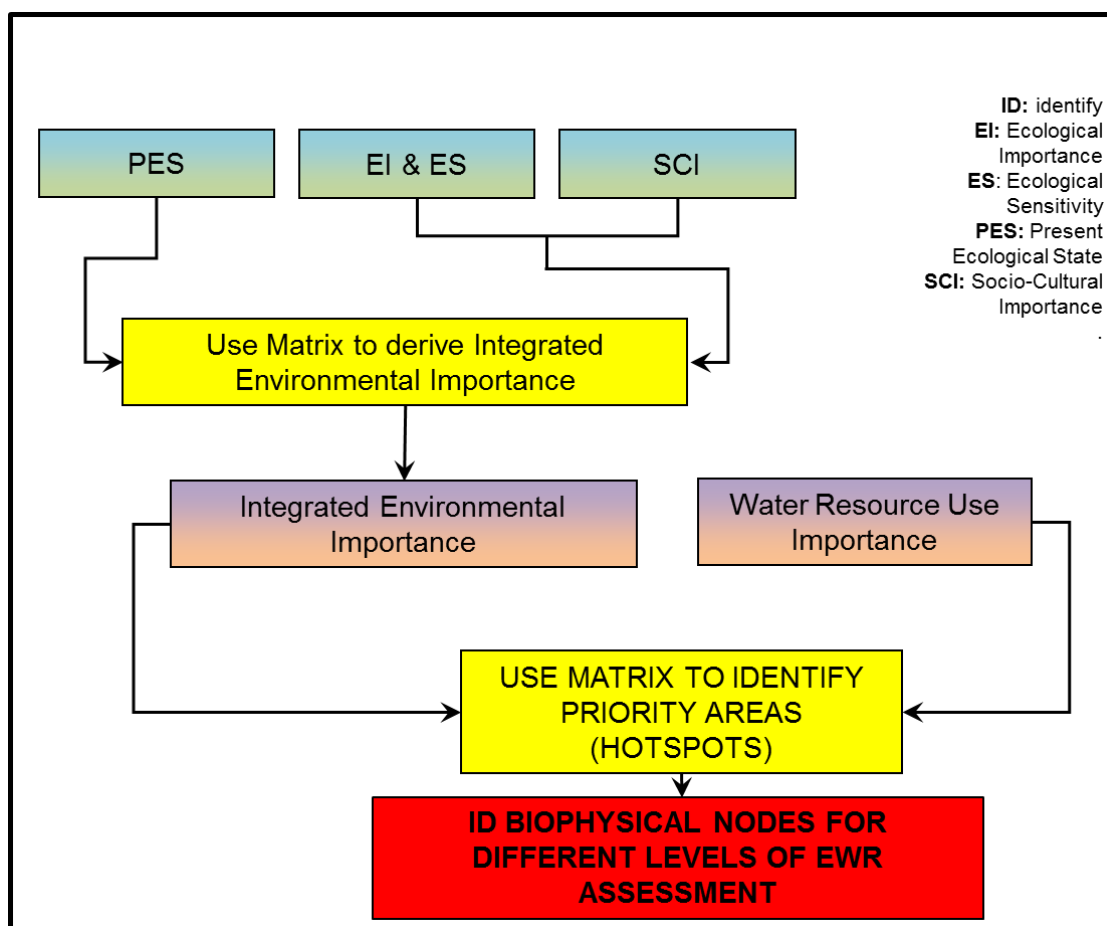
As part of this assessment, the Water Resource Use Importance (WRUI) must be undertaken as well as the Socio-Cultural Importance (SCI). Wetlands associated with rivers must also be identified. All of the above-mentioned information will be captured in excel spreadsheets that will allow integration of the different parameters or metrics considered (such as river PES, river EI, river ES). A workshop will be held from 6-10 January 2014 to populate the spreadsheets.

In cases where there are significant river-dependent wetlands present, the ecological importance (EI) of the river reach will be increased to reflect this additional importance.

**Task Responsibility:** D Louw, J Mackenzie, P Kotzé, M Rountree (wetlands), S Mallory (WRUI)

**Deliverables:**

- Water quality, socio-economics and WRUI input: December 2013
- Worksheet to populate spreadsheets: 6-10 January 2014
- Data collected for wetlands will be summarized in the Desktop EcoClassification Report.
- Spreadsheet with all results: February 2014
- Desktop EcoClassification Report (rivers): March 2014



**Figure 5.2: Summary of the process to identify priority RUs and EWR sites**

5.3.4 *Task D: Reconnaissance site visit and cross-sectional surveys*

Ecological Water Requirement (EWR) site selection is only relevant for rivers where Rapid III, Intermediate or Comprehensive Ecological Reserve Methodology (ERM) will be followed as outlined in Kleynhans and Louw (2008). EWR sites are set at specific points on the river. These points are critical sites within a Resource Unit (RU). The EWR sites must provide sufficient indicators for specialists to attach environmental flows to. The criteria for site selection as detailed in the Building Block Methodology (BBM) (King and Louw, 1998) manual and DWA (1999) will be followed.

Two reconnaissance field surveys will be undertaken to select the sites during January and February 2014. Cross-sections will be undertaken and water level measurements for hydraulic calibration measured. The field trip will also be used for the water quality (rivers) specialist to survey the area and collect diatom samples.

**Task Responsibility:** D Louw, A Birkhead, P Scherman (water quality), S Koekemoer (diatom analysis)

**Deliverables**

- Survey 1 - January 2014
- Survey 2 - February 2014

- EWR sites selected and documented in the Delineation Report - March 2014.
- Diatom sample analysis to be used for the water quality assessment.

### 5.3.5 Task E: Delineation of Resource Units

#### 5.3.5.1 Task E1: Rivers

Management Resource Units (MRUs) for rivers will be selected according to approved DWA methods outlined in DWAF (2008a). This more detailed delineation method is required as it ultimately guides the selection of EWR sites and provides the reaches applicable for management. The RU process defines the MRUs as final output and plays an important role in terms of the development of operational scenarios.

#### **Information required: Rivers**

- SQ reaches (available from DWA)
- Level II EcoRegions (available from DWA; Kleynhans et al., 2007)
- Geomorphic zones (available from DWA)

**Task Responsibility – Rivers:** D Louw

#### 5.3.5.2 Task E2: Estuaries

The objective of the task is to produce a map and description of the estuary zones.

**Task Responsibility – Estuaries:** S Taljaard

#### 5.3.5.3 Task E3: Wetlands

The most up-to-date version of the South African National Biodiversity Institute's (SANBI) Wetland Probability Map will be used together with any other available desktop information (including NFEPA layers) to undertake an initial assessment of wetland occurrence within the study area. Although these data are generally not ground-truthed, and should thus be treated with caution, they can provide a good indication of relative wetland occurrence, size and density across the WMA. Wetland types across the catchment will be broadly described according to their hydrological and geomorphological characteristics. These hydrogeomorphic (HGM) wetland types will be determined based on the criteria of SANBI (2009), DWAF (2007) and DWA (2011) approaches.

This initial information will be used, together with the geological, EcoRegion, vegetation and rainfall distribution data, to delineate preliminary Wetland Resource Units across the WMA for inclusion in the Resource Unit report. Wetland Resource Units (WRUs) are large areas of the study area delineated according to the similarity of wetland types and functions located within them.

A review of the available literature relating to the wetlands of the entire WMA (building upon the earlier Outeniqua Reserve study) will be undertaken. The objective of this task is to assist with baseline information in determining the Reference Conditions, PES of the wetlands across the study area as well as to assist in identifying potential priority wetland systems. Wetlands such as the Bitou wetlands

have already been prioritised, in addition to those identified during the ORDS.

**Task Responsibility – Wetlands:** M Rountree

5.3.5.4 Task E4: Groundwater

The task will be conducted following the steps below:

- Evaluate geological data and delineate Groundwater Resource Units (GRUs) based on hydrogeology, aquifer units and boundaries.
- Evaluate hydrological data and based on water level distributions, delineate GRUs based on surface water quaternary catchment boundaries.
- Evaluate merits for surface water quaternary catchment boundaries and hydrogeological boundaries.
- Identify wetland areas dependent on groundwater recharge.

**Task Responsibility – Groundwater:** AGES

**Deliverable for Task E:** Delineation Report - March 2014.

**Responsibility for Task E:** Report compilation – Scherman, with report inputs from the Technical team.

5.3.6 Task F: Field surveys

5.3.6.1 Task F1: Field survey to Duiwenhoks, Goukou, Gouritz, Touw/Wilderness, Klein Brak and Keurbooms estuaries

A once-off summer field survey will be conducted on five estuaries (Duiwenhoks, Goukou, Gouritz, Touw/Wilderness and Klein Brak estuaries) in accordance with the data requirements specified in the EWR methods for estuaries (DWAF, 2008b). As per the methods the following will be collected for different abiotic and biotic components:

**Table 5.2: Summary of data to be collected**

Component	Data to be collected
Sediments	Sediment samples for size distribution analysis and organic content
Hydrodynamics/ Water quality	Longitudinal salinity and temperature profiles along the system
	Collected along the estuary: System variables (turbidity, Suspended solids, Dissolved oxygen and pH) Dissolved nutrients (nitrite, nitrate, ammonia, phosphate and silicate)
	NOTE: These systems are not considered to be subject to major toxic pollution (no samples to be collected for trace metals or other toxins)
Microalgae	Water column chlorophyll measurements (phytoplankton)
	Intertidal/sub-tidal benthic microalgae

Component	Data to be collected
Macrophytes	Inventory and distribution of estuarine plant communities

Component	Data to be collected
Invertebrates	Zooplankton
	Macro-invertebrates
	Macrobenthos
Fish	Seine and gill-nets sampling
Birds	Bird counts along systems

Sampling of the different components will be coordinated to ensure that linking between components is possible.

A reconnaissance level field survey for selected components (hydrodynamics, water quality, microalgae and invertebrates) will also be undertaken on the Keurbooms Estuary in December 2013.

**Task Responsibility:** S Taljaard, L van Niekerk, J Adams, G Snow, T Wooldridge, S Lamberth, J Turpie, A Adonis, C Petersen, A Olds, J du Plessis

**Deliverable:** Estuary field survey - December 2013.

#### 5.3.6.2 Task F2 and F3: River biophysical surveys

Biophysical surveys will be undertaken at the EWR sites, specifically the Intermediate and Rapid III sites. The following components will be surveyed:

- Fish;
- Aquatic macro-invertebrates;
- Riparian vegetation;
- Fluvial geomorphology (not at Rapid III sites);
- Habitat assessment;
- Cross-sectional profiles;
- Diatom on-site data will be collected; and
- Photos will be taken.

Hydraulic data will be collected by measuring stage levels and longitudinal riverbed and water surface gradients at sites relative to a local datum. The objective of the hydraulic data collection is to procure field data at EWR sites to enable cross-sections to be rated (relationship between discharge and stage) and provide information on the topography of the EWR sites. Photopoint monitoring will also be undertaken.

**Task Responsibility:** D Louw, M Rountree, A Bok, P Kotzé, M Uys, B Colloty, J Mackenzie, N Mazungula, K Mgaba

**Deliverable:**

Task F2: River survey 1 - April 2014

Task F3: River survey 2 - June 2014

#### 5.3.6.3 Task F4: Additional high flow surveys

Additional surveys will be taken during high flows to calibrate the hydraulic model for Intermediate EWR sites. At an intermediate level of determination, the aim is to achieve the highest possible level of confidence in the hydraulic characterisation by undertaking data collection from a low flow and a high flow period of the hydrological season.

**Task Responsibility:** A Birkhead, assistant

**Deliverable:** Data provided in required format to specialists before the EWR workshop – June 2014

#### 5.3.6.4 Task F5: Groundwater

The first task to be conducted for the Groundwater Reserve component of this study will be Task E4: Delineation of Groundwater Resource Units (GRU). A Rapid Reserve determination with the GRDM method follows, conducted for all quaternary catchments, to get a preliminary idea of problematic and important catchments. The Rapid Reserve will also be one of the tools used to identify quaternary catchments for the groundwater field survey. The Rapid Reserve project actions are described under Task J.

The groundwater field survey (March – May 2014) will form an integral part of the data collection to be used as input to the Intermediate Groundwater Reserve determinations for selected GRUs, and will entail the following:

Hydrocensus and field survey on selected catchments that were identified during the Rapid Reserve. A maximum of 10 to 20 quaternary catchments will be selected to do a hydrocensus. The focus of the hydrocensus study and field survey will be on obtaining current groundwater levels and water quality samples from existing boreholes to determine aquifer status and vulnerability. Note that traditional field hydraulic tests, i.e. pump testing, will not be undertaken. Alternatively, a lower resolution could be used to survey more catchments. This aspect will be decided in conjunction with the client.

**Task Responsibility:** AGES

**Deliverable:** Field survey - March to May 2014

#### 5.3.6.5 Task F6: Wetlands – rapid field assessment

A short field assessment across the entire WMA (in later winter or spring 2014) will be undertaken to verify the results of the initial desktop work, and to obtain a general understanding of the types, importance and condition of wetlands within each quaternary catchment. The results from this task will be used to derive the quaternary catchment-scale wetland PES and EIS scores.

**Task Responsibility:** M Rountree, P Scherman

#### **Deliverables**

- Field assessment - August to September 2014.

- Input to wetland PES and EIS scores at the quaternary catchment level for wetlands across the study area.

#### 5.3.6.6 Task F7: Wetlands – field survey: priority wetlands

Two priority wetlands will be selected for further study. A field survey will be undertaken to the priority wetlands in September 2014. They will be classified by wetland type (using the system of DWAF, 2007) and the appropriate level of RDM assessment (Roundtree et al., 2013) will be determined based on wetland type, size, WULA applications or other similar anticipated water use considerations. EcoStatus (PES and EIS), REC and Ecological Specifications (Ecospecs) for these wetlands will be included in the final report.

**Task Responsibility:** M Rountree, P Scherman, B Colloty, S Koekemoer

#### **Deliverables**

- Field survey on priority wetlands: September 2014

#### 5.3.7 Task G: Data analysis - Estuaries

##### 5.3.7.1 Task G1: Desktop assessment - Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans estuaries

A desktop assessment will be conducted on these five systems, refining the 2012 National Biodiversity Assessment (NBA) using improved hydrological and water quality information. No detailed EWR templates will be produced for these systems.

**Task Responsibility:** Estuary team

**Deliverables:** Completed summary templates - August 2014.

##### 5.3.7.2 Task G2: Rapid Level assessment - Duiwenhoks, Klein Brak and Touw/Wilderness estuaries

EWR templates (as per Estuaries methods) will be prepared for each of the three estuaries. For the Duiwenhoks and Klein Brak estuaries, specialists will also be required to prepare data summary reports (containing analysis of field results). The templates will also include preliminary ecological specifications and monitoring plans to be refined at the EWR workshops.

**Deliverables:** Completed templates (including data summary reports where appropriate) - October 2014.

**Task Responsibility:** Estuary team

##### 5.3.7.3 Task G3: Intermediate Level: Goukou and Gouritz estuaries

Rapid/intermediate assessments will be conducted on the Goukou and Gouritz estuaries, based on the results of the once-off field surveys as well as available historical data and literature. Specialists will be required to prepare specialist reports on their individual components together with EWR templates (DWAF 2008). The

templates will also include preliminary ecological specifications and monitoring plans for each component to be refined at the EWR workshops.

**Deliverables:** Completed specialist reports and templates - November 2014.

**Task Responsibility:** S Taljaard, L van Niekerk, A Adams, G Snow, T Wooldridge, S Lamberth, J Turpie

### 5.3.8 Task H: Data analysis - Rivers

#### 5.3.8.1 Task H1: EcoClassification

Level IV EcoClassification will be applied at Intermediate and Comprehensive EWR sites. Methods as described in Kleynhans and Louw (2008) will be followed. The rule-based models developed as part of the Eco-Classification system and shown below, will be used to determine the PES for each of the components.

- Physico-chemical Driver Assessment Index (PAI): DWAF (2008c);
- Geomorphological Driver Assessment Index (GAI): Rowntree (2013);
- Fish Response Assessment Index (FRAI): Kleynhans (2007);
- Macro-invertebrate Response Assessment Index (MIRAI): Thirion (2007);
- Riparian Vegetation Response Assessment Index (VEGRAI): Kleynhans et al. (2008); and
- Instream Habitat Integrity (IHI): Kleynhans et al. (2009).

Level III Eco-Classification (Kleynhans and Louw, 2008) will be applied at the Rapid III sites using the FRAI, MIRAI, VEGRAI and IHI models.

**Diatom analysis:** Diatoms have been shown to be reliable indicators of specific water quality problems in rivers such as organic pollution, eutrophication, acidification and metal pollution. Diatom monitoring, together with macro-invertebrate monitoring, will provide a method that combines two independent indicator systems at different trophic levels. Diatom samples will be taken at all sites and analysed as outlined in Taylor et al. (2005) and Taylor et al. (2007). These methods were designed and refined as part of the Diatom Assessment Protocol (DAP), a Water Research Commission (WRC) initiative. The diatom results are useful for providing information on water quality related impacts on rivers and streams.

**Task Responsibility:** D Louw, M Rountree, A Bok, P Kotzé, M Uys, B Colloty, J Mackenzie, S Koekemoer, D Hughes (SPATSIM), P Scherman

**Deliverables:**

Completed models for EcoStatus assessment: July (Rapid sites) and September (Intermediate sites) 2014.

SPATSIM preparation: June 2014.

#### 5.3.8.2 Task H2: Hydraulics and hydraulic modelling

Analysis of field hydraulics data and preparation of look-up tables to be used by the ecologists (see methods in Birkhead, 2002).

**Task Responsibility:** A Birkhead

**Deliverable:** Hydraulic look-up tables for EWR workshop - June 2014.

5.3.9 *Task I: Data analysis - Wetlands*

5.3.9.1 Task I1: Identification of priority wetlands

Wetlands will be identified and prioritized using literature sources, discussions with local and regional experts, discussions with DWA CD: RDM and the regional DWA representatives regarding WULAs, and finally assessing them according to the prioritisation criteria employed in the DWA (2010a) and DWA (2010b) wetland prioritisation tasks. This will generate a ranked list of priority wetlands.

5.3.9.2 Task I2: Description of Reference Conditions, PES and EIS

Historical records, aerial photography and other available desktop information will be used to derive and describe the *reference conditions* of the wetland types within the WMA.

Low confidence desktop assessments of the Wetland PES for each of the quaternary catchments of the study area will be conducted using approaches based on similar desktop assessments of quaternary scale for rivers and tributaries (Kleynhans, 2000) that have been modified for wetlands (DWA, 2009; DWAF, 2010a; DWA, 2010b). These were done to provide an overview of the PES of wetlands across the study area.

The DWA has previously developed PES assessment tool for wetlands, i.e. the Wetland Index of Habitat Integrity (Wetland IHI) (DWAF, 2007). The impact criteria from this tool that are used to assess PES have been adapted for evaluation at the quaternary catchment scale. An average weighted score for each quaternary catchment is derived from the impact scores and these results yield an average PES category for all wetlands within the relevant quaternary catchment.

The river quaternary desktop EIS assessment tool (Kleynhans, 2000) has been adapted for use in determining the EIS of wetlands at the quaternary catchment scale. An average weighted score for each quaternary catchment is calculated and EIS categories assigned. This process allows for regions of the catchment with large and/or sensitive and/or important wetlands to be identified and highlighted for more focussed assessments (e.g. Reserves on priority wetlands or important wetland regions of the WMA) or monitoring activities.

Two priority wetlands will be selected for further study. The selection of two wetlands is based on resource availability, as outlined in the proposal for the study. They will be classified by wetland type (using the system of DWAF, 2007 and DWA, 2011) and the appropriate level of RDM assessment (Rountree et al., 2013) will be determined based on wetland type, size, WULA applications or other similar anticipated water use considerations. EcoStatus and Ecological Specifications (Ecospecs) for these wetlands will be included in the final report.

5.3.9.3 Task I3: Management Recommendations for Wetlands

The use of the river quaternary desktop EIS assessment tool (Kleynhans, 2000)

adapted for use in determining the EIS of wetlands, allows for regions of the catchment with large and/or sensitive and/or important wetlands to be identified and highlighted for more focussed assessments (e.g. Reserves on priority wetlands or important wetland regions of the WMA) or monitoring activities.

#### 5.3.9.4 Task I4: EcoSpecs and Wetland Report

A report explaining the approaches used, citing methods employed and results summarised and explained (including maps, tables and/or figures as appropriate) will be provided. Detailed results or data will also be provided in the supporting appendices, including the REC for priority wetlands. The report will include the delineation of wetland resource units, quaternary scale PES and EIS results, prioritisation of wetlands, management recommendations and Wetland EcoSpecs for the wetlands in the various wetland resource units.

**Task Responsibility:** M Rountree, P Scherman, S Koekemoer, B Colloty

**Deliverables:**

- Data analysis: September - October 2014
- Wetland Report: November 2014

#### 5.3.10 Task J: Rapid Reserve - Groundwater

The first groundwater component task to be conducted prior to the Rapid Reserve is Task E4 where Groundwater Resource Unit (GRU) and catchment delineation **will be** performed. The results of the field survey of Task F will feed into the groundwater Reserve determinations. The following tasks will be undertaken for the Rapid Reserve determination of the groundwater component:

- Data collection: Existing data will be used as input information to the Rapid Reserve as follows:
- The National Groundwater Database (NGDB), National Groundwater Archive (NGA) and local databases will be used for borehole locations, groundwater levels, flow rates, etc.;
- General surface water components such as evapotranspiration and runoff will be obtained from the WR2005 database;
- Evaluation of rainfall and recharge with respect to GRUs and quaternary catchments;
- Groundwater monitoring data obtained directly from DWA will also be used and verified during the survey;
- Development of a conceptual groundwater flow model that will take the groundwater flow components into account. These components would include all sources and sinks such as rainfall-recharge, dam seepage, boreholes, springs, wetlands, riparian vegetation, irrigation, forestry and evaporation losses;
- Specific focus will be given to the following:
- Delineation of the Table Mountain Group (TMG) aquifers and alluvial aquifers; close to surface water streams and the ocean;
- Wetlands and groundwater supported riparian zones;
- Groundwater discharge into the ocean;
- The basic human need (BHN) Reserve;
- Any areas of surface water – groundwater interaction; and

An important outcome of the Rapid Reserve determination would be to identify gaps in the data and conclusions, and to provide input for the more detailed Reserve study.

**Task Responsibility:** AGES

**Deliverables:**

- A spreadsheet with groundwater sources and sinks – March 2014.
- Data gaps outlined in a short report – March 2014.
- Any provision of Basic Human Needs from groundwater: March 2014.

**5.3.11 Task K: Reserve determination of the Groundwater Component**

The following tasks will be undertaken for the Reserve determination of the groundwater component using the Groundwater Reserve Determination Method (GRDM):

- Task F5: Groundwater field survey and hydrocensus in selected GRUs and quaternary catchments;
- Based on the Rapid Reserve outcomes, quaternary catchments and GRUs will be selected to perform more detailed (Intermediate) qualitative and quantitative Reserve determinations on, and will be done using the Groundwater Yield Model for the Reserve (GYMR) (WRC, 2010) method. This method will include the following tasks:
  - Statistical rainfall analysis: From the rainfall analyses, it will be important to determine assurance levels and the potential impacts of droughts;
  - Update the conceptual groundwater flow models from the Rapid Reserve that would take the required flow components into account. These components would include all sources and sinks such as rainfall-recharge, dam seepage, boreholes, springs, wetlands, riparian vegetation, irrigation, forestry and evaporation losses;
  - Qualitative and quantitative groundwater volume modelling using the GYMR method for the present day case;
  - Qualitative and quantitative groundwater volume modelling using the WRC (2010) method for the present day case;
  - Development of three scenarios and scenario modelling to reflect the pristine and potential future cases;
  - Groundwater quality consideration and influence of water quality on the Reserve. Selected samples (50) will be taken during the hydrocensus for water quality analyses; and
  - Surface water – groundwater interaction evaluation to determine groundwater outputs to baseflow and the Ecological Water Requirements (EWR).

