4.2.2 "Salinity" constituents

The second set of the Guideline Compliance Pie Diagram maps (Maps 7 and 8) pertain to the following constituents: Sodium (Na); Calcium (Ca); Magnesium (Mg); Sulphate (SO_4); Chloride (Cl) and Potassium (K) and the guidelines depicted in Table 3.3 (earlier in the document). Note that the median water quality for the desired constituent set is less often within the *Very Good* and *Good* water quality range for domestic (drinking) water use (DWAF, DOH and WRC, 1998) than was the case with the previous constituent set. The sites in Table 3.6 are included in Map 7.

From Map 7 and Table 4.3 it can be seen that it is in the Usutu to Mhlatuze, Upper Vaal, Lower Orange, Fish to Tsitsikamma, Gouritz and Breede WMAs that the median concentrations for the constituents reflected in the Domestic Use "Salinity" set are greater than the *Good* range for certain of those constituents. Table 3.3 lists the applicable water quality guideline classifications. Table 4.3 contains a list of sample sites for which certain of the constituents had median concentrations exceeding the *Good* range for domestic use.

Table 4.3 Sample sites exceeding the *Very Good* and *Good* ranges for domestic water use for the Domestic Use "Salinity" Water Quality Constituents

Sample Site	Constituent/s Exceeding Good Range	Extent of Exceedence	Location of Site
Usutu to Mhlatuze WMA			
W3H015Q01	Cl	Yellow	Hluhluwe River at Valsbaai/St Lucia Inflow
Upper Vaal WMA			
C2H004Q01	SO_4	Yellow	Suikerbosrand River at Uitvlugt (RW S2)
Lower Orange WMA			
D5H021Q01	SO_4; Cl; Na	Red; red; red	Sak River at De Kruis/Williston
Fish to Tsitsikamma WMA			
L6H001Q01	Mg; SO_4; Cl; Na	Yellow; yellow; red; red	Heuningklip River at Campherspoort
N1H013Q01	Ca; Mg; SO_4; Cl; Na	Yellow; yellow; red; red; red	Mackiesputs Eye at Graaf-Reinet/Van Reyneveldspas
N2H007Q01	Cl; Na	Red; yellow	Sundays River at De Draay
N3H002Q01	Cl	Yellow	Voël River at Rietvley
N4H003Q01	Cl; Na	Red; red	Sundays River at Addo Drift East/Addo Bridge
P1H003Q01	Mg; Cl; Na	Yellow; red; red	Boesmans River at Donkerhoek/Alicedale
P3H001Q01	Mg; Na	Yellow; red	Kariega River at Smithfield/Lower Waterford
P4H001Q01	Cl; Na	Red; red	Kowie River at Bathurst/Wolfscrag
Q4H013Q01	Cl; Na	Yellow red	Tarka River at Bridge Farm/Tarka Bridge (New Weir)
Q8H011Q01	Cl; Na	Yellow; yellow	Little Fish River at Rietfontein/Junction Drift
Q9H001Q01	Cl; Na	Yellow; yellow	Great Fish River at Fort Brown Peninsula
Q9H018Q01	Cl; Na	Yellow; yellow	Great Fish River at Matomela's Reserve/ Outspan
Gouritz WMA			
J1H019Q01	Mg; SO_4; Cl; Na	Yellow; yellow; purple; purple	Groot River at Buffelsfontein/Van Wyksdorp
J3H011Q01	Mg; SO_4; Cl; Na	Red; purple; purple; purple	Olifants River at Warm Water
K2H004Q01	Ca; Mg; SO_4; Cl; Na; K	Red; purple; purple; purple; purple; red	Great Brak River at Vishoek
K4R002Q01	Mg; SO_4; Cl; Na; K	Red; yellow; purple; purple; yellow	Swart Vlei at Ronde Valley/Hoogekraal
Breede WMA			
H5H005Q01	Cl	Yellow	Bree River at Wagenboomsheuvel/Drew

From Table 4.3 it can be seen that the median concentrations of Calcium (Ca), Magnesium (Mg), Sulphate (SO_4), Chloride (Cl) and Sodium (Na) were greater than the *Very Good* or *Good* ranges at selected sample sites in the national assessment sample site set.

