3 GROUNDWATER RESOURCES OVERVIEW

3.1 HYDROGEOLOGY

The geology of the Mzimvubu to Mbashe ISP area is dominated by the Mapumulo Metamorphic complex and associated igneous intrusives, such as

- The Msikaba Formation, Ecca Group and lower Beaufort Group found on the coastal plateau
- The Molteno and Elliot Formations and Drakensberg Formation, including the upper Beaufort Group, found inland.

The major portion of the Mzimvubu to Keiskamma WMA is underlain by shallow intergranular and fractured aquifer systems which include the following:

- The Msikaba sandstone Formation in the T60A, D, G, and H quaternary catchments. This formation gives good borehole yields and the high rainfall in the coastal plains of Pondoland ensures good aquifer recharge and yields.
- The Katberg sandstones, which extend from the Kei River to Mtata. Boreholes in these sandstones also have reasonably good yields, but the lower rainfall reduces the recharge and aquifer yields.
- The Clarens sandstones which form the foothills of the Drakensberg Mountains in the north-western and northern parts of the ISP area.

These aquifers are shown in **Figure 3.1**.

The springs in the Mzimvubu to Mbashe ISP area, are mostly confined to the upper Mbashe (T11 and T12) and western Mzimvubu (T35) catchments. However, there are some other springs in the lower catchments, such as the Sinuka Spring near Port St Johns.

3.2 GROUNDWATER USE

The National Groundwater Data Base (NGDB) indicates that there is a concentration of boreholes in the Matatiele – Kokstad district. Groundwater abstraction is from shallow alluvial aquifers. There is also extensive groundwater usage along the Katberg sandstone axis south west of Mtata. The rest of the borehole distribution pattern in the area does not seem to reflect the underlying geology.

A number of towns depend fully or partly upon groundwater supply. The town supply is summarized in **Table 3.1**. The total current groundwater usage is estimated at approximately 1.65 million m^3/a, based on the available information. However there are major gaps in the information. There is no information for Tsolo (T35K) and Tabankulu (T33H/T32F) although it is known that these towns are dependent on groundwater. Libode (T70 E) was previously supplied by boreholes, but is now supplied from the Umhlanga Scheme. One borehole remains active as a back-up source. Kokstad (T32D/C) relies on the Crystal Spring for a portion of its supply. Based on the information collated from the DWAF database, the total estimated groundwater use could be as much as 6.2 million m^3/a.

There are uncertainties in the estimated yields of the existing boreholes because of the following:

- The properties of the aquifers from which water is drawn are unknown.
- Depths, diameters and construction details of the boreholes supplying the towns are not available.
- Records of what the boreholes and wells have yielded are not available.

Table 3.1: Main towns dependent on groundwater supply

Quats	Scheme Name	Groundwater Details	Population Supplied	Scheme Capacity		
				Million m^3/a	Unit consumption l/c/d	Limiting Factor
Amatole District Municipality						
T90C	Willowvale/Gatyana	5 boreholes	10 146	0.15	40	Source
T90G	Kentani	13 boreholes	800	0.05	170	Source
T90G	Ncerana	2 boreholes	1 350	0.07	151	Source
T90G	Ngicizele	4 boreholes	3 785	0.13	100	Source
Total			16 081	0.4		
OR Tambo District Municipality						
T32H	Flagstaff	4 boreholes and small dam	5 300	0.18	94	Treatment Capacity
T70F	Godini	Boreholes	2 500			
T20D	Lower Gungululu	Protected springs	Unknown			
T70C	Cwele	Boreholes				
T35K	Qumbu Town	9 boreholes	2 000	0.04	60	Source
T20D	Emtebe	Borehole and spring	8 700			
Total			18 500	0.22		
Chris Hani District Municipality						
T12B	Engcobo Town	Boreholes and 2 streams	11 000	0.21	52	Source
T12A	Mtangana	Springs, boreholes & Mtangana Dam	16 000	0.14	24	Source
Total			27 000	0.35		

Ukhahlamba District Municipality						
T34B	Mt Fletcher	Boreholes	11 500	0.05	12	Source
T33H	Mnceba	Protected springs, boreholes & weir	29 000	0.63	60	Source
Total			40 500	0.68		

3.3 GROUNDWATER RESOURCE AVAILABILITY

An estimate of the yield potential of the aquifers in the Mzimvubu to Mbashe ISP area was conducted based on the long-term average recharge from rainfall. It was assumed that the storage capacity of the aquifers is large enough to even out year-to-year variations in recharge. Table 3.2 presents the estimated groundwater exploitation potential, the present use and the remaining potential that can still be developed in each of the ISP key areas.

