

## **APPENDICES**

# AMATOLE – KEI INTERNAL STRATEGIC PERSPECTIVE

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**APPENDIX A**

**REFERENCES AND DOCUMENTATION**

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| 8.  | Myburgh JA | Groundwater potential evaluation - siting of boreholes at the Poplar Grove and Longdraai villages in the Stormberg District                | August 2000    |
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## **APPENDIX B**

### **ISP RELATED INFORMATION**

## AMATOLE – KEI ISP

## RIVERS, DAMS AND TOWNS IN THE ISP AREA

QUATS	RIVERS/RIVER REACHES	DAMS	TOWNS/SUBURBS
<b><u>Amatole Catchments</u></b>			
R10A	Keiskamma		
R10B	Keiskamma Cata Wolf	Sandile Cata Mnyameni	Keiskammahoek
R10C	Keiskamma Rabula		
R10D	Keiskamma		
R10E	Keiskamma Debe	Debe	Middledrift
R10F	Tyume		
R10G	Tyume	Binfield Park Pleasant View	
R10H	Tyume		Alice
R10J	Keiskamma		
R10K	Keiskamma Zalara	Dimbaza	Dimbaza
R10L	Keiskamma		
R10M	Keiskamma		Hamburg
R20A	Buffalo Cwengcwe	Rooikrantz, Maden	
R20B	Buffalo Zeke		
R20C	Mgqakwebe		
R20D	Buffalo Ngqokweni		King William's Town
R20E	Buffalo Yellowwoods	Laing	Bisho
R20F	Buffalo		Mdantsane
R20G	Buffalo Amalinda Mzonyana	Bridle Drift Amalinda Umzoniana	East London
R30A	Kwenxura		Morgan Bay
R30B	Kwelera Kwamehlwenyoka	Amberdene Bideford Sun Rise, Magazo Park	Cintsa East
R30C	Gqunube  Tanga  Ngculu	Windmill, The Lake, Queens Court Big Fairview Farm, Sunnyside Irrigation Kentbury	Sunrise-on-Sea
R30D	Gqunube		Gonubie
R30E	Nahoon Nkobongo Qoqongwane Xolo	Partners Valley Lyndhurst Conrad Swart Ossie, Lillystone	
R30F	Nahoon	Nahoon	East London/Beacon Bay

QUATS	RIVERS/RIVER REACHES	DAMS	TOWNS/SUBURBS
R40A	Gxulu	Rockcliff	East London, Kidd's Beach
R40B	Tyolomnqa		
R40C	Tyolomnqa		Kayser's Beach
R50A	Bira		Bira, Wesley
R50B	Magwalana Mtati Mpekwani		
<b><u>White Kei Catchments</u></b>			
S10A	Grootvleispruit Kleinvlei	Glen Wallace Kleinvlei B, Park, Kleinvlei T	
S10B	White Kei  Sidwadwa Birds	Rietfontein, Above Huts  Birds River	
S10C	White Kei Lemoenfontein		
S10D	White Kei Qoqodala		
S10E	White Kei	Xonxa	
S10F	Cacadu Hol	Macubeni Glen Doris	
S10G	Cacadu		Lady Frere
S10H	White Kei		
S10J	White Kei		
S20A	Doring	Blaauwkrantz	Indwe
S20B	Doring Indwe	Doring River, Rustdal, Redlands	
S20C	Indwe	Lubisi	
S20D	Indwe		Qamata
<b><u>Black Kei Catchments</u></b>			
S31A	Hex	Lismore	Sterkstroom
S31B	Klaas Smits		
S31C	Heuningklip	Varkenskuilen, Spes Bona L, Lekkerlag, Glen Torret	
S31D	Lesseyton	Vaalkrantz	
S31E	Klaas Smits Bonkolo	Skietfontein Oakleigh	
S31F	Bonkolo	Bongolo	Queenstown, Ezibeleni
S31G	Klaas Smits  Bonkolo Komani	Western Essex Prospect  Rathwick	
S32A	Black Kei	Thrift Limietskloof	
S32B	Black Kei	Tentergate, McEwan	