A technical report for the groundwater component of the Reserve will be compiled.

**Task Responsibility:** AGES

**Deliverables:**

- Field survey results - May 2014.
- A Groundwater Report – June 2014.

### 5.3.12 Task L: Hydrology and yield modelling and operational scenarios

The following specific approach is recommended for the hydrological and yield modelling component of the GRDS:

#### 5.3.12.1 Task L1: Evaluation of hydrology and compilation of flow records at all points of interests

The *objective* of this task is to evaluate the latest available hydrology of the Gouritz WMA for the period October 1920 to September 2005, which is the latest hydrological information available for the system.

The *methodology* for the task will be to collect the latest WRSM2005 hydro-meteorological data. This will include the WRSM2000-configuration for the study area, summary of water users and all other relevant information with regards to the reservoir infrastructure, climatology and hydrology. The WRSM2000 model is the model prescribed for flow generation by the “*Guidelines for Decision Support Models for Water Evaluation*”. The simulated flow data will be scaled with the sub-division of the WRSM2000-model to create flow records at all points of interest, including flow records at the selected EWR sites. The *results* of the hydrological activities will be included in the relevant report.

The modelling team will assist the Reserve team with the collection of updated streamflow data at points of interest from the DWA Hydstra database.

#### 5.3.12.2 Task L2: System modelling and yield analysis

The *objective* of this task will be to configure the Water Resources Yield Model (WRYM) and determine the historical and stochastic yields from dams and also run-of-river yields, at key points in the study area. The WRYM-IMS model is the model prescribed for flow generation by the “*Guidelines for Decision Support Models for Water Evaluation*”. The *methodology* will be to set-up the WRYM configuration for the following scenarios:

- Current level of development with no EWR releases;
- Current level of development with EWR release; and
- Future level of development with EWR releases.

A natural yield is also specified in the ToR and will be included, if necessary. The scenario results will feed back to the Reserve team for their comments on adjustments to the Reserve. Provision is also made in the budget for analysing five scenarios as proposed by the Reserve team, in consultation with the client. The Reconciliation Strategy for the area, the Internal Strategic Perspective (ISP) for the Gouritz and the Water Management Strategy Team will be consulted as guidelines, with inputs from the Reserve, with regards to deciding on key areas where yield analyses are required.

Note that existing yield models already set up in the WMA will be used as far as possible. Liaison with the other modellers will form part of this task. A number of these models have been set up for DWA’s Small Dams project (contact: Jenny Pashkin, DWA, or Stephen Mallory, IWR Water Resources), and a WRC estuaries

project using either WRYM or the WRMP (Water Resources Modelling Platform) model.

The *results* of the yield modelling will be WRYM configuration together with historical and stochastic yields for the 1:50 year and 1:200 year return period at key points. Scenario analyses for the Reserve team will also be done.

#### 5.3.12.3 Task L3: Water balances

The *objective* of this task is to determine at critical points in the system if the water requirements of various scenarios are satisfied. The *methodology* will be to calculate water balances (usually at 1:50 year return period) at all points of interest in the study area. Water balances will be calculated to summarise the water requirements as well as the water supply for three scenarios which will be decided on in consultation with the DWA CD: RDM. The *results* of the water balances will summarise water requirements and supply in the catchment at points of interest for the various water users, namely domestic, irrigation, afforestation. It will also show the status of supply to support the EWR. The availability and contribution of groundwater will be identified.

##### **Task Responsibility - Tasks L1-3:**

- All tasks: E van Niekerk, S Mallory (as required)
- Hydrology Report: E van Niekerk, P Scherman, D Louw, S Taljaard, S Mallory (as required)

##### **Deliverables - Tasks L1-3:**

- Input to the Desktop EcoClassification Report – March 2014
- Preparation of basic hydrology, e.g. natural and present day flows - May/June 2014.
- Set up and run scenarios through the yield model (WRYM) - June to August 2014.

#### 5.3.12.4 Task L4: Liaison regarding scenarios

Liaison will be with the DWA as the Client, and the estuary and river task leaders. Maximum amount of scenarios evaluated for the estuary team will be six, i.e. reference, present day and a maximum of four future scenarios. Estuary scenario modelling will also take into consideration the models already set up for an existing CSIR project for the WRC.

**Task Responsibility:** DWA, P Scherman, D Louw, L van Niekerk, E van Niekerk, S Mallory (as required)

##### **Deliverables:**

- Decision on scenarios to produce - May to August 2014.

#### 5.3.12.5 Task L5: Running scenarios and reporting

This task will entail the actual running of scenarios and production of the Scenario Report:

**Task Responsibility:** E van Niekerk, S Mallory (as required), P Scherman (review)

**Deliverables:**

- Provision of hydrological scenarios for the present and reference conditions to the CSIR in the required Excel spread sheet format by June 2014 (all estuaries) and the operational scenarios by August 2014 (Duiwenhoks, Klein Brak & Touw/Wilderness, Goukou & Gouritz).
- Input to Scenario Report: January 2015

5.3.13 *Task M: Estuary EWR workshops, including EcoSpecs and monitoring*

5.3.13.1 Task M1: EWR workshop on the Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans, Duivenshok, Klein Brak and Touw/Wilderness

A 5-day workshop will be convened at the CSIR in Stellenbosch to conduct the following:

Desktop Assessment (improving on the 2012 NBA assessment): Hartenbos, Blinde, Piesang, Groot (Wes), Bloukrans (2 days). For each of the estuaries the following will be provided:

- Present Ecological State;
- Ecological Importance on a national and regional scale;
- Recommended Ecological Category; and
- Estimated ecological water requirements for the recommended EC.

Generic EcoSpecs and monitoring plan will be proposed for all the above-mentioned five estuaries, as well as for the Maalgate, Gwaing, Kaaimans, Goukamma, Noetsie, Keurbooms, Matjies and Sout (East) estuaries (8) for which such information were not provided as part of previous EWR studies.

Rapid Level Assessment: Duiwenhoks (1 day), Klein Brak (1 day) and Touw/Wilderness (1 day). For each of the estuaries the following will be provided:

- Present Ecological State;
- Ecological Importance on a national and regional scale;
- Recommended Ecological Category;
- Implications of selected future operational scenarios; and
- Ecological water requirements for the REC.

**Task Responsibility:** S Taljaard, L van Niekerk, J Adams, G Snow, S Lamberth, J Turpie, A Theron, P Huizenga

**Deliverable:** EWR Desktop / Rapid workshop - November 2014

5.3.13.2 Task M2: EWR workshop on Intermediate sites: Goukou and Gouritz estuaries

A 5-day workshop will be held at the CSIR offices in Stellenbosch for the Goukou and Gouritz estuaries to determine the following:

- Present Ecological State;
- Ecological Importance on a national and regional scale;
- Recommended Ecological Category;
- Implications of selected future operational scenarios;
- Ecological water requirements for the REC; and
- Refinement of ecological specification and monitoring plans.

At this workshop, specialist opinion will be gathered on whether the new data on the Keurbooms Estuary (following the previous study) warrants refinement of the preliminary ecological reserve determination. A letter capturing the outcome/recommendations will be prepared and submitted to DWA for their consideration.

**Task Responsibility:** S Taljaard, L van Niekerk, J Adams, G Snow, S Lamberth, J Turpie, A Theron, P Huizenga

**Deliverables:**

- EWR Intermediate workshop - January / February 2015
- Letter re: Keurbooms Estuary approach – January / February 2015

#### 5.3.14 Task N: River EWR determination

##### 5.3.14.1 Task N1: Intermediate specialist meeting

The objective of this task is to determine an EWR scenario for the range of Ecological Categories to be addressed at each EWR site. The process followed for the determination of low flows will be the Habitat Flow Stressor Response (HFSR) method (IWR S2S, 2004; O’Keeffe et al., 2002).

The output of this task will be the standard requirement, i.e. the .tab and .rule files for a range of ECs at each EWR site. SPATSIM (Hughes and Forsythe, 2006) will be used as a framework for the hydrological information used within the process, and to capture the EWR results. The output is generated at a specialist EWR meeting and serves as the initial demands for the range of ECs to be modelled using a yield model

**Task Responsibility:** D Louw, D Hughes, M Rountree, A Bok, P Kotzé, M Uys, B Colloty, J Mackenzie, P Scherman, A Birkhead (hydraulics input before workshop)

**Deliverables:**

- Evaluation of scenarios if required – September 2014
- Intermediate specialist workshop - September 2014
- EWR Report, Intermediate sites – February 2015

##### 5.3.14.2 Task N2: Rapid specialist meeting

The Rapid III approach will be followed at a provisional five EWR sites and will include a flooding component to ensure results which will be of higher confidence than what is normally associated with a Rapid III. This will then also allow for scenario evaluation. The Revised Desktop Reserve Model (RDRM; Hughes et al., 2011) will be used to generate Reserve estimates which will then be modified.

An additional provisional five EWR sites will be used for an 'extended Desktop assessment'. This will entail a review of the fish estimates only and will result in a higher confidence than a standard desktop estimate.

**Task Responsibility:** D Louw, D Hughes, M Rountree, A Bok, P Kotzé, M Uys, B Colloty, J Mackenzie, P Scherman, A Birkhead (hydraulics input before workshop)

**Deliverables:**

- Rapid specialist workshop - July 2014.
- Extended desktop assessment result - September 2014
- EWR Report, Rapid sites – December 2014

*5.3.15 Task O: Basic Human Needs Reserve (surface water)*

The Basic Human Needs Reserve (BHNR) approach as revised by DWA during October 2008 will be followed. In this method the BHNR only applies to the areas in which informal water sources are the means by which communities are provided with Schedule 1 rights. This study will therefore not provide estimates of population numbers above or below EWR sites, and will not give an indication of the amount of water needed to pass certain EWR sites in order to meet the demands downstream due to budgetary constraints.

**Task Responsibility:** G Huggins

**Deliverable:** BHNR assessment - May/June 2014.

(The budget does not allow for Ground-truthing to check the validity of the data. As the BHNR is generally a small percentage of the total EWR, the risk of inaccuracies having a significant impact on the BHNR allocation in WMA16 is considered low.)

*5.3.16 Task P: Consequences to operational scenarios – rivers and estuaries*

This task consists of four components, i.e. consequences to macro-economics and Ecological Services, and ecological consequences to rivers/wetlands and estuaries:

*5.3.16.1 Task P1: Rivers/wetlands*

It is assumed that ecological consequences will focus on estuaries as it is assumed that the operational scenarios will mostly impact on estuaries, or that the estuary consequences will override the river consequences. If any operational scenarios have to be assessed, they will be addressed during the Intermediate EWR specialist meeting and included in the Scenario Report.

**Task Responsibility:** D Louw, P Scherman, M Rountree, A Bok, P Kotzé, B Colloty, J Mackenzie, M Uys

**Deliverables:**

- Evaluation of scenarios at the EWR Intermediate workshop: September 2014
- Input to the Scenario Report: November 2014

### 5.3.16.2 Task P2: Estuaries

The potential impact of scenarios on the EcoStatus of estuaries will be addressed during the Intermediate EWR specialist meeting and included in the Scenario Report. The effect of the run-off scenarios on the occurrence and variability of the abiotic states will be predicted. Based on the changes in the abiotic states, the effect that each of the future scenarios will have on the biotic components is also predicted. For each of the scenarios, the Estuarine Health Index (EHI) score, PES category and EC will be determined.

**Task Responsibility:** S Taljaard, L van Niekerk, J Adams, G Snow, S Lamberth, J Turpie, A Theron, P Huizenga

**Deliverables:**

- Evaluation of scenarios at the Estuary EWR Intermediate workshop - January 2015
- Input to the Scenario Report - January 2015

### 5.3.16.3 Task P3: Economics

The economic study will consider conventional measures of economic impact due to changes in water yield under different scenarios at a qualitative level only. Qualified estimations of economic implications of different flow scenarios can be estimated using the secondary data available. This will be applied per relevant sector as far as is possible. If possible, the Value Added Gross Domestic Product (GDP) and employment multipliers will be calculated for each of the sectors, but this will not be to the detail or level of confidence that would be generated using the more commonly applied Social Accounting Matrix.

**Task Responsibility:** W Mullins, D Mosaka , P Scherman (compilation of integrated Scenario Report)

**Deliverable:** Input to the Scenario Report - January 2015

### 5.3.16.4 Task P4: Ecological Services

The impact of potential scenarios on Ecological Services provided by the river, as identified during Task C1, must be assessed. This is normally conducted using a simple spreadsheet approach during the EWR workshops once the scenario assessment has been completed. The ecological services that are influenced by in-stream flow are identified. For example, tourism and recreational value will be estimated in terms of expenditure generated by activities such as river rafting and angling, and multiple uses of estuaries. It will not, however, include the real estate value generated by those that invest in enjoying access to, and views of, aquatic ecosystems. Conservation value is another example of an ecological service, which will be considered for a number of systems, e.g. Touw/Wilderness.

**Task Responsibility:** G Huggins, P Scherman (compilation of integrated Scenario Report and water quality input), M Rountree, B Colloty, A Bok, S Taljaard, L van Niekerk, J Adams, G Snow, S Lamberth, J Turpie (specialist input at EWR workshops)

**Deliverable:** Input to the Scenario Report - January 2015

5.3.17 *Task Q: Estuary Reports*

5.3.17.1 Task Q1: Desktop Assessment Report - Hartenbos, Blinde, Piesang, Groot (West) and Bloukrans estuaries

A joint report will be prepared for the Hartenbos, Blinde, Piesang, Groot (West) estuaries, based on the outcome of the specialist workshop. The report will include EcoSpecs/ Monitoring plans for the Maalgate, Gwaing, Kaaimans, Goukamma, Keurbooms, Noetsie, Matjies, Sout (East) estuaries.

5.3.17.2 Task Q2: Rapid level EWR report: Duiwenhoks, Klein Brak and Touw/Wilderness estuaries

Three EWR reports will be prepared on the Duiwenhoks, Klein Brak and Touw/Wilderness estuaries. Data summary will be included as Appendices.

5.3.17.3 Task Q3: Rapid/intermediate level EWR reports: Goukou and Gouritz estuaries

EWR reports will be prepared on the Goukou and Gouritz estuaries. Specialist reports will be included as Appendices to these EWR reports.

**Task Responsibility:** S Taljaard, L van Niekerk, A Adams, G Snow, S Lamberth, J Turpie, A Theron, P Huizenga

**Deliverables:**

- Task Q1: Desktop Assessment report for Hartenbos, Blinde, Piesang, Groot (West), Bloukrans estuaries - December 2014
- Task Q2: EWR report (Rapid) on the Duiwenhoks, Klein Brak and Touw/Wilderness estuaries - January / February 2015
- Task Q3: EWR report (Intermediate) on the Goukou and Gouritz estuaries - March 2015

5.3.18 *Task R: Ecological and other objectives*

Note that estuarine monitoring programmes are covered under Task M.

5.3.18.1 Task R1: EcoSpecs and TPCs - Rivers

The objective of this task is to determine the EcoSpecs (the ecological component of RQOs) for the recommended EC and link the ECs to Thresholds of Potential Concerns (TPCs). EcoSpecs will be set for flow, quality, habitat and biota. Detailed EcoSpecs can only be provided for the EWR sites. Liaison with DWA will ensure that the most applicable and latest available information and tools will be used.

**Task Responsibility:** P Scherman, D Louw (flow), M Rountree, B Colloty, A Bok, M Uys, S Koekemoer (reporting)

**Deliverables:**

- EcoSpecs and TPCs for EWR sites: January 2015.
- Broad qualitative statements for additional sites: January 2015.

5.3.18.2 Task R2: Wetlands

- Detailed Ecological Specifications (EcoSpecs) for two priority wetlands will be provided. Drivers of present state for other sensitive wetlands will be outlined in the Wetland Report. Detailed results or data will be provided in the supporting appendices.

**Task Responsibility:** M Rountree, P Scherman, B Colloty, S Koekemoer

**Deliverable:** Wetland EcoSpecs as contribution to the Monitoring Report for the study - January 2015.

5.3.18.3 Task R3: Groundwater objectives and monitoring programme

Based on the output of the Groundwater Reserve determination, a groundwater monitoring programme will be developed per GRU and per quaternary catchment. Groundwater monitoring boreholes and geosites will be recommended per quaternary catchment and GRU. The monitoring programme will make provision for the following monitoring aspects:

- Spatial distribution and requirement for the number of monitoring sites. Monitoring sites could include boreholes, springs, groundwater discharge zones to the ocean, wetlands or riparian zones;
- Monitoring parameters such as water levels and water quality components; and
- Monitoring frequencies for parameters to determine requirements for monthly, quarterly or annual monitoring requirements.

**Task Responsibility:** AGES

**Deliverable:** Compilation of a monitoring programme and report as contribution to the Monitoring Report for the study - July 2014.

**Deliverable for the Task:** Ecological and other objectives: An Integrated Monitoring Report - March 2015.

5.3.19 Task S: Stakeholder engagement

This task covers all specialist technical input to stakeholder engagement task.

5.3.19.1 Task S1: Input to advertisements, Background Information Document (BID), etc.

**Task Responsibility:** P Scherman

**Deliverable:** Input as required: August/September 2013

5.3.19.2 Task S2: Public meeting, October 2013

**Task Responsibility:** P Scherman, D Louw, S Taljaard, K Vivier

**Deliverable:** Attendance of public meeting: October 2013

#### 5.3.19.3 Task S3: Public meeting, provisionally May 2015

**Task Responsibility:** P Scherman, other specialists as required

**Deliverable:** Attendance of public meeting: provisionally May 2015

#### 5.3.20 Task T: Integrated Main Report

This task is the production of the Main Report for the GRDS.

**Task Responsibility:** P Scherman, D Louw, S Taljaard, K Vivier, S Koekemoer (editor)

**Deliverables:**

- Task inputs - April 2015
- Summary Main Report for the study - May 2015

#### 5.3.21 Task U: Training workshops

The following training workshops are proposed and will be offered to DWA and trainees of the projects (at own cost).

- Workshop 1: General introduction to RDM and EWR studies, components of such studies and an introduction to biophysical riverine components (i.e. hydraulics/hydrology, geomorphology, water quality and diatoms, fish, macro-invertebrates, riparian vegetation);
- Workshop 2: Estuarine and wetland methods and approach; and
- Workshop 3: Yield modelling, and approaches to RDM components such as groundwater and socio-economics (i.e. market economics and Goods and Services). Focus on the importance of socio-economics when evaluating outcomes of operational scenarios.

**Deliverables:**

- Workshop 1: East London, May 2014
- Workshop 2: Cape Town, September 2014
- Workshop 3: Pretoria, January 2015

## 6 PROJECT MONITORING AND AUDIT SYSTEM

### 6.1 Approach

Considering the PMT tasks defined in **Section 4**, the main function of the PMT is to direct and co-ordinate the efforts of the Technical Team, both pro-actively and reactively, on a daily basis with a specific focus on delivering decision support information to the DWA.

The project will be managed along strict project control guidelines. These will be based on the concept of “critical path management” which will ensure that the project is managed in order to achieve all objectives on time, within budget and as per the stipulated briefs. The general approach adopted by the PMT is to set standard protocols and by monitoring progress to ensure that required deliverables are provided. This contribution will, however, not detract from the responsibility of the Technical Team to themselves manage the activities within their assignment.

Regular communication between the PMT and the Technical Team will provide for regular feedback to the DWA. Status and Progress Reports will provide the basis for discussions at PMC meetings. Issues that need discussion and direction will be referred to potential special meetings with the DWA. In addition to contact with the DWA CD: RDM, the PMT will keep close contact with the Technical Team with the aim to regularly monitor the Technical Component.

A provisional management framework for monitoring and control purposes is provided below. This framework provides information related to communication arrangements, change control, reporting, documentation control, invoicing procedures, timeframes of meetings/workshops, deliverables and milestones, etc.

### 6.2 Support required by Technical PSPs

In order to facilitate more accurate project monitoring and control, the Technical Team is expected to align their respective specialist studies in such a way as to achieve all objectives on time, within budget and as per the stipulated briefs. Considering this, the following is expected to be undertaken by the Technical Team:

- A set of clear and concise briefs detailing their programme of work, budget and schedule of deliverables will be sent out by the Technical Study Leader to all Technical Task Leaders once the Inception Report has been finalised;
- Monthly Status Reports, based on the requirements defined in Section 4.3.5 are to be submitted to the PMT;
- Progress Reports, based on the requirements defined in Section 4.3.5 are to be submitted to the PMT one week prior to each PMC meeting; and
- Risk identification and control measures are to be defined and submitted to the PMT.

### 6.3 Communication arrangements

For the purposes of the project, “communication” refers to overall written project related communication, including letters, faxes, e-mail etc., as opposed to general communication within a specific study team.

Six types of communications are envisaged, i.e. :

- Communication between the DWA and overall study team;
- Communication between the DWA and the PMT;
- Communication between the PMT and the Technical Team;
- Communication within the PMT, between the PMT Lead, Stakeholder Liason Service Provider and Specialist advisors/sub- consultants;
- Communication within the Technical Team, between the Technical Study Leader and sub-consultants/specialists and
- Communication with stakeholders.

In order for the PMT to be informed of study activities, the following communication arrangements are proposed:

- All communication between the DWA and overall study team needs to be through the PMT;
- All communication related to team changes, scope variation and motivations for additional budget should be through the PMT;
- All communication potentially affecting costs and programme and relating to quality should be copied to the PMT; and
- Electronic communication to the PMT should be copied to both Aldu le Grange and Simon von Witt.

Note that all changes and/or additions to the benchmark Scope of Work are to follow the process set out in **Section 6.4**.