Calcium (Ca)

The elevated median calcium concentrations would result in hard water and scaling of domestic water pipes and appliances at the site at Mackiesputs Eye at Graaf-Reinet (Fish to Tsitsikamma WMA) and may additionally result in chronic health effects in sensitive groups at the site on the Great Brak River at Vishoek (Gouritz WMA).

Magnesium (Mg)

The elevated median magnesium concentrations could be expected to have a bitter taste and increasing health effects in sensitive individuals at the Groot River at Buffelsfontein (Gouritz WMA), Heuningklip River at Campherspoort, Mackiesputs Eye at Graaf-Reinet, Boesmans River at Donkerhoek and Kariega River at Smithfield (all in the Fish to Tsitsikamma WMA). Potential diarrhoea can result in all individuals using the water for drinking purposes at the site on the Olifants River at Warm Water and at Swart Vlei at Ronde Valley (both in the Gouritz WMA). The Mg levels in the water at the Great Brak River at Vishoek (Gouritz WMA) can be described as Not Acceptable and can be expected to result in diarrhoea in all individuals using it for drinking purposes. Furthermore, magnesium contributes to the total hardness of water.

Sulphate (SO_4)

The median sulphate concentrations could result in a slight chance of diarrhoea in sensitive groups (but disappears with adaptation) at the Suikerbosrand River at Uitvlugt (Upper Vaal WMA), Groot River at Buffelsfontein, Swart Vlei at Ronde Valley (both in the Gouritz WMA) and the Heuningklip River at Campherspoort (Fish to Tsitsikamma WMA). There is a possibility of diarrhoea (with poor adaptation in sensitive individuals) at the Mackiesputs Eye at Graaf-Reinet (Fish to Tsitsikamma WMA). There is a high chance of diarrhoea (with little likelihood of adaptation) at the Olifants River at Warm Water and the Great Brak River at Vishoek (both in the Gouritz WMA).

Chloride (Cl)

The median chloride concentrations could pose increasing health risks to sensitive groups at the Bree River at Wagenboomsheuvel (Breede WMA), Voël River at Rietvley, Tarka River at Bridge Farm, Little Fish River at Rietfontein, Great Fish River at Fort Brown Peninsula, Great Fish River at Matomela's Reserve (all in the Fish to Tsitsikamma WMA) and Hluhluwe River at Valsbaai (Usutu to Mhlatuze WMA). The Cl concentrations could have possible long-term health effects at the Sak River at De Kruis (Lower Orange WMA), Heuningklip River at Campherspoort, Mackiesputs Eye at Graaf-Reinet, Sundays River at De Draay, Boesmans River at Donkerhoek and Kowie River at Bathurst (all in the Fish to Tsitsikamma WMA). The Cl concentrations could result in dehydration in infants, nausea and vomiting at the Groot River at Buffelsfontein, Olifants River at Warm Water, Great Brak River at Vishoek and Swart Vlei at Ronde Valley (all in the Gouritz WMA). The most prominent effect with humans is aesthetic, with a salty taste to the water that does not slake thirst.

Sodium (Na)

The median sodium concentrations could result in a slight health risk to some sensitive groups at the Sundays River at De Draay, Little Fish River at Rietfontein, Great Fish River at Fort Brown Peninsula and Great Fish River at Matomela's Reserve (all in the Fish to Tsitsikamma WMA). The Na concentrations could have a possible health risk, particularly in sensitive groups, at the Sak River at De Kruis (Lower Orange WMA), Heuningklip River at Campherspoort, Mackiesputs Eye at Graaf-Reinet, Sundays River at Addo Drift East, Boesmans River at Donkerhoek, Kariega River at Smithfield, Kowie River at Bathurst and Tarka River at Bridge Farm (all in the Fish to Tsitsikamma WMA). There is a definite Na-related health risk

to using the water at the Groot River at Buffelsfontein, Olifants River at Warm Water, Great Brak River at Vishoek and Swart Vlei at Ronde Valley (all in the Gouritz WMA). The most prominent effect will be aesthetic, with salty tasting water that does not slake thirst.

Potassium (K)

The median potassium concentrations are likely to result in slight risk to some sensitive groups at the Swart Vlei at Ronde Valley (Gouritz WMA). There are possible health effects associated with potassium at this site.

Map 7 “Salinity” effects on the Domestic Use of water reported at the national assessment sample sites