QUATS	RIVERS/RIVER REACHES	DAMS	TOWNS/SUBURBS
S32C	Black Kei Bulhoekspruit KuZitungu	Sherwood Forest Mitford, Glenbrook	Thornhill, Mitford
S32D	Klipplaat	Winston	
S32E	Klipplaat Krom	Waterdown, Lowestoffe	
S32F	Oxkraal	Oxkraal, Bushmanskranz	
S32G	Klipplaat Oxkraal	Shiloh	Sada, Whittlesea
S32H	Black Kei Klipplaat		
S32J	Imvani		Ilinge
S32K	Black Kei		
S32L	Waqu		
S32M	Black Kei		
<b>Great Kei Catchments (downstream of confluence of White and Black Kei Rivers)</b>			
S40A	Thorn	Sam Meyer, Meentgrond Cathcart Koch	Cathcart
S40B	Thomas Little Thomas	Reigate Ailsa Farm Irrigation	
S40C	Thomas		
S40D	Kei		
S40E	Kei Qwanti		
S40F	Kei		
S50A	Tsomo		
S50B	Xentu		
S50C	Tsomo Mbokotwa Mzwazwa	Crossmalooft	
S50D	Tsomo		Cala
S50E	Tsomo	Ncora	
S50F	Tsojana Ncuncuzo	Tsojana	
S50G	Tsomo Tsojana		
S50H	Ngcongcolora		Cofimvaba
S50J	Tsomo		Tsomo
S60A	Gubu Ndakana Kubusi	Gubu Waterfall	Stutterheim, Mlungisi
S60B	Kubusi Kubusi Gqunube	Wriggleswade, Leonard's Valley Big Red, Deemies	
S60C	Gqolonci Toise		
S60D	Gqolonci Mgwali	Boord	
S60E	Kubusi		
S70A	Kei		Komga

<b>QUATS</b>	<b>RIVERS/RIVER REACHES</b>	<b>DAMS</b>	<b>TOWNS/SUBURBS</b>
S70B	Kei Toleni	Toleni	
S70C	Gcuwa Xilinxá	Xilinxá	
S70D	Gcuwa Mtwá		Nqamakwe
S70E	Gcuwa Cegcuwana	Gcuwa	Butterworth
S70F	Kei Tyityaba		Kei Mouth

**AMATOLE - KEI ISP**  
**WATER AND WASTE WATER TREATMENT WORKS IN THE AMATOLE SYSTEM**

**WATER TREATMENT WORKS (Ref. 5 and 24)**

TREATMENT WORKS			RAW WATER SOURCE*				
NAME	CAPACITY (MI/d)	OWNER/ OPERATOR	NAME	1 in 50 YEAR YIELD**		ADDITIONAL YIELD ALLOCATED TO OTHER USERS (million m <sup>3</sup> /a)	OWNER/ OPERATOR
				(million m <sup>3</sup> /a)	(MI/d)		
Rooikrantz King William's Town	1,2 7,0	DWAF/AW BCM	Rooikrantz Dam Rooikrantz and Maden Dams	3,10	8,5	None	DWAF/AW DWAF/AW/ BCM
Laing Dam	27,3	DWAF/AW	Laing Dam	14,90	45,0	None	DWAF/AW
Umzoniana	120,0	BCM	Bridle Drift Dam	30,70	79,0	None	BCM
Nahoon	33,0	DWAF/AW	Nahoon Dam	5,60	15,0	1,3 Irrigation 0,9 Environmental	DWAF/AW
Stutterheim	2,5	Amahlali LM	Gubu Dam Kubusi River Boreholes	2,27	6,3	0,63 Irrigation	DWAF/AW
Kei Road	0,3	Amahlali LM	Wriggleswade Dam	0,10	0,3	16,8 Future urban 3,0 Irrigation 5,5 Environmental	DWAF/AW
Needs Camp	0,8	BCM	Buffalo River	***	***	None	BCM
	192,1			56,67	154,1	28,13	

\* Includes effluent return flows for expected level of development in the year 2010.

\*\* Yields from individual dams vary depending on how the system is operated.

\*\*\* Included in firm yield of Laing Dam.

