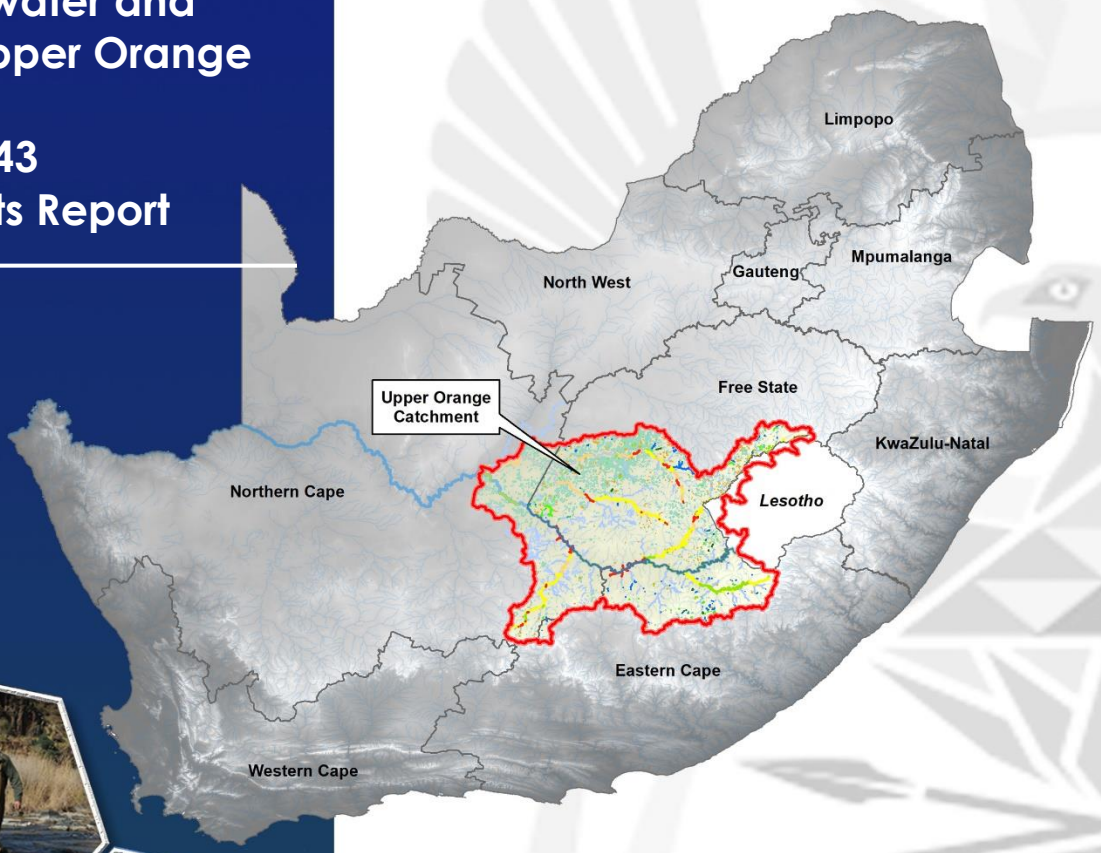
DEPARTMENT OF WATER AND SANITATION

A High Confidence Reserve Determination Study for Surface Water, Groundwater and Wetlands in the Upper Orange

WP11343
Resource Units Report



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LIST OF ACRONYMS

BHN	Basic Human Needs
CVB	Channelled valley bottom
CD: WEM	Chief Directorate: Water Ecosystems Management
CR	Critically endangered
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EC	Electrical Conductivity
EcoRegions	Ecological Regions
EIS	Ecological Importance and Sensitivity
EI	Ecological Importance
ES	Ecological Sensitivity
EWR	Ecological Water Requirements
FEPA	Freshwater Ecosystem Priority Area
FMP	Flow Management Plan
FRAI	Fish Response Assessment Index
GAI	Geomorphology Driver Assessment Index
GRDM	Groundwater Resource Directed Measures
HF	Hydraulic Fracturing
HGM	Hydrogeomorphic
IBA	Important Bird Areas
IEI	Integrated Ecological Index
IHI	Integrated Habitat Integrity
IWUI	Integrated Water Use Index
JBS	Joint Basin Survey
LT	Least Threatened
MCA	Multi-criteria analysis
MIRAI	Macroinvertebrate Response Assessment Index
NFEPA	National Freshwater Ecosystem Priority Areas
NT	Near Threatened
NWM5	National Wetlands Map 5
NWA	National Water Act
PES	Present Ecological State
RDM	Resource Directed Measures
RU	Resource Units

SCI	Social Cultural Importance
SWSA	Strategic Water Source Area
UCVB	Unchanneled valley bottom
VEGRAI	Riparian Vegetation Response Assessment Index
VU	Vulnerable
WARMS	Water use Authorization & Registration Management System
WRC	Water Research Commission
WMA	Water Management Area
WR2012	Water Resources 2012
WRCS	Water Resources Classification System
WWTW	Wastewater Treatment Work

EXECUTIVE SUMMARY

The Reserve has priority over other water uses in terms of the NWA and should be determined before license applications are processed, particularly in stressed and over utilised catchments. Accordingly, the CD: WEM identified the need to determine the Reserve for the ecosystems (rivers, wetlands and groundwater) of the Upper Orange Catchment in the Orange Water Management Area (WMA 6).

This Resource Unit report forms part of Steps 1 and 2 of the integrated framework that is used for this study (DWS, 2017), with the purpose to identify the priority Resource Units (RUs) for rivers, wetlands and groundwater where higher confidence results will be available.

A priority RU represents a river reach, wetland or groundwater area with a high importance or where the water use impacts (quantity and/ or quality), or resource stress is high. These priority RUs provide an indication where detailed assessments would be required to protect the aquatic ecosystems.

The approaches followed for the identification of these priority RUs have been developed through previous Reserve studies and was adopted for this study. The prioritisation was mainly based on the information available from the Desktop PES/EI/ES (DWS, 2014) for rivers, NWM5 map for wetlands and WR2012 data for groundwater. Additionally, results from the recently completed JBS3 surveys (ORASECOM, 2021) and expert knowledge were used to select the final priority RUs.

The assessments to be undertaken for the priority river RUs include desktop, rapid 3 and intermediate level of detail. For selected RUs with a high Ecological Importance and Sensitivity and still in a good present state, with no or little water use, field verification assessments have been included to provide additional confidence in the desktop Ecological Water Requirements. Conceptual input into a Flow Management Plan will be provided for the river reaches of the Orange River downstream of Gariep and Vanderkloof Dams.

A Multiple Criteria Analysis (MCA) process was followed to define those wetlands that were considered more important and thus a priority for further assessments. This was based on variables important from a wetland ecological, functioning, and social and/or biodiversity perspective.

The delineation of priority groundwater resource units was based on quaternary catchment boundaries, aquifer type (primary aquifer, secondary aquifer, karst aquifer), borehole yields groundwater quality, stressed catchments (catchments where the groundwater recharge is less than the sum of groundwater abstraction, groundwater contribution to baseflow and basic human needs), groundwater recharge and geo-political boundaries (logistical, management and functional).

Overall, a total of 39 priority RUs for rivers were selected:

- 10 intermediate;
- 11 rapid 3; and
- 18 field verification assessments.

The Orange River between Gariep and Vanderkloof Dam and downstream of Vanderkloof Dam has been selected to develop an FMP. This plan will address the specification of flow releases from the

dams to optimise the ecological functioning of the river downstream. However, within the constraints of the operating rules for releases for hydropower and other users downstream.

A total of 17 priority wetland areas and 14 groundwater RUs were identified. Of the 14 groundwater RUs, 6 of them have been prioritised, along with possible integration with surface water and wetlands.

Priority RUs for rivers, wetlands and groundwater will be used to guide the planned surveys and the specification of EWRs and other ecological conditions for the management of the water resources within the study area.

Areas/ RUs where integration between rivers, groundwater and wetlands were considered important have been included based on available data. The final selected RUs from an integration perspective includes the Upper Kraai River (rivers wetlands, groundwater), Upper Seekoei River (wetlands and groundwater and to a lesser extent rivers) and the Modder River (wetlands and groundwater and water quality).

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1. INTRODUCTION

1.1 Background

The National Water Act (No. 36 of 1998) (NWA) is founded on the principle that the National Government has overall responsibility for and authority over water resource management for beneficial public use without seriously affecting the functioning and sustainability of water resources. Chapter 3 of the NWA enables the protection of water resources by the implementation of Resource Directed Measures (RDM). As part of the RDM process, an Ecological Reserve must be determined for a significant water resource to ensure a desired level of protection.

The Reserve (water quantity and quality) is defined in terms of (i) Ecological Water Requirements (EWR) based on, the quantity and quality of water needed to protect aquatic ecosystems; water quantity, quality, habitat and biota in the desired state and (ii) Basic Human Needs (BHN), ensuring that the essential needs of individuals dependant on the water resource is provided for. These measures collectively aim to ensure that a balance is reached between the need to protect and sustain water resources while allowing economic development.

The Chief Directorate: Water Ecosystems Management (CD: WEM) of the Department of Water and Sanitation (DWS) is responsible for coordinating all Reserve Determination studies in terms of the Water Resource Classification System (WRCS). These studies include the surface water (rivers, wetlands and estuaries) and groundwater components of water resources.

The Reserve has priority over other water uses in terms of the NWA and should be determined before license applications are processed, particularly in stressed and over utilised catchments. Accordingly, the CD: WEM identified the need to determine the Reserve for the ecosystems (rivers, wetlands and groundwater) of the Upper Orange River catchment in the Orange Water Management Area (WMA 6). The aim is to provide adequate protection for (i) possible hydraulic fracturing (HF) activities, (ii) assessment of various water use license applications, and (iii) evaluation of impacts of current and proposed developments on the availability of water.

1.2 Purpose of this study

It is important to note the following:

- Priority rivers are selected by assessing water use impacts (quantity and quality) to determine the integrated water use index (IWUI) or water stress and (ii) integrated ecological index (IEI) that considers the PES and the ecological importance (EI) and ecological sensitivity (ES) of each sub-quaternary reach. This results in the identification of priority resource units where the EWRs need to be quantified.
- A “high confidence study” refers to a combination of different river level assessments, from desktop extrapolation to intermediate assessments. Furthermore, a wider coverage of the catchment will be undertaken, not only the main stem Orange River and major tributaries, but inclusive of the smaller tributaries within the catchment. Groundwater and wetland priority resources and their interactions will also be assessed.

Therefore, the purpose of this study is to determine the Reserve (quantity and quality of the EWR and BHN) for priority rivers, wetlands and groundwater areas at a high level of confidence in the Upper Orange Catchment. The results from the study will guide the Department to meet the objectives of maintaining, and if attainable, improving the ecological state of the water resources. The primary deliverable will be the preparation of the Reserve templates for the Upper Orange Catchment, specifying the ecological water requirements and ecological specifications/ conditions for the management of the priority rivers, wetlands and groundwater areas.

1.3 Purpose of this report

The purpose of this report is to document the data, information, approaches followed and the results of the selection and prioritisation of Resource Units (RU) for rivers, wetlands and groundwater in the Upper Orange Catchment. The ecological water requirements will be determined for these priority river and groundwater Resource Units and ecological specifications provided for the priority wetlands. Integration between the various components, where applicable, will be assessed and the linkages between the components will be defined. This will initially provide input into the identification and prioritisation of the Resource Units (RU). Ecological Water Requirements will be specified for the integrated RUs to ensure the protection of the water resources. Cognisance will be taken of the gaps that were identified for the study area and where possible, additional data will be collected during the various field surveys.

The prioritisation of Resource Units forms part of Steps 1 and 2 of the integrated steps for the determination of the Reserve (see Figure 1-1 below).

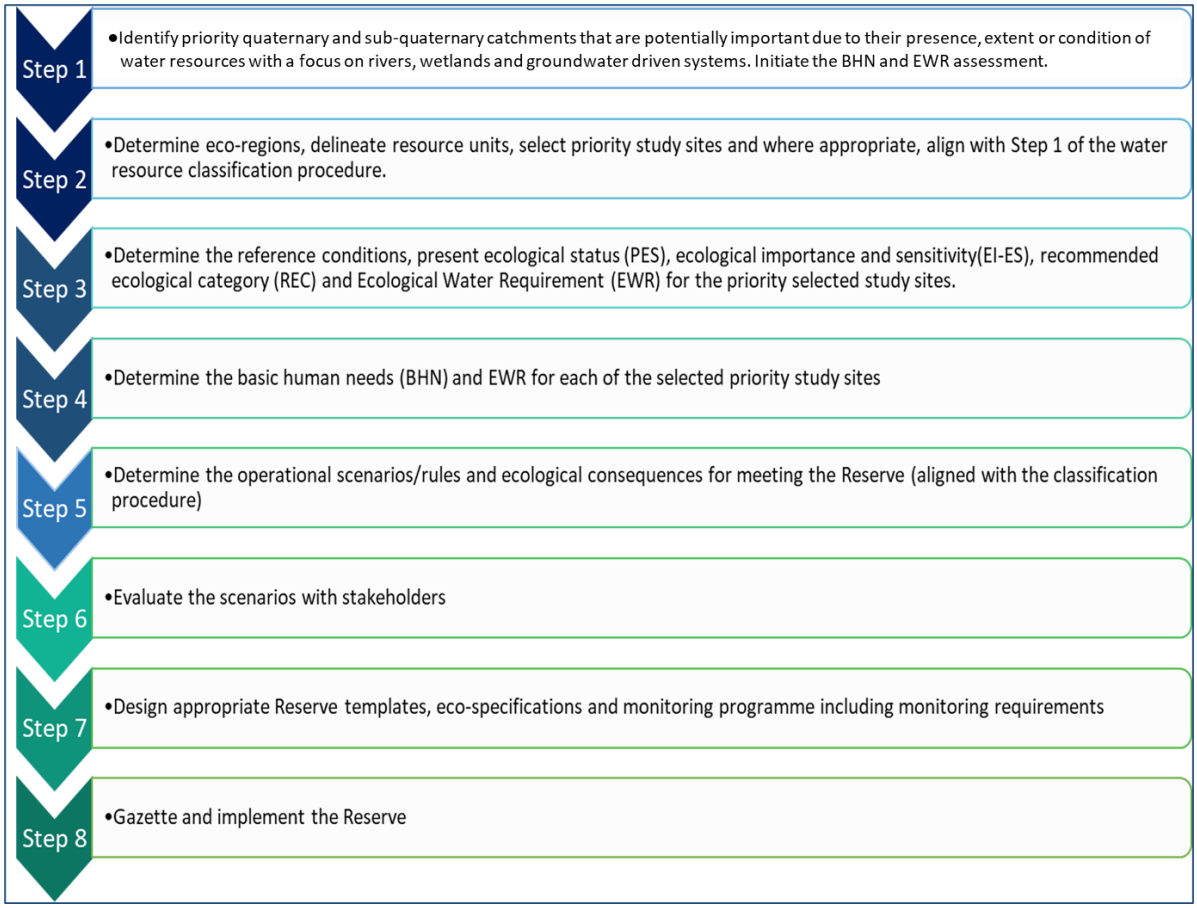


Figure 1-1: Integrated steps for the determination of the Reserve (DWS, 2017)

2. OVERVIEW OF THE STUDY AREA

The study area of the Upper Orange Catchment forms part of the Orange WMA6 (Figure 2-1) and includes the main stem Orange River from the Lesotho border to the confluence with the Vaal River at Douglas. The major tributaries of the Orange River include the Kraai, Caledon and Seekoei Rivers. The Modder-Riet River drain into the Vaal River and due to their interconnectivity (i.e. water transfers) with the Upper Orange River, are included in this study. The study area can be divided into four distinct sub-areas within secondary catchments D1, D2, D3 and C5, namely:

i. The Orange River from the Lesotho Border to the Gariep Dam, including the main tributaries: Kornetspruit, Sterkspruit, Stormbergspruit and Brandwaterspruit (catchments D12, D14 and the SA part of D15 and D18);
ii. The Caledon River from its headwaters and its tributaries to the Gariep Dam (catchments D21, D22, D23, D24);
iii. The Kraai River catchment (catchment D13); and
iv. The Orange River from the Gariep Dam to Marksdrift weir (catchments D31, D33, D34 and D35), just upstream from the confluence with the Vaal River. This includes the Seekoei River

(catchment D32) in the south and the Modder-Riet River (catchments C51 and C52) in the north.

The Gariep and Vanderkloof Dams on the main stem Orange River are two of the country's largest reservoirs with main uses for the generation of hydropower, transfers of water and releases for irrigation and other demands, including estuarine requirements, before reaching its confluence with the Vaal River.

The current infrastructure for water use is mainly for irrigation, transfer of water within the study area (Caledon River to Modder River, Vanderkloof Dam to the Riet River, Marksdrift on Orange River to Modder-Riet Rivers) and to other WMAs (e.g. transfer to Great Fish River in the Eastern Cape), domestic use, stock watering and power generation at the Gariep and Vanderkloof Dams. The Bloemfontein metropolitan area is the largest in the study area with smaller towns scattered throughout the catchment. Larger towns include Herscell/ Sterkspruit, Aliwal North, Burgersdorp, Ficksburg, Ladybrand, Botshabelo, Kimberley and Colesberg.

The regional geology is dominated by the Karoo Supergroup that was deposited in the Karoo Basin with a surface area of 200,000 km^2 (Aarnes *et al.,* 2011). The Karoo Supergroup was formed through sedimentation within an intracratonic, foreland basin on Gondwanaland, during the Carboniferous, Permian, Triassic and early Jurassic ages, about 300 Ma to 160 Ma ago (Truswell, 1970). The main Karoo Basin covers a large part of the central and eastern parts of South Africa, and according to Du Toit (1954), the Karoo Basin has a maximum thickness in the southern parts of the Northern Cape Province and Lesotho.