#### **6.4 Change control**

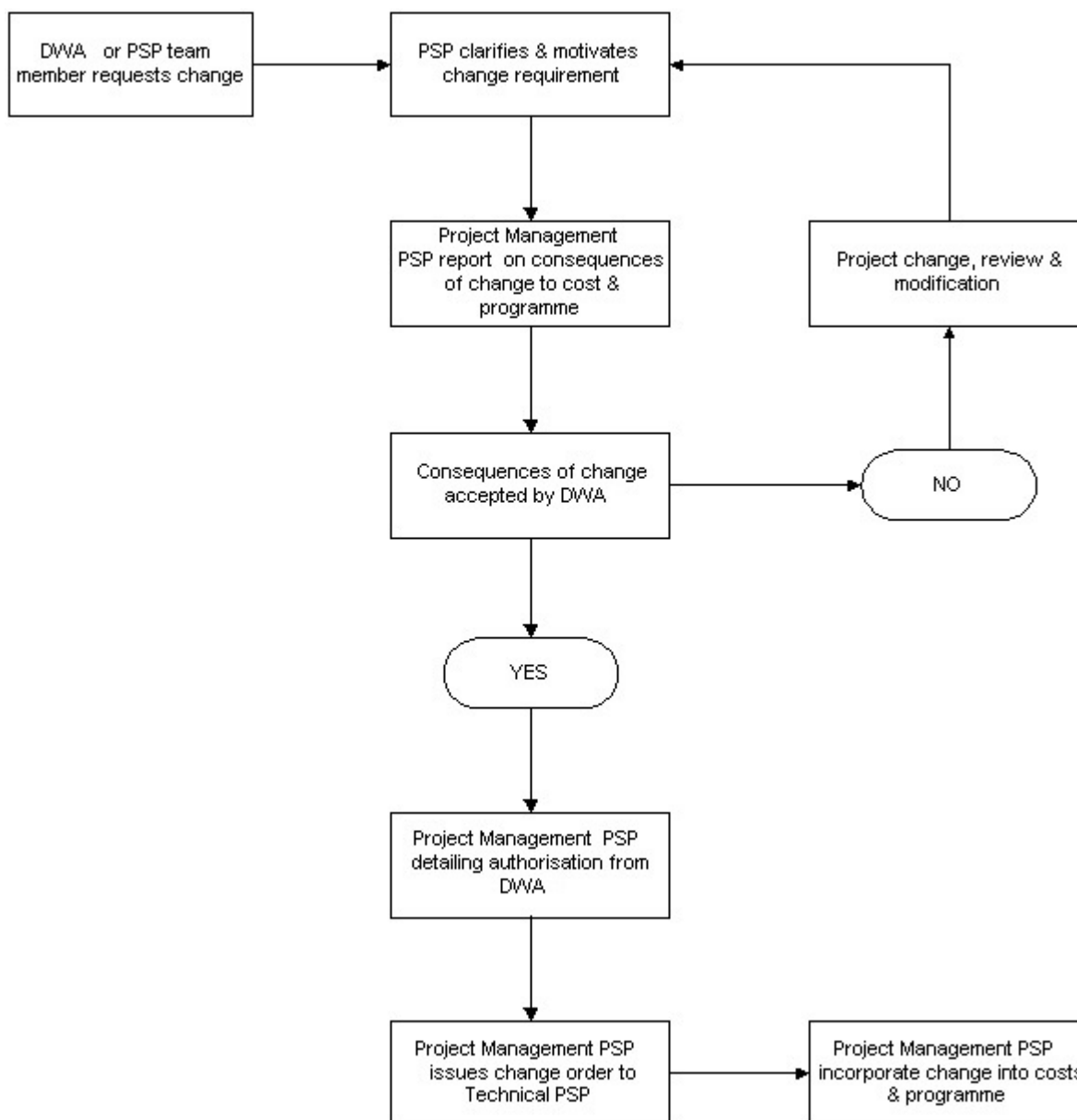
All variations or additions to the benchmark Scope of Work defined in the Inception Report are to be considered as “scope changes” requiring specific approval. In terms of any change control related to scope of work, budget, team composition, etc., a change control management procedure is proposed. The procedure will take into account relevant contractual provisions and identify all consequences of the relevant contractual provisions.

Formal authorisation by the DWA CD: RDM will entail a sign off procedure of sufficient documentation to clearly define the envisaged change and it's consequences.

Counselling will be implemented where problem areas are identified and, if necessary, team members will be replaced with the approval of the PMC. Delays in deliverables will be identified by the PMT and the DWA CD: RDM will be informed immediately in written format. Changes to the programme will be presented to the PMC for approval.

Central to the changed management procedure is the requirement that the PMT together with the Technical Team will thoroughly assess the implications of a proposed change prior to requesting the DWA: CD: RDM to comment.

A typical change control process is diagrammatically proposed in **Figure 6.1**.



**Figure 6.1: Change Control Process**

## 6.5 Performance reporting arrangements

Performance reporting by the Technical Team will be done through performance feedback based on Status and Progress Reports to be submitted with interim progress invoicing and prior to PMC meetings, respectively. PMC meetings are set at specific project milestones with the aim of presenting of deliverables to the PMC (refer to **Section 4.3.5**).

### 6.5.1 Project status reporting

Project status reporting by the Technical Team to the PMT is proposed for auditing purposes of task related progress and associated interim payment claims. It is proposed that this reporting should be matrix based with an indication of work done, progress and percentage completed, fees claimed and HDI participation related to a

specific task for which a payment claim is submitted. Reasons for change to work programme should be provided.

Overall project status reports will be submitted together with interim invoices to the DWA.

### 6.5.2 Progress reports

Detailed Progress Reports, with the purpose of reporting to the PMC, are proposed to be submitted to the PMT two weeks prior to each PMC meeting in order for the PMT to distribute it one week prior to the PMC meeting to the PMC. It is proposed that the contents of such reports, should at least include the following :

- Project administration
  - Overview of meetings
  - Issue/Action Register
  - Decision Register
- Technical
  - Reserve determination status (rivers, estuaries, wetlands, groundwater, socio-economic)
  - Outstanding issues
- Scope of work changes
  - Update status on deliverables
  - Issue register
  - Client approval
- Programme and milestones
- Cost management
  - Cost and cashflow
- Capacity building/training of HDIs
- Changes to PSP teams
- Risks
  - Identification and quantification
  - Monitoring and control
- Project outlook (way forward)
  - Activities to receive attention
- Planned activities for next reporting cycle

An example of the information required for the progress reports will be provided to the Technical Team Leader who then has to provide each Technical Task Leader with similar.

A consolidated Technical Progress Report is to be forwarded by the Technical Team Leader to the PMT two weeks before a PMC meeting. On receipt of a detailed Technical Progress Report, the PMT will forward a combined Project Management and Technical Component Progress Report to PMC members. This is to inform them about project progress to be discussed at the PMC meeting to follow.

## 6.6 Quality control

If the PMT, or any Specialist Advisor delegated by the PMT, or the responsible Technical Team identifies an area of specific action or procedure impacting on the quality of work by the Technical Team or its sub-consultant(s)/specialist(s), the item, activity, procedure, etc. is to be brought to the attention of the PMT and the DWA

CD: RDM.

The Technical Team and sub-consultant/specialist need to discuss with the PMT any corrective action necessary. A date by which corrective measures will be completed for re-inspection purposes needs to be provided. The Technical Team Study Leader needs to sign off an approval thereof and inform the PMT.

## **6.7 Control registers**

The GRDS is envisaged to be completed in about 24 months. Various meetings, including nine PMC and five PSC meetings, integration meetings and specialist as well as stakeholder workshops are envisaged. In addition, general discussions will continue on a regular basis. The control of all the discussions and decisions taken is therefore of utmost importance. In order to do so, separate Decision and Issue/Action Registers are proposed to be maintained by the PMT in terms of the overall project management function. In support of populating such registers, it is proposed that the Technical Team progress reports to be submitted prior to each PMC meeting include such control registers.

## **6.8 Reporting standards**

Report standards related to report numbering, report format, report references and a report review mechanism will be set in consultation with the DWA CD: RDM and the Technical Team.

### *6.8.1 Reporting deliverables*

The main reports regarded as study deliverables will be determined in consultation with the DWA CD: RDM and the Technical Team.

### *6.8.2 Report numbering*

The report numbers applicable to the main reports to be defined will be determined in consultation with the DWA CD: RDM.

### *6.8.3 Reporting format*

All reports related to the GRDS will be in a format prescribed by the DWA: CD: RDM. The format, page layout and font provided will be the reporting standard for the overall study, applicable to all reports.

### *6.8.4 Report references*

References to any of the GRDS reports or any other report are to be done in the same standard. Examples of this are provided below :

- Department of Water Affairs and Forestry (DWAf), 2007. Reserve Determination Studies for Selected Surface Water, Groundwater, Estuaries and Wetlands in the Outeniqua Catchment : Project Management Component. Inception Report. Edition 1. Resource Directed Measures Series, Sub-Series No RDM/K000/00/CON/0107, Pretoria.
- Knysna Municipality, 2004. Knysna Catchment Ecological Reserve Determination Study – Phase 1 : Situation Assessment and Rapid Reserve

- Estimations. Arcus GIBB Report Number J23047A/2004/01. Cape Town.
- Van Niekerk, L and Huizinga, P, 2007. Reserve Determination Studies for Selected Surface Water, Groundwater, Estuaries and Wetlands in the Outeniqua Catchment. Presentation, Estuary Workshop, 6 February 2007. Initial Estimates of the Environmental Water Requirements of the Great Brak Estuary. Cape Town.
- Department of Water Affairs and Forestry, 2007. Outeniqua Coast Water Situation Study : Main Report : Appendix - Environmental Aspects : Estuarine Reserve. Water Resources Planning Series, Pretoria.
- Department of Water Affairs and Forestry (DWAF), 2001. Moordkuil River Reserve Determination : Annexure H : Specialist Report. Ecological Reserve (Quantity) for the Moordkuil River (Quaternary K10F), Klein Brak River System, using the Rapid (Level 3) Methodology. Pretoria.

#### 6.8.5 Report review mechanism

Reports by the Technical Team will be produced on the following basis :

- The Technical Team is responsible for the integrated compilation of study/and task related reports, subject to input by specialists;
- Study and/or task related reports are to be compiled in Draft format;
- Draft Technical Reports are subject to one parallel round of comments by the PMT, including External Reviewers, PMC and PSC, respectively;
- Editorial and technical reviews are to be done of the reports by the abovementioned members within the review period;
- Review period is restricted to a minimum of three weeks and a maximum of four weeks; and
- Reports will be finalised one month after receipt of review comments.

#### 6.8.6 Report reproduction

The minimum requirements for report printing, binding and distribution are two draft black and white and four final full colour copies of each deliverable.

Both WORD and PDF versions of the final documents will be provided to the DWA: CD RDM at the end of the study. Five CDs, containing .doc and .pdf files of all reports, appendices and data, will be made available to the DWA CD: RDM. No allowance is, however, made for a fully interactive file with links, bookmarks and thumbnails.

### 6.9 Invoicing

The Technical Team are to submit monthly invoices, supported by monthly status reports (refer to **Section 6.5.1**), to the PMT. Invoicing for work done in a specific month is to be done at the end of the same month to reach the PMT not later than the 7<sup>th</sup> of the following month. Invoices received by the PMT will be checked for confirmation that the costs incurred are realistic in relation to the work done and variances are identified and explained, as well as corrected, if necessary. In addition, all claims for disbursements will be verified against proof provided. Invoices will then be forwarded to the DWA CD: RDM Project Coordinator for detailed checking, certification and payment. The PMT will maintain detailed records of expenditure, which will be reported on at PMC meetings.

## **7 EMPOWERMENT OF HISTORICALLY DISADVANTAGED INDIVIDUALS (HDI) AND TRAINING**

### **7.1 HDI participation**

The stated Historically Disadvantage Individuals (HDI) involvement in the study is for a minimum target participation of 30%. This relates to at least 30% for workload distribution in hours and also 30% for financial distribution. It is envisaged that both the Project Management and Technical Components are to achieve this minimum participation target:

The estimated HDI time and budget components of the Project Management Component are 52% and 40%, respectively.

The estimated HDI time and budget components of the Technical Component are 57% and 58%, respectively.

### **7.2 Training**

Although the TOR places strong emphasis on training, it does not provide direction regarding the percentage of budget that should be allocated to this task or require a specific training budget. A preliminary training programme is therefore proposed, which may be updated during the study and will be reported on in Progress Reports. All trainees might not participate in each step or workshop, depending on their level of experience, prior training and expected outcomes of training and capacity building. The Technical Team Leader, Dr Patsy Scherman will be responsible for running the training programme.

The training proposed will be primarily applicable suited to DWA personnel and will assume that participants have a broad understanding of the Reserve process.

Capacity building and training will take place at the following levels:

- DWA personnel;
- Specialist trainees as identified by specialists involved in the study; and
- Stakeholders, local specialists, etc. *This component will be not be specific training per se, but will be addressed through PSC Meetings on which stakeholders are represented, and the two Stakeholder Workshops to be held during the study.*

Aims for each level of training are be as follows:

#### **7.2.1 DWA personnel**

It is the recommendation that emphasis be placed on training of DWA staff, although it is understood that training objectives for D: RQS staff vs. CD: RDM or Regional Office staff may be slightly different. Trainees from D: RQS may prefer to join specialist trainees with a particular specialist mentor, depending on their intended career path, while CD: RDM and Regional Office staff generally require a more

holistic and integrated understanding of the RDM and Reserve field. Three workshops are proposed:

- Workshop 1 (East London): General introduction to RDM and EWR studies, components of such studies and an introduction to riverine components (i.e. hydraulics/hydrology, geomorphology, water quality and diatoms, fish, macro-invertebrates, riparian vegetation);
- Workshop 2 (Cape Town): Estuarine and wetland methods and approach; and
- Workshop 3 (Pretoria): Yield modelling, and approaches to RDM components such as groundwater and socio-economics (i.e. market economics and Ecological Goods and Services Attributes). Focus on the importance of socio-economics when evaluating outcomes of operational scenarios.

DWA CD: RDM personnel that have been identified for training are summarised in **Table 7.1**.

**Table 7.1: DWA CD:RDM trainees**

Team member	Field of Training
Vuledzani Muthelo	Wetlands, macroinvertebrates and hydrology
Gladys Makhado	Hydrology, hydraulics and estuaries
Happy Maleme	Estuaries, hydrodynamics and water quality (rivers and estuaries)
Thapelo Machaba	Hydrodynamics and water quality (rivers and estuaries)
Lawrence Maluleke	Groundwater
Netshiendeulu Ndivhuwo	Groundwater
Khoza Philani	Groundwater
Kutama Rotondwa	Groundwater
Tichatonga Gonah	Groundwater

Regional DWA staff that have thus far been identified for training are summarised in **Table 7.2**.

**Table 7.2: DWA Western Cape trainees**

Team member	Field of Training
Pumza Buwa	Estuary field survey
Richard Phaiphai	Estuary field survey
Xolelwa Bhele	Estuary field survey
Rafieka Johaar	Estuary field survey
Earl Herdien	River survey 1
Fezeka Daniel	River survey 1
Caroline Tlowana	River survey 1
Thembele Bushula	River survey 2
Andrew Gordon	River survey 2
Shaddai Daniel	Wetland survey

### 7.2.2 Specialist trainees

Specialist trainees will participate in the following activities of the study:

- Attendance of field surveys, where relevant. One-on-one training with identified specialists will take place during these surveys; and
- Attendance of relevant specialist workshops, where one-on-one training with identified specialists will take place. Attendance of Workshops 1 - 3 depend on the trainee's specialist field.

It is expected that DWA CD: RDM and/or D: RQS trainees may request to join certain specialists in their field surveys and workshops. Specialist trainees therefore include the following trainees that have been identified and budgeted for so far:

Mentor – trainee teams are as follows:

- General RDM process: Patsy Scherman (rivers) and Susan Taljaard (estuaries) - all trainees
- Freshwater invertebrates: Mandy Uys (mentor) and Khaya Mgaba from the Institute for Water Research at Rhodes University – to include DWA trainee;
- Freshwater fish: Anton Bok and Piet Kotzé (mentors) and Nkosinathi Mazungula from the South African Institute for Aquatic Biodiversity (SAIAB) – to include DWA trainee;
- Abiotic components and RDM process: Susan Taljaard and Lara van Niekerk (mentors) and Chantel Petersen from the CSIR – to include DWA specialist trainee/assistant;
- Estuarine fish: Steven Lamberth (mentor) and Jean du Plessis from CapeNature – to include DWA trainee;
- Estuarine invertebrates: Tris Wooldridge (mentor) and Alexis Olds from CapeNature – to include DWA trainee;
- Groundwater: AGES (mentor) - trainee to be identified, but to include DWA trainee. The groundwater capacity building component will be aimed at empowering individuals in:
  - The development of conceptual groundwater mode;
  - Evaluation and analysis of groundwater data; and
  - Principles of modelling and requirements for Reserve determinations.

It must be noted that the training to be provided during the GRDS forms only one step in the training process and that additional exposure to Reserve studies will be required before trainees are sufficiently capacitated to operate as specialist team members. The outcome of the training will be reported on in Progress Reports and in the Main Report. Training opportunities will also be communicated to DWA personnel (particularly CD: RDM, D: RQS and regional offices) for participation in workshops and field trips.

## 8 STUDY PROGRAMME

### 8.1 General

The overall study programme is to a large extent determined by the schedule of activities of the Technical Component. It is to be noted that at Tender Stage, the Technical Component study programme aimed at commencing the study during January, i.e. summer. However, with the study commencing during winter 2013, the Technical Component study programme had to be amended to cater for the seasonal variation. This resulted in the Technical Component project scheduling to be amended, resulting in the Initiation and Design Phase to be longer than anticipated. Initial discussions within the Technical Team have now progressed to a point where a Technical Component project scheduling and eventually an overall study programme can be presented with confidence.

Although the Inception Report Draft 1 was submitted at end September 2013, final DWA comments were only received during December 2013, result in a delay in the completion of the Inception Report until February 2014. However, the different study phases are not entirely independent and can overlap with each other, depending on the different technical approaches. Therefore some Technical Component Implementation Phase tasks already commenced in November/December 2013 with the result that the Technical Component is envisaged to still be completed within the allocated study period. However, the completion of the Main Report and Reserve Templates will be done thereafter. The abovementioned study programme is therefore proposed to be amended as follows:

- Initiation and Design : July 2013 – February 2014
- Implementation : December 2013 – January 2015
- Closure : February 2015 – May 2015

The overall study programme, providing for both the Project Management and Technical Components, is included in **Appendix D**.

### 8.2 Milestones and deliverables

As stated above, the overall study programme, is to a large extent determined by the schedule of activities of the Technical Component. Therefore the project scheduling of the Technical Component in terms of milestones and deliverables are discussed first below, whereafter the Project Management Component and overall study scheduling are discussed.

#### 8.2.1 Technical Component

The Technical Component key milestones, report and deliverable dates are shown in **Table 8.1** below. Deliverables (D) and milestones linked to the task structure provided above are set out in the following table. All references to deliverables are preceded with an ID = 'D', reports with an ID = 'R', field surveys with an ID = 'FS', workshops with an ID = 'WS' and meetings with an ID = 'M'. Q refers to the yearly quarter of three months, i.e. Q1-13 would refer to the first quarter in 2013 which would cover Jan, Feb and March. The timing for the Technical Component therefore starts from Q3, i.e. December 2013.

**Table 8.1: Scheduling of the Technical Component tasks for the Gouritz Reserve study**

Deliverables (D), Internal Deliverables (ID), Reports (R), Field Surveys (FS), Workshops (WS), Meetings (M)		Date	Task	Q
<b>M 1</b>	Initiation Meeting	June 13	A2	Q2-13
<b>R 1</b>	Inception Report: Draft 1	Sep 13	B2	Q2-13
<b>ID 1</b>	Info for stakeholder engagement, e.g. BID	Sep / Oct 13	S1	Q4-13
<b>ID 2</b>	Appointment: Sub-consultants	Nov 13	B3	Q4-13
<b>M 2</b>	PMC Meeting 1	Oct 13	A2	Q4-13
<b>M 3</b>	Stakeholder Workshop 1	Oct 13	S2	Q4-13
<b>ID 3</b>	Prepare spreadsheet templates	Nov / Dec 13	B1	Q4-13
<b>ID 4</b>	EcoSystem services input to Desktop EcoClassification	Dec 13	C1	Q4-13
<b>ID 5</b>	Water Resource Use Importance (WRUI)	Dec 13	C3/4	Q4-13
<b>ID 6</b>	Water quality, wetlands input to Desktop EcoClassification	Dec 13	C3/4	Q4-13
<b>FS 1</b>	Estuary field survey	Dec 13	F1	Q4-13
<b>WS 1</b>	Desktop EcoClassification (rivers) workshop	Jan 14	C2	Q1-14
<b>FS 2</b>	Reconnaissance river survey 1	Jan 14	D1	Q1-14
<b>FS 3</b>	Reconnaissance river survey 2	Feb 14	D2	Q1-14
<b>D 1</b>	Results spreadsheets: Desktop EcoClassification	Feb 14	C3/4	Q1-14
<b>FS 4</b>	Groundwater Reserve hydrocensus and field survey	Mar–May 14	F5	Q1/2-14
<b>M 4</b>	PMC Meeting 2	Mar 14	A2	Q1-14
<b>D 2</b>	Outputs from groundwater Rapid Reserve study: spreadsheet, short report + BHNR (groundwater)	Mar 14	J	Q1-14
<b>R 2</b>	Desktop EcoClassification Report	Mar 14	C3/4	Q1-14
<b>R 3</b>	Delineation Report	Mar 14	E	Q1-14
	<b>TRAINING WORKSHOP 1 (Intro and rivers): provisional date</b>	<b>May 14</b>	<b>U1</b>	<b>Q2-14</b>
<b>FS 5</b>	River Reserve survey 1: Winter rainfall area	Apr 14	F2	Q2-14
<b>M 5</b>	Liaison regarding scenarios	June 14	L4	Q3-14
<b>D 3</b>	Completed templates: Desktop estuaries	Aug 14	G1	Q2-14
<b>ID 7</b>	Preparation of basic hydrology	May - June 14	L1-3	Q2-14
<b>D 4</b>	BHNR (surface water)	May - June 14	O	Q2-14
<b>FS 6</b>	River Reserve survey 2: Summer rainfall area	June 14	F3	Q2-14
<b>ID 8</b>	SPATSIM preparation: rivers	June 14	H1	Q2-14
<b>ID 9</b>	Hydraulic look-up tables: rivers	June 14	H2	Q2-14
<b>M 6</b>	PMC Meeting 3	July 14	A2	Q2-14
<b>M 7</b>	PSC Meeting 1	July 14	A3	Q2-14
<b>WS 2</b>	Specialist workshop 1: Rivers (Rapids)	July 14	N2	Q2-14
<b>D 5</b>	Completed templates + reports: Rapid Level estuaries	Oct 14	G2	Q3-14
<b>R 4</b>	Groundwater Report	Aug 14	K3	Q3-14

Deliverables (D), Internal Deliverables (ID), Reports (R), Field Surveys (FS), Workshops (WS), Meetings (M)		Date	Task	Q
<b>ID 10</b>	Set up and run scenarios through yield model	June - Aug 14	L1-3	Q4-14
<b>ID 11</b>	Completed river models: Rapid sites	July 14	H1	Q2-14
<b>FS 7</b>	Wetland field survey: rapid assessment	Aug - Sep 14	F6	Q2/3-14
<b>ID 12</b>	Groundwater monitoring programme	Sep 14	R3	Q2-14
<b>M 9</b>	PMC Meeting 4	Sep 14	A2	Q3-14
<b>M10</b>	PSC Meeting 2	Sept 14	A3	Q3-14
<b>D 6</b>	Completed templates + specialist reports: Rapid/Intermediate Level estuaries	Nov 14	G3	Q4-14
<b>ID 13</b>	Completed river models: Intermediate sites	Sep 14	H1	Q3-14
<b>WS 3</b>	Specialist workshop 2: Rivers (Intermediates)	Sep 14	N1	Q3-14
	<b>TRAINING WORKSHOP 2 (estuaries and wetlands): provisional date</b>	<b>Sep 14</b>	<b>U2</b>	<b>Q3-14</b>
<b>FS 8</b>	Wetland field survey: priority wetlands	Sep 14	F7	Q3/4-14
<b>WS 4</b>	Estuary workshop: Desktop / Rapid sites	Nov 14	M1	Q3-14
<b>ID 14</b>	River input to Scenario Report	Nov 14	P1	Q4-14
<b>R 5</b>	Wetland Report	Nov 14	I4	Q4-14
<b>M 11</b>	PMC Meeting 5	Nov 14	A2	Q4-14
<b>R 6</b>	Estuary Report: Desktop assessment	Dec 14	Q1	Q4-14
<b>R 7</b>	EWR Report: Rapid sites, rivers	Dec 14	N3	Q4-14
<b>WS 5</b>	Estuary workshop: Intermediate sites	Jan/Feb 15	M2	Q4-14
<b>R 8</b>	Estuary Report: Rapid assessment	Jan 15	Q2	Q4-14
<b>R 9</b>	Estuary Report: Intermediate assessment	Mar 15	Q3	Q1-15
<b>ID 15</b>	Economic consequences of scenarios: Input to Scenario Report	Jan 15	P3	Q1-15
<b>ID 16</b>	Goods + Services consequences of scenarios: Input to Scenario Report	Jan 15	P4	Q1-15
	<b>TRAINING WORKSHOP 3 (yield modelling, groundwater, socio-economics): provisional date</b>	<b>Jan 15</b>	<b>U3</b>	<b>Q4-14</b>
<b>M 13</b>	PMC Meeting 6	Jan 15	A2	Q4-14
<b>M 14</b>	PSC Meeting 3	Jan 15	S3	Q1-15
<b>R 10</b>	Scenario Report	Jan 15	L4	Q1-15
<b>ID 17</b>	EcoSpecs, TPCs and qualitative statements: rivers	Jan 15	R1	Q1-15
<b>ID 18</b>	Wetland EcoSpecs	Jan 15	R2	Q1-15
<b>R 11</b>	EWR Report: Intermediate sites, rivers	Feb 15	N1	Q1-15
<b>M 15</b>	<b>PRESENTATION OF RESULTS TO DWA</b>	<b>Feb 15</b>	<b>A8 / A3</b>	<b>Q4-14</b>
<b>R 12</b>	Monitoring Report	Mar 15	R	Q1-15
<b>M 16</b>	PMC Meeting 7	Mar 15	A2	Q1-15
<b>ID 19</b>	Task inputs for Main Report	Apr 15	T	Q2-15
<b>R 13</b>	Main Report	May 15	T	Q2-15
<b>M 16</b>	PMC Meeting 8	May 15	A2	Q2-15
<b>M 17</b>	PSC Meeting 4	May 15	A2	Q2-15
<b>M 18</b>	Stakeholder Workshop 2	May 15	A2	Q2-15