### WASTE WATER TREATMENT WORKS (Ref. 5)

SCHEME NAME	SOURCE	TYPE OF TREATMENT	DESIGN CAPACITY MI/d	UTILISATION	EFFLUENT DISPOSAL	QUATS	COMPLIANCE	POTENTIAL IMPACT TO RESOURCES
Bisho STW	Domestic sewage	Oxidation ponds	1.75	200%	Irrigation storage dam for pasture	R20E	Not compliant with General Standard or Special Phosphate Standard	Overflows directly into Yellowwoods River
Stutterheim STW	Domestic sewage	Activated sludge reactor & a clarifier, Maturation ponds	0,7	Unknown	Cumakala River	S60C	Compliant with General Standard	Effluent from the abattoir affects the quality of the final effluent. Overflow if tanker is not available.
Mdantsane STW	Domestic sewage & industrial from chicken abattoir	Biofilters	24.0	122%	Buffalo River downstream of East London WTW offtake	R20F	60% compliant	Requires upgrading
Potsdam STW	Potsdam & Mdantsane West (Domestic and industrial)	Trickling Filters	9.24	73%	Buffalo River downstream of East London WTW offtake	R20F	Compliant with General Standard	Works has additional capacity to divert Mdantsane sewage
King Tanning Company	Industrial (Tanning factory)	Closed	1,8	N/A	Irrigation of kikuyu pasture at Bidhli Farm	R20D	Not operational	High salinity runoff from the irrigation lands during high rainfall
King William's Town STW	Domestic and industrial effluent	60% by Activated sludge, & 40% Biofilter	4, 8	108%	80% into Buffalo River, 20% for irrigation purposes and golf	R20D	70% compliant	
Da Gama Textiles (Zwelitsha)	Industrial Effluent				Infiltration, and irrigation	R20D	95% compliant	Area for irrigation cannot cope with volume – Plans for recycling

SCHEME NAME	SOURCE	TYPE OF TREATMENT	DESIGN CAPACITY MI/d	UTILISATION	EFFLUENT DISPOSAL	QUATS	COMPLIANCE	POTENTIAL IMPACT TO RESOURCES
Zwelitsha STW	Domestic sewage & some industrial wastewater	Trickling filter	7.7	76%	Buffalo River	R20D	95% compliant	Works is immediately upstream of Laing Dam – Eutrophication taking place in the dam.
East Bank STW	Domestic & some industrial effluent	Activated sludge modules & clarifiers	40	75%	Irrigation at East London Golf Club, sea outfall and sludge discharge into sea at Hood Point	R30F	85% compliance (not phosphates)	Potential for industrial use
Central (Amalinda) STW	65% industrial effluent & 35% domestic sewage	Biofilters & maturation ponds	5.0	90%	Buffalo River via Umzoniana stream	R30F	60% compliance	Overloaded resulting in overflow of sewage into the Buffalo River
Gonubie STW	Domestic from Beacon Bay & Gonubie	Activated sludge & clarifiers	5.0 (12)	140%	Klokha River & irrigation at Gonubie Golf Course	R30D	90% compliance	Drip irrigation system for tomato farming
Breidbach STW	Domestic sewage	Oxidation Ponds	0,8	N/A	Irrigation of kikuyu pastures	R20E	Unknown	Periodic overflows. Seepage from the ponds into Yellowwoods River

**AMATOLE – KEI ISP**  
**SOLID WASTE DISPOSAL SITES**

SOLID WASTE SITE	SIZE	STATUS OF APPLICATION	OWNERSHIP	COMMENTS
East London Regional	L	PERMITS ISSUED	Local Municipality	G:L:B+
King William's Town	M	Processing	Local Municipality	Well managed
Second Creek	M	To be closed	Local Municipality	To be rehabilitated
Gonubie	C	To be closed	Local Municipality	To establish transfer station
Mdantsane	S	To be closed	Local Municipality	To be rehabilitated
Ducats B/Bay	S	CLOSED DOWN	Local Municipality	To be rehabilitated
Dimbaza	S	CLOSED DOWN	Local Municipality	To be rehabilitated
Butterworth	S	Not Permitted	Local Municipality	New Regional Site being studied
Idutywa	S	Not Permitted	Local Municipality	Will link in with the above Reg Site
Nqamakwe	C	Not Permitted	Local Municipality	Will link in with the above Reg Site
Tsomo	C	Not Permitted	Local Municipality	Will link in with the above Reg Site
Willowvale	C	Not Permitted	Local Municipality	Will link in with the above Reg Site
Kentani	C	Not Permitted	Local Municipality	Will link in with the above Reg Site
Queenstown	S	New site identified	Local Municipality	Municipality to close & rehab existing site
Whittlesea	C	Not Permitted	Local Municipality	Consultants appointed
Lady Frere	C	Not Permitted	Local Municipality	
Cofimvaba	C	Not Permitted	Local Municipality	Poor management
Alice	C	Permit issued	Local Municipality	
Middledrift	C	Permit issued	Local Municipality	
Seymour	C	Not permitted	Local Municipality	Will link in with Queenstown -proposed regional site