The Upper Orange Catchment is covered exclusively by the Karoo Supergroup sedimentary rocks. Widespread volcanism ended the Karoo sedimentation during the early Jurassic Age (Tankard *et al.,* 1982). According to Botha (*et al.,* 1998), magmatic activity is divided into two phases, i.e. an extrusive phase associated with the outpour of Drakensberg lavas, as well as the intrusive phase associated with numerous linear dolerite dykes/sills and kimberlites in the Karoo formations. The intrusion of dolerite dykes resulted in the formation of fractures and contact metamorphism within the sedimentary host rock (Aarnes *et al.,* 2011).

The Upper Orange-Senqu River basin coincides with a major transboundary aquifer, i.e. The Karoo Sedimentary Aquifer. The Stormberg Group of the Karoo Supergroup underlying the trans-boundary area comprises horizontal to sub-horizontal dipping sedimentary rocks of the Burgersdorp, Molteno, Elliot and Clarens Formations. These include fluvio-deltaic mudstones, siltstones and sandstones with dolerite ring dyke intrusions. Formation groundwater storage and flow are functions of porosity. Primary effective porosities are low due to sediment cementation and the fine-grained nature of the sediment, as well as compaction and high mudstone contents. Secondary porosities are enhanced by fracturing and dolerite dyke intrusion. The highest borehole yields are associated with the fractured dolerite and thick sandstone contacts and where these contacts are covered by alluvium. The alluvium plays an important role to enhance recharge to the subsurface lithologies. The borehole yields are variable in the catchment and range from 0.1 L/s to >5.0 L/s, dependent on the underlying geological group.

According to WRC (2012), the total groundwater use in the catchment is estimated at 132Mm^3/a, of which 80% is being used for agriculture, 13% for agricultural livestock and 3% for municipal purposes. In the drier western and southern parts of the catchment, groundwater is the main source of water for rural domestic supplies and stock watering.

Depression wetlands are common wetland types in the Catchment and is largely associated with a combination of geology, rainfall and temperature. A total of 2,868 wetlands was identified by the National Wetlands Map (NWM5) spatial layer (Van Deventer *et al.,* 2018), covering 74,378ha. The majority of the identified wetlands are in the Upper Karoo Bioregion, followed by the Mesic Highveld Grassland Bioregion.

Most of the identified wetlands were categorised as Least Concern followed by Vulnerable based on the vulnerability of the wetland type and vegetation with more than half of the identified wetlands in a largely natural state with limited modifications.

The main modifications affecting the integrity of the wetlands within the Catchment is associated with multiple land use impacts e.g., irrigated commercial croplands, bare areas associated with mining operations and populated areas (hardened surfaces). Other impacts include poor land use management practises and over-grazing in all three provinces.

Large areas of the study area have highly dispersive soils that are a key consideration for the selection of wetlands of importance for protection and maintenance since many of these systems are already highly degraded and at risk of eroding beyond any rehabilitation potential.

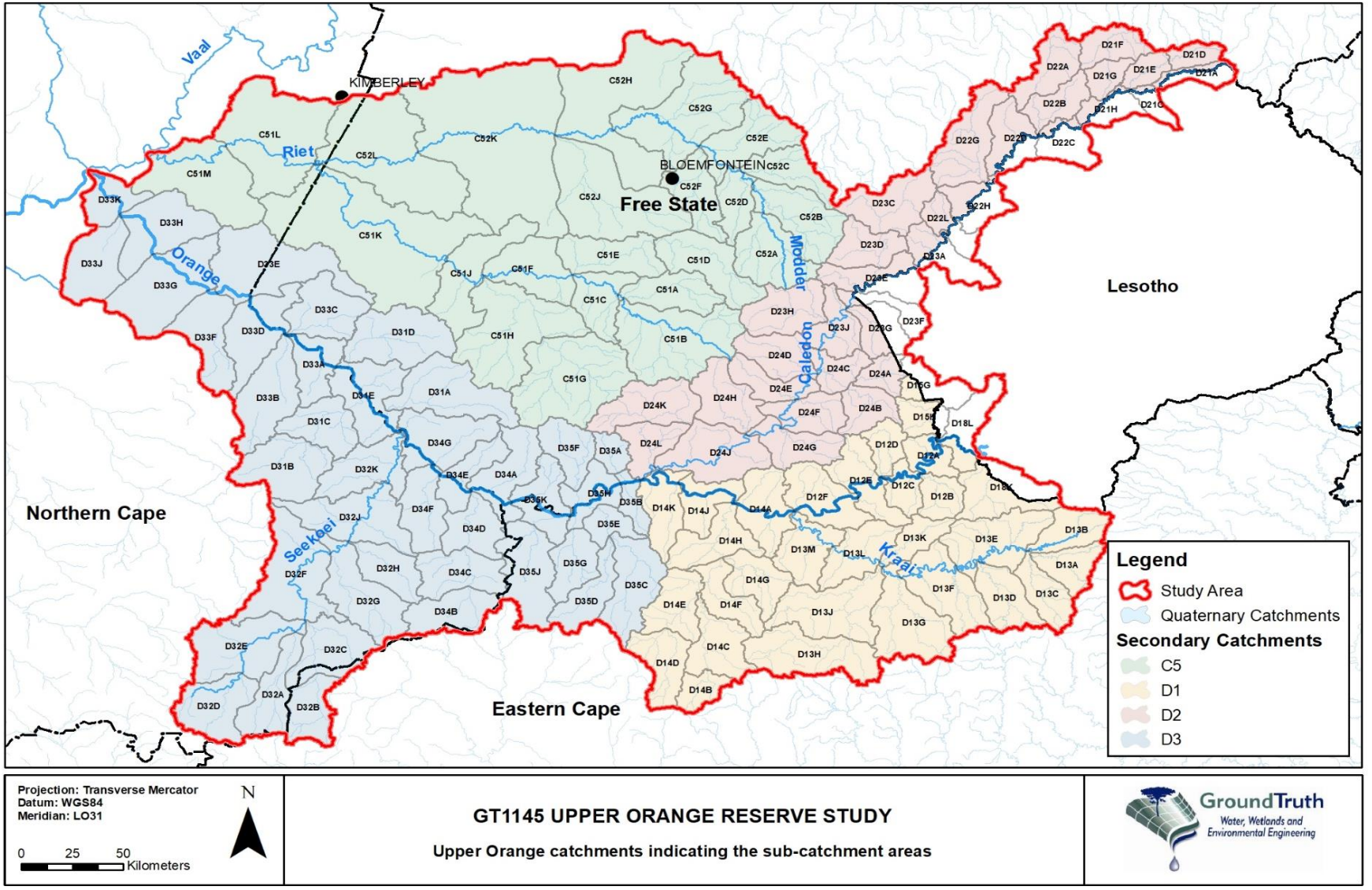


Figure 2-1: Upper Orange Catchment

3. APPROACHES FOR PRIORITY RESOURCE UNITS DELINEATION

Various approaches were followed for the identification and prioritisation of the Resource Units for each of the water resource components (rivers, groundwater and wetlands) within the Upper Orange Catchment.

3.1 Rivers

A Resource Unit represents a river reach that is sufficiently ecologically distinct and homogenous to justify its own EWR specification. This provides the smallest discrete, manageable unit (DWA, 2011).

The delineation of the RUs is done primarily on a biophysical basis and consider the different ecological regions (EcoRegions), geohydrological response units, habitat integrity, water quality units and operation of the system. Approximately 790 sub-quaternary reaches were delineated during the Desktop Present Ecological State (PES), Ecological Importance (EI) and Ecological Sensitivity (ES) assessment study for the Upper Orange Catchment that was done during 2012 to 2014 (DWS, 2014).

The large number of sub-reaches makes it unfeasible to determine EWRs for all of these. Consequently, a prioritisation procedure was applied to select sub-reaches with a high EI and ES that are already stressed or will be stressed in future due to water resource developments or water quality impacts. EWR sites will be selected for these priority sub-reaches and based on the level of stress and the PES will indicate the level of Reserve determination required.

Previous Reserve studies established the method(s) to assess a relatively large number of RUs or sub-quaternary reaches when basin-wide studies are done (DWAF, 2008 and DWA, 2013). This approach was used in the current study based on the results of the DWS, 2014 Desktop PES/EI/ES study and includes the assessment of:

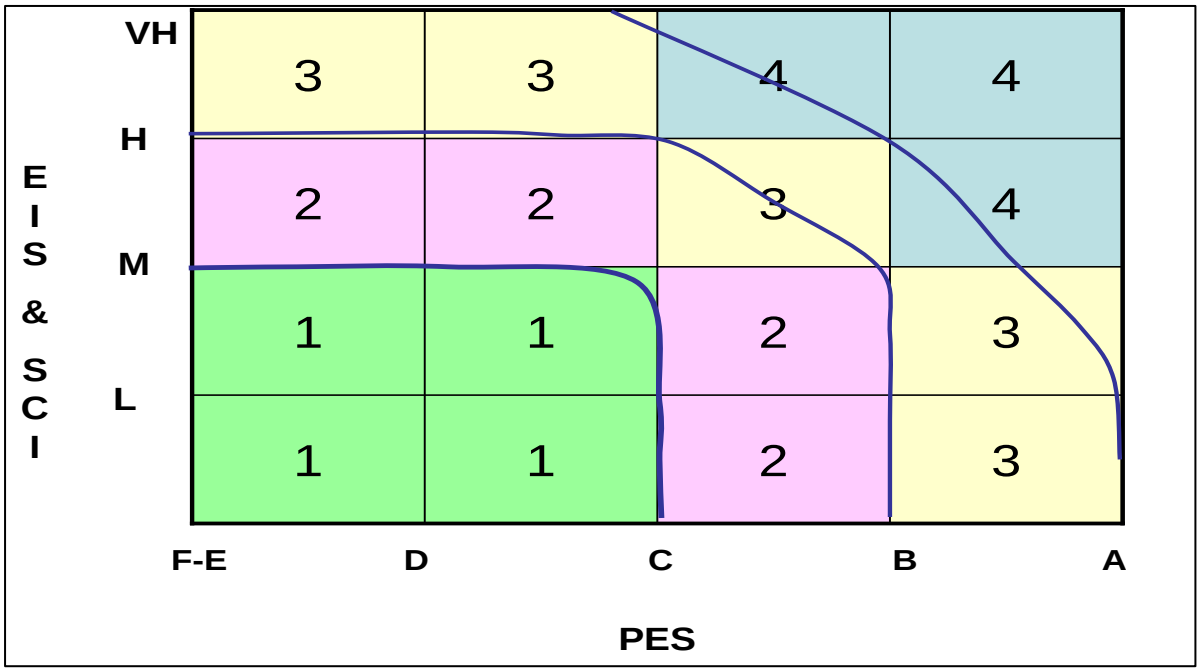
(i) The water use impacts (quantity and quality) to determine the integrated water use index (IWUI) or water stress;
(ii) The highest rating of the EI or ES is used for EIS and integrated with the PES for each sub-quaternary reach to provide an Integrated Ecological Index (IEI); and
(iii) The level of EWR determination required is obtained by integrating the IWUI and IEI.

The following steps were followed:

Step 1:
Determine IWUI per sub-quaternary reach using the flow and quantity modification metric scores from the desktop PES/EI/ES study. These were scored from 0 (no modification) to 5 (critical modification). The highest score of the two metrics was used as the IWUI per sub-quaternary reach. If any water use developments between 2012 and 2021 were undertaken that changed the water availability or quality in a specific area/ reach, these were considered, and the original score changed to reflect it.

Step 2:
Determine the EIS (very low to very high) by selecting the highest score of EI and ES.

Step 3:
Integrate the EIS with the PES, using the following matrix to determine the Integrated Ecological Index (IEI) (Figure 3-1). If the Social-Cultural Importance (SCI) scores are available per sub-quaternary reach, the highest score of EIS and SCI is used and integrated with PES. The EIS and SCI are scored from Low (L), Moderate (M), High (H) and Very High (VH) and the PES in terms of categories A (natural) to E-F (critically modified). The integrated scores (IEI) is from 1 (low importance) to 4 (high importance) based on ecological considerations, thus indicating where the focus should be, i.e. river reaches with very high EIS and SCI, even if the PES is in a modified state or where the PES is in an A or B category, even with a low EIS.



EIS and SCI indicates Very High (VH), High (H), Medium (M), Low (L)
PES indicates natural/pristine (Category A), largely natural (Category B), moderately modified (Category C), largely modified (Category D) and critically modified (Category E-F)

Figure 3-1: Matrix to integrate PES and EIS/ SCI to derive IEI (from DWA, 2013)

Step 4:
The IEI and IWUI/ Resource Stress scores are integrated in this step to determine the level of Reserve study (desktop, rapid 3, intermediate or comprehensive) and is guided by the matrix below (Figure 3-2). For example, if the IEI score is 2 (moderate important) and the IWUI score is a 3 (high impact), then the resultant level is a rapid 3.

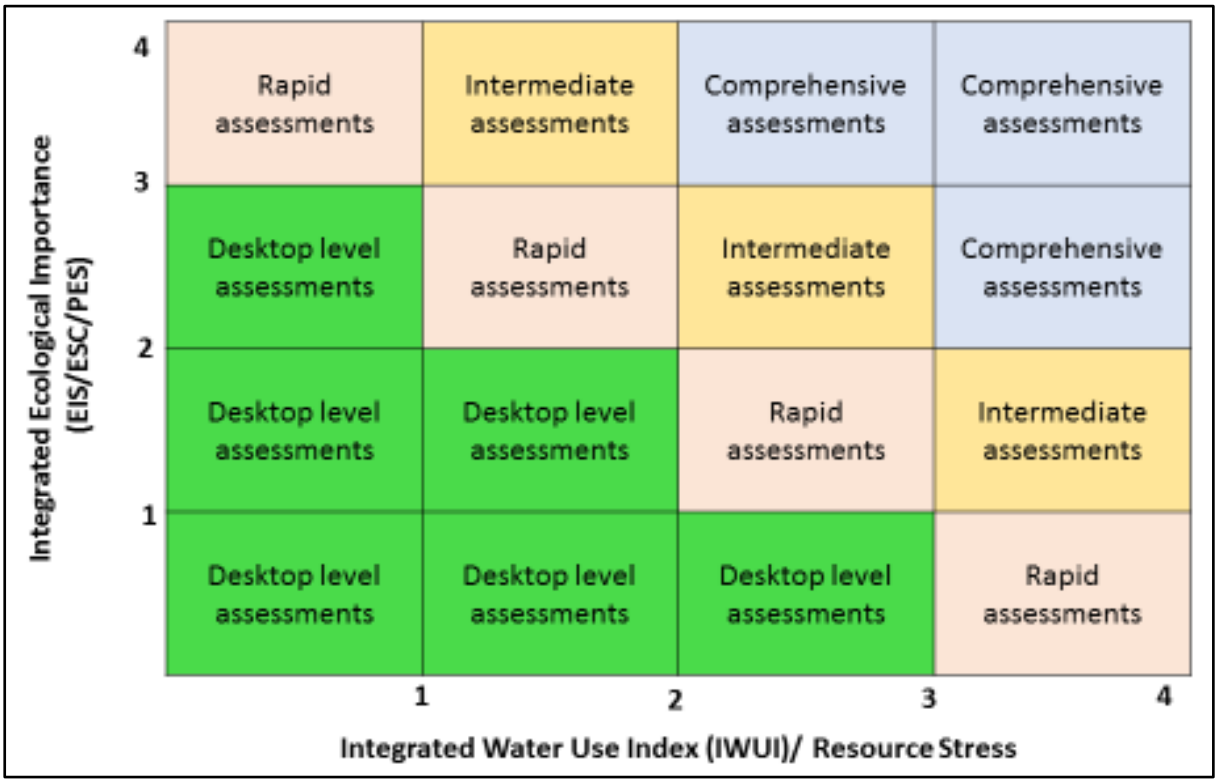


Figure 3-2: Matrix to integrate the Integrated Ecological Importance (IEI) and the Resource Stress (IWUI) and to derive the level of Reserve assessment (from DWAF, 2008)

Step 5:

The final step was to check the following and to adjust the level of Reserve assessment to provide higher confidence in the final results:

i. Sub-quaternary reaches that falls within the identified Strategic Water Source Areas (SWSA) (Lötter & Maitre, 2021);
ii. FEPA rivers, especially the reaches that were identified as Fish Support Areas, fish corridors, flagship rivers and free flowing rivers;
iii. Any planned future large-scale water resource developments that will impact on the downstream water resource and degrade the PES;
iv. Information from the recently completed JBS3 surveys (ORASECOM, 2021) and the diatom samples that were taken during the catchment visit in October 2021. Where the results indicated that river reaches were in a poor present state, and is currently on a desktop level assessment, these have been adjusted for field verification and possible rapid assessments;
v. Information on the Social Cultural Importance (SCI). Where specific reaches or quaternary catchments have a high SCI, these reaches were included for field verification or rapid assessments. See Appendix A for the output of the desktop SCI assessment;
vi. Specific conservation targets as set by the Department of Environmental Affairs were considered and the level of assessment was adjusted; and
vii. If any priority wetlands or groundwater areas, contributing to baseflows have been identified in specific sub-quaternary reaches, these were included for more detailed assessments.

The final priority river RUs are presented in tables and maps in Section 4 below.

3.2 Wetlands

The identification, prioritisation and inclusion of wetland RUs as part of a broader Reserve determination project have been relatively limited in the past, as river and groundwater priority areas have usually been the focus of such studies. However, the importance of integrating wetlands into this process has been recognised as necessary for implementation of a holistic approach to such studies by ensuring that all water resources are accounted for within the broader study area.

The identification of wetland RUs is focused on identifying those systems at an ecosystem level and is strongly reliant on knowing where important and/or priority wetland systems are within the landscape. Therefore, the methods used to identify these priority RU areas was reliant on existing wetland coverages (Nel et al., 2011 and Van Deventer *et al.,* 2019) and modification of previous approaches used to define strategically important wetland areas within the broader landscape (Van Deventer *et al.,* 2019).

Additional spatial layers that were viewed as important for consideration throughout this process were incorporated into the approach. The sections below provide an overview of the steps taken to identify the priority wetland RUs for the Upper Orange Catchment.