## 8.2.2 Project Management Component

Based on the Technical Component project scheduling provided in **Section 8.2.1**, the Project Management Component task scheduling is provided in **Table 8.2**:

**Table 8.2: Schedule of PMT milestones and deliverables**

Milestone	Deliverables	Due date
Project commencement	-	7 May 2013
Project Initiation Meeting	Agenda, Arrangements & Minutes	6 June 2013
Stakeholder Workshop 1	Agenda, Arrangements & Minutes	2/3 October 2013
Inception Report (Draft 1)	Project Management protocols and Master Study Programme	30 September
PMC Meeting 1	Agenda, Arrangements & Minutes	2 October 2013
Stakeholder Meeting 1	Agenda, Arrangements & Minutes	3 October 2013
Estuary field survey		December 2013
Desktop Ecoclassification (Rivers) Workshop		January 2014
PMC Meeting 2	Agenda, Arrangements & Minutes	4 March 2014
Groundwater Reserve hydro census and field survey		March – May 2014
Desktop EcoClassification Report	PMT comment feedback and incorporation of DWA feedback	March 2014
Delineation Report	PMT comment feedback and incorporation of DWA feedback	March 2014
<b>TRAINING WORKSHOP 1 (Intro and Rivers)</b>		May 2014
Stakeholder Progress Report	Compilation of progress report	May 2014
BHNR (surface water)		May-June 2014
PMC Meeting 3	Agenda, Arrangements & Minutes	23 July 2014
PSC Meeting 1	Agenda, Arrangements & Minutes	24 July 2014
Specialist workshop 1 : Rivers (Rapids)		July 2014
Groundwater Report	PMT comment feedback and incorporation of DWA feedback	August 2014
Wetland Field Survey: rapid assessment		August –Sept 2014
Groundwater monitoring programme		September 2014
PMC Meeting 4	Agenda, Arrangements & Minutes	September 2014
PSC Meeting 2	Agenda, Arrangements & Minutes	September 2014
Specialist Workshop 2: Rivers (Intermediates)		September 2014

Milestone	Deliverables	Due date
<b>TRAINING WORKSHOP 2 (estuaries and wetlands) - provisional date</b>		September 2014
Wetland field survey: priority wetlands		September 2014
Estuary Workshop: Desktop/Rapid sites		November 2014
Completed templates + specialist reports: Rapid/Intermediate Level estuaries		November 2014
Wetland Report	PMT comment feedback and incorporation of DWA feedback	November 2014
PMC Meeting 5	Agenda, Arrangements & Minutes	November 2014
Stakeholder Progress Report	Compilation of progress report	November 2014
Estuary Report: Desktop assessment	PMT comment feedback and incorporation of DWA feedback	December 2014
EWR Report: Rapid sites, rivers	PMT comment feedback and incorporation of DWA feedback	December 2014
Estuary workshop: Intermediate sites		Jan/Feb 2015
Estuary Report: Rapid assessment	PMT comment feedback and incorporation of DWA feedback	January 2014
Estuary Report Intermediate assessment		March 2015
<b>TRAINING WORKSHOP 3 (yield modelling, groundwater, socio-economics) - provisional date</b>		January 2015
PMC Meeting 6	Agenda, Arrangements & Minutes	January 2015
PSC Meeting 3	Agenda, Arrangements & Minutes	January 2015
Scenario Report	PMT comment feedback and incorporation of DWA feedback	January 2015
EWR Report: Intermediate sites, rivers	PMT comment feedback and incorporation of DWA feedback	February 2015
<b>PRESENTATION OF RESULTS TO DWA</b>		February 2015
Monitoring Report	PMT comment feedback and incorporation of DWA feedback	March 2015
PMC Meeting 7	Agenda, Arrangements & Minutes	March 2015
Main Report	Compilation and submission to DWA	May 2015
PMC Meeting 8	Agenda, Arrangements & Minutes	May 2015
PSC Meeting 4	Agenda, Arrangements & Minutes	May 2015
Stakeholder Workshop 2	Agenda, Arrangements & Minutes	May 2015
Reserve templates		May 2015

\*PMC and PSC meeting and stakeholder workshop dates are all still to be finalised and only provisional dates are provided

The scheduling for PMC meetings indicated in **Table 8.2** is provisional, but primarily based on certain milestones to be reached by the Technical Team. The arguments for setting the provisional dates are as follows.

- PMC Meeting 1, 2 October 2013 : Stakeholder Meeting
- PMC Meeting 2, 4 March 2014 : Inception Report completed
- PMC Meeting 3, July 2014 : Desktop Ecoclassification and Delineation Reports completed
- PSC Meeting 1, July 2014
- PMC Meeting 4, September 2014 : Groundwater Report and Groundwater Monitoring Programme completed
- PSC Meeting 2, September 2014
- PMC Meeting 6, November 2014 : Wetland Report completed
- PMC Meeting 6, January 2015 : Estuary Report and EWR Reports completed
- PSC Meeting 3, January 2015

Presentation of results to the DWA, February 2015

- PMC Meeting 7, March 2015 2014 : Monitoring Report completed
- PMC Meeting 8, May 2015 : Main and Study Closure Reports completed;
- PSC Meeting 4, May 2015 : Stakeholder Workshop 2

### 8.3 Integrated timeframe of meetings and workshops

Based on the information presented in **Section 8.2**, an integrated chronological timeframe summary of all planned study related meetings, site visits, workshops and deliverables is provided in **Table 8.3** :

**Table 8.3: Integrated timeframe of meetings, site visits, workshops and deliverables**

Milestone	Action item	Date
Commencement of study		7 May 2013
Project Initiation Meeting		6 June 2013
Inception Report (Draft)	Project Management protocols and Master Study Programme	30 September
PMC Meeting 1	Agenda, Arrangements & Minutes	2 October 2013
Stakeholder Workshop	Agenda, Arrangements & Minutes	3 October 2013
Estuary field survey		December 2013
Reconnaissance river survey 1		January 2014
Reconnaissance river survey 2		February 2014
PMC Meeting 2	Agenda, Arrangements & Minutes	March 2014
Desktop EcoClassification Report	PMT comment feedback and incorporation of DWA feedback	March 2014
Delineation Report	PMT comment feedback and incorporation of DWA feedback	March 2014
Groundwater Reserve hydrocensus and field surveys		May – Mar 2014
River Reserve survey 1: Winter rainfall area		Apr 2014
<b>TRAINING WORKSHOP 1 (Intro and Rivers)</b>		May 2014
Stakeholder Progress Report	Compilation of progress report	May 2014
BHNR		May-June 2014
River Reserve survey 2: Summer rainfall area		June 2014
PMC Meeting 3	Agenda, Arrangements & Minutes	July 2014
PSC Meeting 1	Agenda, Arrangements & Minutes	July 2014
Specialist Workshop Rivers (Rapids)		July 2014
Groundwater Report	PMT comment feedback and incorporation of DWA feedback	August 2014
PMC Meeting 4	Agenda, Arrangements & Minutes	Sept 2014
PSC Meeting 2	Agenda, Arrangements & Minutes	Sept 2014
Wetland field survey: rapid assessment		Aug - Sept 2014
Specialist Workshop 2: Rivers (Intermediates)		Sept 2014
<b>TRAINING WORKSHOP (estuaries and wetlands)</b>		Sept 2014
Wetland field survey: priority wetlands		Sept 2014
Estuary workshop: Desktop/Rapid sites		November 2014
Wetland Report	PMT comment feedback and incorporation of DWA feedback	November 2014
PMC Meeting 5	Agenda, Arrangements & Minutes	November 2014
Stakeholder Progress Report	Compilation of progress report	November 2014
Estuary Report: Desktop assessment	PMT comment feedback and incorporation of DWA feedback	December 2014
EWR Report: Rapid sites, rivers	PMT comment feedback and incorporation of DWA feedback	December 2014
Estuary workshop: Intermediate sites		Jan/Feb 2015

Milestone	Action item	Date
Estuary Report: Rapid assessment	PMT comment feedback and incorporation of DWA feedback	January 2015
Estuary Report: Intermediate assessment		March 2015
<b>TRAINING WORKSHOP 3 (yield modelling, groundwater, socio-economics)</b>		January 2015
PMC Meeting 6	Agenda, Arrangements & Minutes	January 2015
PSC Meeting 3	Agenda, Arrangements & Minutes	January 2015
Scenario Report	PMT comment feedback and incorporation of DWA feedback	January 2015
EWR Report: Intermediate sites, rivers	PMT comment feedback and incorporation of DWA feedback	February 2015
<b>PRESENTATION OF RESULTS TO DWA</b>		February 2015
Monitoring Report	PMT comment feedback and incorporation of DWA feedback	March 2015
PMC Meeting 7	Agenda, Arrangements & Minutes	March 2015
Main Report	Compilation and submission to DWA	May 2015
PMC Meeting 8	Agenda, Arrangements & Minutes	May 2015
PSC Meeting No 4	Agenda, Arrangements & Minutes	May 2015
Stakeholder Meeting Workshop 2	Agenda, Arrangements & Minutes	May 2015
Reserve templates		May 2015

\*To be finalised and more dates included for PSC Meetings once decided

## 9 BUDGETARY ASPECTS

### 9.1 Total study budget

The total approved GRDS budget Value Added Tax (VAT) inclusive, is indicated in **Table 9.1**.

**Table 9.1: Approved study budget**

Study Component	Approved Budget (R – VAT inclusive)	% of Approved Budget
Project Management	3 689 427.60	29.8
Technical	8 698 815.60	70.2
<b>Total</b>	<b>12 388 243.20</b>	<b>100.0</b>

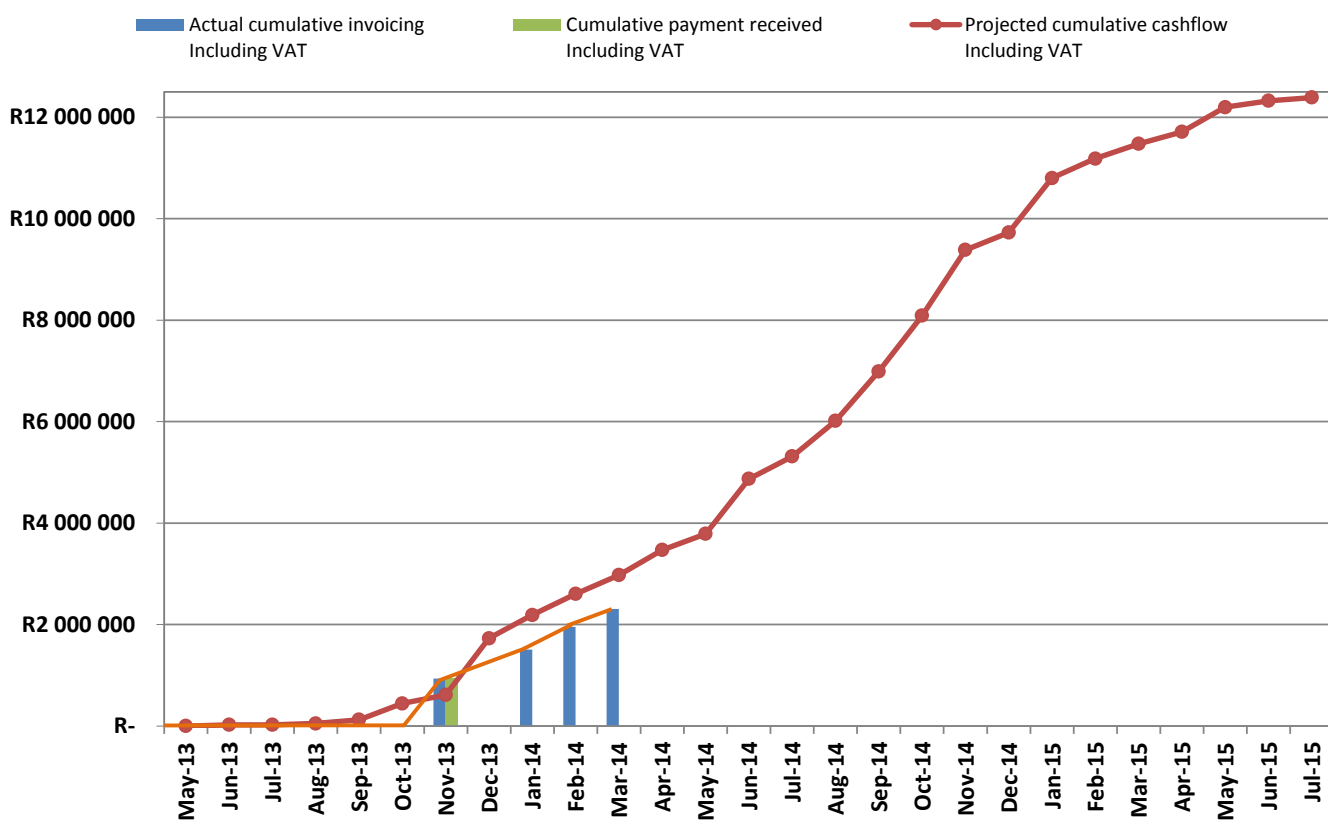
### 9.2 Cashflow

Based on the overall study programme and the approved study budget, a detail project cash flow per task or deliverable is included in **Appendix E**. A summarised cashflow is indicated in **Table 9.2**:

**Table 9.2: Cashflow projection**

Month	Projected monthly cashflow (Including VAT)	Projected cumulative cashflow (Including VAT)
May-13	-	-
Jun-13	22 344.00	22 344.00
Jul-13	-	22 344.00
Aug-13	27 972.34	50 316.34
Sep-13	74 142.34	124 458.68
Oct-13	320 193.43	444 652.11
Nov-13	169 235.99	613 888.10
Dec-13	1 115 385.38	1 729 273.48
Jan-14	459 648.51	2 188 921.99
Feb-14	414 447.51	2 603 369.50
Mar-14	372 581.01	2 975 950.51
Apr-14	492 888.47	3 468 838.98
May-14	318 460.82	3 787 299.80
Jun-14	1 084 893.68	4 872 193.48
Jul-14	440 292.08	5 312 485.56
Aug-14	701 317.88	6 013 803.44
Sep-14	976 529.62	6 990 333.06
Oct-14	1 097 046.08	8 087 379.14
Nov-14	1 297 234.42	9 384 613.56
Dec-14	340 406.55	9 725 020.11
Jan-15	1 076 424.02	10 801 444.13
Feb-15	383 132.48	11 184 576.61

Month	Projected monthly cashflow (Including VAT)	Projected cumulative cashflow (Including VAT)
Mar-15	290 667.62	11 475 244.23
Apr-15	237 493.68	11 712 737.91
May-15	484 168.51	12 196 906.42
Jun-15	127 010.90	12 323 917.32
Jul-15	64 325.86	12 388 243.18
<b>Total</b>	<b>12 388 243.18</b>	<b>-</b>



## 10 CONCLUSION

This Inception Report documents an investigative assignment, which demonstrates the project management and technical responsibilities and their respective activities which are associated with the GRDS project environment.

The delay in contractual award resulted in the Technical Component to be rescheduled in terms of seasonal variation with a resulting impact on the study programme. In addition, concerns raised at the initial Stakeholder Workshop and comments received thereafter not covered by the original ToR and the potential impact thereof in terms of scope variation may have either an impact on the budget or scope of work. Future ToRs should be specific according to budget limitations, thereby reducing Inception Phase scope of work discussions and changes. This will ensure that :

- Investigations remain focussed on real issues;
- The DWA and the PSPs have maximum opportunity to use limited resources effectively;
- The assignment reaches the best possible outcome; and
- Parties to the agreement are not unnecessarily constrained in inappropriate contractual arrangements.

**Appendix A**  
Terms of Reference

DEPARTMENT OF WATER AFFAIRS

**RESERVE DETERMINATION STUDIES FOR  
SELECTED SURFACE WATER,  
GROUNDWATER, ESTUARIES AND  
WETLANDS IN THE GOURITZ WMA**

TERMS OF REFERENCE  
FOR THE  
PROJECT MANAGEMENT AND TECHNICAL  
COMPONENTS OF THE RESERVE DETERMINATION  
STUDIES

2011

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CHIEF DIRECTORATE: RESOURCE DIRECTED MEASURES  
**DEPARTMENT OF WATER AFFAIRS**  
Private Bag X313  
PRETORIA 0001  
REPUBLIC OF SOUTH AFRICA

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## **1. INTRODUCTION**

### **1.1 BACKGROUND**

The National Water Act (Act No. 36 of 1998) (NWA) is founded on the principle that National Government has overall responsibility for and authority over water resource management for the benefit of the public without seriously affecting the functioning of the natural environment. In order to achieve this objective, Chapter 3 of the NWA provides for the protection of water resources, including groundwater resources, through the determination and implementation of the Reserve for these resources.

The Reserve is one of a range of measures aimed at the ecological protection of water resources and the provision of basic human needs. The Reserve is defined in terms of the ecological water requirements of the resource and assurance of supply provided at a defined spatial and temporal distribution. This is needed to provide in basic human needs and to protect the template and functioning of ecosystems to ensure ecologically sustainable development and utilisation of a water resource.

The Chief Directorate: Resource Directed Measures (CD: RDM) is tasked with the responsibility to co-ordinate all Reserve determination studies. These studies include the surface water, groundwater, estuarine and wetland components of water resources. The Reserve have priority over other water uses in terms of the Act, and should be determined before license applications are processed, particularly in stressed and over utilised catchments.

These terms of reference concerns the:

- Overall Project Management of the study;
- Technical co-ordination of the Reserve determination studies; and
- The preliminary Reserve determinations for selected rivers, wetlands, estuaries and groundwater resources in the WMA 16 ( Gouritz) catchments on various levels of detail.

### **1.2 STUDY MOTIVATION**

The need to undertake detailed Reserve determination studies for various water resource components became apparent due to various Licence applications, the conservation status of various Resources in this catchment and increasing land use impacts in the adjacent catchments, specific development pressures in the catchment area including forestry, farming activities, eradication of alien vegetation, waste water treatment works, etc and the associated impacts of these developments on the availability of water and the associated impacts the need to undertake more detailed Reserve determination studies. The resultant higher levels of confidence in the Reserve determination results will assist the DWA to make informed decisions regarding the authorisation of future water use and the magnitude of the impacts of the proposed developments.

### 1.3 STRUCTURE OF THE STUDY

The proposed study has been structured into two main components namely:

- Component 1: Project Management Component  
Component 2: Technical Component (Reserve determination studies)

These Terms of Reference apply to **both** the Project Management and Technical components. One Project Management Professional Service Provider (PSP) will be appointed to provide the overall management and integration of the results of the project. The technical component would be divided into 4 Management units (MU).

### 1.4 PURPOSE OF THE PROJECT MANAGEMENT AND TECHNICAL COMPONENTS

#### 1.4.1 Project Management Component

The primary purpose of the Project Management Component is for the appointed PSP to assist the Client with the co-ordination of all the activities required to achieve the management information objectives, including all the Technical Components of the Reserve determination studies during the duration of the study (18 - 24 months).

A secondary purpose is that the appointed PSP will be responsible for the integration of the results as provided by the technical teams.

#### 1.4.2 Technical Component

This component is aimed at the actual co-ordination and completion of the Reserve determination tasks to be undertaken for each sub-system. The determination of the Reserve for the identified aquatic ecosystems in the Gouritz WMA shall consist of the following:

- The determination of the water quantity and quality for the **rivers** at various Ecological Water Requirement (EWR) sites. The flow and non-flow Ecological Resource Quality Objectives (ERQOs) shall also be clearly defined for all the sites;
- The determination of the water quantity and quality of the priority wetlands, pans and lakes. The flow and non-flow related ERQOs for wetlands shall also be clearly defined;
- The determination of the water quantity and quality of **estuarine** freshwater requirements (EFRs) for various identified estuaries; and
- The determination of the **groundwater** quantity and quality requirements.

The following additional tasks should also be conducted as part of the Reserve determination studies:

- Outline the socio-economic water use situation in the study area;
- Undertake limited public awareness activities; and
- Determine the Basic Human Needs Reserve.

The specialists shall determine various ecological scenarios for each Reserve site (EWR, EFR and wetlands) and relate those scenarios to the defined ecological categories. The scenarios shall consider the realities of the current

and possible future ecological and socio-economic situation in the catchment. Current knowledge about stakeholder attitudes, values and expectations towards water resources of the catchment shall also be taken into account. No formal consultation with stakeholders shall, however, be required.

The latest available Reserve methods (both the 1999 RDM documents and the new updated method manuals for estuaries, groundwater and water quality for rivers) should be utilised when conducting the Reserve determination studies. Available data should be assessed and additional data collected during the field surveys.

Where previous studies have been undertaken, these results should be assessed as to the possible use in the proposed Reserve determination studies.

#### *1.4.3 Specific Requirement*

Technical:

Groundwater protection zoning and surface water/groundwater interaction will have to be assessed in detail in areas where such interactions or protection is identified in the previously determined groundwater component of the Reserve.

Capacity building

A further requirement for all the PSP teams is to include persons from previously disadvantaged communities in the project team and to train them in the day to day activities being undertaken. The aim of this will be to ensure the transfer of project management and technical skills to historically disadvantaged individuals or firms.

The contracted PSP must spend 3% of the payroll towards capacity building.

## **2. SCOPE OF WORK**

This section discusses the details of tasks for both the project management and the technical components..

### **2.1 PROJECT MANAGEMENT COMPONENT**

The scope of the professional services to be provided by the appointed Project Management PSP is as follows:

- Assist the Department with the overall management functions for the study and the dissemination of information to serve the requirements of the Client.
- Responsible for all day-to-day management activities of the study as set out in this ToR.
- Establish and maintain an information framework for both the Project Management and Technical Components.
- Integration of the technical component's results.

The work to be conducted by the appointed project management PSP is divided into three sequential phases, namely:

Phase 1: Study Initiation and Design

Phase 2: Study Implementation

Phase 3: Study Termination

It is expected that the three phases will run sequentially, but will overlap for at least some period. Following is a description of the objectives, tasks, activities and expected deliverables for each phase.