SOLID WASTE SITE	SIZE	STATUS OF APPLICATION	OWNERSHIP	COMMENTS
Cala	C	Permit issued	Local Municipality	Poorly managed
Cathcart	C	Not permitted	Local Municipality	To issue directions
Stutterheim	GSB+	Consultants appointed	Local Municipality	Consultants investigating
Keiskammahoek	C	Permit issue	Local Municipality	Permit issued
Cintsa West	C		Private	
Cosy Corner	C		Private	
Fish River Sun	C	To be closed	Private	Will link with the Peddie Regional Site
Haga Haga	C		Private	
Hamburg Transfer Station	C	Processing Direction	Local Municipality	With final disposal at Peddie regional solid waste site
Peddie	C	Proposed regional site	Local Municipality	To be a regional site for Ngqushwa Municipality
Indwe	C	Not permitted	Local Municipality	To issue directions
Kayser's Beach	C	Closed	ADM/BCM	All waste taken by ADM to Second Creek
Kei Mouth	C	Not Permitted	Local Municipality	Poor State - need to identify new site
Morgan Bay	C	Not permitted	Local Municipality	
Kidds Beach	C	To be closed	ADM/BCM	To be rehabilitated
Komga	C	Not permitted	Local Municipality	Poor state - need to identify new site
Macleantown	C	Not permitted	ADM	
Seavale	C	To issue directions	Private	
Sterkstroom	C	Processing Direction	Local Municipality	Construction to start soon
Christmas Rock	C	Processing	Private	Well managed

**Total No of sites** = 42  
**Permitted** = 5  
**Processing** = 3  
**Sites to Close(d)** = 14

## **APPENDIX B4**

### **GROUNDWATER MAPS**

<b>Appendix B4.1</b>	<b>Study area and topography</b>
<b>Appendix B4.2</b>	<b>Aquifer type</b>
<b>Appendix B4.3</b>	<b>NGDB and DWAF monitoring sites</b>
<b>Appendix B4.4</b>	<b>Groundwater occurrence</b>
<b>Appendix B4.5</b>	<b>Recharge to groundwater</b>
<b>Appendix B4.6</b>	<b>Aquifer vulnerability</b>

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## AMATOLE - KEI ISP

## DWAf TARIFF TABLE FOR RAW WATER USE CHARGES FOR GOVERNMENT WATER SCHEMES FOR 2003-2004 (excl. VAT)

Government Water Scheme / Irrigation District (1)	Region (2)	WMA (see) (3)	Charges for irrigation purposes					Charges for domestic and industrial use				
			m <sup>3</sup> quota per ha (4)	Cent per m <sup>3</sup>		Total tariff cent per m <sup>3</sup> (7)	Payment dates (8)	Cent per m <sup>3</sup>				Total tariff Cent per m <sup>3</sup> (13)
				O & M (5)	Deprec'n (6)			O & M (9)	ROA (10)	Deprec'n (11)	Input cost (12)	
AMATOLA (WRIGGLESWADE DAM) (a) From the Dam and Kubusi River (b) From Yellowwoods & Nahoon Rivers & from Wriggleswade canal	EC	12										53.99
BINFIELD PARK DAM	EC	12	6 100	2.46	1.00	3.46	31/07 31/01					60.19
BUSHMANSKRANTZ DAM (Zweledinga)	EC	12										67.40
DEBE DAM	EC	12										67.40
DORING RIVER (DORING RIVER DAM)	EC	12	6 100	13.50	1.00	14.50	31/07 31/01					40.81
KEISKAMMAHOEK (CATA DAM)	EC	12	6 100	5.08	1.00	6.08	31/07 31/01					
KEISKAMMAHOEK (MNYAMENI DAM)	EC	12	6 100	4.86	1.00	5.86	31/07 31/01					67.40
KLIPPLAAT RIVER (WATERDOWN DAM) Raw water from the dam	EC	12	6 100	2.33	1.00	3.33	31/07 31/01					10.54
KUBUSI RIVER (GUBU DAM)	EC	12										23.19
LAING DAM	EC	12										30.80
MACUBENI DAM	EC	12										67.40
NAHOON RIVER (NAHOON DAM)	EC	12										107.99
NCORA GWS	EC	15		2.11	1.00	3.11	31/07 31/01					44.01
PLEASANT VIEW DAM	EC	12										38.45
QAMATA (Lanti Weir)	EC	12	6 100	7.52	1.00	8.52	31/07 31/01					
ROOIKRANTZ DAM	EC	12	6 100	5.19	1.00	6.19	31/07 31/01					35.68
TOLENI (TOLENI DAM)	EC	12										48.39
TSOJANA DAM Raw water from the dam	EC	12	6 100	7.82	1.00	8.82	31/07 31/01					36.77
XILINXA DAM (and Gcuwa weir) From weir	EC	12										27.69 40.36
XONXA GWS	EC	12	6 100	0.65	0.85	1.50						
ZANYOKWE (SANDILE DAM) From the dam and the main pipeline	EC	12	6 100	2.24	1.00	3.24	31/07 31/01					67.40