3.2.1 Identification of additional/ potential wetland areas

The reliance of the process on existing wetland coverages was of particular concern as it was recognised at the outset that the available wetland coverage had significant gaps; with certain areas identified as being underrepresented in terms of wetland extent. I It was assumed that additional wetlands may be scattered across the study area and excluded from the Multi-criteria Analysis (MCA) results. Where possible a brief review of the National Freshwater Ecosystem Priority Area (NFEPA) wetland spatial layer was undertaken at a desktop level to identify any obvious differences in the wetland coverages that may identify additional areas for consideration i.e. the NWM5 and NFEPA datasets.

Following the review of the relevant national spatial datasets, the wetland gaps that were noted across specific areas of the Upper Orange Catchment were still a concern, specifically the centre of the study area. A desktop review of the study area was undertaken for those areas that were not accounted for in any of the wetland datasets and these were indicated with a point shapefile. It is recognised that this approach favoured larger-scale systems. These areas were typically recognized through vegetation signatures in the landscape and evidence of the movement of water through the landscape. These points, in combination with the wetland coverages and base layers, were then used to identify the priority wetlands and/or wetland complexes to be considered as Wetland RUs.

3.2.2 Multi-criteria analysis (MCA)

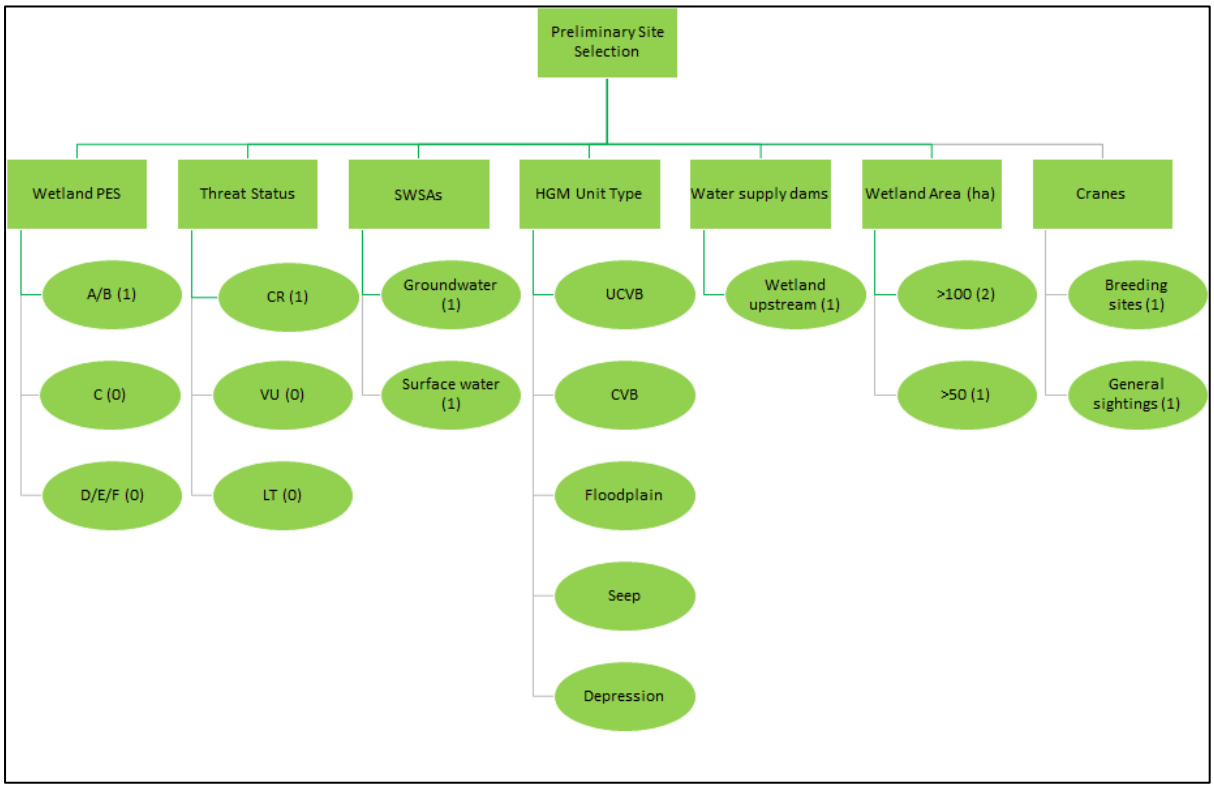
As part of the initial wetland prioritisation process, a MCA process was undertaken to broadly define those wetlands that were considered more important, based on a selected list of variables viewed as important from a wetland ecological, functioning, social and/or biodiversity perspective. This process was informed through a desktop screening process, making use of the various national spatial layers relating to wetlands, their importance and possible delivery of specific ecosystem services. Since the majority of these spatial layers have been created at a national scale, the extent and associated

attributes may not be accurate at a fine scale and field verification of these sites will be necessary to review the characteristics of the wetlands that have been prioritised.

The following information was sourced and used in the identification of priority wetlands for consideration in this study:

- National Wetland Map 5 spatial dataset (Van Deventer *et al.* 2019);
- National Freshwater Ecosystem Priority Areas (NFEPAs) wetland shapefile (Nel *et al.,* 2011);
- Important Bird Areas (IBAs) (BirdLife South Africa, 2016;
- Crane sightings and nest sites (Endangered Wildlife Trust, 2019);
- Wetlands that interacted with the surface and groundwater SWSAs (Lötter & Maitre, 2021);
- Wetlands with a Present Ecological State (PES) of A/B (Van Deventer *et al.* 2019);
- Hydrogeomorphic (HGM) unit type, which was used to determine the level to which each system may provide services associated with (Van Deventer *et al.* 2019);
    - Flood attenuation;
    - Stream flow regulation;
    - Erosion control;
    - Sediment trapping; and
    - Water quality enhancements (assimilation of nutrients).
- Those systems that were classified as *Critically Endangered or Endangered* (Nel *et al.,* 2012);
- Wetlands located upstream of important water supply dams; and
- Identified water-stressed catchments/basins from the river RU process.

To simplify the MCA process, a presence/absence scoring system was developed, whereby wetland systems associated with the abovementioned features were scored 1, with wetlands not associated with these areas was scored 0. Following the overlay of information and intersecting wetland systems were identified, the number of occurrences for a particular wetland feature were summed and then ranked accordingly (Figure 3-3). Through this process, over 3000 priority wetlands were flagged as potentially being important within the study area.



Critically endangered (CR), Vulnerable (VU), Least Threatened (LT), Hydrogeomorphic (HGM), unchanneled valley bottom (UCVB), channelled valley bottom (CVB)

Figure 3-3: Overview of the Upper Orange Catchment wetland MCA prioritisation process

3.2.3 Finalised Wetland RUs

Using the data that was derived from the MCA process, a manual review of the entire study area was undertaken, focussing on the initially prioritised wetland sites. The project team also considered the following spatial layers to inform the final desktop prioritisation process:

- Presence of surface and/or groundwater SWSAs;
- Preliminary priority River RU quaternary catchments;
- The top 10% of quaternary catchments identified through the Working for Wetlands (WfWets) strategic planning for the Eastern Cape, Northern Cape and Free State provinces;
- Specific important wetland areas identified by individual stakeholders; and
- Quaternary catchments identified with the highest recorded water uses (water quantity).

Through this largely iterative process, the final wetland RUs were derived. This involved the project team workshopping the prioritised sites, newly identified areas, and identifying those wetland systems that were considered important in terms of conservation and the protection of the water resource.

3.3 Groundwater

Following WRC (2007, 2012), delineation of groundwater resource units was based on quaternary catchment boundaries with the following groundwater related data/information assessed:

- Aquifer type (primary aquifer, secondary aquifer, karst aquifer);

- Groundwater use (obtained from the WARMs database and general expertise knowledge);
- Strategic Water Source Areas (SWSA), both for groundwater, and those where interaction exists between surface and groundwater;
- Sole source (where groundwater is used as the sole source of supply to communities);
- Groundwater stress areas and stress index – areas where over-utilisation of the groundwater resource is having an impact on the resource (under stressed, severely stressed);
- Subterranean Government control areas (protected groundwater areas as promulgated in the Water Act 54 of 1956); and
- Other physical, management and/or functional criteria. An example of functional criteria is groundwater dependent ecosystems where groundwater plays a major role in sustaining wetlands and/or riparian vegetation.

Quaternary catchments form the basic unit for a GRDM assessment. However, these units can then be further subdivided (or grouped). Typically, areas of similar character can be mapped into distinct units using expert judgement and interpretation. A key outcome is a map showing the extent of the groundwater resource GRDM assessment data sheet, in which the name of each unit and its aerial extent is recorded.

Using the WR (2012) datasets, groundwater RU delineation for the Upper Orange Catchment used the following criteria:

1. Aquifer Type: The catchment has two basic aquifer types, i.e. fractured as well as fractured and intergranular;
2. Borehole Yield: Borehole yields for the two aquifer types were further subdivided into borehole yields >2.0l/s and borehole yields <2.0l/s;
3. Groundwater Quality: In terms of groundwater quality, the catchment has two broad subdivisions, i.e. groundwater quality with ECs between 0 – 70mS/m and groundwater quality with ECs between 70 – 300mS/m;
4. Stressed catchments: The study area has several stressed quaternary catchments, defined as catchments where the groundwater recharge is less than the sum of groundwater abstraction, groundwater contribution to baseflow and basic human needs;
5. Groundwater Recharge: The catchment was further subdivided based on groundwater recharge criteria. A recharge threshold value of 20mm/annum was used to differentiate between high recharge (>20mm/annum) and low recharge (<20mm/annum); and
6. Geo-political boundaries: The catchment falls within three different provinces, i.e. Free State, Northern Cape and Eastern Cape Provinces. The geo-political boundaries have been included for logistical, management and functional reasons.

Overall based on the above, the groundwater could be delineated into groundwater RUs and prioritisation of RUs for groundwater, taking cognisance of stream flow response, stress-index, water levels and quality was undertaken.

4. RESOURCE UNIT DELINEATION RESULTS

4.1 Rivers

A summary of the final priority RUs where EWR sites will be selected and surveys undertaken, are presented in Table 4-1 and Figure 4-1. The rationale for the selection is also provided. The following levels of assessments will be undertaken:

(i) **Intermediate** – fish (modelled with the Fish Response Assessment Index – FRAI), macroinvertebrates (modelled with the Macroinvertebrate Response Assessment Index – MIRAI), riparian vegetation (using the Riparian Vegetation Response Assessment Index (VEGRAI), geomorphology (using the Geomorphology Driver Assessment Index – GAI), hydraulics and water quality;

(ii) **Rapid 3** – fish, macroinvertebrates, Index of Habitat Integrity (IHI), hydraulics and water quality where there are specific concerns due to Wastewater Treatment Works (WWTWs), extensive irrigation or where the results of the October 2021 diatom samples indicated poor water quality;

(iii) **Field verification** – the objective of these identified reaches is to confirm the desktop PES, EI and/ or ES and to provide specific recommendations for future management of these smaller tributaries. The components included will be a combination of those for the Rapid 3 and will be confirmed during the in-field surveys; and

(iv) **Flow Management Plan (FMP)** – these are the reaches along the Orange River directly downstream of the Gariep and Vanderkloof Dams, which are associated with the hydropower releases. The main impacts of these dams are the disruption of longitudinal sediment transport and the disruption in geomorphic effective flows. This has an impact on building new habitats and eroding existing habitats. This leads to the coarsening of the bed material and reduced scouring of bars and benches, leading to active channel narrowing that is worsened by reduced and infrequent flooding events due to the dams. Currently the channel has adapted to these altered flows and sediment regime, as can be observed from the armoured bed, narrow active channel and stable, well vegetated bars and benches. This stable phase is likely to persist with the current operation of the dams. This state supports terrestrial vegetation encroachment on the macro channel. The current operation of the dams' results in abrupt changes in the flow rates on a daily basis, especially those flows released for hydropower generation. These rapid changes in water elevation can lead to stranding of the biota. The recently completed JBS3 survey results downstream of the dams will be used to provide an initial indication of the impacts of these flows on the habitats and biota. Potential impacts of the altered drivers will be discussed with DWS, Eskom, WRP Consulting Engineers (responsible for the modelling of the operating rules), with the aim to determine whether the effects can be ameliorated by changes in the operation/flow releases from the dams. If possible, to change the operation of the dams, a more appropriate flow release (rate of change and seasonal pattern) will be described to optimise the aquatic ecosystem health and geomorphic processes, to renew habitats through the evaluation of various flow scenarios.

The initial, detailed results for the IWUI, IEI and level of Reserve per sub-quaternary reach are attached as Appendix B.

Table 4-1: Priority RUs for intermediate Reserve determination

RU No.	River	Quaternaries	JBS3	Rationale for selection
R_RU01	Sterkspruit	D12B	-	• Dam in upper reaches (Mhlangeni River); • Increased sedimentation; • Sand mining; • Water quality issues concerning WWTW and hospital return flows; and • Although a small system, high runoff.
R_RU02	Upper Orange	D12A or D12C	Site 33	• Orange River just downstream of Lesotho border with the impacts of the proposed Polihali Dam and other developments in Lesotho; and • Possible new dam in South Arica to be constructed in the Orange River.
R_RU03	Kraai	D13M	Site 34	• The entire upstream reach of the mainstem is a designated Freshwater Ecosystem Priority Area (FEPA) for fish species with vulnerable or Near Threatened (NT) fish populations; • Classed as a flagship river; • Upper parts of the Kraai River and tributaries forms part of the SWSAs; and • Possible dam on the lower reaches of the Kraai River.
R_RU04	Middle Caledon	D23A	Site 28	• Impacts from water use in the tributaries; • Increased sediment due to erosion and downstream Ficksburg and Maseru; and • Recent diatom results (October 2021) indicated poor ecological water quality.
R_RU05	Lower Caledon	D24J	Site 37	• Impacts of upstream water use (irrigation, domestic); • High levels of sedimentation; • Welbedacht Dam upstream of the site and the transfer from Caledon to Modder system at Knellpoort Dam; and • Existing EWR site (D24J) from ORASECOM EFR study, 2010.
R_RU06	Seekoei	D32J or D32K	Site 39	• Reach designated as a fish sanctuary and regarded as a Fish Support Area with vulnerable or NT fish populations; and • Priority wetlands located in the middle reaches.
R_RU07	Upper Orange release into Lower Orange	D33K	Site 41	• Lowest site on the Upper Orange River before the Vaal confluence; • Includes all the impacts of water use and infrastructure (Gariep and Vanderkloof Dams with hydropower and irrigation releases); • Water also transferred at Marksdrift Weir to the lower Riet and Vaal Rivers at Douglas;

RU No.	River	Quaternaries	JBS3	Rationale for selection
				• Reach designated as a fish sanctuary and regarded as a Fish Support Area with vulnerable or NT fish populations; and • Priority wetlands located in the middle reaches.
R_RU08	Upper Riet	C51F	Site 24	• Agricultural activities; • Small dams in upper reaches and tributaries; and • Extensive water use.
R_RU09	Modder	C52G	Site 23	• Extensive water use; • Dams on mainstem and tributaries; and • WWTWs from Bloemfontein and surrounding areas discharges into upstream tributaries.
R_RU10	*Lower Riet	C51L	Site 25	• All impacts of upstream water use; and • Discharges and infrastructure from both the Modder and Riet Rivers and before the impacts of the extensive irrigation of the lower Riet River.

**Use hydraulics from Vaal comprehensive study (Vaal_EWR19) and update PES/EI/ES with results from JBS3 (wet season) and dry season survey*

Table 4-2: Priority RUs for rapid 3 Reserve determination

RU No.	River	Quaternaries	Rationale for selection	WQ	Diatoms
R_RU11	Upper Kraai and tributaries	D13A-E	• Forms part of the SWSAs; • Priority wetlands located along reaches; • Irrigation along rivers; • Social Cultural Important (SCI) area; • The entire upstream reach of mainstem designated as a FEPA for fish species; and • Classed as a flagship river.		x
R_RU12	Wonderboom/ Stormbergspruit	D14A-H	• Numerous dams; • Irrigation; • Non-functional / unmaintained WWTW; and • SCI area.	x	

RU No.	River	Quaternaries	Rationale for selection	WQ	Diatoms
R_RU13	Little Caledon	D21D-E	• Forms part of the SWSAs; • Priority wetlands located along reach; • WWTW; • Irrigation; • Recent diatom results (October 2021) indicated poor ecological water quality; • SCI area; and • Part of the reach within D21D is designated as a fish sanctuary.	x	x
R_RU14	Brandwater	D21F-G	• Priority wetlands located along reach; and • Extensive irrigation.		x
R_RU15	Upper Caledon	D21A, H	• Forms part of the SWSAs; • Priority wetlands located along reach; • Impacts from Lesotho; and • SCI area.		
R_RU16	Mopeli	D22G	• Priority wetlands located along reach; and • extensive irrigation.		x
R_RU17 (R3)	Leeu	D23C-D	• Numerous dams; • Irrigation • Priority wetlands located along reach; and • Part of the reach within C23D is designated as a fish sanctuary and regarded as a Fish Support Area.	x	
R_RU18	Fouriespruit	C51A	• Representative of upper tributaries of the Riet River; and • Extensive irrigation.		x
R_RU19	Kromellenboog/ Vanzylspruit/ Prosesspruit	C51G-H	• Priority wetlands located along reaches; • WWTW; • Irrigation • SCI area (Prosesspruit); and • D51G and C51H designated as a fish sanctuary area with vulnerable or NT fish populations in the upper reaches of Kromellenboogspruit.		x

RU No.	River	Quaternaries	Rationale for selection	WQ	Diatoms
R_RU20	Kgabanyane/ Klein-Modder/ Sepane	C52B	• Representative of upper tributaries of the Modder River; and • Extensive erosion with dams.		x
R_RU21	Osspruit	C52E	• Irrigation; • Small dams; and • Priority wetlands located along reach.		x