## **PHASE 1: STUDY INITIATION AND DESIGN**

### *2.1.1 Objectives*

The objective of Phase 1 is to ensure that the appointed project management PSP and the Client have a common understanding of the efforts and level of management, technical co-ordination and integration that will be required to achieve the objective of the study. At the start of this phase, the appointed PSP shall produce an Inception Report that will spell out all the tasks with cash flows within specific timeframes.

### *2.1.2 Tasks and Activities*

The appointed PSP is required to undertake the following sub-tasks/activities during the project initiation phase together with other tasks as appropriate:

- Familiarise and understand the nature and scope of work for the project management, technical co-ordination and integration of results.
- Familiarise and understand the nature and scope of historic and currently undertaken Reserve determination studies in the study area by various other organisations, including DWA. Compile an inventory of past and current related projects.
- Compile, in collaboration with the Client and the technical PSP teams, and in terms of the new water legislation, the management information requirements for achieving resource monitoring and protection objectives.
- Together with the Client, the appointed PSP shall provide a framework for planning, budgeting, monitoring and control of the study. Progress and outcomes will be measured against a baseline set in terms of technology (specifications, performance, quality), time (due dates, milestones) and cost (required cash flow programme). This baseline will be used to determine any variances and the corrective measures required during the execution of the work.
- Design the project monitoring and control system with three purposes in mind: (1) to detect current deviations and to forecast possible future deviations between actual progress and the Project Plans; (2) to trace the source of these deviations; and (3) to support management decisions by the Client aimed at putting the study back on the desired course. The appointed project management PSP will have to compare the work undertaken in the technical studies in terms of their ToR's and if deviations are detected report it to the Client who on their side must liaise with the relevant technical project leader of the technical team.
- Set up a management information system (MIS) in conjunction with the Client and other technical project leaders for ensuring the timeous

completion of the studies. This will include a Client filing system which will be kept at the offices of the PSP and a backup to be kept by the Client until the completion of the study.

- Identify the risk drivers in the technical assignments of the Reserve determination studies and develop contingency plans to handle unfavourable events if and when they occur.

### *2.1.3 Deliverables*

The Study Initiation and Design phase will be completed with a report documenting the outcome of this phase. This report shall contain at least the following:

- A statement of the objectives and scope of the management and other tasks to be performed.
- The management information requirement to ensure resource utilisation and protection.
- An integrated work programme, manpower schedule and cash flow estimate for each task on the programme.
- A consolidated work programme showing inter-module links and a total cash flow estimate.
- An information framework comprising a formalised progress report, expenditure report and exception reporting. A schedule of the progress meetings must be included.
- Documentation of any other subsidiary task(s) requested by the DWA Project Manager.

A Project Management component Inception Report, focussing on the project management and integration of the technical results, shall be compiled and will form the basis of the contract between the Client and the Project Management PSP.

## **PHASE 2: STUDY IMPLEMENTATION**

### *2.1.4 Objectives*

The purpose of the Implementation Phase of the study is for the appointed project management PSP to implement the project plan developed in the initiation and design phase. This phase of the project management component will be the most dominant in terms of effort and duration. The critical aspect for the appointed project management PSP in this phase is to ensure the flow of information between the Client, the technical PSPs and all other relevant stakeholders.

### *2.1.5 Tasks and Activities*

During the Implementation Phase the project management PSP shall undertake at least the following tasks and activities:

- Attend all the Reserve specialist meetings to ensure:
  - The technical PSPs carefully follow the procedures set out in the RDM manuals;
  - The ecological categories provided by the technical PSP teams reflect the full range

of possible socio-economic and ecological goals that stakeholders may support;

- The correct hydrological modelling techniques are applied by the technical PSP teams and that the Reserve results are available in such a format that it can easily be incorporated in yield simulation models; and
  - Provide final integrated Reserve determination results for the priority water resources in WMA 16.
- Collect and analyse the most recent data on the actual progress, cost, resource use and performance of the technical PSPs on a continuous basis during the execution of the studies. The project management PSP shall compare the information from the analysis to the project plans of the technical studies. If deviations are detected, the project management PSP shall inform the Client of the implications of the deviations and devise a scheme to mitigate these deviations.
  - Maintain liaison with the Client and the technical PSPs by establishing and convening regular Project Management meetings. The project management PSP shall provide the secretarial services for the meetings.
  - Ensure co-ordination between and integration of the activities of the technical PSPs during the Reserve determination studies and align the study to the primary objectives of the project.
  - Conduct regular evaluations and audits to assess the status of the critical milestones during the execution of the studies.
  - Compile and submit on a regular basis a consolidated (project management and technical components) progress and financial report as well as a performance audit of the study.
  - Compile a formal project schedule, utilising MS Projects, to present and manage the assigned projects.
  - Establish and maintain a project file with all correspondence related to the project, transfer a full set of copies of the project file on a regular basis to the departmental representative. On completion of the assignment the complete filing system with all the relevant documentation to be transferred to the Department.
  - Establish, capture and maintain all data relevant to the project on a database compatible to the departmental electronic database systems. If such a database does not exist in various sub-projects and tasks, this should be prescribed and co-ordinated by the appointed consultant.

A specific task of the project management PSP is to ensure integration of the technical results. This includes, amongst others, and in combination with the technical teams:

- The scaling (extrapolation and estimation) and/or of the Ecological Reserve determination results for specifically the rivers. This is to ensure that the EWRs at specific sites can be utilised on smaller and/or larger catchments for modelling purposes.
- The applicability of the wetlands Reserve determination method as applied to the priority wetlands should be investigated to determine the ecological

water requirements for those wetlands. The other wetlands in the catchment should also be classified in terms of the following:

- The relative ecological importance and sensitivity;
  - The ecological classification of the wetlands in term of the relative uniqueness and type;
  - The overall importance and present status of the wetlands to allow the department to make decisions to ensure adequate protection; and
  - The possible extrapolation of the results to the other wetlands in the catchment.
- Compile a list containing the following ecological details for the estuaries in the Gouritz WMA:
    - The relative ecological importance and sensitivity;
    - The rank of the estuaries in terms of their present ecological status;
    - The ecological classification of the estuaries in term of the relative uniqueness;
    - The ecological classification of the estuaries in terms of type;
    - The overall importance and present status of the estuaries to allow the department to make decisions to ensure adequate protection; and
    - The possible extrapolation of the results to the other estuaries in the catchment.
  - Ensure the integration of the ecological requirements between the rivers estuaries and groundwater.
  - Assist in the compilation of the monitoring programmes for the surface and groundwater resources of the WMA.

The integration of the technical results should be done during an integration workshop between the project management PSP and all the relevant specialists of the technical components (river, estuarine and wetlands).

#### 2.1.6 Deliverables

The appointed PSP shall produce at least the following:

- Progress reports, technical memoranda and other material necessary to properly inform the Client and other stakeholders. It should be noted that the progress reports required for the project management meetings shall be compiled by both the project management PSP and the technical component PSPs.
- Ensure that a complete record of proceedings of the project management meetings is received from the technical PSPs in good order and appropriately archived.
- Consolidated progress reports on a regular basis documenting, for each Reserve determination study, progress of work against programme, actual expenditure against cash flow estimates, significant findings and outcomes and corrective actions taken in respect of work programme and cash flow estimates. The input to these deliverables shall be obtained from the detail progress reports that will be compiled by the technical PSPs.
- A report containing the details on the integration of the results, the possible scaling and/or extrapolation of the results as well as a summary of the

overall importance and present status of the estuaries, wetlands and groundwater in the catchment.

### **PHASE 3: STUDY TERMINATION**

#### *2.1.7 Objectives*

The purpose of this phase is firstly to consolidate what the appointed PSP has learnt and to translate this knowledge into improvements in the management of future Reserve determination studies.

The project manager shall also ensure completion and termination of the technical studies.

#### *2.1.8 Tasks and Activities*

The appointed project management PSP is required to assist and support the Client with the following:

- Ensure that the Technical study team leaders document their findings in a format that can be used by the department to submit the Reserve determination results for approval by the CD: RDM.
- Assist the Client in selecting and approving independent reviewers for review of the study reports, if and when necessary.
- Ensure that all study documents including specialist reports are received from the technical study team leaders in the format and quantities described in Annexure D. The project management PSP must also ensure that all the project files are completed and transferred to the Client.
- Develop a database that stores and supports the retrieval of information on cost, schedules, resource utilisation and technical performance measurements of all the Reserve determination studies being undertaken in the catchment.
- Prepare a project management performance audit report and provide comments on the capacity building done by both the project management and technical PSPs of the study.
- Ensure that all the final invoices are paid and that a financial report is completed for each of the technical and project management components.
- Terminate all work orders and contracts.

#### *2.1.9 Deliverables*

The appointed PSP shall produce the following:

- A study performance audit report which shall include the following items:
  - Amount of actual project costs versus budgeted project costs; and
  - Technical and financial performance evaluation of the study.
- A comprehensive final report on both the Technical and Project Management Components documenting their history, objectives, achievements, administrative performance, organisational structure, techniques used and the successfulness of various technical techniques. The report will also include recommendations on how to improve project

management of future Reserve determination studies.

- The final report should also contain the information on the capacity building of HDIs during the project management and technical studies.
- Preparation of the required administrative letters to the regions including the generic conditions and taking into consideration the WULA's at the time of completion.

## **2.2 TECHNICAL COMPONENT**

A phased approach reflecting the life cycle of the project, with specific milestones at the end of each phase, shall be followed for each of the four sub-systems as identified in section 1.3:

Phase 1: Study Initiation and Design

Phase 2: Study Implementation

Phase 3: Study Termination

The generic tasks to be undertaken by all the technical PSPs are discussed in the following sections.

### **PHASE 1: STUDY INITIATION AND DESIGN**

#### *2.2.1 Objectives*

The aim of this task is for the PSPs to initiate the project, mobilise the project team and consult with the Client and the Project Management PSP regarding the development of a project Inception Report.

#### *2.2.2 Tasks and Activities*

The primary purpose of this phase will be to give the PSPs the opportunity to identify, assess and document all the relevant information currently available on the study area.

The PSP shall review existing literature, reports, maps, aerial photos, and any other relevant information on the Study Catchment including any system analyses conducted. The review shall specifically include an overview of previous Reserve determinations in order to provide a detailed Project Plan of the additional work that is required.

Based on the literature review, the PSPs shall identify and schedule the tasks and activities required to undertake the Technical Component of the Reserve Determination Studies and shall develop a Gantt chart in MSProject or similar project management software. This chart will form the basis of the Project Plan and Inception Report that is discussed in the next section.

Of particular importance at this stage is the development of consensus between the technical PSPs, the Project Management PSP and the Client regarding the particular requirements of the assignment including the finalisation of the level of detail, scope of work, work processes and programmes and how they will be monitored and controlled by the Project Management PSP. The necessity and level of study detail associated with the wetlands component must specifically be clarified in this document.

All aspects must be formulated into a Project Plan to be included in the Inception Report which will serve as a baseline from which progress can be monitored, evaluated and controlled against defined goals and performance measures including cost, time, quality and risk of potential additional work. The Project Plan should also cover all aspects of the project in sufficient detail to support work authorisation and execution, taking due note of the phased approach.

The Inception Report will form the basis of a contract between the Client and the PSP. Once the Client has approved the Inception Report and the contract has been signed, project implementation can commence.

Each technical PSP shall develop a Management Information System MIS with the purpose of:

- Providing an early warning system should deviations from the Project Plan occur;
- Constantly feeding study progress information to the Project Management PSP;
- Managing the financial aspects of the study;
- Providing information on human resource utilisation, especially with regard to historically disadvantaged individuals (HDIs);
- Reporting study progress at project management meetings (including cashflow reports) and at other forums;
- Keeping record of study related correspondence and documentation.

The technical PSPs shall in consultation with the Project Management PSP use the Project Plan to identify the key factors and critical tasks and activities to be monitored and controlled during Phase 2: Study Implementation.

The MIS will specify the following:

- The frequency and format of study progress, financial and human resources data to be collected and transferred to the Project Management PSP.
- The format of financial, progress, human resource and interim reports to be produced by the PSPs;
- A GIS information system that will capture as much data as possible in a GIS database;
- The format of a record keeping system for all technical correspondence and documentation of the study.

The exact information needs and reporting process shall be developed between the Project Management PSP and the technical PSPs after consultation with the Client.

### *2.2.3 Deliverables*

An Inception Report containing the Project Plan shall be submitted to the Project Management PSP for discussion and approval at the project management meeting. The approval of the project plan should take place

before proceeding with Phase 2. The Inception Report must include but not be confined to the following elements:

- **Overview** - A detailed statement of the objectives and scope of the Technical Component of the study.
- **Reserve Components** – A description of the study area and the aquatic ecosystem components of the Reserve that will be investigated such as Rivers, Estuaries, Wetlands and groundwater as well as the level of investigation of each component.
- The **technical approach** and methodologies to be followed to achieve the objectives of the study.
- **Contractual Aspects** - A description of the MIS, requirements for study reports, client supplied information, liaison arrangements with other PSPs, expected technical specifications and deliverables and the delivery schedule.
- **Project Plan** - The Project Plan will provide **detailed descriptions of various tasks** that must be completed and deliverables produced in order to achieve the objectives of the study. An integrated Gantt chart in MSProject or similar, which defines the interface between tasks and cash flows and clearly indicates project milestones, will form the basis of the Project Plan.
- **Resources** - A clear description of the personnel, financial and other resources required for the study is required in this section. **The availability of specialist skills during the duration of the project must be ensured.** A project budget must be formulated by project activity or work package and must make provision for the possible development of methodologies and procedures especially as far as the groundwater and wetlands tasks are concerned.
- **Review methods** - a brief description of the procedure to be followed to review the study results must be provided.

## **PHASE 2: STUDY IMPLEMENTATION**

### *2.2.4 Objectives*

This phase will only proceed once the Client has approved the Inception Report, the contract between the technical PSPs and the Client has been signed and the PSPs are formally instructed to proceed with the execution of the study. This phase of the study is expected to dominate all the other phases in effort and duration.

In this phase the water quantity and quality characteristics of various Ecological Water Requirement sites in the study area will be determined. The management of study progress and changes in the original Project Plan will also be key focus areas.

### *2.2.5 Tasks and Activities*

The specialists shall be expected to undertake the tasks and activities as described in the project plan in accordance with the level of confidence, approach and methodologies proposed in the Inception Report. The main tasks to be undertaken, depending on the sub-system as described in section 1.3

and using the generic steps as defined in the RDM manuals, during this phase are as follows:

- Assist with the preliminary Reserve determination for the surface water component of the Reserve (quantity and quality) for the **rivers** in the study area. The methodology as set out in *DWAF (1999): Resource Directed Measures for Protection of Water Resources; Volume 3: River Ecosystems Version 1.0 (Revised water quality methodology, 2002)* and any other subsequent method development as approved by the D:RDM should be used.
- Assist with the preliminary Reserve determination for the surface water component of the Reserve (quantity and quality) for the **estuaries** in the study area. The methodology as set out in *DWAF (2007): Resource Directed Measures for Protection of Water Resources; Methodologies for the determination of ecological water requirements for estuaries, Version 2* should be used.
- Assist with the preliminary Reserve determination for the surface water component of the Reserve (quantity and quality) for the priority **wetlands** in the study area. The methodology as set out in *DWAF (1999): Resource Directed Measures for Protection of Water Resources; Volume 4: Wetland Ecosystems Version 1.0* should be used. If the existing method is not applicable.
- Assist with the preliminary Reserve determination of the **groundwater** component of the Reserve (quantity and quality) for identified stressed areas. The methodology as set out in *WRC (2010) Groundwater Resource Directed Measures must be used*.

#### 2.2.6 Deliverables

This phase consists of specific tasks, each with a defined deliverable in the form of an interim milestone report. These reports shall describe the procedures and methodologies followed and the results achieved and shall be prepared and submitted to the Project Management PSP according to the milestone programme. These reports will be used as supporting documents to write the main study report. The reports shall include descriptions and motivations, but not limited to, for the following sections:

- Site selection and delineation of resource units/integrated units of analysis;
- Outline of the socio-economic water use in the study area;
- Reference conditions, present ecological state and the ecological and socio-cultural importance and sensitivity of each resource unit. The results from this task shall be summarised in table format;
- Recommended ecological categories of all the resource units;
- Setting of the ecological Reserve and describe the ERQOs. The results from this task shall be summarised in table format;
- Quantification of the Basic Human Needs Reserve;
- Setting of the ecological Reserve and ERQOs for the different ecological scenarios. The results from this task shall be summarised in table format;

- Quantification of the ecological risks associated with each scenario; and
- Presentation of a monitoring programme together with a list of monitoring requirements. It should also include a complete implementation strategy spelling out all the required resources.

### **PHASE 3: PROJECT TERMINATION**

#### *2.2.7 Objectives*

Once all objectives of the Reserve determination studies, including technical integration as required from the project management PSP have been achieved and upon recommendation of the project management PSP, the Client will issue instructions to the technical PSPs to terminate the study.

#### *2.2.8 Tasks and Activities*

During the termination phase, the PSP shall conduct the following tasks:

- Provide actual delivery dates of all study documents and contractual end items.
- Close out all work orders and contracts.
- Complete all study reports as required.
- Prepare a final evaluation and capacity building report and submit the report at the final project management meeting.
- Submit final accounts and prepare a final project financial report and close out all financial documents and records.

#### *2.2.9 Deliverables*

The technical PSPs should ensure that all the study reports as required during the execution of the study has been finalised and approved by the Client. An integrated report on all the findings and including the final Reserve results should also be finalised and approved. A technical Integrated Reserve template with the required rule and tab tables, ecological and monitoring specifications and special terms and conditions must be compiled and submitted to the client for approval.

A report describing the capacity building results of the project should also form part of the final deliverables.

### **3. HYDROLOGICAL MODELLING**

It is important that the hydrology developed for the Reserve determinations will be compatible with that used for the yield modelling of the catchments when the compulsory licensing process is conducted. For this purpose, the Technical PSPs shall use the models specified in the **DWAF “Guidelines for Decision Support Models for Water Use Evaluation.”** A Draft version of this document will be made available to the PSPs by the Client. It shall also be ensured that existing hydrology be used when it is available. ***Approval shall be obtained from the Client before any additional hydrology is developed by the PSP.***

### **3.1 HYDROLOGICAL INPUT DATA FOR THE RESERVE**

The hydrological yield of the system must be analysed for natural conditions, for present and future developments.

A water balance of the system must also be carried out.

### **4. EXTERNAL REVIEWER**

The CD: RDM will appoint independent external reviewers to assist the Department with the final review of all the deliverables of the study. This will be done prior to the CD: RDM's preparation of the necessary documentation of the preliminary ecological Reserve to be submitted for approval by the Chief Director.

### **5. CAPACITY BUILDING**

Capacity building can be realised through the following mechanisms, namely:

- Local specialists and stakeholders (e.g. Local Authority, Environmental Groups, etc.) will be involved in the project. Through their participation, these groups will develop an understanding of water resource protection through the Reserve determination methodologies and its relevance. This will also assist in the enhancement of their understanding of the concepts of integrated water resource management and sustainable development;
- Participation of DWA officials (RQS, RDM Chief Directorate, Western Cape Regional Office) will ensure active sharing of ideas and contribute to the broadening of the RDM skills base;
- The proposed specialists will be required to identify and include Historically Disadvantaged Individuals (HDIs) as well as junior personnel in their teams in order to train and build capacity by maximising their involvement in the project; and
- The Client and the RDM chief directorate will consider to second DWA staff members to the appointed project team.

The Project Manager, together with the specialists, shall develop a capacity building programme as part of the inception report. This programme should include specific quantifiable measures to ensure capacity building take place throughout the project.

### **6. ORGANISATIONAL MATTERS**

#### **6.1 CLIENT AND STUDY NAME**

The Department of Water Affairs(DWA) will act as the Client for the study through the CD: RDM.

The study shall be called **“RESERVE DETERMINATION STUDIES FOR PRIORITY RIVERS, GROUNDWATER, ESTUARIES AND WETLANDS IN THE GOURITZ WMA”**.

#### **6.2 EXECUTION, SUPERVISION AND CONTROL**

Supervision of the project and the management of all administrative and

contractual matters will be conducted by the CD: RDM of the Department of Water Affairs through their nominated Study Manager, with assistance from the project management PSP. The project will be carried out under the guidance of the Project Management Committee.

#### *6.2.1 Project Management PSP*

The project management PSP shall be responsible for overall study management and the dissemination of information to serve the requirements of the Client.

#### *6.2.2 Technical PSPs*

Each PSP team shall nominate a team leader responsible for the monitoring of the execution of various technical tasks to be conducted. The team leader will serve as the central hub of all study information. He/she will ensure that all information is received from the different tasks and the information is disseminated and re-distributed to the project management PSP, the Client and other stakeholders. It must be clearly understood that the team leaders will be responsible for all the day-to-day management of the technical tasks.

The technical team leader shall therefore act as the technical project manager and shall be responsible for updating the Project Plan, financial and progress reporting and invoicing. Provision must be made for the time and cost involved in co-ordination meetings with team members and shall provide the following information at regular intervals as agreed with the Project Management PSP:

- Information on human resource utilisation, management and control.
- Study status and any variances from the Project Plan.
- Financial status of the study, schedule performance and product quality.
- An updated Project Plan.

Provision must also be made for the time and cost involved in skills transfer to assistant team leaders who are historically disadvantages individuals. The PSPs must develop a programme for capacity building of these individuals within his/her scope of work.

#### *6.2.3 Additional appointments*

The Client reserves the right to appoint any support sub-consultant directly after consultation and agreement with the appointed PSP. The Client also reserves the right to second one or more of his staff to work on the project.

Sub-consultants that may be required to render specialist services will do so under the direct control of the technical PSP. The Client reserves the right to appoint any sub-consultant directly after consultation and agreement with the PSP. *6.2.4 Project Management Committee*

The study will be carried out under the guidance of a Project Management Committee comprising of representatives from the Client, Project Management PSP and the technical PSPs.

The technical PSPs shall submit written progress reports to members of the PMC at least seven days before the PMC meeting date. He/she shall also

present this information at the PMC meetings in a format agreed with the Project Management PSP and the Client during the Study Initiation and Design phase.

As a guide, the PSPs (project management and technical) should plan for reporting at approximately 9 PMC meetings over an 18 to 24 month study period. Participation by the technical team leaders in 6 other ad-hoc meetings should also be budgeted for. Secretarial services at PMC meetings shall be provided by the project management PSP.

### **6.3 PROGRAMME OF WORK**

The programme of work for the Project Management and Technical components will be dependent on the schedule of activities and duration of the related studies that will be submitted by the Department to the appointed PSPs.

This assignment shall be completed within an 18 to 24 month period. As discussed earlier, all the PSPs shall provide the Client with a Project Plan describing activities and cash flows and shall amend or update the plan as required by Client.

### **6.4 STUDY ARRANGEMENTS**

#### *6.4.1 Project Proposals*

All PSPs are required to submit, at their cost, a Project Proposal as described in **Annexure B2**, in which they will show their ability to perform the tasks described in this ToR and provide a cost estimate on a per task basis.

It will further be required of each bidding PSP to prepare the following documents to DWA standards and to include it in their proposals:

- Schedule of human resource utilisation (Annexure B1.1);
- Time and cost schedule (Annexure B1.2);
- Financial summary (Annexure B1.3);
- Cash Flow Projection per support PSP if applicable (Annexure B1.4).

These documents must be updated and included in the study progress reports by the PSP on a continuous basis.