NB: VAT SHOULD BE ADDED TO CHARGES

Ref : DWAF

## AMATOLE - KEI ISP

## CONTROLLED AND MAJOR IRRIGATION SCHEMES (1995)

(Ref. 24)

SCHEME NAME	SCHEDULED IRRIGATION (Ha)	IRRIGATED AREA IN 1995 (Ha)	CROPS IRRIGATED	SUPPLY SOURCE	QUATS	WATER USE* (x 10 <sup>6</sup> /a)	ALLOCATION (x 10 <sup>6</sup> /a)	AVAILABLE WATER @ 90% ASSURANCE (x 10 <sup>6</sup> /a)
Klipplaat Government Water Scheme	2 060 (Section 63)	1820	Lucerne, maize and pastures	Waterdown Dam	S32G, H S31G S32K, M	18,0	14,83	7,2
Oxkraal Irrigation Scheme	0	0	Land has not been developed	Shiloh Dam Oxkraal Dam	S32G	1,7	6,18**	0,4 7,9
Nthabhemba Irrigation Scheme	1 200	720	Maize and mixed vegetables	Thrift, Limietskloof Tentergate, Mitford Glenbrock dams & Black Kei	S32A, S32B, S32C	Unknown		2,52
Zweledinga Irrigation Scheme	239	239	Maize	Bushmanskrantz Dam	S32F	Unknown		2,26
Doring River	513 (Section 63)	180	Lucerne, maize and pastures	Doring River Dam	S20B	1,8	3,13	1,8
Qamata Irrigation Scheme	2 600	650	Lucerne, maize and pastures	Lubisi Dam	S20D	Unknown		30,5
Xonxa Irrigation Scheme	1 643	60	Lucerne, maize and pastures	Xonxa Dam	S10H	Unknown		33,0
Zanyokwe Irrigation Scheme	47	90	Mixed vegetables	Sandile Dam	R10C, D	1,0		5,18
Keiskammahoek Irrigation Scheme	854	744	Dairy Farming	Mnyameni & Cata Dams	R10G, H	6,02		9,86
Tyume Irrigation Scheme	231	114	Citrus	Binfield Park Dam	R10G	0,7		17,36
Ncora Irrigation Scheme	2 600	750	Dairy, vegetables and maize	Ncora Dam	T12C, D	Unknown		35,0
Rooikrantz				Rooikrantz Dam	R20A			

\* Field edge water requirements (no water losses taken into account).

\*\* 566 ha planned under the Oxkraal Scheme but not developed. The dam releases water for irrigators under the Klipplaat Government Water Scheme.

## AMATOLE - KEI ISP

## WATER MANAGEMENT INSTITUTIONS

ORGANISATION	RESPONSIBILITY	AREA	COMMENT
Department of Water Affairs and Forestry	Overall responsibility for and authority over the nation's water resources and their use	Entire ISP Area	At present DWAF is filling the role of Water Services Authority and Provider in certain instances until hand over of assets to the District Municipalities and establishment of CMA's
Amatole District Municipality	Water Service Authority (WSA) for ensuring an equitable supply of water to all consumers within its boundary	Amatole District Municipal area	
Chris Hani District Municipality	Water Service Authority for ensuring an equitable supply of water to all consumers within its boundary	Chris Hani District Municipal area	
Buffalo City Municipality	Water Service Provider (WSP) for ensuring and delivering an equitable supply of water to all consumers within its boundary	Buffalo City Municipal area	Exact role of the BCM needs to be clarified. Should the BCM become a Metropolitan it will then become a WSA.
Local Municipalities <ul style="list-style-type: none"> <li>▪ Great Kei</li> <li>▪ Amahlati</li> <li>▪ Nkonkobe</li> <li>▪ Ngqushwa</li> <li>▪ Mquma</li> <li>▪ Lukanji</li> <li>▪ Inkwanca</li> <li>▪ Intsika Yethu</li> <li>▪ Emalahleni</li> </ul>	Water Service Provider responsible for delivering an equitable supply of water to all consumers within the local municipality boundary	Local Municipal boundary areas	This role is to change for some municipalities due to a lack of resources. To be handed to DM's.
Amatola Water Board	Water Service Provider. Provides a service to DWAF and the WSA's where the Local Municipalities cannot fulfill role of WSP		Contracts with the relevant Water Services Authority, DWAF or the relevant Local Municipality
Kubusi Irrigation Board			
Village Water Committees	Water Service Provider responsible for delivering an equitable supply of water to all consumers within the village boundary	Rural villages throughout the ISP area	
Forums	Unknown		