Table 4-3: Priority RUs for field verification surveys

RU No.	River	Quaternaries	Rationale for selection	Fish	Inverts	IHI	Diatoms	Discharge	Quality
R_RU22	Gryskopspruit	D12D	• Confirm PES; • Dams; and • WWTW.			x	x		x
R_RU23	Bokspruit	D13A	• SWSA; • Part of upper Kraai wetlands cluster; and • Confirm PES.	x		x		x	
R_RU24	Joggemspruit	D13E	• SWSA; • Part of upper Kraai wetlands cluster; • Forms part of the SWSAs; and • Confirm PES.	x		x		x	
R_RU25	Wasbankspruit	D13G	• SWSA; • Wetlands; • Numerous dams; and • Irrigation			x		x	
R_RU26	Karringmelkspruit	D13K	• Forms part of the SWSAs; • Wetlands; and • SCI area.			x	x	x	
R_RU27	Holspruit	D13H-J	• Numerous small dams in catchment • Confirm PES.			x	x	x	
R_RU28	Klipspruit	D13M	• Confirm PES/EI/ES (Very high EIS).	x	x	x	x		

RU No.	River	Quaternaries	Rationale for selection	Fish	Inverts	IHI	Diatoms	Discharge	Quality
R_RU29	Orange	D14J-K	• Falls within a protected area; • Confirm PES/EI/ES (Very high EIS).	Use JBS3, Site 36 results					
R_RU30	Meulspruit	D22A-B	• Wetlands; • Dams; • Irrigation; • SCI area; and • Confirm PES.			x	x		
R_RU31	Witspruit	D24A-C	• Numerous dams; • Irrigation; • SCI area; and • Confirm PES.			x	x	x	
R_RU32	Skulp/ Groenspruit	D24H	• Dams and irrigation; • Confirm PES/EI/ES.			x	x		x
R_RU33	Hondeblaf	D31B-C	• Small, almost ephemeral system; • Wetlands interaction			x	x		
R_RU34	Elandskloof	D32A	• Small seasonal system in upper reaches of Seekoei River; • Wetland interaction - surface and groundwater.			x	x		
R_RU35	Klein-Seekoei	D32C	• Small seasonal system; • Wetlands interaction - surface and groundwater.			x	x		
R_RU36	Middle Riet	C51K	• SCI (fingerling production)			x	x		
R_RU37	Renoster/ Bloemspruit	C52F	• Water quality; • Large urban areas; • Irrigation; and • WWTWs			x	x		x
R_RU38	Rietspruit	C52G	• WWTW; and • Wetlands			x	x		x
R_RU39	Modder	C52H	• Numerous weirs for abstraction; and • Irrigation			x	x		

Table 4-4: Flow Management Plan RUs

River	Quaternaries	Comments*
Orange	D34A, E, F, G	Assessment indicates intermediate determination for Orange between Gariep and Van der Kloof Dams. However, due to the operation of Gariep Dam with constant releases and hydropower releases that change flows daily, a FMP has been proposed.
Orange	D33A, C, D, E, F, G	Van der Kloof Dam hydropower releases and extensive irrigation along river. Existing EWR site from ORASECOM EFR study, 2010. A FMP is proposed (this is in line with the results from the 2010 ORASECOM study).

* Assessment results of the JBS3 surveys will be used to guide the surveys in terms of the components to be included to be able to specify specific changes to the flow releases

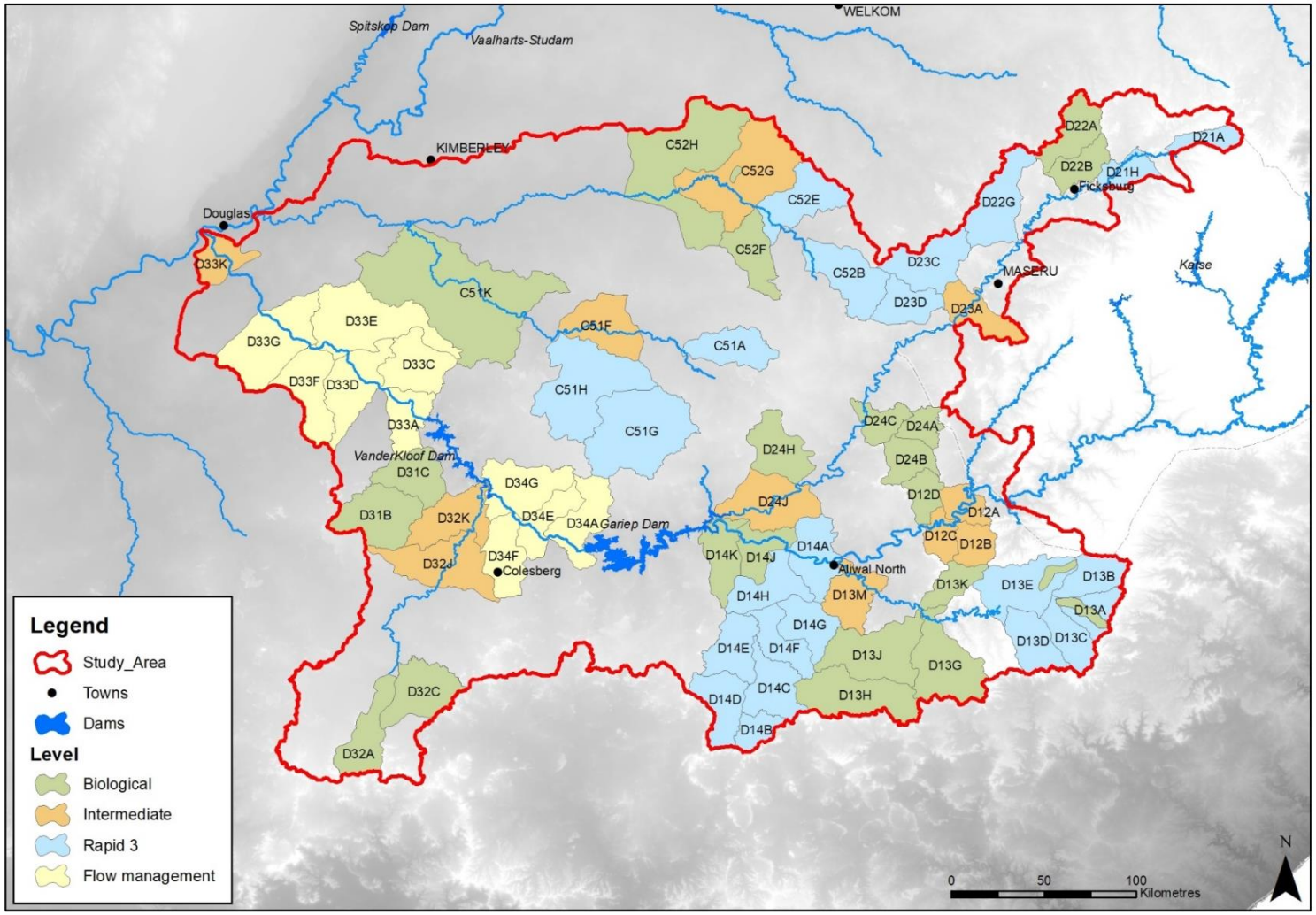


Figure 4-1: Map indicating the proposed levels of assessment of the priority river RUs

4.2 Wetlands

Through the interrogation of various spatial layers and MCA, and initial consultation with numerous wetland and freshwater ecologists during a specialist workshop in December 2021, seventeen (17) wetland RUs were identified within the Upper Orange River study area. It is recognised that further feedback is anticipated in a follow-up specialist workshop and finalisation of the wetland RUs will be subject to this input being received. Table 4-5 below provides a list of the finalised wetland RUs, their location and broad motivations for their inclusion, whilst Figure 4-2 indicates the spatial representation of the RUs across the study area.

Table 4-5: Prioritised Wetland RUs and their motivation

Resource Units	Quaternary catchment/s	Latitude	Longitude	Reasons for Prioritisation
W_RU01	D14A	-30.69826667	26.72413611	1. Priority wetland (as derived from the MCA). 2. Priority River RU quaternary. 3. Adjacent to a settlement – potential water quality pressure.
W_RU02	D21G	-28.72193611	28.11472500	1. Priority wetlands (as derived from the MCA) upstream. 2. Large wetland complex. 3. Located within a top 10% priority WfWets catchment. 4. Priority River RU quaternary. 5. Large portions of intact wetland habitat.
W_RU03	C52H	-28.60825278	26.04387222	1. Located within a high water demand catchment. 2. Priority River RU quaternary. 3. Unique pan complex (potential paleo-river channel linkages). 4. Priority wetlands (as derived from the MCA) upstream of the complex.
W_RU04	D31B	-30.43539722	24.59086389	1. Located within a top 10% priority WfWets catchment. 2. Priority River RU quaternary. 3. Limited impacts on the systems. 4. Significant wetland complex (size and integrity).
W_RU05	D13G	-31.31131944	27.19699167	1. Complex of Priority wetlands (as derived from the MCA). 2. Priority River RU quaternary. 3. Good representation of HGM units within complex.
W_RU06	D13E	-30.82665278	27.46506389	1. Large wetland complex.

Resource Units	Quaternary catchment/s	Latitude	Longitude	Reasons for Prioritisation
				2. Downstream of a surface water SWSAs. 3. Expert identified wetlands 4. Largely intact wetland headwaters.
W_RU07	D32C	-31.23131389	24.64254722	1. Large wetland complex. 2. Downstream of a groundwater SWSA. 3. Just downstream of a top 10% priority WfWets catchment. 4. Priority River RU quaternary.
W_RU08	D32A	-31.34631667	24.52170000	1. Large wetland complex 2. Priority River RU quaternary. 3. Scattered priority wetlands (as derived from the MCA) up- and downstream.
W_RU09	D31C	-30.20494167	24.70858333	1. Priority River RU quaternary. 2. Large wetland complex. 3. Located upstream of the Vanderkloof Dam.
W_RU10	G51M	-29.62005833	24.63800278	1. Priority wetlands (as derived from the MCA). 2. Dense complex of pan systems (providing representation of HGM Units in the study area). 3. Possible example of paleo-river/pan systems. 4. Downstream of a high-water demand catchment.
W_RU11	C52J	-29.02964722	25.82646667	1. Located within a high water demand catchment. 2. Groundwater SWSAs. 3. Diverse complex of pan systems (providing representation of HGM Units in the study area). 4. Within a top 10% priority WfWets catchment. 5. Extent of wetland potentially subjected to land use and water use pressure.
W_RU12	C52G	-28.80097222	26.22816111	1. Multiple priority wetlands (as derived from the MCA) upstream. 2. Fairly good condition wetland complex. 3. Located within a high-water demand catchment.

Resource Units	Quaternary catchment/s	Latitude	Longitude	Reasons for Prioritisation
W_RU13	D22D	-28.93842222	27.72458056	1. Priority wetland (as derived from the MCA). 2. Large wetland complex. 3. Large portions of intact wetland habitat.
W_RU14	D22C	-29.76397222	26.93757778	1. Priority wetland (as derived from the MCA). 2. Upstream of the Welbedacht Dam. 3. Large valley-bottom wetland with limited impacts
W_RU15	C51H	-29.80879722	25.49632222	1. Large wetland complex. 2. Priority River RU quaternary. 3. Portions of intact systems, with some land uses affecting integrity.
W_RU16	D13D	-31.20413333	27.68551944	1. Large, intact wetland complex. 2. Priority wetlands (as derived from the MCA) upstream. 3. Within a top 10% priority WfWets catchment. 4. Priority River RU quaternary.
W_RU17	D13B	-30.68051111	27.96218889	1. Headwater wetlands identified as important systems by wetland ecologist. 2. Large wetland complex. 3. Within a top 10% priority WfWets catchment. 4. Priority River RU quaternary. 5. Upstream of surface water SWSAs. 6. Largely intact wetlands with limited impacts.

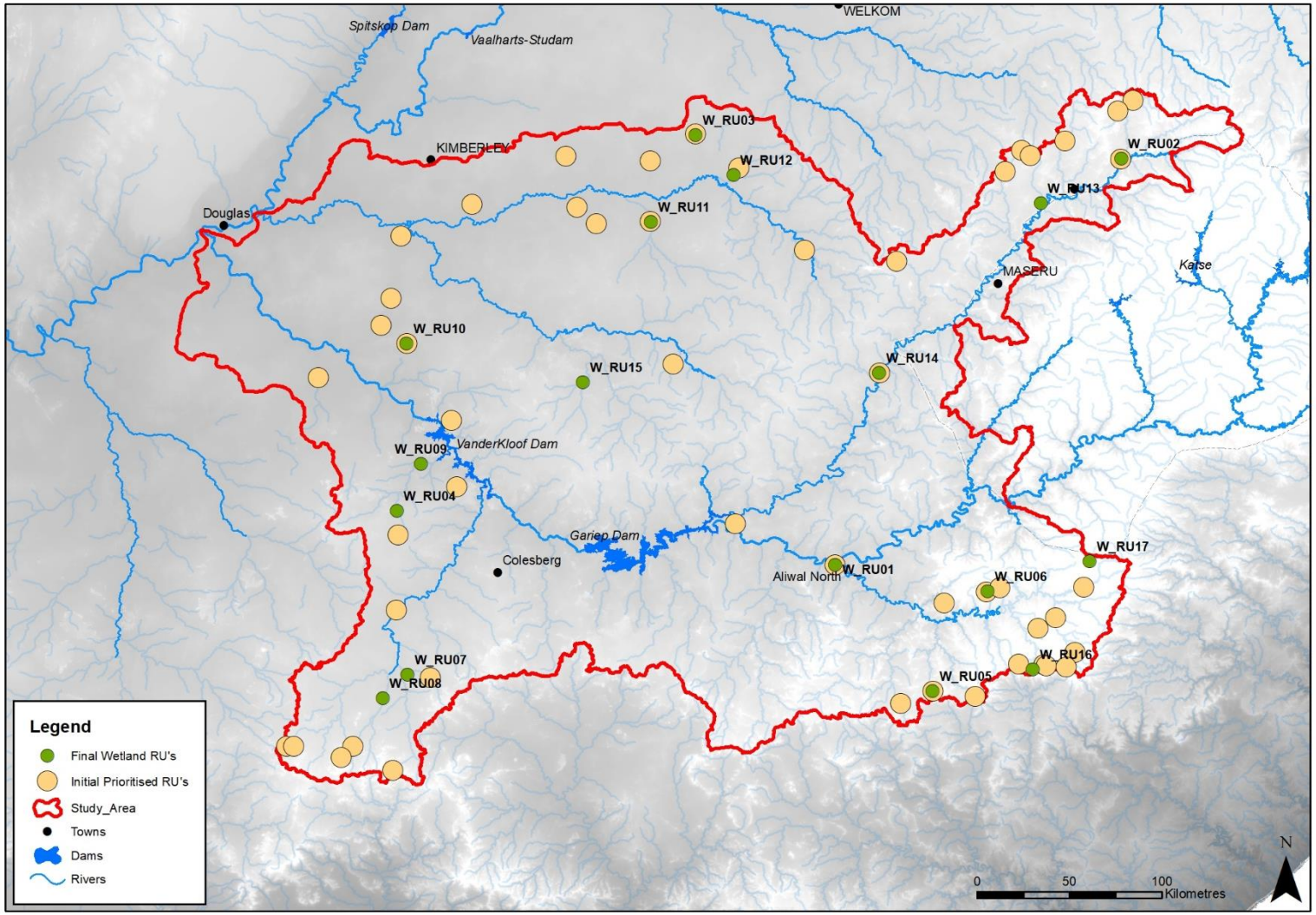


Figure 4-2: Location of the final wetland RUs for inclusion into this study

4.3 Groundwater

A total of 14 groundwater resource units were identified, each with unique characteristics as summarised in Table 4-6. The layout of the groundwater resource units for the Upper Orange study area is provided in Figure 4-3.