Table 3.2: Estimate groundwater availability per ISP key area (million m^3/a)

ISP key area	Recharge capacity			Potential groundwater yield (50% of Recharge less Baseflow)	Current groundwater use	Unexploited potential still available
	Recharge	Baseflow	Recharge less Baseflow			
Mzimvubu	1009	496	513	256	1.3	255
Pondoland	260	186	74	37	0.9	36
Mtata	310	193	117	58	2.7/1.5	55
Mbashe	440	217	223	111	1.4	110
TOTAL	2019	1092	927	462	6.2	456

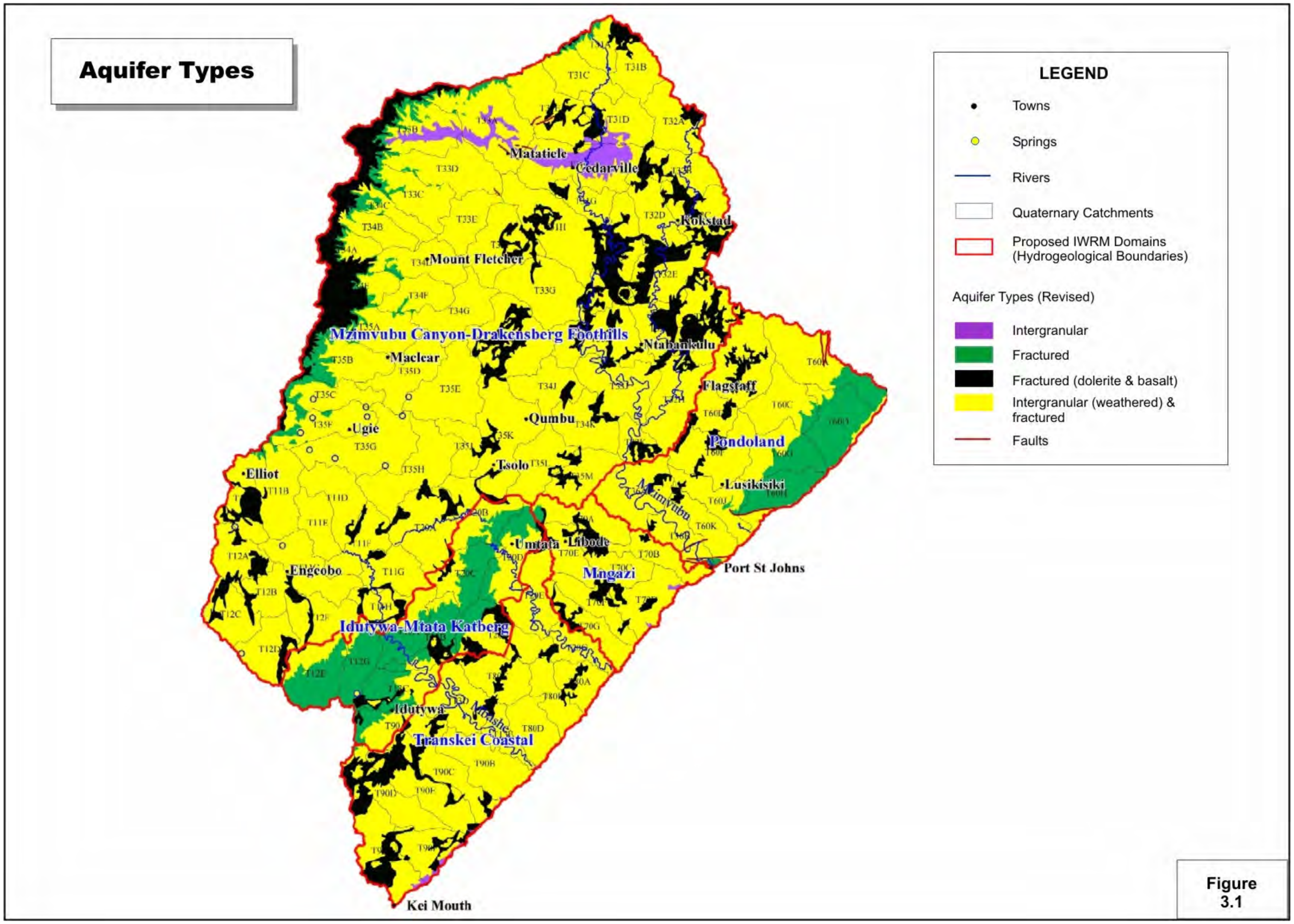

Figure 3.1: Aquifer Types

Table 3.2 indicates that there are still significant amounts of unexploited groundwater in all the ISP key areas. What is more significant is that the available surface water resources in the Pondoland key area under current development are limited, while there are indications from the above table that there is scope for groundwater development to meet the growing domestic water requirements in that key area. A feasibility study by the Directorate: Options Analysis is at present being undertaken for Lusikisiki and surrounding villages to determine the preferred development option between groundwater and surface water.

In the other key areas, although there is enough surface water resources available to meet any growth in water requirements, a large number of the rural towns are dependent on groundwater. There are substantial advantages to groundwater use. The quality of the groundwater in the ISP area is good and borehole water requires no treatment. There is however potential for groundwater pollution.

Boreholes should be well sited and there should be proper monitoring of the groundwater. The borehole success rate may increase the cost of supplying domestic water supply from groundwater. Therefore, there is a need for conducting detailed hydrogeological surveys to determine the groundwater potential and estimated cost of development, which should be compared with the cost of supplying water from surface sources.

3.4 GROUNDWATER STRATEGIC PERSPECTIVE

Groundwater is of major importance to rural development in the Mzimvubu to Mbashe ISP area, and more specifically in the Pondoland key area in meeting an array of basic needs from public health, livestock watering, poverty alleviation and economic development. The challenge for DWAF is to raise awareness of the linkages between groundwater and rural development and to assist the WSAs to identify appropriate approaches for the use of groundwater, from improving the operational reliability of groundwater to the sustainability of groundwater resources as a whole. This requires management of social, functional and skills changes.