Guidelines for the preparation of Project Proposals are presented in **Annexure B2** and project proposals will be evaluated according to the scoring sheet in **Annexure B3**.

#### *6.4.2 Minimum participation rate*

The participation rate is the ratio of professional fees that shall be apportioned to HDIs. The minimum target participation rate for this project shall be 25%.

#### *6.4.3 Tax certification*

The proposal must be accompanied by a Tax Clearance Certificate as set out in the documentation attached in **Annexure D**.



**Appendix B**  
Background Information Document



WP 10543

**Preliminary  
RESERVE DETERMINATION STUDIES  
for selected Surface and Groundwater  
Resources, as well as Estuaries and Wetlands  
in the  
GOURITZ WATER MANAGEMENT AREA**

**BACKGROUND INFORMATION DOCUMENT**  
September 2013



**water affairs**

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

**AECOM**



Sohierman Collopy and Associates cc  
Environmental and Aquatic Management Consulting  
[Tel: 2010 712 2400/201]

## PURPOSE OF THE BACKGROUND INFORMATION DOCUMENT

The purpose of this document is to inform water users and other stakeholders in the **Gouritz Water Management Area (WMA)** of the Preliminary Reserve Determination studies. These are to be undertaken over the next two years for selected surface and groundwater resources, as well as estuaries and wetlands in the Gouritz WMA.

## INTRODUCTION

The National Water Act of 1998 (Act No 36 of 1998) (NWA) (Chapter 3, Part 3) provides for the protection of significant water resources through the **Reserve**. As the Department of Water Affairs (DWA) is the custodian of the nation's water resources, it is the DWA's responsibility to ensure the adequate protection, effective management and the sustainable utilisation of these resources. The Chief Directorate (CD): Resource Directed Measures (RDM) within the DWA is tasked with the responsibility of ensuring that **Reserve requirements**, which take priority over other uses in terms of the NWA, are determined before **licensing applications** can be processed, particularly in water-stressed catchments.

The DWA has appointed AECOM SA (Pty) Ltd (AECOM) as Lead Service Provider responsible for the Gouritz Reserve Determination Study (GRDS). Whilst AECOM will fulfil the project management and coordination role, they will be supported by Scherman Colloty & Associates (SC&A) as the Technical Professional Service Provider to conduct the preliminary Reserve determination studies for the selected water resources of the Gouritz Water Management Area (WMA). SC&A will be assisted by numerous consultants including Rivers for Africa (river team leader) and the CSIR (estuary team leader). The Study is funded by the RDM Chief Directorate of the DWA.

## BACKGROUND

- The need to undertake detailed Reserve determination studies for various water resource components in the Gouritz WMA became apparent due to:
- Numerous water use licence applications in the WMA.
- The conservation status of various resources with associated development pressures such as forestry, farming, alien vegetation and poorly functioning waste water treatment works, which lead to impacts on both water quality and the availability of water.
- Impacts of land use and above-mentioned developments on the availability and quality of water resources.
- Gaps that were identified in the completed Outeniqua Reserve Determination Study.

The DWA, by means of the CD: RDM, subsequently initiated a Reserve study for water resources of the Gouritz WMA. This information will assist the DWA to make informed decisions regarding the authorisation of future water use licence applications and to determine the magnitude of the impacts of proposed developments.

Reserve determinations can be conducted at different levels of confidence and complexity, i.e. a *Rapid*, *Intermediate* or *Comprehensive* level. The level at which particular water resources will be evaluated depends on a number of factors, e.g. resources available, importance of the resource and data available for the assessment. Resources to be evaluated at particular levels of confidence will be outlined during the Inception Phase of the study.

## GOURITZ PRELIMINARY RESERVE DETERMINATION STUDY

The study area for the preliminary Reserve determination will include water resources of the Gouritz WMA as shown in **Figure 1**.

Work conducted on rivers, estuaries, wetlands and groundwater resources will determine required ecological states, flows,

groundwater levels and water quality conditions (collectively named **Ecological Water Requirements**) for the *Ecological Reserve*.

The study is comprised largely of the following four components:

- Setting water quality and quantity (flow) requirements for rivers at various Ecological Water Requirement (EWR) sites.
- Identifying priority wetlands across the study area and determining their present state. Management recommendations will be set for priority wetlands.
- Determining estuarine requirements (quantity and quality) for specified estuaries.
- Determining the present state and Reserve requirements of groundwater resources.

## TIME-FRAMES

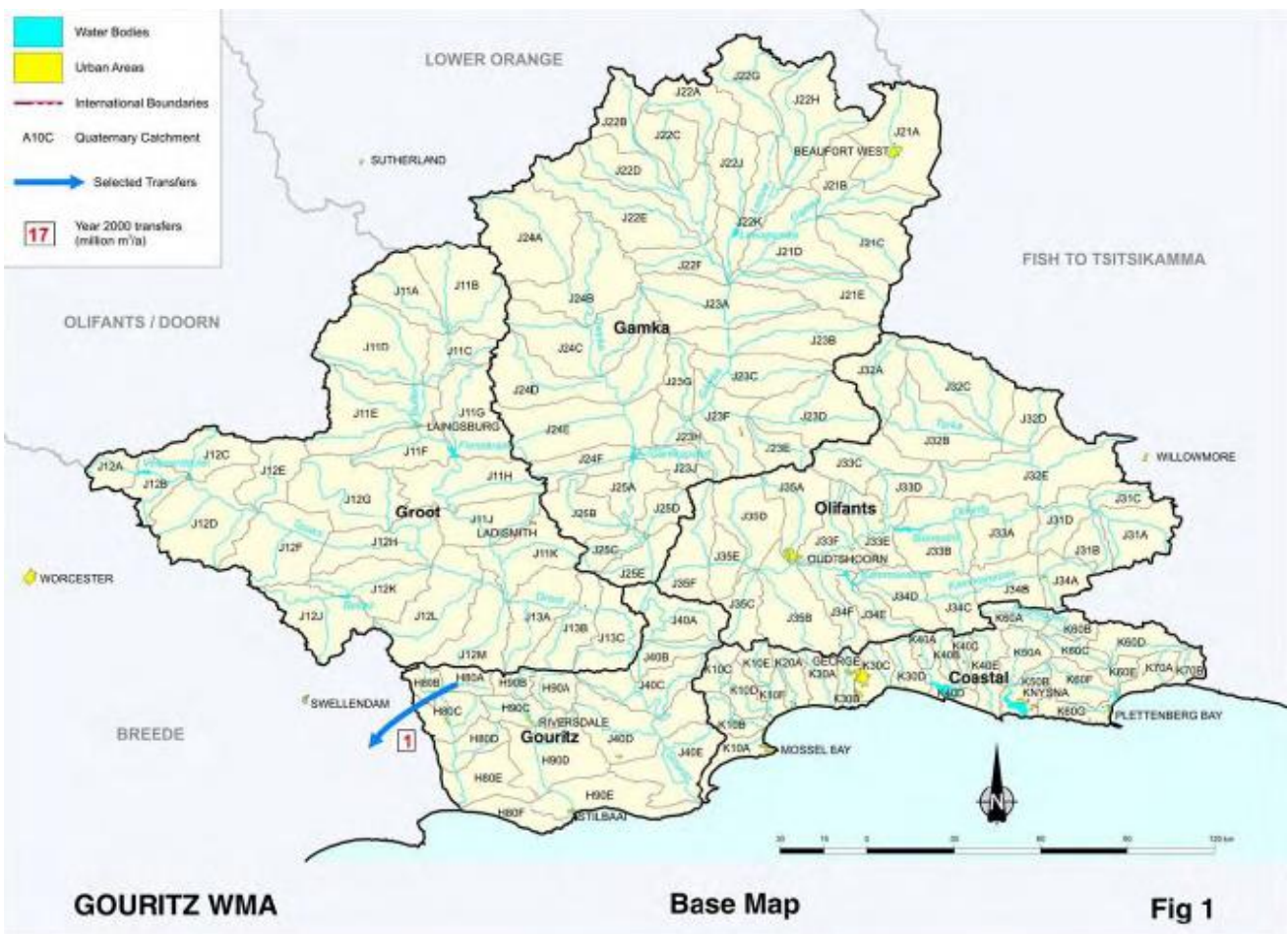
The study will take place over two years, with the final results available in 2015.

## PROJECT TEAM: GOURITZ PRELIMINARY RESERVE STUDY

The project is managed by *AECOM*, based in Cape Town, under the leadership of Dr Aldu le Grange.

Patsy Scherman of *Scherman, Colloty & Associates*, Grahamstown, is the technical team leader, and can be contacted with any technical queries. They are working in co-operation with:

- Mr Yakeen Atwaru (Director), Ms Barbara Weston (Deputy-Director) and Ms Thapelo Machaba (Study manager) of the RDM Directorate, DWA, Pretoria
- the DWA regional office in Bellville, Cape Town, contact person Ms Wilna Kloppers



Contact details are provided below.

Stakeholder engagement will be conducted as part of the preliminary Ecological Reserve study. Stakeholders involved in various water resource management processes in the Gouritz WMA will form part of the database of stakeholders. They are further requested to forward the information to any other organisation and/or individual potentially interested to participate in this process.

Please feel free to contact us with any questions, queries or information. We thank the landowners in advance for their willingness to allow us access to their properties and for their hospitality.

<b>Team member</b>	<b>Responsibility</b>	<b>Contact numbers</b>	<b>E-mail</b>
Aldu le Grange	Project Manager	021 - 950 7500 083 - 462 0817	Aldu.LeGrange@aecom.com
Patsy Scherman	Team leader – Technical team	046 – 622 2905 082 – 503 6070	patsy@itsnet.co.za
Yakeen Atwaru	Director, D: Reserve Requirements, CD: RDM, DWA	012 – 336 7866 083 – 630 7248	AtwaruY@dwa.gov.za
Barbara Weston	Deputy-Director, D: RR, DWA	012 – 336 8221 083 – 631 0801	WestonB@dwa.gov.za
Thapelo Machaba	Study Manager, D: RRR, DWA	082 – 884 1858	MachabaJ@dwa.gov.za
Wilna Kloppers	DWA, Western Cape	021 - 941 6196 082 – 807 6191	KloppersW@dwa.gov.za
Bea Whittaker / Kirstie du Bain	Stakeholder engagement	076 - 442 7083	gouritzreserve@gmail.com

**Appendix C**  
Minutes of Project Inception Scoping Meeting and  
Project Initiation Meeting



**PROJECT** : **GOURITZ RESERVE DETERMINATION STUDY**  
**MEETING** : **INCEPTION MEETING**  
**VENUE** : **DWA OFFICES, EMANZINI BUILDING, SCHOEMAN STREET, PRETORIA**  
**DATE** : **3 May 2012**

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#### ATTENDANCE

Name	Representing	E-mail Address
B Weston (BW)	DWA: CD: RDM	<a href="mailto:westonb@dwa.gov.za">westonb@dwa.gov.za</a>
Y Atwaru (YA)	DWA: D:RR	<a href="mailto:atwaruy@dwa.gov.za">atwaruy@dwa.gov.za</a>
N Kleynhans (NK)	DWA: RQS	<a href="mailto:kleynhansn@dwa.gov.za">kleynhansn@dwa.gov.za</a>
M Ndimam (MN)	DWA: GWRR	<a href="mailto:ndimam@dwa.gov.za">ndimam@dwa.gov.za</a>
E Netshitanini (EN)	DWA: GWRR	<a href="mailto:netshitaninie@dwa.gov.za">netshitaninie@dwa.gov.za</a>
V Muthelo (VM)	DWA: SWRR	<a href="mailto:muthelov@dwa.gov.za">muthelov@dwa.gov.za</a>
M Makhado (MM)	DWA: SWRR	<a href="mailto:makhadog@dwa.gov.za">makhadog@dwa.gov.za</a>
N Jaffa (NJ)	DWA: SWRR	<a href="mailto:jaftan@dwa.gov.za">jaftan@dwa.gov.za</a>
T Machaba (TM)	DWA: SWRR	<a href="mailto:machabaj@dwa.gov.za">machabaj@dwa.gov.za</a>
S Manamela (SM)	DWA: RDMC	<a href="mailto:manamelas@dwa.gov.za">manamelas@dwa.gov.za</a>
D Louw (DL)	R4A	<a href="mailto:iwre@icon.co.za">iwre@icon.co.za</a>
P Scherman (PS)	SC&A	<a href="mailto:patsy@itsnet.co.za">patsy@itsnet.co.za</a>
S Taljaard (ST)	CSIR	<a href="mailto:staljaard@csir.co.za">staljaard@csir.co.za</a>
L van Niekerk (LvN)	CSIR	<a href="mailto:lvnieker@csir.co.za">lvnieker@csir.co.za</a>
A le Grange (AIG)	BKS	<a href="mailto:aldulg@bks.co.za">aldulg@bks.co.za</a>
S von Witt (SvW)	BKS	<a href="mailto:simonvw@bks.co.za">simonvw@bks.co.za</a>

#### ADDITIONAL DISTRIBUTION

W Kloppers (WK)	DWA	<a href="mailto:wkloppers@dwa.gov.za">wkloppers@dwa.gov.za</a>
N Mohapi (NM)	DWA	<a href="mailto:mohapin@dwa.gov.za">mohapin@dwa.gov.za</a>
W Roets (WM)	DWA	<a href="mailto:roetsw@dwa.gov.za">roetsw@dwa.gov.za</a>
I Thompson (IT)	DWA	<a href="mailto:thompsoni@dwa.gov.za">thompsoni@dwa.gov.za</a>
N Motebe (NM)	DWA:GWRR	<a href="mailto:motheben@dwa.gov.za">motheben@dwa.gov.za</a>
M Rountree (MR)	Fluvius	<a href="mailto:mark.rountree@iburst.co.za">mark.rountree@iburst.co.za</a>
K Vivier (KV)	AGES	<a href="mailto:k.vivier@ages-group.com">k.vivier@ages-group.com</a>

Item	Description	Action
<b>1</b>	<b>WELCOME</b>	
1.1	Yakeen Atwaru (YA) opened the meeting and welcomed everyone. A round of introductions followed. BW added that there were several new DWA staff attending the meeting to receive exposure to an Inception meeting.	
1.2	Apologies were received from Wilna Kloppers, Ndeleka Mohapi, Rashid Khan, Wietsche Roets, Isa Thompson and Nancy Motebe.	
1.3	The agenda was discussed and BW requested that agreement on methods be added under Item 4. AIG suggested starting with the Technical Component and if time allows do the Project Management Component. He also proposed that Agenda Items 3 and 4 should be combined. BW added that the Technical Component must address gaps from the Outeniqua Reserve Determination Study (ORDS). YA agreed on the changes.	
<b>2.</b>	<b>BACKGROUND</b>	
2.1	YA listed the following as motivations for the Gouritz Reserve Determination Study (GRDS): <ul style="list-style-type: none"> <li>• Various licence applications</li> <li>• Current impacts</li> <li>• Water stressed nature of the area</li> </ul>	
2.2	YA stated that an integrated Reserve study would be done, as groundwater was also involved. A multi-disciplinary team would handle the Reserve study. The project had been budgeted for 2 years, although the proposal from BKS/SC&A stated 30 months.	
<b>3</b>	<b>PSP BRIEFING OF PROPOSAL</b>	
3.1	<b>General</b>	
3.1.1	YA reiterated that Agenda Items 3 and 4 had been merged on request from AIG.	
3.1.2	PS commenced with an overview presentation on the Technical Component of the GRDS. DL and ST to discuss rivers and estuaries thereafter.	
3.1.3	As part of the Technical Component presentation PS pointed out the following: <ul style="list-style-type: none"> <li>• There are about 100 quaternary catchments, which is a sizeable area to cover.</li> <li>• Groundwater is important in inland areas. This could be used for domestic supply, stock watering and irrigation in the Gamka and Olifants River catchments. PS also emphasised the importance of water quality when considering the groundwater component.</li> <li>• The Touw/Wilderness River catchments had been excluded from the ORDS, but were now included in the GRDS.</li> <li>• The location of Water Use Licence Applications (WULAs) will be considered during site selection for the river component of the Technical Component.</li> </ul>	
3.1.4	BW advised that trade-offs agreed on during the ORDS were very important and must be included in the GRDS. The same process must also be followed in this study. They could be used as scenarios for the GRDS.	All
3.1.5	BW to check the licensing requirements for dams in the upper and lower Knysna catchments.	BW
3.1.6	NK stressed the necessity of working at sub-quaternary level to ensure that the scale of the EWR study is the same as that used for the PES/EI/ES or finer where necessary. He added that the final PES/EI/ES information for the WMA will be provided by RQS-RDM as soon as the front end for each secondary is finalised.	

<b>Item</b>	<b>Description</b>	<b>Action</b>
3.1.7	PS expressed the urgency of getting work done as soon as possible due to the seasonality of the rivers.	PS/DL
3.1.8	PS queried whether someone from RDM would be assigned to this project. BW recommended the inclusion of sessions at specialist workshops where specialists can take trainees through the process before the specialist workshop. A workshop was proposed which would be open to stakeholders, I&APs and specialists so all could gain insight into all components of the Reserve study.	
3.1.9	PS queried whether sub-quaternaries as provided for the PES/EI/ES project should be used, or the new Resource Quality Services (RQS) sub-quaternary delineations. NK cautioned the team that RQS must work with the existing PES/EI/ES sub-quaternaries, and, if deemed necessary, these could be translated into the updated RQS delineations.	PS/DL
3.1.10	YA requested that PMC meetings be arranged for a date preceding the submission of a deliverable.	BKS
<b>3.2</b>	<b>Wetlands</b>	
3.2.1	PS stated that it is important to look at dry areas with critical pools, where the wetlands task may overlap. Priority areas are to be determined.	PS/MR/DL
3.2.2	YA recommended that as there were lots of palmiet wetlands, where people mine for peat, someone should be identified who can locate priority areas. This should be covered during the wetland task.	DWA/PS/MR
<b>3.3</b>	<b>Groundwater</b>	
3.3.1	A proposal was made that the Groundwater Resource Directed Measures (GRDM) and Groundwater Yield Model for the Reserve (GYMR) methods could be used, as it would add credibility to the process. AIG pointed out that the use of only one model was proposed and costed for at Tender Stage for the GRDS.	AGES
3.3.2	BW added that the Touw River (running through Wilderness lake system), Rondevlei, Groenvlei, etc. were all interlinked (i.e. groundwater/surface water interactions). Groundwater therefore cannot be neglected here. BW recommended considering these areas first when looking at groundwater/surface water interactions.	AGES/PS
3.3.3	DL suggested that it would be more appropriate to focus on dry areas, where groundwater use and contribution to river baseflows may be high. It was decided to identify areas where groundwater will play a significant role.	PS/DL/AGES
3.3.4	PS referred to lessons learnt from the Groundwater assessment in the ORDS. The results were quite different using the two approaches, i.e. the GRDM method and the GYMR method that follows a (geo) hydrological approach. BW requested that AGES present both approaches to compare outcomes and differences. PS suggested this could be done in a written form more cheaply. Similar information already exists in the Groundwater Reports for the ORDS. AIG pointed out that using both groundwater methods, other than proposed at tender stage, would increase costs significantly. YA requested that Variation Orders be avoided.	All
<b>3.4</b>	<b>Capacity Building and Training</b>	
3.4.1	NJ recommended that all involved in the study should attend at least one site visit so they could better conceptualise the scope of work. PS advised that training during specialist workshops is difficult due to time constraints and that a pre-meeting before the workshop would be more beneficial to trainees.	All

Item	Description	Action
3.4.2	It was agreed that people involved in the study should get exposure to the key elements which determine a Reserve. DWA are to draw up a framework on who should attend and the manner in which it will be carried out. DWA are to discuss internally and finalise capacity building framework.	DWA
<b>3.5</b>	<b>Rivers</b>	
3.5.1	DL delivered a presentation on the Reserve component for rivers, focussing on EcoClassification. She listed the following as potential shortcomings: <ul style="list-style-type: none"> <li>• Only budgeted for one site visit, which will need to cater for low flows.</li> <li>• Variable rainfall across the region means it will be difficult to plan field surveys. In-stream loggers will need to be used.</li> <li>• Little available information in some area, e.g. groundwater significance in the Karoo.</li> <li>• There are few tools available to work on ephemeral rivers.</li> </ul>	DL
3.5.2	DL stated that hotspot identification is dependent on: <ul style="list-style-type: none"> <li>• Socio-cultural importance (information from PES fact sheets can be used)</li> <li>• Water resource use information (BKS to assist and include proposed future developments)</li> <li>• Role of weirs and pools important – local knowledge to play a role here</li> <li>• Scoring matrix</li> </ul>	
3.5.3	MR to identify all wetland areas at sub-quatarnary level.	MR
3.5.4	NK pointed out that EWR determination in the Gouritz sub-quatarnary catchment would probably be driven by 'hotspots' of refugia where biota would tend to concentrate. He stressed that to maintain the ecological sustainability of the system, it is essential that such areas be identified and the EWR quantified according to their attributes. Geozones would be one of the steps that would contribute to the identification of such areas. Geozone information is available at Sub-quatarnary reach level.	DWA
3.5.5	DL defined a hotspot as an overlay of all four items listed in Item 3.5.2 and an area of particular importance. DWA requested that refuge areas also be considered in terms of hotspots. DL added that PES/EI/ES information available from Southern Waters would probably override the hotspot identification process.	PS/DL
3.5.6	AIG queried how the Gamka River in Prince Albert area would be handled in terms of the impact of snowfall on the Swartberg Mountains as well as sub-surface drainage from mountainous areas into rivers. NK and DL both recommended looking at geozones using the different variants discussed in Item 3.5.2.	DL/PS
3.5.7	DL advised that the recommendation is to identify about ten (10) rivers for detailed work at EWR sites (i.e. intermediate and rapid III approaches). The technical team is to place loggers near gauges at selected sites to measure water levels and link to real time flows from gauged data. Measurements to be done every 30 seconds to one minute and to also pick up temperature and conductivity (note: parameters to be checked).	DL/PS
3.5.8	NK added that a Rapid Habitat Assessment Method (RHAM) must be included or bio-monitoring could not be done accurately.	DL/PS
3.5.9	DL noted that there was a problem with ephemeral rivers, e.g. in the Karoo area, particularly when applying the estimation process. Further to this, the following were listed as potential issues in dry areas: <ul style="list-style-type: none"> <li>• Interaction between ground and surface water, and what drives the systems</li> <li>• Drilling for groundwater, influencing surface water pools.</li> <li>• Runoff from floods could either feed groundwater (i.e. interflow) or end in pools.</li> </ul>	