Table 4-6: Groundwater Resources Units

Ground-water RU No.	Quaternary	Aquifer Type	Aquifer Yield	Ground-water Quality	Stressed Catchment (Yes or No)	Ground-water Recharge	Geo-political/ Province
GW_RU01	C52A, C52B, C52C, D21A, D21C, D21D, D21E, D21F, D21G, D21H, D22A, D22B, D22C, D22D, D22F, D22G, D22H, D22L, D23A, D23C, D23D, D23E, D23F, D23G, D23H, D23J,	Intergranular and Fractured	<2.0l/s	0–70mS/m	No	>20.0mm/annum	FS
GW_RU02	C51A, C51B, C51D, C51G, C52A, D12A, D12B, D12C, D12D, D12E, D12F, D14A, D14J, D14K, D15G, D15H, D18L, D23F, D23G, D23H, D23J, D24A, D24B, D24C, D24D, D24E, D24F, D24G, D24H, D24J, D24K, D24L, D31A, D34A, D34C, D34D, D34E, D34F, D34G, D35A, D35B, D35E, D35F, D35G, D35H, D35J, D35K	Intergranular and Fractured	<2.0l/s; and >2.0l/s	0–70mS/m	No	>20.0mm/annum	EC
GW_RU03	C51A, C51B, C51C, C51D, C51E, C51F, C51G, C51H, C51J, C51K, C52A, C52B, C52C, C52D, C52E, C52F, C52G, C52H, C52J, C52K, D23E,D23F, D23H, D23J, D24K, D31A,	Intergranular and Fractured	<2.0l/s	0–70mS/m	No	>20.0mm/annum	FS
GW_RU04	C52E, C52F, C52G, C52H	Intergranular and Fractured	<2.0l/s	70–300mS/m	No	<20.0mm/annum	FS
GW_RU05	C51J, C52K, C52L	Fractured	>2.0l/s	70–300mS/m	No	<20.0mm/annum	FS
GW_RU06	C51K, C51J, C51F, C51H, D31D, D31A	Intergranular and Fractured	<2.0l/s	70–300mS/m	No	<20.0mm/annum	FS
GW_RU07	D12A, D12B, D12C, D12D, D12E, D13A, D13B, D13C, D13D, D13E, D13F, D13G, D13J, D13K, D13L, D15H, D18G, D18K, D18L,	Intergranular and Fractured	<2.0l/s and >2.0l/s	0–70mS/m	Yes	>20.0mm/annum	EC

Ground-water RU No.	Quaternary	Aquifer Type	Aquifer Yield	Ground-water Quality	Stressed Catchment (Yes or No)	Ground-water Recharge	Geo-political/ Province
GW_RU08	D12B, D12C, D12E, D12F, D13F, D13G, D13H, D13J, D13K, D13L, D13M, D14C, D14F, D14G	Intergranular and Fractured	<2.0l/s	0–70mS/m	No	>20.0mm/annum	EC
GW_RU09	D12F, D13M, D14A, D14B, D14C, D14D, D14E, D14F, D14G, D14H, D14J, D14K, D24J, D32B, D32C, D32G, D32H, D34B, D34C, D34D, D35B, D35C, D35D, D35E, D35G, D35H, D35J, D35K	Fractured	<2.0l/s	0–70mS/m	No	<20.0mm/annum	EC/NC
GW_RU10	D32A, D32B, D32C, D32D, D32E, D32F, D32G	Intergranular and Fractured	<2.0l/s	70–300mS/m	No	<20.0mm/annum	NC
GW_RU11	D32F, D32G, D32H, D32J, D32K, D34A, D34B, D34C, D34D, D34E, D34F, D34G, D35J	Intergranular and Fractured	<2.0l/s	0–70mS/m	No	<20.0mm/annum	NC
GW_RU12	D31D, D33A, D33B, D31A, D31E, D31C, D34G, D32K, D31B, D34F, D32J, D32F, D32G, D32H	Intergranular and Fractured	<2.0l/s	70–300mS/m	No	<20.0mm/annum	NC
GW_RU13	C51K, C51L, C51M, C52L, C92B, C92C, D31B, D31C, D31E, D33A, D33B, D33C, D33D, D33E, D33F, D33G, D33H, D33J, D33K	Intergranular and Fractured	<2.0l/s	70–300mS/m	No	<20.0mm/annum	NC
GW_RU14	C51E, C51F, C51G, C51H, C51J, C51K, C52G, C52H, C52J, C52K, C52L, D31A, D31D, D31E, D33A, D33B, D33C, D33D, D33E, D34G	Fractured	<2.0 l/	70–300mS/m	No	<20.0mm/annum	FS

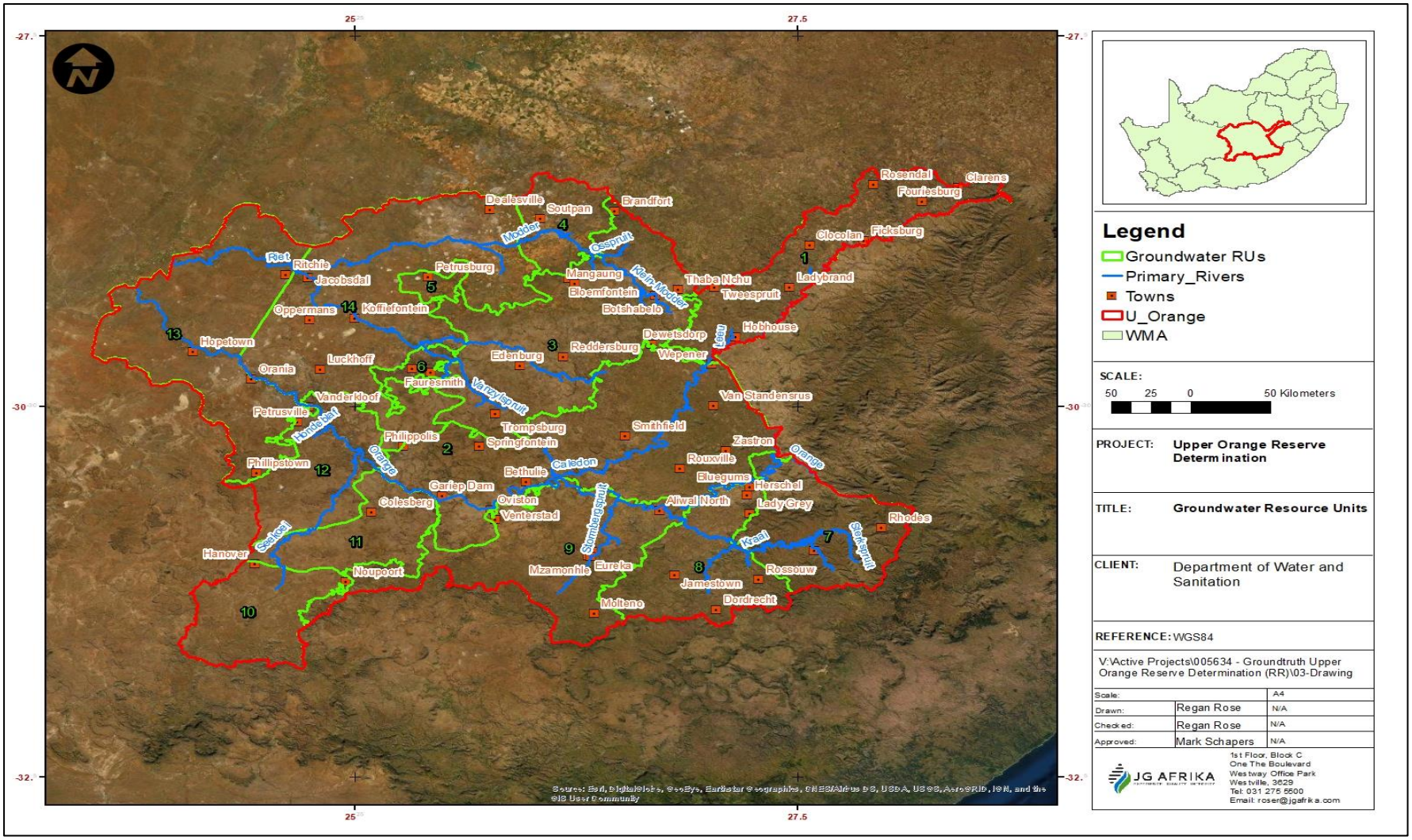


Figure 4-3: Groundwater Resource Units

5. INTEGRATION BETWEEN SURFACE WATER, GROUNDWATER AND WETLANDS

The integration between surface water, groundwater and wetlands was considered and evaluated using available data. Knowledge of these interactions will be essential in addressing key gaps that were identified (DWS, 2021). Please refer to Figure 5-1 for the map illustrating the integration between surface, groundwater and wetlands.

The integrations that will be considered for this study include:

- The Kraai System, especially the upper part of the catchment forms part of the SWSA and is important from a wetlands, groundwater and surface water perspective ();
- Current assessments will provide an opportunity to integrate geomorphology data and sediment with riparian vegetation, macroinvertebrate and fish information; and
- Integrate data between the current diatom data obtained from JBS3 and during the in-field verifications, with that of available water quality data to further understand the ecological water quality within the catchment.

Additional data related to groundwater use (DWS WARMS), baseflows, wetlands and strategic groundwater resources were used to assist with the prioritisation of groundwater resource units linked to possible integration between surface and groundwater (Lötter & Maitre, 2021). The WARMS data was interpolated to spatially characterise the existing registered groundwater use in the catchment. The preliminary wetland sub-quaternaries and strategic groundwater resources were superimposed with the DWS WARMS interpolated layer to manually assign priority groundwater resource units (see Figure 5-3). A summary of the priority groundwater resource units is provided in Table 5-1. A total of 6 groundwater resource units were identified as priorities where integration with wetlands and rivers should be considered (Table 5-1, Figure 5-3 and Figure 5-3).

Table 5-1: Priority Groundwater Resource Units

Groundwater RU No.	Groundwater Use (High or Low)	Wetlands sub-catchment (Yes or No)	Strategic Ground-water Resource (Yes or No)	Priority Groundwater Resources (Yes or No)
GW_RU01	Low	Yes	No	No
GW_RU02	Low	Yes (minor)	No	No
GW_RU03	Mainly low but locally high at Dewetsdorp	Yes (minor)	Yes	Yes
GW_RU04	High	Yes	Yes	Yes
GW_RU05	High	Yes	Yes	Yes

Groundwater RU No.	Groundwater Use (High or Low)	Wetlands sub-catchment (Yes or No)	Strategic Ground-water Resource (Yes or No)	Priority Groundwater Resources (Yes or No)
GW_RU06	Low	No	No	No
GW_RU07	High	Yes	Yes	Yes
GW_RU08	High	Yes (minor)	No	No
GW_RU09	Low	Yes (minor)	Yes	No
GW_RU10	High	Yes	Yes	Yes
GW_RU11	Low	Yes (minor)	Yes	No
GW_RU12	Low	Yes (minor)	No	No
GW_RU13	Low	Yes (minor)	No	No
GW_RU14	High	Yes	Yes	Yes

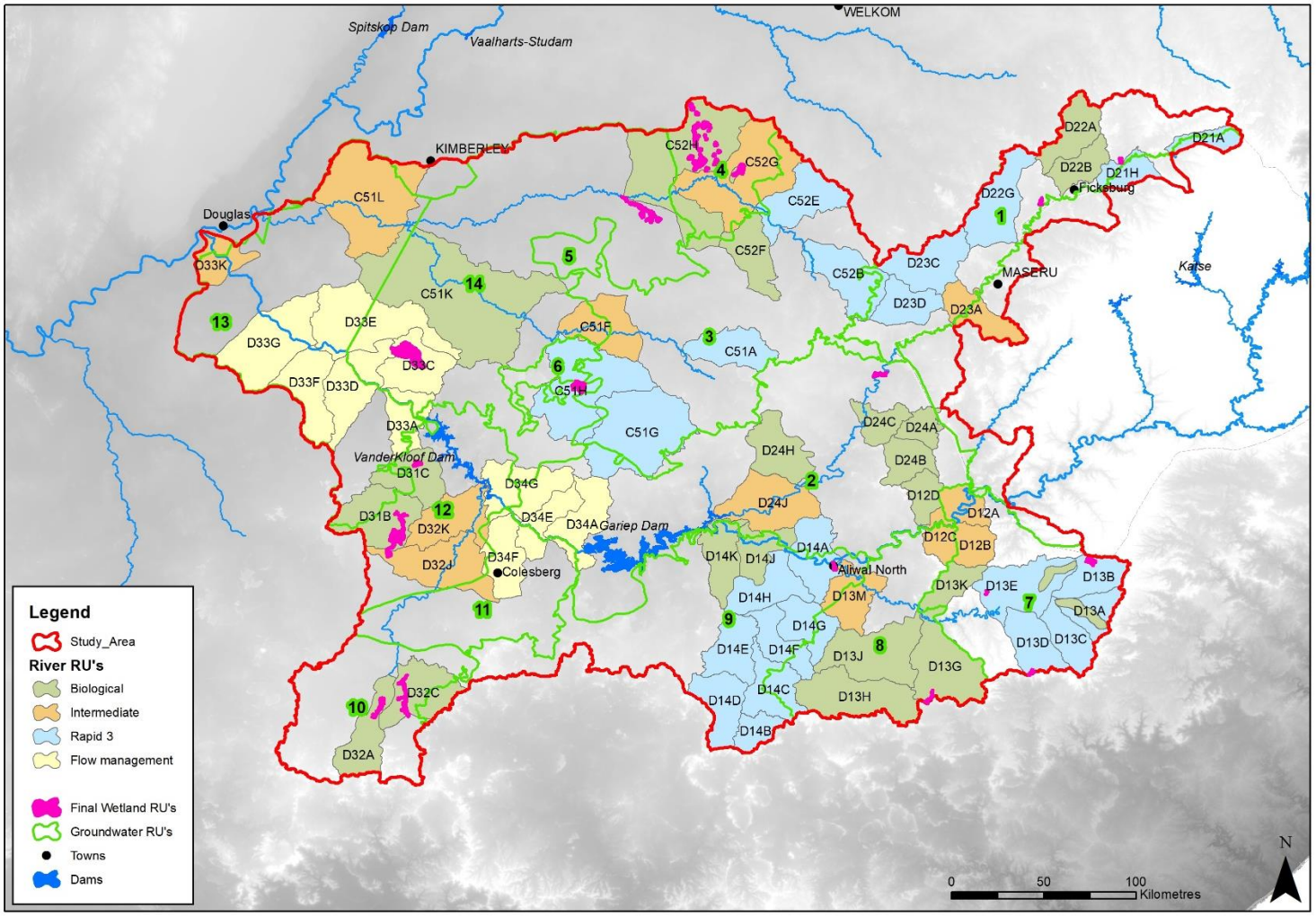


Figure 5-1: Map illustrating the integration between surface water, groundwater and wetlands

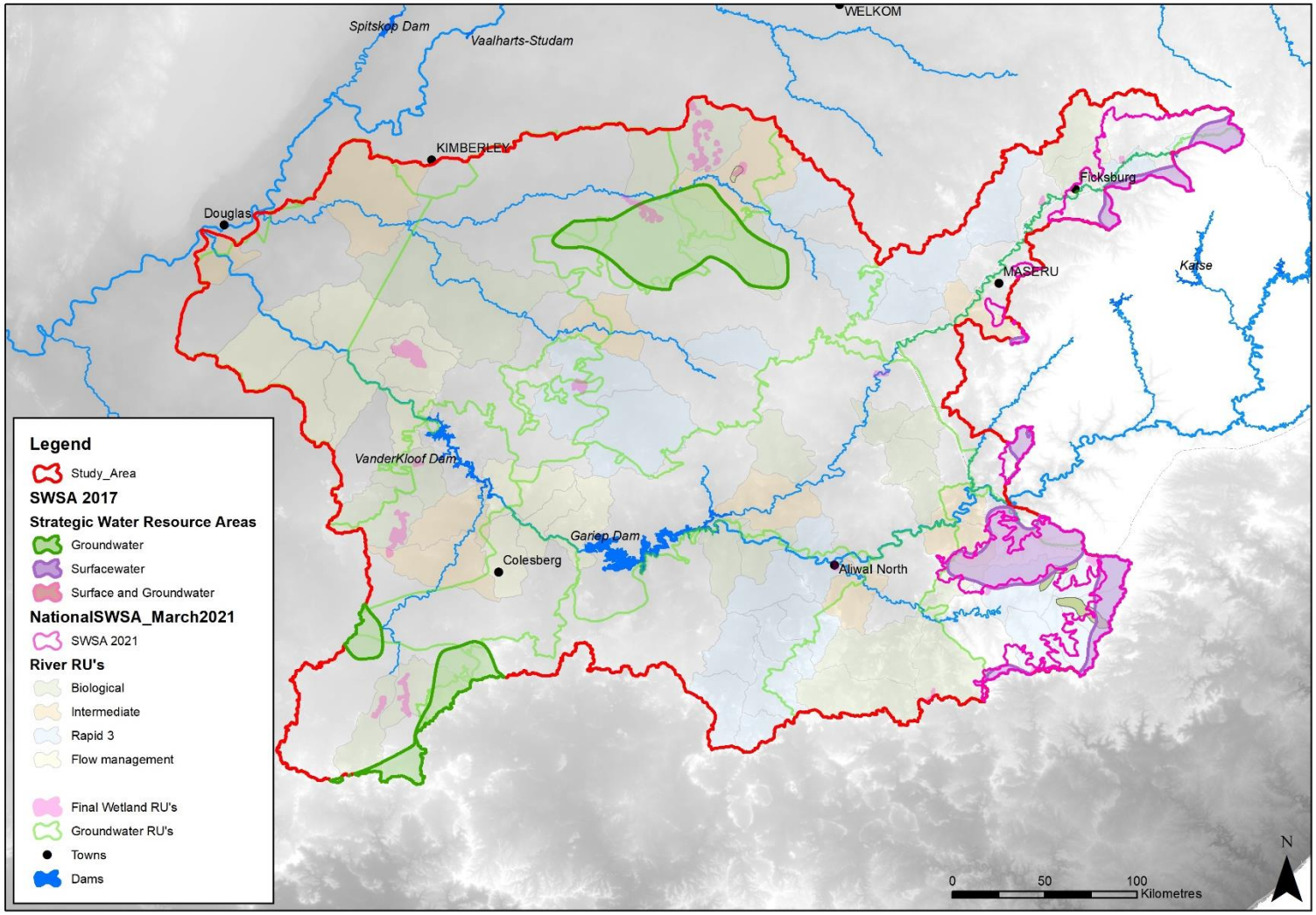


Figure 5-2: Map illustrating the SWSA overlayed over the faded integration between surface water, groundwater and wetlands

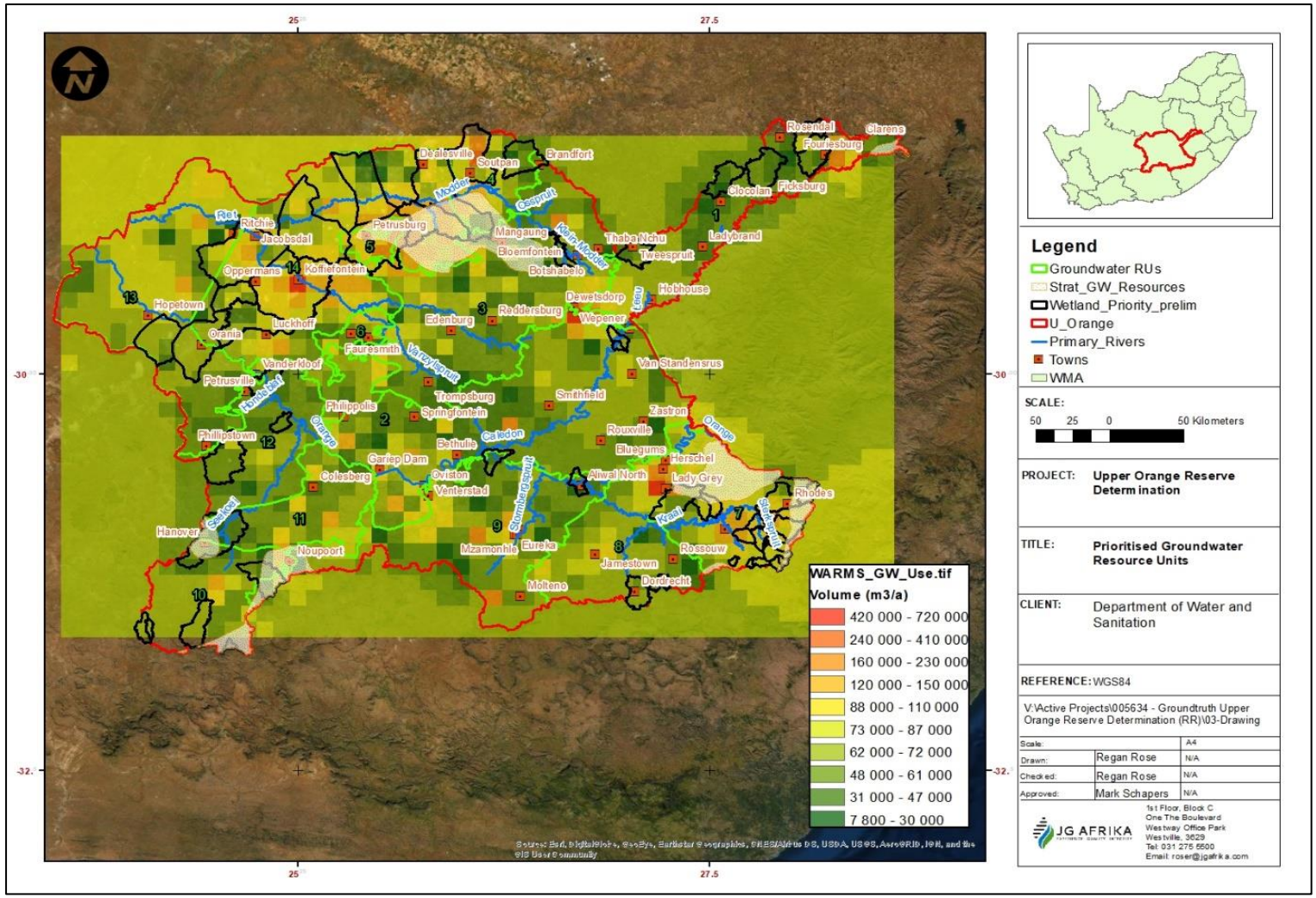


Figure 5-3: WARMS groundwater use superimposed with wetlands and strategic groundwater resources

6. CONCLUSIONS

Available information was used to evaluate the water resources of the Upper Orange Catchment and to identify the priority RUs for rivers, wetlands and groundwater. The main sources of information used were:

- Desktop PES/EI/ES results (DWS, 2014) for the rivers;
- NWM5 map for wetlands; and
- WR2012 data for groundwater.