In the north-eastern portion of the ISP area, that is the Matatiele and Kokstad area, there is extensive use of groundwater while the area also has wetlands. An important factor is to manage groundwater abstraction in order to maintain groundwater levels in and discharges to the groundwater-fed wetlands because of the ecological importance of these wetlands.

For groundwater use to be regarded as sustainable there is a need to improve the understanding of groundwater recharge and the aquifer recharge mechanisms, even in the absence of adequate field data.

The primary objective is to empower the Eastern Cape Regional Office with the knowledge, information, manpower, hardware and software to monitor and regulate groundwater usage in accordance with the National Water Act (NWA) (1998), the Environmental Conservation Act (ECA) (1989) and the National Environmental Management Act (NEMA) (1997).

A secondary objective is to create awareness by district municipalities of the advantages of groundwater use. The cycle of cause and effect with regard to issues of health, operations and maintenance, as well as project and contract processes, must be addressed.

The detailed strategy on groundwater availability and use is described in Strategy No 1.5.

3.5 GROUNDWATER QUALITY

Figure 3.2 illustrates the groundwater aquifer vulnerability of the ISP area, indicating the extent to which the aquifers can be adversely affected by an imposed contaminant load. The least vulnerability indicates aquifers only vulnerable to the most persistent pollutants in the very long term. The moderate vulnerability of most of the aquifers in the ISP area illustrates vulnerability to many pollutants, except those highly absorbable and/or readily transformed.

The groundwater over most of the ISP area is generally of very good quality. However, the groundwater quality of the Katberg area near Idutywa has total dissolved solids (TDS) in the range 70-300 mg/l, and the TDS reaches over 300 mg/l where the Katberg wedges out closer to Mtata. The reason for this is because of the pollution of the groundwater from the recharge zone of the Mtata River. This in turn is due to pollution from overflow of sewage from the treatment works in Mtata town into the nearby Mtata River. There is a need to address this problem. Although the quality of the groundwater in the Pondoland ISP key area is still of good quality there is increasing potential of contamination from the sewage works in the area eventhough the aquifer vulnerability is low.