Item	Description	Action
	<ul style="list-style-type: none"> <li>• Flooding regimes are probably very important in these areas – possibly rely on the state of the riparian vegetation as an indicator for setting EWRs.</li> </ul>	
3.5.10	DL pointed out that hot spots in dry areas may be at farm weirs. Despite not being natural they should be regarded as important, as they may represent areas where pools used to be. These then form refuge areas, and abstractions from these pools/weirs may be needed.	DL
3.5.11	NK recommended that water levels need to be set at pools/weirs, which the water cannot go below. BW added that water quality be linked to a predetermined level.	PS/DL
3.5.12	DL advised that detailed EcoSpecs could only be provided for intermediate sites. The use of RHAM data to set EcoSpecs would require the assistance of NK from Resource Quality Services (RQS). A formal request must be sent by BKS to Nadene Slabbert at RQS in this regard.	DL/PS/BKS
3.5.13	NK cautioned about using National Freshwater Ecosystem Priority Area (NFEPA) data as designed specifically for conservation purposes. It was agreed that NFEPA recommendations would always be considered and feedback provided by the team where relevant.	DL
3.5.14	NK pointed out that despite sections of rivers, like the Olifants River, being in a poor state there are fish in other sections. It is thus important that the teams take cognisance of the scale at all times.	
<b>3.6</b>	<b>Estuaries</b>	
3.6.1	ST delivered a presentation on estuaries in the study area. In the initial proposal the Duiwenhoks estuary was not costed for, but it was recommended that it be included. She recommended that given the current budget, the Duiwenhoks Estuary can be included as a rapid assessment, but then the study on the Hartenbos (already highly modified) will need to be downgraded to a Desktop assessment.	DWA/PS/ST
3.6.2	It was decided to categorise Swartvlei as rapid for the purposes of the GRDS.	DWA/PS/ST
3.6.3	The usefulness of the Estuary Management Plans (EMPs) available or under development for a number of estuaries was discussed as a potential platform for evaluating scenarios and future developments. It was agreed that forums established by the EMPs could be used by the GRDS. Vernon Gibbs-Halls from Eden District Municipality and Wietsche Roets were recommended for inclusion on the PMC/PSC.	DWA
3.6.4	It was decided that the Touw/Wilderness catchment would be done at rapid level due to its complexity. To improve confidence in this complex system detail, long-term data sets will be required. Within the time and budget constraints of this project the money could be used more effectively on seasonal systems where data can be collected over shorter intervals matching the time scale of this project.	PS/ LvN/ST
3.6.5	BW requested that recommendations be made for monitoring, which should be fed into Gerhard Cilliers' National Estuary Monitoring Programme. Stakeholders need to see that DWA have put something in place, particularly as a follow-on from the ORDS.	All
3.6.6	ST pointed out that when looking at the impact of changes in flow in estuaries, they first translate flows into hydrodynamics, sediment dynamics and water quality (abiotic components). These then feed into the biotic components to assess responses. They still include both abiotic and biotic components, as they often have much better data on abiotic aspects. The recommended ecological state is based on the present ecological state and the ecological importance of an estuary, using a health index and an importance rating index. To establish the recommended flow scenario a range of future flow scenarios are assessed. ST advised that in the Gouritz WMA the	ST/LvN/PS

Item	Description	Action
	workplan and field trips will have to be staggered (a winter survey was planned for Jul/Aug 2012, but this will now need to happen in Jul/Aug 2013). The proposed approach was agreed on in general. However, BW added that they must expand on items recommended for future studies in the ORDS and develop a reporting system.	
3.6.7	It was agreed that the team should look at the minutes from the ORDS Stakeholder Workshop and use what came out of these. Stakeholder initiatives are to be used where possible.	PS/ST/DL
3.6.8	AIG proposed that the team looks at recommendations from the ORDS and the interaction between SANParks, Global Environmental Fund (GEF), etc.	PS/ST
3.6.9	LvN recommended that Dirk Roux and Ian Russell, both managers at SANParks, be contacted regarding the proposed GEF funded project on the Swartvlei and Touw/Wilderness systems. Linking into the ORDS and taking the GRDS forward was proposed as a sound solution. LvN noted that in the case of these two systems artificial mouth breaching management actions was the primary factor resulting in a deterioration in their health, rather than flow modification. Therefore better input on flow scenarios may not improve confidence significantly.	DWA
3.6.10	YA emphasised that the purpose of the GRDS is to focus on the Reserve and contain it within the confines of a Reserve study. The implementation side would be handled by others. AIG stated that socio-economic problems also needed to be resolved in conjunction with the Reserve determination. YA argued that this was a corporate governance issue and that the Reserve was a pre-cursor to a management plan.	
3.6.11	BW proposed that the team investigate whether any berm monitoring had been done through GEF funding.	ST/DL/PS
3.6.12	ST recommended that because there are currently numerous activities happening in the estuaries of this region (e.g. roll out of estuary management plans, this project, etc) a road map be done to show what is happening in the study area to better inform stakeholders. BW added that the team must indicate in the Inception Report what has been done and which recommendations have been followed. The ORDS must be revisited by the DWA to ensure outstanding actions are addressed somewhere.	ST/DL/PS
3.6.13	DL advised that the monitoring promise made in the ORDS be implemented and emphasised that stakeholders were very concerned about ending up with unusable brackish water in the estuaries.	DWA
3.6.14	LvN proposed that NJ spend two days with the CSIR team to identify the gaps from the ORDS. This was agreed on and would be done with the RDM.	NJ
3.6.15	LvN to check which priority dams Stephen Mallory is working on. Integration with his study will be decided on in collaboration with RDM as there has been a request to incorporate operational rules into Reserve templates.	LvN/PS/RDM
<b>3.7</b>	<b>Project Management</b>	
3.7.1	AIG delivered a presentation on the project management component of the study. Eugene Matthews has resigned from Londoloza and is therefore no longer available to work on the GRDS. A suitable HDI replacement is to be sourced by the project management team. A letter must be submitted to the DWA requesting permission for a new person to join the team.	BKS
3.7.2	A lesson learned from the ORDS is that the Project Management team must attend technical workshops from the beginning to better understand the technical aspects of the GRDS.	
3.7.3	Project Management and Technical teams to submit combined reporting.	BKS/PS

Item	Description	Action
3.7.4	The same invoicing format could be used as in the ORDS. YA recommended that AIG consider including an Issues and Response Register.	BKS
3.7.5	BW recommended that three PSC and six PMC meetings be held. Cate Brown and Angus Paterson are to be included in these meetings. The first PMC meeting is to address this. It was agreed that the PMC meetings would be held as a preparation meeting for the PSC meetings, which would be held one week apart.	All
3.7.6	BKS is tasked with finding a functional website on which to download documents. PS volunteered that of SC&A, while LvN recommended using Dropbox. BKS to investigate these options, although it is already known that DWA does not have access to Dropbox	BKS
3.7.7	PS proposed that a Background Information Document (BID) and two newsletters be placed on the website. Phase 1 is to include one technical report, which would include both the PMC and technical components.	BKS/PS
3.7.8	AIG proposed that status reports be drafted on a monthly basis and to accompany invoices.	All
3.7.9	TM queried how the accuracy reviews would be handled. Specialist Advisors/Reviewers are to provide support. Monitoring is to be handled by the DWA. Managerial support required by the DWA will be provided by the Project Management Team.	PS/DWA
3.7.10	YA requested that the focal point remain with the PSP team to ensure smooth administration. This will be achieved via the BKS Project Management Team.	
<b>4</b>	<b>CONTRACTUAL AGREEMENTS</b>	
4.1	The draft contract will be sent out to BKS by DWA once Eugene Matthews' replacement has been identified and approved by the relevant committee within DWA.	BKS
4.2	PS stressed the urgency of initiating the GRDS in July 2012 (i.e. during the Inception Phase) by placing loggers in selected rivers so that the winter flows would not be missed. YA assured her that the Departmental Budget Committee (DBC) sit every week, so the Contracts would be done quickly and the GRDS could commence. However, two steps have to be undertaken before the contract will be signed: <ol style="list-style-type: none"> <li>1. A replacement for Eugene Matthews must be found and authorized by the DBC</li> <li>2. The contract has to be reviewed by DWA Legal Services</li> </ol>	DWA
4.3	AIG was tasked with sending a letter to the DWA as soon as possible to include a replacement team member. Approval is required from the Legal Services Department and the DBC in the DWA before this request can be finalised.	AIG
4.4	BW requested a breakdown of deliverables and that the team invoice per target. SM cautioned the team not to start invoicing before the Contract is signed. AIG queried progress-related invoicing whether a sub-task is not a defined deliverable. It was decided that a brief progress report would be required to determine their progress in the sub-task.	BKS/PS
4.5	BW requested that the Project Management team draw graphs of deliverables versus expenditure as done in the ORDS by BKS.	
4.6	Ian Russell is to be included on the Steering Committee.	BKS
4.7	The initiation of work before the finalization of the Inception Report (by end July	

Item	Description	Action
	2012), i.e. placing data loggers in relevant rivers, was approved. However, this work would not proceed until the DWA contract has been signed. <b>Note that if the contract is not signed in time, the entire programme would have to move forward as the river component is entirely dependent on low flows.</b>	
<b>5</b>	<b>GENERAL</b>	
5.1	ST proposed that the first estuary field trip be shifted to July/August 2013. In the meantime YA recommended that the team go ahead with all preliminary work. Note that this will only proceed once the DWA contract has been signed.	DWA
5.2	SvW to send correspondence to Joyce Machaba and Vula Muthelo at RDM, DWA, as the appointed RDM liaison for the GRDS. PS to be copied in on correspondence.	SvW
5.3	BW requested that presentations be attached to the minutes.	
<b>6</b>	<b>DATE OF THE 1<sup>ST</sup> PMC MEETING</b>	
6.1	First PMC Meeting to be held at the end of July/beginning of August. Date to be decided after additional members are included and the Contract has been signed. The meeting will be held at BKS Offices in Bellville, Cape Town.	
<b>7</b>	<b>CLOSURE</b>	
	YA thanked all for attending and closed the meeting	

Signed :

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On behalf of BKS

.....  
Date

.....  
On behalf of DWA

.....  
Date

6/06/2013



**PROJECT** : GOURITZ RESERVE DETERMINATION STUDY  
**MEETING** : PROJECT INITIATION MEETING  
**VENUE** : AECOM OFFICES, WATERSIDE PLACE, SOUTH GATE, TYGER WATERFRONT, CARL CRONJE DRIVE, BELLVILLE  
**DATE** : 6 June 2013

<b>ATTENDANCE</b>			
<b>Name</b>		<b>Representing</b>	<b>E-mail Address</b>
B Weston	(BW)	DWA: CD: RDM	<a href="mailto:westonb@dwa.gov.za">westonb@dwa.gov.za</a>
W Kloppers	(WK)	DWA: W-CAPE	<a href="mailto:kloppersw@dwa.gov.za">kloppersw@dwa.gov.za</a>
Y Atwara	(YA)	DWA: D:RR	<a href="mailto:atwaruy@dwa.gov.za">atwaruy@dwa.gov.za</a>
T Machaba	(TM)	DWA: SWRR	<a href="mailto:machabaj@dwa.gov.za">machabaj@dwa.gov.za</a>
M Ndimma	(MN)	DWA: GWRR	<a href="mailto:ndimam@dwa.gov.za">ndimam@dwa.gov.za</a>
P Scherman	(PS)	SC&A	<a href="mailto:patsy@itsnet.co.za">patsy@itsnet.co.za</a>
A le Grange	(AIG)	AECOM	<a href="mailto:aldu.legrange@aecom.com">aldu.legrange@aecom.com</a>
S von Witt	(SvW)	AECOM	<a href="mailto:simon.vonwitt@aecom.com">simon.vonwitt@aecom.com</a>
<b>ADDITIONAL DISTRIBUTION</b>			
N Mohapi	(NM)	DWA	<a href="mailto:mohapin@dwa.gov.za">mohapin@dwa.gov.za</a>
W Roets	(WM)	DWA	<a href="mailto:roetsw@dwa.gov.za">roetsw@dwa.gov.za</a>
I Thompson	(IT)	DWA	<a href="mailto:thompsoni@dwa.gov.za">thompsoni@dwa.gov.za</a>
N Motebe	(NM)	DWA:GWRR	<a href="mailto:motheben@dwa.gov.za">motheben@dwa.gov.za</a>

Item	Description	Action
<b>1</b>	<b>WELCOME</b>	
1.1	Yakeen Atwaru (YA) opened the meeting and apologised for the late start due to a flight delay.	
1.2	YA welcomed all and stated that it was the first meeting after the signing of the contract. The purpose of the meeting was to touch base again, go over the deliverables, Terms of Reference (ToR) and focus on the way forward.	
1.3	The Department of Water Affairs (DWA) acknowledged and apologised for the delays in signing the contract. The contract has now, however, been signed and the project is ready to move forward. A copy of the signed contract document will be handed to the Professional Service Provider (PSP) during the meeting.	
<b>2</b>	<b>ATTENDANCE</b>	
2.1	Apologies were received from Nancy Motebe (NM) from the DWA Groundwater Resource Reserve (GRR) team. Manelisi Ndima (MN) is, however, representing the DWA: GRR.	
<b>3</b>	<b>APPROVAL AND ADDITIONS TO THE AGENDA</b>	
3.1	No changes or additions to the agenda were made.	
<b>4</b>	<b>CONTRACT PROCESS</b>	
4.1	<b>Delays</b>	
4.1.1	The financial implications of the time delay in the project are to be discussed under Agenda Item 12.1.	
4.2	<b>Challenges experienced</b>	
4.2.1	As a result of the delays, the project programme would need to be adjusted to allow for the six month seasonal change. Both the DWA and the project team are to make the necessary adjustments resulting from the delays.	ALL
4.2.2	YA recommended that these issues be raised in the Inception Report, which is to be the first deliverable for the project.	PS/AIG
4.3	<b>Actions</b>	
4.3.1	An order number has been issued by the DWA. JM is to send the original order number to the PSP.	JM
4.3.2	BW added that deliverables will be allocated a project number as per the Outeniqua Reserve Determination Study (ORDS). DWA project numbers are therefore also to be allocated to associated reports.	BW
<b>5</b>	<b>UNDERSTANDING OF DELIVERABLES</b>	
5.1	<b>Confirmation of Study Area</b>	
5.1.1	<b>Overall focus</b>	
5.1.1.1	PS initially requested confirmation whether this meeting is a PMC meeting or Project Initiation meeting. YA confirmed that it was the Project Initiation Meeting.	

Item	Description	Action
5.1.1.2	YA stressed that areas not covered in the ORDS need to be looked at in the Gouritz Reserve Study (GRS).	ALL
5.1.1.3	PS highlighted five sub-areas, being primary drainage areas. The important part for PS is that the study area includes the inland dry Karoo area. The delay in the commencement of the GRS has been useful in that it has allowed them more time to learn dry systems, as in the last year they had completed the Fish River Study in Namibia. This was a good example of ephemeral systems.	
5.1.1.4	The Touw/Wilderness system was left out of the ORDS and will be covered in the GRS. However, the level at which it can be covered needs to be discussed, as it is a complex system.	DWA/PS
5.1.1.5	BW emphasised that the GRS needs to move towards implementation, which entails scenario building. YA added that the inclusion of new items would change the scope of work and add delays. This needs to be avoided. PS added that one of their requests up front is to know exactly what format is required for the templates. As a result the configuration of templates for the DWA was discussed and it was decided that those used in the ORDS were comprehensive and provided a good example. Clarification to be provided on this later in the GRS.	DWA/PS
5.1.1.6	<p>DWA need to put the Reserve into a language, which can be written into a set of operational rules, which can be easily interpreted by any potential stakeholder. PS emphasised the importance of matching up the templates in such a way that they are conducive for trainees to take notes.</p> <p>WK pointed out the Klein Brak River links up with the Groot Brak River and that it should be done in the GRS. There is a small system here which includes the Wolwedans Dam and Moordkuil and Hartebeeskuil Rivers. Stephen Mallory (SM) is to assist with this. SM developed a set of rules for various systems, such as Moordkuil, Wolwedans, Mossel Bay, but used the same set of operating rules. SM's requirements were not to allow Wolwedans to be drawn down less than 70%. Desalination to complement this. AIG noted that Estelle van Niekerk (EvN) had also done this for the ORDS and it could be used as an example.</p> <p>WK listed the following as the motives behind SM's study:</p> <ul style="list-style-type: none"> <li>• To maximise water supply to Mossel Bay</li> <li>• To provide the best Reserve Situation for the Groot Brak</li> <li>• To manage the system in the best manner for the environment and the municipality.</li> </ul> <p>BW recommended that they take the most crucial impacts and use them as scenarios. The DWA need to sign off on what they propose to handle.</p>	DWA/PS
5.1.1.7	PS to double check on the Groot Brak River system. Angus Paterson (AP) and his estuarine team are currently busy with the Estuarine Management Plan. BW added that the ecospecs for the Groot Brak had already been done. PS is to ascertain whether anything in terms of water quality had been done here.	PS
5.1.1.8	AIG queried the status of the Hartebeeskuil. WK is to confirm whether there has been any progress on this.	WK
5.1.1.9	If the Technical Team has the PES results in the GRS area at high confidence these will probably be used for the determination of hotspots.	
5.1.1.10	BW requested that PS's Technical Team keeps tradeoffs, as they did in the ORDS, where they traded one system for another.	PS
5.1.1.11	PS is to do templates for the rivers and estuaries in the GRS. PS emphasised the	PS

Item	Description	Action
	importance of including estuary water quality in the templates. The Groundwater team is to do its own templates.	
5.1.1.12	PS acknowledged that more effort needs to be put in for estuaries. Keurbooms is to be relooked at, as it was done ages ago and at a Rapid level.	
5.1.1.13	BW recommended that one integrated report be done, which included all the components of the GRS. Further to this she advised that one template be done containing all the conditions. An additional block should be added to this to include the Groundwater results. For Groundwater a quality and quantity component have been included.	PS
5.1.1.14	<p>Duiwenhoks was excluded from the ToR, but had been flagged by the PSP at Tender Stage, as was considered important. It was decided that National Freshwater Ecosystem Priority Areas (NFEPA) are to initially be given an Ecological Category status of 'a' or 'b' and then to find the true status at a later stage. WK added that in the Olifants/Doring system an a/b was not sufficient.</p> <p>It was decided that a point of departure would be to use the Present Ecological State (PES) results. These would assist with determining priority sites.</p>	
5.1.1.15	PS acknowledged that as the budget was unlikely to change, the scope of work would need to change. It was thus important to know when classification would be coming to this area, so they can plan accordingly. The Technical Team needs to establish whether to focus more on the Reserve component and not so much on the scenarios. PS inquired how much should be planned for scenarios, if classification is still coming. PS tasked herself with asking her team leaders what can be done with the existing budget.	PS
5.1.1.16	Previously a five (5) year proposal was placed on classification. This should be completed in 2015. PS requires urgent feedback from the DWA to plan for this.	DWA
5.1.1.17	PS acknowledged that development options are very important for scenarios. BW agreed that these are more important for the sites. PS required this info from the DWA to complete the Inception Report. WK added that the Technical Team needs to know if they go the classification route how would this differ from the scenario approach.	WK/PS
5.1.1.18	PS replied that classification, the Reserve and Archaeological Operating Systems (ARCHEOS) are all part of one classification process. To avoid doing additional work, scenarios won't be done here, but they will be done in less detail. As when classification comes along the Technical Team will do it in much more detail.	PS
5.1.1.19	A priority area is required from an ecological point of view. Once the DWA know what the WULAs and planning developments are, the DWA need sites to represent these. Ecological aspects are to be handled thoroughly first, classification is to be done later through this.	PS
5.1.1.20	YA recommended that the eight step guideline process on how to determine a Reserve be used.	PS
5.1.1.21	<p>YA stated that this process is still preliminary and can only be called a Reserve after classification has been gazetted for a given water management area. This should include socio-economics. YA added that a detailed assessment is to be done for socio-economics. Models are to be run using data from government, Statistics South Africa, etc. The same approach is to be followed as was done in the ORDS.</p> <p>BW emphasised the importance of focussing on the priority ecological areas in the Recommended Ecological Categories (RECs) and how they are going to influence</p>	

Item	Description	Action
	activities.	
5.1.1.22	BW pointed out that one of the most useful sessions in the ORDS was the stakeholder workshop and recommended that this be done as soon as possible. The stakeholder meeting could provide all the necessary statistical information on the activities underway in the area. It was agreed from the lessons learned in the ORDS that there should be two stakeholder workshops in future studies, thus it was proposed that one workshop be held at the beginning of the GRS and one at the end.	ALL
5.1.1.23	It was recommended that the stakeholder workshops be held in Oudtshoorn. Eden, Central Karoo and Winelands District Municipalities should all be present at these meetings and Oudtshoorn was considered as fairly centrally located for these municipalities. Groundwater is also very important in the Oudtshoorn area.	
5.1.1.24	<p>PS was tasked with checking Reconciliation studies for the GRS with Isa Thompson (IT). However, AIG recommended that the PMT acquire all the information from IT and JR and write letters to all the municipalities within the study area to obtain their planning studies. YA added that they should obtain the Provincial Spatial Development Frameworks (SDF) 5-10 year plans for future growth. AECOM was involved in the Western Cape Bulk Water and Sanitation Infrastructure Project, where each district municipality drew up bulk water and sanitation plans, including population growth and water resources. There are five district reports and a final report.</p> <p>The WSDP is included in the bulk water and sanitation plans. Stephen Marais is driving this process and must be contacted to obtain the necessary info.</p>	PMT
5.1.1.25	PS is to determine where focus areas are going to be. PS is aware of where the gauges are, but will need to put loggers at focus areas. Loggers are to be placed where gauges are not picking all the required data. WK recommended that Frans Mouski (FM) at W-Cape DWA and Johan Knoetzen at George be contacted, as they know where the gauges are, what flows, what measurements are being taken, electrical conductivity (ECn) temperatures, etc.	PS
5.1.1.26	<p>DWA and PSP to include the River Habitat Assessment Methods (RHAM), as it would be easier for monitoring afterwards, and to do a team effort in looking at water quality. FM and Johan Rossouw are to be contacted to establish what is covered in terms of probes.</p> <p>A request is to be sent through to Nadine Slabbert for Neels Kleynhans to assist with the RHAM. Capacity building is to be discussed at the end of the meeting. NFEPA must be considered with caution.</p>	DWA/PS  DWA/ AECOM
5.1.1.27	DWA stressed the need to train people from the Reserve and Groundwater components. The same is to be done in the Regional Office.	DWA/PS
5.1.1.28	PS reiterated that they will need to streamline the scope of works if the budget is to remain the same. Koos Vivier (KV) requires additional water quality samples and SM is to be consulted regarding yield models. The focus is strongly on ecology, but it still needs to follow the eight steps recommended by YA in Item 5.1.1.25 above. No systems models appear to be set. These are to be checked with IT and Mennard Mugumo. It was agreed that budget could be allocated for the appointment of SM. James McKenzie is also to be included, as he is highly knowledgeable about ephemeral systems.	
5.1.1.29	<p>AIG listed the following hydrological systems previously investigated by either Aurecon or during the Outeniqua Coast Water Assessment Study:</p> <ul style="list-style-type: none"> <li>• Knsyna</li> <li>• Plettenberg Bay</li> </ul>	