Additionally, a desktop assessment of the SCI was undertaken. Quaternaries, where the social-cultural activities were directly linked to the water resources, were highlighted and further included in the final selection of the priority RUs and the level of assessment for rivers.

Specific approaches as developed during previous studies have been used to prioritise the RUs for rivers, wetlands and groundwater. Additional considerations during the selection and prioritisation of RUs were SWSAs and areas where the integration between the water resource components need to be considered.

A total of 39 priority RUs for rivers were selected:

- 10 intermediate;
- 11 rapid 3; and
- 18 field verification assessments.

The Orange River between Gariep and Vanderkloof Dam and downstream of Vanderkloof Dam has been selected to develop an FMP. This plan will address the specification of flow releases from the dams to optimise the ecological functioning of the river downstream. However, within the constraints of the operating rules for releases for hydropower and other users downstream.

A total of 17 priority wetland areas and 14 groundwater RUs were identified. Of the 14 groundwater RUs, 6 of them have been prioritised, along with possible integration with surface water and wetlands.

Priority RUs for rivers, wetlands and groundwater will be used to guide the planned surveys and the specification of EWRs and other ecological conditions for the management of the water resources within the study area.

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8. APPENDICES

Appendix A: Results of desktop assessment of SCI

Site	Quarter-naries	Cultural aspect/benefit	Source
General - conservation/protected areas		Biodiversity and non-use/indirect values	
The "Diamond and Wine" tourist route - Jagersfontein, Koffiefontein, Landzicht Wine Cellars (R704)	C51H,K	Prominent tourism route – social-economic development, open mines at Jagersfontein and Koffiefontein and the "Mining Village" at Jagersfontein are tourist attractions	Xhariep profile
Kalkfontein Dam & Nature Reserve (Riet River)	C51J	Recreation - local camping, fishing and picnics, not a main tourism destination	URL and others
Koffiefontein area	C51K	Socio-economic development - production of fingerlings (aquaculture) projects	Xhariep profile
Mokala National Park	C51M	Recreation, Tourism - National Park, relatively high use, high value	Online search
Maria Moroka Game Reserve (Thaba Nchu) & Montloatse Setlogelo (Groot Hook) Dam	C52B	Heritage, Recreation - local angling; hiking, birding	Online search
Spitskop Verkeerdevlei - rock art	C52E	Heritage - rock paintings	Online search
Slypsteenberg - Bushman/San engraving site	C52J	Heritage - Bushman/San engraving site	Online search
Petrusburg	C52K	Game farm areas - tourism	Xhariep profile
Sterkspruit - rock art	D12B	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)

Site	Quarter-naries	Cultural aspect/benefit	Source
Zastron & surrounds - rock art	D12D	Heritage - rock art	Xhariep Profile
Lady Grey - rock art	D12E	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)
Sterkstroom rock art site (between Rouxville & Aliwal North)	D12F	Heritage - rock paintings	Online search
Tiffindell Ski Resort (Barkley East)	D13B	Recreation, Tourism - winter (skiing), summer - high altitude hiking, mountain biking, grass skiing, mountain boarding, photography, rock art, birding, some of SA's best fly fishing, quad biking, and the famous "8 Passes" route for motorcyclists and 4x4's. Tiffindell is known internationally for its flowers	https://tiffindell.co.za/
Rhodes - rock are	D13B	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)
Barkley East - rock art	D13D	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)
Rossouw - rock art	D13G	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)
Jamestown - rock art	D13J	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)

Site	Quarter-naries	Cultural aspect/benefit	Source
Aliwal North - rock art	D14A	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)
Burgersdorp area - rock art	D14E	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)
De Bruin Dam	D14F	Targeted for tourism development & other development opportunities	Joe Gqabi Profile
Upper Caledon (previous EFR site C5)	D21A	Spiritual / ritual - high, given the densities of people, not sensitive to flow changes unless the river dries up completely.	Huggins et al. (2010)
Golden Gate National Park - associated with little Caledon	D21D	Recreation; National Park - higher numbers of visitors, high value; central feature supporting tourism in the area	Online search
Greater Clarens, Fouriesberg, Ficksberg area	D21D, D21G,D21H,D22C	Landscape aesthetic & tourism - fishing, hiking, cycling, running (including events), Heritage (rock paintings - Kiara, Schaapplaats)	DWA (2009), Online search
Sandstone caves -The Motouleng caves - located in the mountains between Clarens and Fouriesberg.	D21D,E,F	Spiritual/ritual, Pilgrimage - There is a fountain at the entrance of Motouleng called 'Sediba sa Bophelo', meaning 'The Fountain of Life' where people drop coins for good fortune.	Ngobese & Masoga (2019); Online - https://en.wikipedia.org/wiki/Sacred_caves_of_the_Basotho
Sandstone caves (Sacred caves of the Basotho) - Mount Mautse, Mautse area, Badimong cave - a complex valley with caves and isolated	D22A, B; D21G, H	Spiritual/ritual - traditional healers use water from the waterfalls and herbs from the mountains; water is an ancestrally important element and the streams & pools of the caves have an NB role in the ceremonies. Close to these caves is a prominent	Ngobese & Masoga (2019); Online - https://en.wikipedia.o

Site	Quarter-naries	Cultural aspect/benefit	Source
areas. The area lies between Ficksburg and Fouriesburg.		sacred medicinal clay site called 'Nkokomoni', meaning 'the swelling place'; Heritage - rock paintings; Tourism	rg/wiki/Sacred_caves_of_the_Basotho
Nkgono Annah Mantsopa Cave Site - Modderpoort farm 9outside Ladybrand)	D22G	Spiritual/ritual, Heritage, Pilgrimage	Ngobese & Masoga (2019)
Tandjiesberg, Modderpoort - rock art site	D22G,H	Heritage, Pilgrimage	Online source
Old wagon-bridge, Caledon River, Wepener District	D23G	Heritage - Provincial heritage site	Online - heritage sites of the Free State
The Maluti route which originates in the north and includes the towns of Wepener, Van Stadensrus, Zastron and Rouxville (R26)	D23G, D24C, D12D	Prominent tourism route - social economic development	Xhariep profile
Caledon Nature Reserve & Welbedacht Dam (Caledon River) - situated between Wepener and Smithfield	D23J	Heritage - rock paintings; Tourism - fishing and 4x4 (limits access)	Huggins et al. (2010); Online search
The Xhariep Dam Route - including Smithfield, Bethulie and Xhariep/Gariep dam (R701)	D24H, L, D35B, H, K	Prominent tourism route - social economic development	Xhariep profile
Lower Caledon (previous EFR site C6)	D24J	Tourism - the river is an important aspect of the reserve and fishing tourism.	Huggins et al. (2010)

Site	Quarter-naries	Cultural aspect/benefit	Source
Tussen-2-Riviere Nature Reserve (Confluence of Caledon & Orange)	D24L & surrounds	Recreation, Tourism - targeted for tourism expansion leisure & water sport	Xhariep profile
Vanderkloof Dam	D31E	Recreation - fishing, water sports	https://adventurekayaking.co.za/
Kraai (EFR K7)	D31M	Tradition & subsistence - sedges, reeds & grazing use in the former homeland areas	Huggins et al. (2010)
Doornkloof Nature Reserve (Seekoi Trib)	D32K	Recreation - hiking, cycling, game viewing	https://www.doornkloofnature.co.za/
Luckhoff	D33C	Game farm areas - tourism	Xhariep profile
Archaeological occurrences - Orange River banks, Hopetown area	D33G	Heritage - 33 archaeological occurrences comprising more than 120 stone artefacts were recorded across the proposed development site	Matenga (2020) citing Kaplan (2017)
Heritage site - Old Wagon Bridge	D33G	Heritage - Provincial Site (Grade III)	Matenga (2020)
Phillipolis	D34G	Game farm areas - tourism	Xhariep profile
DH (Hennie) Steyn / Bethulie Bridge (Bethulie, Gariep Dam area)	D35B	Heritage - longest bridge in the country, landscape aesthetic, spiritual (local legend of river snake - coins tossed from bridge by returning mine workings as a peace offering)	Online search
Bethulie area (in Gariep Dam)	D35B	Socio-economic development - production of fingerlings projects	Xhariep profile

Site	Quarter-naries	Cultural aspect/benefit	Source
Bethulie Town	D35B	Heritage - sandstone architecture of historical importance	Xhariep Profile
Bethulie	D35B	Game farm areas - tourism	Xhariep profile
Springfontein area	D35F	Socio-economic development - production of fingerlings projects	Xhariep profile
Gariep Dam & Nature Reserves	D35K,H & surrounds	Recreation, Tourism - game viewing, nature trails, fishing, top micro-lighting spot; targeted for tourism expansion leisure & water sport	Online search, Xhariep profile
Gariep Dam & surrounds	D35K,H & surrounds	Socio-economic development - Fish production	Xhariep profile
Venterstad rock art	D35G	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)
Oviston surrounds rock art	D35H	Heritage - rock art, generally sites located close to the main rivers, as well as the tributaries and streams feeding these rivers	Green (2017)

Appendix B: Initial level of Reserve per sub-quaternary river reach *(yellow: intermediate, blue: rapid3 and green: desktop)*

Table B1: Secondary catchment D1 (sub-reaches in Lesotho or bordering Lesotho highlighted in orange)