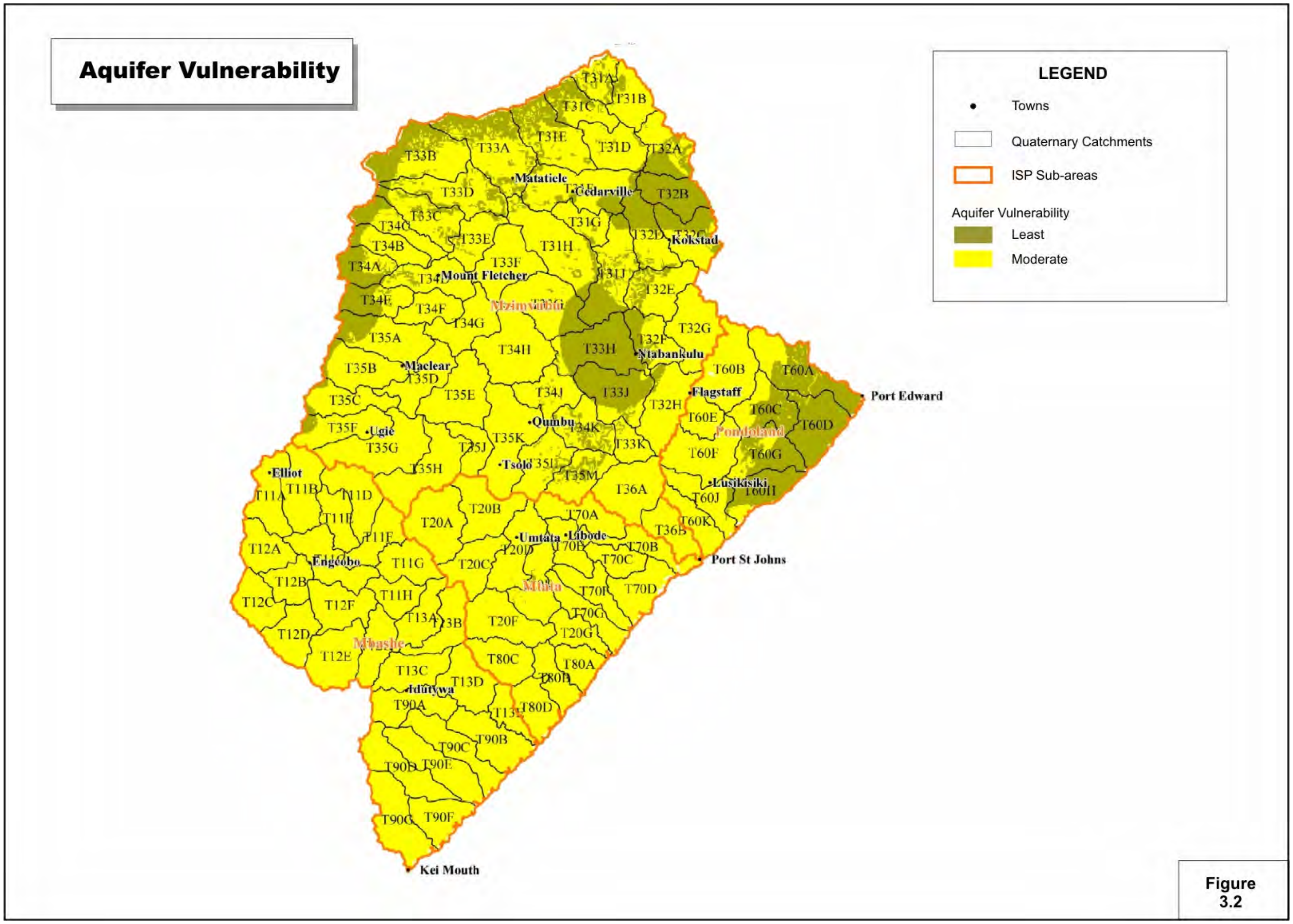

Figure 3.2: Aquifer vulnerability