Item	Description	Action
	<ul style="list-style-type: none"> <li>• George</li> <li>• Mossel Bay</li> <li>• Oudtshoorn</li> </ul> <p>AIG added that additional information for Oudtshoorn could be obtained from Andre Roux at the Department of Agriculture.</p>	
5.1.1.30	DWA needs to have a policy position on fracking in the Karoo and of particular relevance to the GRS in the Beaufort West area. If fracking is managed well it can go ahead on a case by case basis. AIG queried the source of the water required for fracking. YA responded that they utilise boreholes and bring in water from other areas. In the GRS fracking must be looked at and its impact on the Reserve. YA acknowledged that there were many uncertainties regarding fracking and its potential impacts.	DWA/PS
5.1.2	<b>Rivers</b>	
5.1.2.1	The main focus of the GRS Rivers' component is on Ecospecs and monitoring. PS stated that the main interest is on the Gouritz and Goukou Rivers with both being at an intermediate level. The next step is a rapid level. The Touw/Wilderness Rivers do not require a detailed survey to be done, due to complexity of this system. A quick field study is to be done and then still produce estuary templates, generic EcoSpecs and monitoring. Hartenbos River is in a bad state and has been downscaled due to its poor state.	PS
5.1.2.2	Bloukrans River is potentially not considered for future development due to its inaccessibility. Only a desktop study should be required here. However it was considered to be of high conservation value.	
5.1.2.3	<p>AIG queried the purpose of a reserve for Bloukrans Estuary, as it may be marine driven. DWA's role is to protect high conservation areas like Bloukrans and Storms Rivers, even though these are marine driven. The DWA is to specify conditions to keep Bloukrans in its A category. PS recommended that there could be a trade-off between Bloukrans and another river, which was been actively used for development and other purposes.</p> <p>YA recommended that Bloukrans River be done on a low level as a compromise to meet protection requirements. SanParks and Cape Nature are to help the DWA draw up conditions for this.</p>	DWA/PS San Parks/ Cape Nature
5.1.2.4	WK recommended a re-look at the Southern Cape rivers. PS recommended that Duiwenhoks, Klein Brak and Piesang be reviewed. Estuaries and rivers to be looked at simultaneously, as estuaries sometimes drive the rivers. A site upstream to be selected to cater for these and estuary would be the main focus.	PS
5.1.2.5	The Bitou River system is to be looked at properly, as it is considered to be a very important floodplain by the DWA. PS is required to do river work on the Bitou in addition to the wetland work required. Potential off-channel development in the Plettenberg Bay area is also to be looked at while doing the Bitou River system.	PS
5.1.2.6	The Piesang River was previously done in 1994/5 and needs to be done again and included on the river side.	PS
5.1.2.7	BW recommended that the Hartenbos River should be focussed on as a water quality hotspot and that the Ecological Water Requirement (EWR) site is removed from this system. The Blinde River should also be looked at.	
5.1.2.9	Wietsche Roets is to be contacted regarding the Touws River.	PS

Item	Description	Action
5.1.3	<b>Groundwater</b>	
5.1.3.1	WK expressed concern about not always picking up on issues that the Reserve is expected to do. A different approach is required in the dry areas.	KV
5.1.3.2	It was agreed that groundwater doesn't always contribute to surface water and that a different approach would be required for dry areas.	
5.1.3.3	YA recommended that the Technical Team looks at two scenarios: <ul style="list-style-type: none"> <li>• Contribution to surface water</li> <li>• No contribution, but communities are dependant for Basic Human needs</li> </ul>	PS
5.1.3.4	PS recommended that the Technical Team look very broadly at groundwater, as it doesn't operate in the same way as other components. BW recommended taking a look at the Groundwater scale over a massive area, for example its influence on the Klein Karoo aquifer recharge. KV and Mark Rountree (MR) are to look at where systems maintain each other – groundwater maintaining wetlands and vice versa.	PS/KV/MR
5.1.3.5	Ian Russell is to be contacted for the flow management plan for Swartvlei, which SanParks are working on. YA added that the problem with Sedgefield largely revolves around bad town planning, as it is built ten metres below sea level.	PS
5.1.3.6	YA advised that with climate change being present, towns like Prince Albert should brace themselves for more extreme events.	
5.1.3.7	PS expressed concern about what is happening in the Karoo in terms of groundwater. Surface water/groundwater interaction here could be very useful for the GRS. PS recommended that thermal tools used in a similar Namibian project be applied here.	PS
5.1.3.8	ALG added that AECOM and Aurecon are busy with water use validation and verification studies outside the Gouritz River system and that the Technical Team should obtain information from the Langkloof Study. There is a study out on the Wolwedans system too.	
5.1.3.9	AIG noted that there are a lot of monitoring boreholes in areas where they are using groundwater. AIG recommended that Julian Conrad (GEOSS) be contacted for groundwater information in the Karoo area. In the Klein Karoo area Rowena Hay (Umvoto Africa) can be contacted.	PS/KV
5.1.3.10	AIG reiterated that the Western-Cape Bulk Water Infrastructure and Sanitation Study contains all the information on existing boreholes. KV is to do additional water sampling, if budget allows. KV is to liaise with Mike Smart from the Western Cape DWA to assist with groundwater problems. If boreholes are required then KV is to contact the DWA drilling section for assistance. PS is to proceed with placing loggers in the interim period.	PS/KV
5.1.4	<b>Wetlands</b>	
5.1.4.1	MR and WK to meet at the beginning of July to discuss wetlands and look at Regions requirements. The Bitou wetland has been flagged for the GRS.	
5.1.4.2	WK to discuss with John Roberts (JR) to see if there are any other requirements from them DWA Western Cape side.	WK
5.1.4.3	Bitou wetlands and floodplains are very important and must be handled by Mark Rountree (MR). PS is to confirm in the ToR whether wetlands are to be done at a sub-quadernary level. Wetlands were broken down into two categories: <ul style="list-style-type: none"> <li>• Pan</li> </ul>	MR

Item	Description	Action
	<ul style="list-style-type: none"> <li>Valley bottom</li> </ul>	
<b>5.2</b>	<b>Lessons Learned from the ORDS</b>	
5.2.1	AIG stressed that the PMT be included in all technical workshops. PS to advise when these workshops will be held so the rest of the team can attend.	PS
5.2.2	AIG recommended that only one review period be held for reports by both PMC and PSC members.	ALL
5.2.3	It was decided that PMC and PSC meetings would be held on the same day for the GRS. PMC meetings can be used as a dry run for the PSC meeting. Minutes are to be completed within a week of the meetings.	ALL
5.2.4	BW is to give task report numbers once the PMC provides a list of the task reports proposed for the GRS.	BW
5.2.5	It was decided that the following lessons learned from the ORDS would be applied in the GRS: <ul style="list-style-type: none"> <li>To have sufficient budget for the project</li> <li>To have PMT members within close vicinity</li> <li>Related studies to be run concurrently</li> <li>Variation Orders to be eliminated</li> <li>Strict adherence to the number of meetings allocated.</li> </ul>	ALL
5.2.6	PS to provide AECOM with their study programme as soon as possible so that AECOM can start monitoring compliance.	PS
5.2.7	Communication to be transparent within the team and all members of the PMT to be included in correspondence. YA agreed that communication is of high importance.	PMT
5.2.8	The following specialist advisors were contracted for the GRS. The DWA agreed that they could also undertake the external review of reports done on their respective field of expertise in the GRS: <ul style="list-style-type: none"> <li>Johan Rossouw (water resources)</li> <li>Cate Brown (rivers)</li> <li>Geordie Ractliffe (wetland)</li> <li>Julian Conrad (groundwater)</li> <li>Angus Paterson (estuaries)</li> </ul> <p>It was also agreed that the specialist advisors listed above should also be included on the PSC.</p>	
5.2.9	PMC only to discuss the following management and budget related items: <ul style="list-style-type: none"> <li>Progress</li> <li>Budget</li> <li>Corrective actions</li> </ul>	
5.2.10	AECOM to do a revised programme for the GRS as soon as possible on receipt of the technical programme.	AECOM
5.2.11	Editorial and technical reviews are to be done of the reports within the three week review period. A record of Actions/Decisions is to be kept, as was done for the ORDS. This should be done as part of the minutes and also, when reviewing the reports.	ALL
5.2.12	Active participants are to be included only in the PSC meetings. This was supported fully by the DWA. ALG and YA recommended that the following people be invited to	AECOM

Item	Description	Action
	<p>participate in PSC meetings:</p> <ul style="list-style-type: none"> <li>• Local municipalities in the GRS study area</li> <li>• SanParks</li> <li>• Cape Nature</li> <li>• Department of Agriculture</li> <li>• DWA (Water Quality Planning)</li> <li>• DEA&amp;DP</li> </ul> <p>These people are expected to attend all twelve (12) PSC meetings.</p>	
5.2.13	SvW tasked with reviewing the list used for the stakeholder meeting for the ORDS to determine who should be invited to the first stakeholder meeting for the GRS.	SvW
5.2.14	Stakeholder meetings are to be held in Oudtshoorn. PS is to provide a broad programme for the technical team so that a date for the stakeholder meeting can be set.	SvW/PS
5.2.15	<p>The following two important dates are to be agreed upon:</p> <ul style="list-style-type: none"> <li>• Inception Report</li> <li>• Stakeholder meeting</li> </ul>	ALL
5.2.16	It was decided that a draft version of the Inception Report is to be presented to the PSC and thereafter input from stakeholders should be obtained. Stakeholders are to advise on the relevant hotspots and potential development areas. Thereafter their input is to be included and the report is to be finalised.	AECOM, SC&A
5.2.17	It was agreed that a draft version of the Inception Report should be made ready by 31 July 2013. Shortly thereafter a Stakeholder Workshop is to be scheduled. Following the inclusion of comments from stakeholders the final report is to be presented to the PSC at the PSC meeting.	AECOM, SC&A
5.2.18	AIG is to contact Bea Whittaker, a communications expert, regarding the handling of the workshop, dates and participants. AIG is to provide YA with feedback during June 2013 on this.	AIG
<b>6</b>	<b>REPORTING</b>	
<b>6.1</b>	<b>Progress reporting - frequency</b>	
6.1.1	The DWA are to obtain clarity on what is defined as a deliverable. The bigger projects need to be broken into smaller tasks as deliverables. Related invoicing is to be done on a monthly basis.	DWA/AEC OM/SC&A
6.1.2	AIG to provide projected cash flow and monitor this on a monthly basis. YA added that monthly invoices are to be submitted with progress reports. Percentage progress completed is to be stated in these and claimed accordingly.	AIG/PS
6.1.3	YA advised that last year's meeting in Pretoria should be factored into one of the project meetings. Everything from 1 June 2013 can be claimed.	AECOM/S C&A
<b>6.2</b>	<b>Meetings</b>	
6.2.1	Nine (9) PMC meetings and two (2) stakeholder meetings have been budgeted for in the GRS. Two meetings have already been held. A revised programme to be submitted to the DWA and also included in the Inception Report, where the number of meetings is discussed.	AECOM/S C&A

Item	Description	Action
<b>6.3</b>	<b>Channels</b>	
6.3.1	It was decided that all email correspondence should be sent to JM with BW and YA copied into the mail.	ALL
6.3.2	All hand deliveries to be sent to: Department of Water Affairs 185 Schoeman Street Pretoria 0001 For the attention of: Mr Yakeen Atwaru/Papu Qaqamba	AECOM
<b>7</b>	<b>BUDGET</b>	
<b>7.1</b>	<b>Revisions required</b>	
7.1.1	BW requested that when the study team break down the new budget that the following be adhered to in motivating for additional budget: <ul style="list-style-type: none"> <li>• How has the budget changed</li> <li>• Why has the budget changed</li> </ul> DWA require a motivational letter for the Departmental Bid Adjudication Committee (DBAC). AIG added that hourly rates have also changed. AIG is to include these in the motivational letter.	AIG
7.1.2	JM tasked with providing AECOM with the DWA approach to the increases in budget and hourly rates. SvW is to follow up on this.	JM/SvW
7.1.3	PS is to include relooking at the Keurbooms system. The conservation status and development potential to be looked at here. PS recommended including the Bitou/Keurbooms estuaries at an intermediate level. Duiwenhoks is to be done at a desktop level. PS is to send BW all the possible options. DWA to revert to PS about doing these at an intermediate level and the rest at desktop.	PS
7.1.4	WK/DWA to provide feedback on whether the approach to the Noetzie system is sufficient. At present it is at the lowest level of confidence. Lara van Niekerk (LvN) wanted to relook at the hydrology for Noetzie to increase the confidence level.	DWA
7.1.5	Field trips for estuaries are planned for November/December 2013.	PS
7.1.6	SvW to send a copy of the meeting presentations as well as the minutes of the May 2012 meeting along with the June 2013 minutes. BW requested a copy of PS' map. AECOM is to provide WK with a copy of the Technical Proposal.	SvW/PS
<b>8</b>	<b>CAPACITY BUILDING</b>	
8.1	PS recommended that this be handled at different levels: <ul style="list-style-type: none"> <li>• DWA personnel</li> <li>• Specialist trainees</li> <li>• Stakeholders</li> <li>• Local specialists</li> <li>•</li> </ul> The following four workshops were proposed by PS for the GRS: <ul style="list-style-type: none"> <li>• General introduction to RDM</li> <li>• Estuarine approach/Wetlands approach</li> <li>• Yield modelling and approaches to groundwater and socio-economics</li> <li>• Closure workshop – use Gouritz as an example for approaches which worked and didn't. EcoClassification and rivers to be looked at here.</li> </ul>	PS

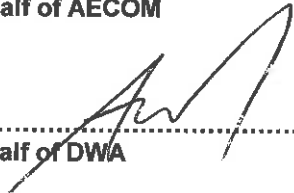
Item	Description	Action
	BW recommended that they must look at the overall management of a Reserve Study.	
8.2	YA stated that the purpose of this work is to train people to work at a rapid level and equip them with the necessary tools to do EcoClassification.	PS/YA
8.3	BW suggested that the overall management of a Reserve Study must be handled at a workshop, where everything is brought together.	DWA
8.4	PS recommended that the GRS could be used as an example, which highlights areas to look out for and also shows areas that didn't work so well.	DWA
8.5	JM is to be taught how to measure water quality in the GRS.	DWA
8.6	The review and the inclusion of scientific work were considered critical in report writing for this GRS.	ALL
8.7	BW recommended that 1-1.5 day workshop be held on the integration and synthesis of a Reserve study. WK added that the implementation of the Reserve was very important. The DWA require guidance on the monitoring and implementation of a Reserve. These tie in with the classification of Archeos.	DWA
8.8	YA summarised the four aims of the reserve as follows: <ul style="list-style-type: none"> <li>• Operation</li> <li>• Synthesising and integrating different specialisations</li> <li>• Original aim- to train people to do mapping etc.</li> <li>• Water quality</li> </ul>	
8.9	WK requested that some of her trainees join PS on their field studies. It was agreed that DWA trainees are to join the technical team in the field. PS added that the best way to maximise the benefit of this training would be to run an eco-Classification course and then practise this. WK recommended that this be done as part of the river health.	PS
8.10	YA emphasised that the DWA were serious about providing relevant training for their staff. This is to be done at various levels. PS to inform all whenever there were activities and people to decide on whether their attendance is required.	PS
8.11	PS recommended that trainees do an initial course on the relevant field of study before they attend a workshop. JM recommended that staff join from the beginning and continue through to the end of the GRS to maximise learning potential. YA requested that the Region and Reserve staff are prioritised for training purposes.	YA
<b>9</b>	<b>GENERAL</b>	
9.1	No further items were included here. AIG thanked DWA for calling the meeting, which was much needed.	
<b>10</b>	<b>CLOSURE</b>	
	YA thanked all for attending and closed the meeting.	

**Item**      **Description**

**Action**

**Signed :**

.....  
On behalf of AECOM

A handwritten signature in black ink, appearing to be 'AW', is written over a horizontal dotted line.

.....  
On behalf of DWA

.....  
Date

24/07/2014  
.....  
Date

**Appendix D**  
Master Study Programme



TECHNICAL COMPONENT																							
	2013												2014										
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
<b>TASK A - PROJECT MANAGEMENT</b>																							
Task A1 Technical Team management and coordination																							
Task A2 PMC Meetings (incl Initiation meeting)																							
Task A3 PSC meetings																							
Task A4 Financial management																							
Task A5 Technical team management - Rivers																							
Task A6 Technical team management - Estuaries																							
Task A7 Technical team management - Groundwater																							
Task A8 Presentation of study results to the DWA																							
<b>TASK B - PROJECT INCEPTION (PLANNING AND PROCESS)</b>																							
Task B1 Gather background information																							
Task B2 Design project plan and produce Inception Report																							
Task B3 Mobilisation of study team																							
<b>TASK C - DESKTOP ECOCLASSIFICATION - RIVERS</b>																							
Task C1 Ecosystem services																							
Task C2 Rivers ecological + water quality components																							
Task C3 WRUI																							
Task C4 Desktop Ecoclassification Report																							
<b>TASK D - RECONNAISSANCE RIVER SURVEYS</b>																							
Task D1 Survey 1																							
Task D2 Survey 2																							
<b>TASK E - DELINEATE RESOURCE UNITS</b>																							
Task E1 Rivers																							
Task E2 Estuaries																							
Task E3 Wetlands																							
Task E4 Groundwater																							
Task E5 Delineation Report																							
<b>TASK F - FIELD SURVEYS</b>																							
Task F1 Estuary survey																							
Task F2 River survey 1																							
Task F3 River survey 2																							
Task F4 Additional high flow surveys																							
Task F5 Groundwater field survey (hydrocensus + groundwater sampling)																							
Task F6 Wetland field survey 1 (rapid assessment)																							
Task F7 Wetland field survey: priority wetlands																							
<b>TASK G - DATA ANALYSIS: ESTUARIES</b>																							
Task G1 Hartenbos, Blande, Piesang, Groot (Wes) and Bloukrans																							
Task G2 Duiwenhoks, Klein Brak and Touw/Wilderness																							
Task G3 Goukou and Gouritz																							
<b>TASK H - DATA ANALYSIS: RIVERS</b>																							





**Appendix E**  
Detail Cash Flow per Deliverable

Task No	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15		
<b>PROJECT MANAGEMENT COMPONENT</b>																												
<b>Phase 1: Study planning and Process Initiation</b>																												
Task 1.1: Inception meetings	R	22 344.00	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 1.2: Familiarisation with Scope of Work	R	-	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80	R	13 816.80
Task 1.3: Familiarisation with historic and current Reserve studies	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 1.4: Resource Monitoring Inventory	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 1.5: Management Framework & Task 1.7: Establishment of an Information Management System	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 1.6: Project Monitoring and Control System	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 1.8: Support to the Technical Component PSP's	R	-	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54	R	14 155.54
Task 1.9: Stakeholder Engagement, BID & Stakeholder Workshop No.1	R	-	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00	R	46 170.00
Task 1.10: Phase 1 Close-out: Inception Report (including Project Plan)	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 1.11: PMC Meeting No.1	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
<b>SUB-TOTAL PHASE 1</b>	<b>R</b>	<b>22 344.00</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>27 972.34</b>	<b>R</b>	<b>74 142.34</b>	<b>R</b>	<b>113 130.34</b>	<b>R</b>	<b>55 623.04</b>	<b>R</b>	<b>55 623.04</b>	<b>R</b>	<b>51 230.24</b>	<b>R</b>	<b>60 920.24</b>	<b>R</b>	<b>19 114.00</b>	<b>R</b>	<b>9 690.00</b>	<b>R</b>	<b>9 690.00</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>
<b>Phase 2: Study implementation</b>																												
Task 2.1: Project Management & Task 2.2: Client Liaison	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
PMC Meeting	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
PSC Meetings	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 2.3: Technical Monitoring and Support	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 2.4: Stakeholder Participation	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 2.5: Status and Progress Reports	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 2.6: Integration of Technical Results	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 2.7: Provision of data, reports and supporting information	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
<b>SUB-TOTAL PHASE 2</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>14 921.33</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>	<b>R</b>	<b>29 842.67</b>
Task 3.1: Review and Management of Deliverables	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 3.2: Project Auditing	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 3.3: Termination Strategy	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 3.4: Newsletter	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 3.5: Reserve Templates	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 3.6: Feedback to DWA	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 3.7: Final MNC & PSC Meetings	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
Task 3.8: Study Closure Reports	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
<b>SUB-TOTAL PHASE 3</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>9 288.00</b>	<b>R</b>	<b>9 288.00</b>	<b>R</b>	<b>9 288.00</b>	<b>R</b>	<b>9 288.00</b>	<b>R</b>	<b>9 288.00</b>	<b>R</b>	<b>26 440.62</b>	<b>R</b>	<b>26 440.62</b>	<b>R</b>	<b>26 440.62</b>	<b>R</b>	<b>26 440.62</b>	<b>R</b>	<b>26 440.62</b>	<b>R</b>	<b>26 440.62</b>
Total fees	R	22 344.00	R	-	R	27 972.34	R	74 142.34	R	113 130.34	R	55 623.04	R	131 128.38	R	141 656.91	R	151 346.91	R	152 100.67	R	100 116.67	R	142 896.48	R	107 579.28	R	192 699.28
Disbursements	R	-	R	-	R	-	R	20 194.29	R	20 194.29	R	10 097.14	R	10 097.14	R	10 097.14	R	20 194.29	R	10 097.14	R	20 194.29	R	10 097.14	R	20 194.29	R	10 097.14
<b>TOTAL PROJECT MANAGEMENT COMPONENT</b>	<b>R</b>	<b>22 344.00</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>27 972.34</b>	<b>R</b>	<b>74 142.34</b>	<b>R</b>	<b>133 324.63</b>	<b>R</b>	<b>75 817.33</b>	<b>R</b>	<b>141 225.52</b>	<b>R</b>	<b>151 754.05</b>	<b>R</b>	<b>161 444.05</b>	<b>R</b>	<b>172 294.95</b>	<b>R</b>	<b>110 213.81</b>	<b>R</b>	<b>163 090.77</b>	<b>R</b>	<b>117 674.42</b>	<b>R</b>	<b>202 796.42</b>
<b>TECHNICAL COMPONENT</b>																												
<b>TASK A - PROJECT MANAGEMENT</b>																												
A1: Technical team management and coordination	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
A2: PMC Meetings (incl. initiation meeting, 6 June 2013)	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
A3: PSC Meetings	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
A4: Financial Management	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
A5: Technical team management - Rivers	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
A6: Technical team management - Estuaries	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
A7: Technical team management - Groundwater	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
A8: Presentation of study results to DWA	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
<b>SUB-TOTALS: TASK A</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>76 083.60</b>	<b>R</b>	<b>17 004.46</b>	<b>R</b>	<b>17 004.46</b>	<b>R</b>	<b>17 004.46</b>	<b>R</b>	<b>46 986.46</b>	<b>R</b>	<b>17 004.46</b>	<b>R</b>	<b>30 855.46</b>	<b>R</b>	<b>17 004.46</b>	<b>R</b>	<b>32 850.46</b>	<b>R</b>	<b>17 004.46</b>	<b>R</b>	<b>46 986.46</b>
<b>TASK B: PROJECT INCEPTION (PLANNING AND PROCESS INTEGRATION; BACKGROUND INFORMATION)</b>																												
B1: Gather background information	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
B2: Design Project plan and produce Inception Report	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
B3: Mobilisation of study team	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
<b>SUB-TOTALS: TASK B</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>47 538.00</b>	<b>R</b>	<b>58 744.20</b>	<b>R</b>	<b>41 416.20</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>
<b>TASK C: DESKTOP ECOCLASSIFICATION - RIVERS</b>																												
C1: Ecosystem services	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
C2: Rivers ecological + water quality (workshop)	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
C3: WRUI	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
C4: Desktop EcoClassification Report (incl. hotspots)	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
<b>SUB-TOTALS: TASK C</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>14 478.00</b>	<b>R</b>	<b>53 067.00</b>	<b>R</b>	<b>138 624.00</b>	<b>R</b>	<b>37 221.00</b>	<b>R</b>	<b>3 762.00</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>
<b>TASK D: RECONNAISSANCE RIVER SURVEYS</b>																												
D1: Survey 1 (January 2014)	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
D2: Survey 2 (February 2014)	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
<b>SUB-TOTALS: TASK D</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>	<b>R</b>	<b>140 562.00</b>
<b>TASK E: DELINEATE RESOURCE UNITS</b>																												
E1: Rivers	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
E2: Estuaries	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
E3: Wetlands	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
E4: Groundwater	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
E5: Delineation Report	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-	R	-
<b>SUB-TOTALS: TASK E</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>-</b>	<b>R</b>	<b>78 318.00</b>	<b>R</b>	<b>-</b>	<b>R</b>																	



**Appendix F**  
Project Team Contact Details

**DEPARTMENT OF WATER AFFAIRS PROJECT NO: WP10543**

**RESERVE DETERMINATION STUDIES FOR SELECTED SURFACE WATER, GROUNDWATER, ESTUARIES AND WETLANDS IN THE GOURITZ CATCHMENT**

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