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D12A-05065	Orange	3	1	3	C	HIGH	MODERATE	High	2	Rapid 3
D12A-05080	Hendrik Smitstroom	2	1	2	C	HIGH	MODERATE	High	2	Desktop
D12A-05144	Orange	3	1	3	B	HIGH	MODERATE	High	3	Intermediate
D12B-05232	Kromspruit	2	3	3	C	MODERATE	HIGH	High	2	Rapid 3
D12B-05262	Kromspruit	1	1	1	C	MODERATE	HIGH	High	2	Desktop
D12B-05297	Sterkspruit	3	4	4	E	LOW	MODERATE	Moderate	1	Rapid 3
D12B-05411	Mpongo	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D12B-05414	Mhlangeni	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D12C-05164	Orange	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D12C-05222	Orange	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D12C-05256	Orange	2	1	2	B	MODERATE	HIGH	Moderate	2	Desktop
D12C-05263	Bamboesspruit	1	1	1	C	HIGH	HIGH	High	2	Desktop
D12C-05284	Un-named tributary	1	2	2	D	MODERATE	HIGH	High	2	Desktop
D12D-04976	Gryskopspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D12D-05086	Un-named tributary	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D12D-05214	Gryskopspruit	2	1	2	B	HIGH	MODERATE	High	3	Rapid 3
D12E-05062	Winnaarspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D12E-05163	Knoffelspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D12E-05218	Orange	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D12E-05248	Orange	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D12E-05291	Orange	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D12E-05370	Wilgespruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D12F-05170	Beeskraalspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D12F-05210	Nuwejaarspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D12F-05251	Un-named tributary	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D12F-05294	Orange	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D12F-05311	Nuwejaarspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D12F-05348	Orange	3	1	3	C	HIGH	HIGH	High	2	Rapid 3
D12F-05430	Orange	3	1	3	C	MODERATE	HIGH	High	2	Rapid 3
D13A-05617	Rifle Spruit	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13A-05679	Bokspruit	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D13A-05712	Bokspruit	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13A-05829	Un-named tributary	0	0	0	A	HIGH	HIGH	High	4	Rapid 3
D13A-05837	Un-named tributary	0	0	0	A	HIGH	HIGH	High	4	Rapid 3
D13B-05440	Un-named tributary	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13B-05468	Un-named tributary	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13B-05474	Kraai	3	1	3	C	HIGH	HIGH	High	2	Rapid 3
D13C-05672	Sterkspruit	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D13C-05701	Sterkspruit	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D13C-05797	Un-named tributary	0	1	1	B	MODERATE	HIGH	High	3	Desktop
D13C-05802	Sterkspruit	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D13C-05845	Koffiehoekspruit	0	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D13C-05856	Koffiehoekspruit	1	1	1	C	MODERATE	HIGH	High	2	Desktop
D13C-05868	Un-named tributary	0	1	1	B	MODERATE	HIGH	High	3	Desktop
D13C-05892	Un-named tributary	3	2	3	D	MODERATE	HIGH	High	2	Rapid 3
D13C-05902	Bamboeshoekspruit	1	2	2	C	MODERATE	HIGH	High	2	Desktop
D13C-05910	Un-named tributary	2	2	2	C	MODERATE	HIGH	High	2	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D13C-06005	Un-named tributary	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D13C-06008	Un-named tributary	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D13D-05725	Langkloofspruit	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13D-05751	Un-named tributary	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D13D-05766	Langkloofspruit	2	3	3	C	MODERATE	HIGH	High	2	Rapid 3
D13D-05813	Vrouenshoekspruit	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D13D-05843	Langkloofspruit	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D13D-05941	Langkloofspruit	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D13D-05962	Rytjiesvlaktespruit	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D13D-06009	Rytjiesvlaktespruit	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D13D-06023	Un-named tributary	1	1	1	C	MODERATE	HIGH	High	2	Desktop
D13D-06026	Langkloofspruit	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D13D-06027	Un-named tributary	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D13E-05438	Joggemspruit	3	1	3	C	HIGH	HIGH	High	2	Rapid 3
D13E-05455	Vlooikraalspruit	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13E-05483	Three Drifts	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D13E-05488	Diepspruit	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13E-05535	Un-named tributary	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13E-05541	Joggemspruit	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D13E-05563	Klein-Wildebeesspruit	0	1	1	B	MODERATE	HIGH	High	3	Desktop
D13E-05592	Diepspruit	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13E-05604	Kraai	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D13E-05629	Kraai	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D13E-05647	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13E-05703	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D13E-05708	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13F-05599	Un-named tributary	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D13F-05664	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13F-05704	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13F-05728	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13F-05736	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13F-05788	Saalboomspruit	1	1	1	C	HIGH	HIGH	High	2	Desktop
D13F-05810	Un-named tributary	0	1	1	C	MODERATE	HIGH	High	2	Desktop
D13F-05873	Vaalhoek	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D13F-05881	Noodshulpspruit	1	1	1	C	HIGH	HIGH	High	2	Desktop
D13F-05887	Saalboomspruit	1	1	1	C	HIGH	HIGH	High	2	Desktop
D13F-05903	Vaalhoek	1	1	1	C	MODERATE	HIGH	High	2	Desktop
D13G-05716	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13G-05806	Wasbankspruit	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D13G-05913	Wolwespruit	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D13G-05916	Un-named tributary	2	2	2	D	MODERATE	MODERATE	Moderate	1	Desktop
D13G-05918	Wasbankspruit	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D13G-05985	Wolwespruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D13G-05993	Un-named tributary	1	1	1	C	HIGH	HIGH	High	2	Desktop
D13G-05996	Wasbankspruit	3	2	3	D	MODERATE	HIGH	High	2	Rapid 3
D13G-06140	Un-named tributary	2	1	3	C	MODERATE	HIGH	High	2	Desktop
D13G-06150	Un-named tributary	2	2	3	C	MODERATE	HIGH	High	2	Desktop
D13G-06173	Un-named tributary	1	1	1	C	MODERATE	HIGH	High	2	Desktop
D13G-06225	Un-named tributary	1	2	2	C	MODERATE	HIGH	High	2	Desktop
D13H-06042	Rooihoogte se Loop	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D13H-06067	Holspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13H-06105	Holspruit	2	1	2	B	MODERATE	MODERATE	Moderate	2	Desktop
D13H-06119	Holspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D13H-06121	Un-named tributary	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13H-06129	Un-named tributary	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D13H-06144	Holspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13H-06152	Un-named tributary	4	3	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D13H-06157	Un-named tributary	3	2	3	D	MODERATE	HIGH	High	2	Rapid 3
D13H-06189	Kromspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13H-06196	Holspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13H-06199	Un-named tributary	2	2	2	D	MODERATE	MODERATE	Moderate	1	Desktop
D13H-06217	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D13H-06228	Un-named tributary	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05741	Holspruit	1	1	1	B	HIGH	MODERATE	High	3	Desktop
D13J-05827	Telemachusspruit	3	1	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05871	Holspruit	1	1	1	B	HIGH	MODERATE	High	3	Desktop
D13J-05917	Skulpspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05931	Skulpspruit	2	1	2	B	MODERATE	MODERATE	Moderate	2	Desktop
D13J-05933	Un-named tributary	1	2	2	D	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05935	Holspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05943	Skulpspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05952	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05975	Braklaagtespruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05978	Skulpspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13J-05992	Leeuspruit	1	2	2	C	MODERATE	LOW	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D13J-05995	Holspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13J-06034	Un-named tributary	2	2	2	D	MODERATE	MODERATE	Moderate	1	Desktop
D13J-06052	Holspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13K-05454	Karringmelkspruit	0	0	0	B	HIGH	HIGH	High	3	Desktop
D13K-05718	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13L-05485	Bossielaagtespruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D13L-05521	Oslaagte	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13L-05625	Kraai	2	2	2	C	HIGH	HIGH	High	2	Desktop
D13L-05630	Rondefonteinspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D13L-05640	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13L-05646	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13L-05650	Kraai	1	1	1	B	HIGH	HIGH	High	3	Desktop
D13L-05674	Windvoelspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D13M-05442	Kraai	2	2	2	C	HIGH	HIGH	High	2	Desktop
D13M-05493	Kraai	2	2	2	C	HIGH	HIGH	High	2	Desktop
D13M-05524	Elandspruit	1	2	2	C	HIGH	MODERATE	High	2	Desktop
D13M-05565	Kraai	2	2	2	C	HIGH	HIGH	High	2	Desktop
D13M-05591	Klipspruit	2	1	2	C	HIGH	VERY HIGH	Very high	3	Rapid 3
D14A-05192	Sanddrifspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14A-05233	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14A-05350	Orange	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
D14A-05366	Orange	3	2	3	C	MODERATE	HIGH	High	2	Rapid 3
D14A-05386	Orange	3	2	3	C	MODERATE	HIGH	High	2	Rapid 3
D14A-05424	Orange	3	1	3	C	HIGH	HIGH	High	2	Rapid 3
D14A-05459	Melkspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D14A-05498	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D14A-05499	Melkspruit	3	1	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14B-06326	Stormbergspruit	3	1	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14B-06340	Un-named tributary	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D14B-06479	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14B-06489	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14C-05863	Stormbergspruit	2	2	2	C	MODERATE	LOW	Moderate	1	Desktop
D14C-05990	Wilgespruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14C-06017	Stormbergspruit	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D14C-06151	Wonderhoekspruit	2	2	2	D	MODERATE	MODERATE	Moderate	1	Desktop
D14C-06184	Stormbergspruit	3	4	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D14D-06068	Bamboesbergspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14D-06073	Wonderboomspruit	4	3	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D14D-06084	Un-named tributary	3	2	4	C	MODERATE	MODERATE	Moderate	1	Desktop
D14D-06092	Un-named tributary	3	2	4	D	MODERATE	MODERATE	Moderate	1	Desktop
D14D-06134	Un-named tributary	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14D-06136	Un-named tributary	3	1	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14D-06137	Wonderboomspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14D-06343	Bamboesbergspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D14D-06356	Un-named tributary	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14D-06441	Un-named tributary	2	1	2	C	MODERATE	LOW	Moderate	1	Desktop
D14D-06454	Un-named tributary	2	2	2	C	MODERATE	LOW	Moderate	1	Desktop
D14E-05733	Buitendagspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D14E-05760	Buitendagspruit	3	3	3	D	LOW	MODERATE	Moderate	1	Desktop
D14E-05796	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D14E-05804	Wonderboomspruit	3	4	4	C	MODERATE	MODERATE	Moderate	1	Rapid 3
D14E-05823	Wonderboomspruit	2	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14E-05853	Wonderboomspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14E-05920	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14E-05950	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14E-05979	Un-named tributary	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D14E-05989	Wonderboomspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14E-06025	Wonderboomspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14F-05684	Stormbergspruit	4	2	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D14F-05819	Klein-Buffelsvleispruit	4	3	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D14F-05880	Witkopspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14F-05915	Klein-Buffelsvleispruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14G-05642	Barnardspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14G-05668	Barnardspruit	3	1	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14G-05676	Barnardspruit	1	2	2	C	HIGH	MODERATE	High	2	Desktop
D14G-05737	Mooiplaasspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14G-05744	Witkopspruit	3	1	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14G-05776	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14G-05786	Mooiplaasspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14G-05793	Witkopspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D14G-05808	Un-named tributary	1	2	2	C	HIGH	MODERATE	High	2	Desktop
D14H-05372	Stormbergspruit	3	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14H-05478	Stormbergspruit	4	2	4	C	MODERATE	MODERATE	Moderate	1	Rapid 3
D14H-05501	Brandkopspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D14H-05513	Kop-en-pootjiespruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D14H-05602	Stormbergspruit	2	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14H-05605	Stormbergspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14H-05623	Wilgerspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14J-05224	Orange	2	2	2	B	HIGH	HIGH	High	3	Rapid 3
D14J-05259	Orange	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D14J-05355	Modderbulrspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D14K-05204	Orange	2	2	2	B	HIGH	HIGH	High	3	Rapid 3
D14K-05228	Orange	2	2	2	B	HIGH	HIGH	High	3	Rapid 3
D14K-05277	Palmietspruit	2	2	2	C	HIGH	MODERATE	High	2	Desktop
D14K-05288	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D15G-04784	Mantikoana	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D15H-04878	Deklerkspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D15H-04889	Makhaleng	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D15H-04944	Makhaleng	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D15H-04945	Worsfonteinspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D15H-04995	Makhaleng	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D18K-05157	Tele	1	1	1	B	MODERATE	MODERATE	Moderate	1	Desktop
D18K-05187	Tele	1	1	1	B	HIGH	MODERATE	High	3	Desktop
D18K-05201	Tele	1	1	1	B	HIGH	HIGH	High	3	Desktop
D18K-05203	Un-named tributary	0	1	1	B	HIGH	HIGH	High	3	Desktop
D18K-05265	Tele	1	1	1	B	HIGH	HIGH	High	3	Desktop
D18K-05268	Blikana	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D18K-05359	Tele	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D18K-05368	Pelandaba	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D18K-05371	Blikana	0	1	1	B	MODERATE	HIGH	High	3	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D18K-05376	Tele	0	0	0	A	HIGH	HIGH	High	4	Rapid 3
D18K-05393	KwaSijora	0	1	1	B	HIGH	HIGH	High	3	Desktop
D18K-05407	KwaNomlengaba	0	1	1	B	HIGH	HIGH	High	3	Desktop
D18K-05413	Sidwadwa	0	1	1	B	HIGH	HIGH	High	3	Desktop
D18L-05017	Orange	3	1	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D18L-05067	Orange	3	1	3	C	HIGH	MODERATE	High	2	Rapid 3

Table B2: Secondary catchment D2

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D21A-03178	Caledon	1	1	1	B	MODERATE	HIGH	High	3	Desktop
D21A-03194	Caledon	1	1	1	B	HIGH	HIGH	High	3	Desktop
D21A-03207	Caledon	2	1	2	C	HIGH	HIGH	High	2	Desktop
D21C-03286	Caledon	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D21C-03293	Caledon	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D21D-03094	Little Caledon	2	1	2	C	MODERATE	HIGH	High	2	Desktop
D21E-03127	Un-named tributary	2	1	2	C	HIGH	HIGH	High	2	Desktop
D21E-03142	Little Caledon	3	1	3	C	MODERATE	MODERATE	Moderate	1	Rapid 2
D21F-03007	Brandwater	3	1	3	C	HIGH	HIGH	High	2	Rapid 3
D21F-03011	Brandwater	3	2	3	C	HIGH	MODERATE	Moderate	1	Desktop
D21F-03046	Swartspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D21F-03054	Un-named tributary	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D21G-03101	Brandwater	2	2	2	C	HIGH	HIGH	High	2	Desktop
D21H-03278	Caledon	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D21H-03300	Caledon	2	1	2	B	HIGH	HIGH	High	3	Rapid 3
D21H-03313	Caledon	2	2	2	C	HIGH	HIGH	High	2	Desktop
D21H-03340	Caledon	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D22A-03005	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D22A-03081	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D22A-03105	Meulspruit	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D22A-03152	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D22A-03173	Meulspruit	2	1	2	C	HIGH	HIGH	High	2	Desktop
D22B-03214	Moolmanspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D22B-03442	Meulspruit	4	2	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D22C-03437	Caledon	3	4	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D22C-03483	Caledon	2	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D22C-03502	Caledon	3	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D22C-03524	Caledon	2	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D22D-03304	Rantsho	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D22D-03415	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D22D-03550	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D22D-03585	Caledon	2	2	2	C	MODERATE	HIGH	High	2	Desktop
D22G-03255	Mopeli	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03463	Mopeli	3	2	3	D	HIGH	HIGH	High	2	Rapid 3
D22G-03466	Morakabi	3	3	3	D	LOW	MODERATE	Moderate	1	Desktop
D22G-03474	Morakabi	2	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03499	Un-named tributary	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03562	McCabes Spruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03629	Beytelspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03649	Un-named tributary	3	3	3	D	LOW	MODERATE	Moderate	1	Desktop
D22G-03661	Mopeli	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03691	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03714	Modderpoortspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03732	Mopeli	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D22G-03741	Modderpoortspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D22H-03781	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D22H-03815	Caledon	3	4	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D22H-03821	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D22L-03856	Tenniskopspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D22L-03889	Tweelingspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D22L-04004	Tweelingspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D22L-04017	Caledon	3	4	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D23A-04014	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23A-04026	Appledore Spruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23A-04069	Caledon	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D23A-04143	Caledon	2	2	2	C	HIGH	MODERATE	High	2	Desktop
D23A-04182	Caledon	2	2	2	C	HIGH	MODERATE	High	2	Desktop
D23A-04189	Caledon	3	2	3	C	HIGH	MODERATE	High	2	Rapid 3
D23C-03701	Leeu	4	2	4	C	MODERATE	MODERATE	Moderate	1	Rapid 3
D23C-03823	Klein-Leeu	4	3	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D23C-03842	Leeu	4	2	4	C	MODERATE	MODERATE	Moderate	1	Rapid 3
D23C-03888	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D23D-03963	Mokopu	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D23D-03973	Leeu	4	2	4	C	MODERATE	MODERATE	Moderate	1	Rapid 3
D23D-04107	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23D-04128	Mokopu	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23E-04171	Caledon	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D23E-04213	Leeu	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
D23E-04225	Bokpoortspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D23E-04232	Caledon	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D23E-04261	Caledon	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D23E-04265	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23E-04346	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23F-04361	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D23G-04424	Sandspruit	2	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D23G-04501	Montsoane	1	2	2	D	MODERATE	MODERATE	Moderate	1	Desktop
D23G-04518	Un-named tributary	2	2	2	C	MODERATE	LOW	Moderate	1	Desktop
D23H-04310	Klipspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23H-04333	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23H-04386	Rietspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D23H-04416	Rietspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D23H-04464	Rietspruit	5	2	5	E	LOW	MODERATE	Moderate	1	Rapid 3
D23H-04467	Rietspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23H-04469	Rietspruit	5	2	5	E	LOW	MODERATE	Moderate	1	Rapid 3
D23J-04339	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23J-04433	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23J-04443	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23J-04453	Caledon	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D23J-04484	Nuwejaarspruit	2	2	2	C	MODERATE	LOW	Moderate	1	Desktop
D23J-04523	Caledon	4	2	4	C	MODERATE	MODERATE	Moderate	1	Rapid 3
D23J-04531	Caledon	3	2	3	D	HIGH	HIGH	High	2	Rapid 3
D23J-04583	Bloemspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24A-04672	Boesmanskopspruit	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
D24A-04744	Witspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24A-04783	Witspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24A-04787	Un-named tributary	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
D24B-04812	Klipspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24B-04830	Un-named tributary	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D24B-04840	Elandspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D24B-04869	Klipspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24C-04644	Un-named tributary	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D24C-04692	Witspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D24C-04739	Witspruit	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D24C-04740	Witspruit	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
D24C-04757	Witspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D24C-04764	Un-named tributary	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D24C-04768	Blaasbalkspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24D-04553	Wilgeboomspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24D-04569	Vaalspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24D-04624	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24D-04657	Wilgeboomspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24D-04718	Caledon	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
D24D-04738	Un-named tributary	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
D24D-04756	Vaalspruit	2	1	2	B	MODERATE	MODERATE	Moderate	2	Desktop
D24E-04658	Vinkelspruit	2	1	2	C	HIGH	MODERATE	High	2	Desktop
D24E-04769	Caledon	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
D24E-04883	Caledon	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D24F-04843	Grahamstadspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24F-04849	Un-named tributary	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
D24F-04872	Caledon	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
D24F-04895	Grahamstadspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24F-04935	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24F-04973	Caledon	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
D24G-04958	Caledon	3	2	3	C	HIGH	HIGH	High	2	Rapid 3

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D24G-05025	Leeuspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24G-05042	Leeuspruit	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
D24G-05045	Leeuspruit	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
D24G-05058	Eldoradospruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24G-05094	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24H-04686	Skulpspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24H-04794	Un-named tributary	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24H-04806	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24H-04835	Groenspruit	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D24H-05022	Skulpspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D24J-04984	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24J-05000	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24J-05016	Caledon	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
D24J-05031	Caledon	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
D24J-05093	Caledon	3	2	3	B	HIGH	HIGH	High	3	Intermediate
D24J-05107	Caledon	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D24J-05117	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24K-04780	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24K-04798	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24K-04818	Un-named tributary	2	1	2	B	MODERATE	MODERATE	Moderate	2	Desktop
D24K-04848	Un-named tributary	1	1	1	C	MODERATE	LOW	Moderate	1	Desktop
D24K-04860	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24K-04876	Slykspruit	2	2	2	C	MODERATE	LOW	Moderate	1	Desktop
D24K-04881	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24K-04901	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D24K-04916	Un-named tributary	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
D24K-04919	Slykspruit	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
D24K-04930	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24K-04932	Un-named tributary	1	1	1	C	LOW	MODERATE	Moderate	1	Desktop
D24K-04941	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
D24K-04950	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24L-04970	Slykspruit	1	1	1	B	HIGH	MODERATE	Moderate	2	Desktop
D24L-04981	Un-named tributary	1	1	1	B	LOW	MODERATE	Moderate	2	Desktop
D24L-05014	Un-named tributary	2	1	2	B	MODERATE	LOW	Moderate	2	Desktop
D24L-05034	Un-named tributary	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24L-05052	Un-named tributary	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
D24L-05073	Un-named tributary	2	1	2	B	MODERATE	LOW	Moderate	2	Desktop
D24L-05100	Slykspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D24L-05156	Caledon	3	2	3	B	HIGH	MODERATE	High	3	Intermediate

Table B3: Secondary catchment D3

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D31A-04670	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D31A-04691	Un-named tributary	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D31A-04786	Knapsak	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31A-04788	Knapsak	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31A-04831	Knapsak	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D31B-05039	Hondeblaf	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31B-05044	Jood se Sloot	0	0	0	C	LOW	LOW	Low	1	Desktop
D31B-05074	Hondeblaf	0	0	0	C	LOW	LOW	Low	1	Desktop
D31B-05079	Hondeblaf	0	0	0	B	LOW	MODERATE	Moderate	2	Desktop
D31B-05089	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31B-05091	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31C-04847	Hondeblaf	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D31C-04857	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31C-04924	Hondeblaf	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31C-04925	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31C-04954	Diepsloot	0	0	0	C	LOW	LOW	Low	1	Desktop
D31C-04975	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31C-04977	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D31C-04982	Hondeblaf	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31C-04985	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31C-04998	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31D-04420	Berg	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D31D-04446	Un-named tributary	0	0	0	B	LOW	LOW	Low	2	Desktop
D31D-04470	Berg	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D31D-04530	Berg	0	0	0	B	LOW	LOW	Low	2	Desktop
D31D-04573	Un-named tributary	0	0	0	B	LOW	MODERATE	Moderate	2	Desktop
D31D-04585	Un-named tributary	0	0	0	B	LOW	LOW	Low	2	Desktop
D31D-04586	Un-named tributary	0	0	0	C	LOW	LOW	Low	1	Desktop
D31E-04688	Un-named tributary	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D31E-04726	Un-named tributary	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D31E-04971	Kattegatspruit	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D32A-06085	Elandskloof	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D32A-06317	Elandskloof	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32A-06335	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32A-06513	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D32A-06518	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32B-06330	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32B-06360	Klein-Seekoei	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32B-06548	Klein-Seekoei	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D32B-06549	Seekoei	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D32B-06578	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32B-06589	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D32B-06590	Un-named tributary	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D32C-05988	Klein-Seekoei	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D32C-06047	Klein-Seekoei	1	2	2	B	MODERATE	MODERATE	Moderate	2	Desktop
D32C-06154	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D32C-06188	Klein-Seekoei	2	2	2	B	MODERATE	MODERATE	Moderate	2	Desktop
D32C-06195	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32C-06210	Klein-Seekoei	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D32D-06318	Seekoei	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32D-06331	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32D-06361	Seekoei	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32D-06400	Soetvlei se Loop	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D32D-06420	Seekoei	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32D-06460	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32E-05959	Seekoei	1	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D32E-06011	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32E-06012	Seekoei	1	3	3	B	MODERATE	MODERATE	Moderate	2	Rapid 3
D32E-06160	Seekoei	1	3	3	B	MODERATE	MODERATE	Moderate	2	Rapid 3
D32E-06174	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32E-06193	Seekoei	0	3	3	B	LOW	LOW	Low	2	Rapid 3
D32F-05441	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32F-05574	Seekoei	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D32F-05645	Seekoei	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D32F-05857	Un-named tributary	0	0	0	C	LOW	LOW	Low	1	Desktop
D32F-05901	Seekoei	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
D32G-05534	Seekoei	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D32G-05651	Noupoortspruit	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32G-05775	Noupoortspruit	0	0	0	D	LOW	LOW	Low	1	Desktop
D32G-05782	Un-named tributary	0	0	0	C	LOW	LOW	Low	1	Desktop
D32G-05948	Un-named tributary	0	0	0	D	LOW	LOW	Low	1	Desktop
D32G-05949	Noupoortspruit	0	0	0	C	LOW	LOW	Low	1	Desktop
D32G-06007	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32G-06010	Noupoortspruit	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D32H-05575	Elandsfonteinspruit	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D32J-05237	Seekoei	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D32J-05312	Seekoei	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D32J-05328	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32J-05336	Un-named tributary	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D32J-05420	Seekoei	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D32J-05435	Un-named tributary	0	0	0	B	MODERATE	MODERATE	Moderate	2	Desktop
D32J-05449	Un-named tributary	0	0	0	B	MODERATE	MODERATE	Moderate	2	Desktop
D32J-05451	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32J-05458	Elands	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D32J-05476	Un-named tributary	0	0	0	C	MODERATE	LOW	Moderate	1	Desktop
D32J-05481	Seekoei	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
D32K-05026	Seekoei	3	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D32K-05088	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D32K-05179	Seekoei	3	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
D32K-05181	Gansgatspruit	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D33A-04561	Orange	4	2	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D33A-04668	Orange	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
D33A-04689	Un-named tributary	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D33B-04557	Un-named tributary	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D33C-04235	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D33C-04437	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D33C-04458	Lemoenspruit	0	0	0	C	LOW	LOW	Low	1	Desktop
D33C-04483	Lemoenspruit	0	0	0	C	LOW	LOW	Low	1	Desktop
D33C-04552	Lemoenspruit	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	River	Water Use	Quality	IWUI	PES	EI	ES	EIS	IEI	Level
D33C-04564	Orange	4	2	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
D33G-04051	Orange	4	2	4	C	HIGH	HIGH	High	2	Intermediate
D33J-03947	Un-named tributary	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D33K-03723	Orange	4	2	4	C	HIGH	MODERATE	High	2	Intermediate
D34A-04993	Donkerpoortspruit	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D34A-05196	Orange	4	2	4	C	HIGH	HIGH	High	2	Intermediate
D34A-05282	Orange	4	2	4	E	MODERATE	HIGH	High	2	Intermediate
D34B-05861	Oorlogspoort	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D34B-05867	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D34C-05682	Un-named tributary	0	0	0	C	LOW	LOW	Low	1	Desktop
D34C-05756	Oorlogspoort	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D34C-05759	Klipfonteinspruit	0	0	0	C	MODERATE	LOW	Moderate	1	Desktop
D34C-05785	Oorlogspoort	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D34D-05314	Oorlogspoort	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D34E-05040	Rietkuilspruit	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D34E-05154	Orange	4	2	4	C	HIGH	HIGH	High	2	Intermediate
D34E-05280	Orange	4	2	4	C	MODERATE	HIGH	High	2	Intermediate
D34F-05174	Orange	4	2	4	C	HIGH	HIGH	High	2	Intermediate
D34F-05206	Vanderwaltsfonteinspruit	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D34F-05364	Vanderwaltsfonteinspruit	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D34F-05377	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D34G-04911	Paaiskloofspruit	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D34G-04940	Otterspoortspruit	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D34G-04986	Orange	4	2	4	C	HIGH	HIGH	High	2	Intermediate
D35A-05033	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D35A-05038	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D35A-05083	Un-named tributary	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D35B-05279	Oudagspruit	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D35C-05491	Broekspruit	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D35C-05641	Winnaarsbakenspruit	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D35C-05698	Broekspruit	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D35C-05894	Un-named tributary	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D35C-05896	Broekspruit	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D35D-05554	Brandspruit	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35E-05401	Broekspruit	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D35F-04961	Bossiespruit	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D35F-04994	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35F-05027	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35F-05085	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35F-05167	Bossiespruit	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D35G-05443	Brakspruit	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop
D35G-05579	Brakspruit	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35G-05580	Un-named tributary	0	0	0	D	LOW	LOW	Low	1	Desktop
D35G-05686	Brakspruit	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35G-05688	Swarthoekspruit	0	0	0	C	LOW	LOW	Low	1	Desktop
D35G-05730	Swarthoekspruit	0	0	0	C	LOW	LOW	Low	1	Desktop
D35G-05732	Un-named tributary	0	0	0	B	LOW	LOW	Low	2	Desktop
D35G-05789	Un-named tributary	0	0	0	B	LOW	LOW	Low	2	Desktop
D35G-05790	Un-named tributary	0	0	0	B	MODERATE	LOW	Moderate	2	Desktop
D35J-05509	Un-named tributary	0	0	0	D	LOW	LOW	Low	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
D35J-05529	Suurbergspruit	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35K-05133	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35K-05140	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D35K-05198	Un-named tributary	0	0	0	D	MODERATE	MODERATE	Moderate	1	Desktop
D35K-05225	Un-named tributary	0	0	0	C	LOW	MODERATE	Moderate	1	Desktop
D35K-05253	Un-named tributary	0	0	0	D	LOW	MODERATE	Moderate	1	Desktop
D35K-05423	Suurbergspruit	0	0	0	C	MODERATE	MODERATE	Moderate	1	Desktop

Table B4: Secondary catchment C5

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
C51A-04263	Leeuspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51A-04269	Fouriespruit	3	3	3	D	HIGH	MODERATE	High	2	Rapid 3
C51A-04297	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51A-04323	Fouriespruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51A-04336	Fouriespruit	1	2	2	C	MODERATE	LOW	Moderate	1	Desktop
C51A-04352	Kroonspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51A-04354	Riet	4	2	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
C51A-04389	Fouriespruit	4	2	4	D	LOW	MODERATE	Moderate	1	Rapid 3
C51B-04393	Riet	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04422	Un-named tributary	1	2	2	C	LOW	LOW	Low	1	Desktop
C51B-04425	Riet	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04439	Riet	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04442	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04447	Riet	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04454	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04466	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04476	Ruigtespruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04486	Ruigtespruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51B-04487	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51B-04497	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04511	Ospoortspruit	3	2	3	D	LOW	MODERATE	Moderate	1	Desktop
C51B-04520	Ruigtespruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51B-04548	Ospoortspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04558	Un-named tributary	2	2	2	C	LOW	LOW	Low	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
C51B-04559	Un-named tributary	1	2	2	C	LOW	MODERATE	Moderate	1	Desktop
C51B-04567	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04574	Riet	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
C51B-04667	Un-named tributary	1	2	2	C	MODERATE	LOW	Moderate	1	Desktop
C51B-04676	Un-named tributary	1	2	2	C	LOW	LOW	Low	1	Desktop
C51B-04678	Ospoortspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51B-04702	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51B-04717	Un-named tributary	1	1	1	C	MODERATE	VERY LOW	Moderate	1	Desktop
C51B-04720	Un-named tributary	2	2	2	C	LOW	LOW	Low	1	Desktop
C51B-04728	Un-named tributary	2	2	2	C	LOW	LOW	Low	1	Desktop
C51B-04748	Un-named tributary	1	1	1	B	LOW	LOW	Low	2	Desktop
C51C-04264	Riet	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51C-04267	Riet	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51C-04322	Un-named tributary	1	2	2	B	MODERATE	MODERATE	Moderate	2	Desktop
C51C-04366	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51C-04373	Un-named tributary	1	2	2	C	LOW	MODERATE	Moderate	1	Desktop
C51C-04377	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51C-04440	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51C-04441	Un-named tributary	1	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51D-04043	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51D-04127	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51D-04266	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51D-04283	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51E-04040	Un-named tributary	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
C51E-04062	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	River	Water Use	Quality	IWUI	PES	EI	ES	EIS	IEI	Level
C51E-04078	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51E-04080	Un-named tributary	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
C51E-04087	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51E-04145	Holspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51E-04216	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51F-04071	Riet	3	2	3	C	HIGH	MODERATE	High	2	Rapid 3
C51F-04236	Riet	3	2	3	C	HIGH	MODERATE	High	2	Rapid 3
C51F-04300	Un-named tributary	1	2	2	C	MODERATE	LOW	Moderate	1	Desktop
C51F-04357	Un-named tributary	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C51F-04358	Un-named tributary	1	2	2	B	MODERATE	LOW	Moderate	2	Desktop
C51G-04550	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04580	Kromellenboogspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04589	Kromellenboogspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04596	Un-named tributary	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C51G-04612	Kromellenboogspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04622	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51G-04640	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51G-04648	Vanzylspruit	3	2	3	C	MODERATE	HIGH	High	2	Rapid 3
C51G-04663	Kromellenboogspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04671	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51G-04707	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04719	Un-named tributary	2	2	2	C	MODERATE	LOW	Moderate	1	Desktop
C51G-04725	Vanzylspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04727	Vanzylspruit	1	2	2	C	HIGH	MODERATE	High	2	Desktop
C51G-04733	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	River	Water Use	Quality	IWUI	PES	EI	ES	EIS	IEI	Level
C51G-04734	Un-named tributary	1	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04735	Kromellenboogspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04749	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04759	Un-named tributary	2	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04761	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51G-04779	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04790	Un-named tributary	0	2	2	B	MODERATE	LOW	Moderate	2	Desktop
C51G-04801	Kromellenboogspruit	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04804	Un-named tributary	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04809	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04813	Un-named tributary	3	2	3	D	LOW	MODERATE	Moderate	1	Desktop
C51G-04832	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51G-04856	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04864	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04870	Kromellenboogspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51G-04871	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51H-04284	Kromellenboogspruit	3	1	3	B	MODERATE	MODERATE	Moderate	2	Rapid 3
C51H-04376	Kromellenboogspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51H-04414	Prossesspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C51H-04429	Un-named tributary	1	2	2	B	MODERATE	MODERATE	Moderate	2	Desktop
C51H-04450	Kromellenboogspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51H-04456	Un-named tributary	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C51H-04503	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51H-04524	Prosesspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C51H-04540	Vanzylspruit	2	1	2	B	MODERATE	MODERATE	Moderate	2	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	River	Water Use	Quality	IWUI	PES	EI	ES	EIS	IEI	Level
C51H-04541	Prosesspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51H-04588	Vanzylspruit	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C51H-04619	Un-named tributary	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C51H-04636	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51H-04637	Prosesspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C51J-03946	Riet	5	2	5	D	MODERATE	MODERATE	Moderate	1	Rapid 3
C51J-04219	Riet	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
C51J-04299	Un-named tributary	1	2	2	C	MODERATE	LOW	Moderate	1	Desktop
C51K-03878	Riet	4	3	4	D	HIGH	MODERATE	High	2	Intermediate
C51K-04210	Un-named tributary	1	3	3	C	LOW	MODERATE	Moderate	1	Desktop
C51M-03519	Riet	3	3	3	D	HIGH	HIGH	High	2	Rapid 3
C52A-03984	Kromspruit	2	2	2	C	HIGH	MODERATE	High	2	Desktop
C52A-03995	Modder	3	3	3	D	HIGH	MODERATE	High	2	Rapid 3
C52A-04048	Bo-Kromspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52A-04081	Kromspruit	3	2	3	D	MODERATE	MODERATE	Moderate	1	Desktop
C52A-04088	Gannaspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C52A-04123	Un-named tributary	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C52A-04154	Bo-Kromspruit	3	2	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C52A-04157	Modder	3	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C52A-04203	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52A-04205	Modder	4	3	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
C52B-03782	Sepane	2	3	3	D	HIGH	MODERATE	High	2	Rapid 3
C52B-03819	Modder	3	3	3	D	MODERATE	HIGH	High	2	Rapid 3
C52B-03854	Klein-Modder	3	4	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
C52B-03873	Modder	4	3	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
C52B-03911	Un-named tributary	1	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C52B-03922	Kgabanyane	1	3	3	D	LOW	MODERATE	Moderate	1	Desktop
C52B-03926	Kgabanyane	1	2	2	C	LOW	LOW	Low	1	Desktop
C52B-03954	Kgabanyane	3	2	3	C	LOW	MODERATE	Moderate	1	Desktop
C52B-03968	Kgabanyane	4	2	4	C	LOW	MODERATE	Moderate	1	Rapid 3
C52B-03970	Un-named tributary	1	2	2	B	MODERATE	MODERATE	Moderate	2	Desktop
C52B-03971	Wildebeesspruit	2	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
C52B-03989	Un-named tributary	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52B-04041	Un-named tributary	2	3	3	D	LOW	MODERATE	Moderate	1	Desktop
C52B-04054	Un-named tributary	3	3	3	D	LOW	MODERATE	Moderate	1	Desktop
C52B-04068	Wildebeesspruit	2	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C52B-04096	Un-named tributary	2	3	3	D	LOW	MODERATE	Moderate	1	Desktop
C52B-04101	Wildebeesspruit	3	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
C52B-04109	Un-named tributary	2	3	3	D	MODERATE	MODERATE	Moderate	1	Desktop
C52C-03561	Steynspruit	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C52C-03577	Steynspruit	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C52C-03619	Korannaspruit	1	1	1	C	HIGH	MODERATE	High	2	Desktop
C52C-03633	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C52C-03654	Korannaspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52D-03726	Matjiespruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C52D-03736	Modder	2	3	3	C	HIGH	HIGH	High	2	Rapid 3
C52D-03755	Koringspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52D-03758	Modder	2	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop
C52E-03307	Klein-Osspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C52E-03326	Un-named tributary	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
C52E-03371	Un-named tributary	2	1	2	C	LOW	LOW	Low	1	Desktop
C52E-03420	Klein-Osspruit	4	1	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
C52E-03424	Un-named tributary	1	1	1	C	LOW	LOW	Low	1	Desktop
C52E-03427	Un-named tributary	1	1	1	B	LOW	LOW	Low	2	Desktop
C52E-03430	Klein-Osspruit	2	2	2	C	LOW	LOW	Low	1	Desktop
C52E-03460	Osspruit	2	2	2	C	LOW	LOW	Low	1	Desktop
C52E-03478	Osspruit	1	2	2	C	LOW	LOW	Low	1	Desktop
C52E-03480	Osspruit	2	1	2	C	HIGH	MODERATE	High	2	Desktop
C52E-03496	Modder	3	3	3	C	HIGH	HIGH	High	2	Rapid 3
C52E-03498	Osspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C52E-03586	Modder	3	2	3	C	HIGH	HIGH	High	2	Rapid 3
C52E-03646	Un-named tributary	1	2	2	C	MODERATE	LOW	Moderate	1	Desktop
C52F-03560	Renostерspruit	3	4	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
C52F-03728	Bloemspruit	3	3	3	F	LOW	LOW	Low	1	Desktop
C52F-03752	Bloemspruit	3	4	4	D	MODERATE	MODERATE	Moderate	1	Rapid 3
C52F-03760	Bloemspruit	3	3	3	E	LOW	MODERATE	Moderate	1	Desktop
C52F-03763	Renostерspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52F-03797	Un-named tributary	3	4	4	D	LOW	MODERATE	Moderate	1	Rapid 3
C52F-03808	Un-named tributary	3	3	3	E	MODERATE	MODERATE	Moderate	1	Desktop
C52F-03809	Un-named tributary	1	4	4	D	LOW	MODERATE	Moderate	1	Rapid 3
C52F-03820	Renostерspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52F-03940	Un-named tributary	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52F-03942	Renostерspruit	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52G-03109	Aardoringspruit	1	2	2	C	HIGH	MODERATE	High	2	Desktop
C52G-03257	Keeromspruit	1	3	3	C	MODERATE	MODERATE	Moderate	1	Desktop

		Resource stress			Ecological					IWUI+IEI
Sub-quat	**River**	**Water Use**	**Quality**	**IWUI**	**PES**	**EI**	**ES**	**EIS**	**IEI**	**Level**
C52G-03305	Doringspruit	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C52G-03335	Rietspruit	1	2	2	B	MODERATE	MODERATE	Moderate	2	Desktop
C52G-03350	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C52G-03361	Doringspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C52G-03380	Doringspruit	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C52G-03404	Modder	3	3	3	C	HIGH	HIGH	High	2	Rapid 3
C52G-03447	Un-named tributary	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C52G-03462	Modder	3	3	3	C	HIGH	HIGH	High	2	Rapid 3
C52G-03465	Modder	3	3	3	D	HIGH	HIGH	High	2	Rapid 3
C52G-03472	Stinkhoutspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52G-03521	Un-named tributary	1	1	1	B	MODERATE	LOW	Moderate	2	Desktop
C52G-03523	Stinkhoutspruit	1	1	1	C	MODERATE	VERY LOW	Moderate	1	Desktop
C52G-03570	Un-named tributary	1	1	1	C	MODERATE	MODERATE	Moderate	1	Desktop
C52G-03571	Un-named tributary	2	2	2	C	MODERATE	LOW	Moderate	1	Desktop
C52H-03155	Modder	4	3	4	D	HIGH	HIGH	High	2	Rapid 3
C52J-03503	Kaalspruit	1	1	1	B	MODERATE	MODERATE	Moderate	2	Desktop
C52J-03733	Kaalspruit	1	2	2	B	MODERATE	MODERATE	Moderate	2	Desktop
C52J-03762	Un-named tributary	1	2	2	B	MODERATE	MODERATE	Moderate	2	Desktop
C52J-03792	Un-named tributary	2	1	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52J-03794	Kaalspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52J-03886	Kaalspruit	2	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52J-03905	Un-named tributary	1	2	2	C	MODERATE	LOW	Moderate	1	Desktop
C52J-03936	Klein-Kaalspruit	1	2	2	C	MODERATE	MODERATE	Moderate	1	Desktop
C52K-03183	Modder	3	2	3	D	HIGH	HIGH	High	2	Rapid 3