## AMATOLE – KEI ISP AREA

## MUNICIPALITIES (refer Appendix C2 for map)

Old Transitional Local Council Name	New Local Municipality Name	New District Municipality Name
East London / Mdantsane / Gonubie / Beacon Bay	Buffalo City (moving towards becoming a Metropole)	Amatole District Municipality
King William's Town / Bisho / Dimbaza / Zwelitsha		
Amatola Coastal Local Council		
Komga	Great Kei	
Kei Mouth		
Amatola Coastal Local Council		
Stutterheim	Amahlati	
Keiskammahoek		
Kei Road		
Cathcart		
Alice	Nkonkobe	
Middledrift		
Hamburg	Ngqushwa	
Butterworth	Mnquma	
Nqamakwe		
Queenstown / Ezibeleni / Ilinge	Lukanji	Chris Hani District Municipality
Whittlesea / Sada		
Sterkstroom	Inkwanca	
Tsomo	Intsika Yethu	
Cofimvaba		
Lady Frere	Emalahleni	
Indwe		

## AMATOLE - KEI ISP

### POSSIBLE FUTURE BULK WATER SUPPLY SCHEMES

ISP AREA	CATCHMENT	SCHEME	ESTIMATED YIELD
AMATOLE	R10	Extension of rural water supply schemes. Possible future raw water supply from Keiskamma River to Buffalo River (Buffalo City). Potential = 37 million m <sup>3</sup> /a	
	R20	Mainly rehabilitation and upgrading of existing infrastructure to balance demand. Extension of rural water supply schemes. Extensions of supply to coastal resorts both east and west of East London.	
	R30	Extension of rural water supply schemes. Future potential raw water supplies to Buffalo City from the Nahoon, Gqunube and Kwelera Rivers	
	R40	Extension of urban supply from Buffalo City to coastal resorts	
	R50	Extension of rural water supply schemes from existing Peddie RWSS. Source from Keiskamma River.	
KEI	S10	Extension of rural water supply schemes. Possible future bulk supply from Xonxa Dam to Queenstown (8 million m <sup>3</sup> /a)	
	S20	Extension of rural water supply schemes	
	S31	Bulk supply from Xonxa Dam to Queenstown	Requirement = 8 million m <sup>3</sup> /a
	S32	Extension of rural water supply schemes	
	S40	Extension of rural water supply schemes	
	S50	Extension of rural water supply schemes	
	S70	Extension of rural water supply schemes. Possible supply from Great Kei River to Wavecrest for mining purposes (project on hold)	

## AMATOLE - KEI ISP

## MAJOR DAMS (Ref. 24)

Name	Live Storage Capacity (million m <sup>3</sup> )	Yield* (million m <sup>3</sup> /a)	Purpose	Catchment	Owner/operator
Maden	0,22	3,1	Domestic water use	R20A	BCM
Rooikrantz Dam	4,9		Irrigation	R20A	DWAF/AW
Laing Dam	21,0	14,9	Domestic water use	R20E	DWAF/AW
Bridle Drift Dam	101,7	30,7	Domestic water use	R20F	BCM
Nahoon Dam	20,7	7,8	Domestic water use, irrigation	R30E	DWAF/AW
Gubu Dam	8,8	2,9	Domestic water use, irrigation	S60A	DWAF/AW
Wiggleswade Dam	91,2	25,4	Domestic water use, irrigation	S60B	DWAF/AW
Sandile Dam	30,9	18,0	Irrigation/ Domestic	R10B	DWAF/AW
Binfield Park Dam	36,8	16,5	Irrigation/ Domestic	R10G	DWAF/AW
Pleasant View Dam	2,0	1,5	Irrigation	R10G	DWAF
Debe Dam	6,0	2,2	Domestic water use	R10E	DWAF
Mnyameni Dam	2,0	2,3	Domestic water use	R10B	DWAF/AW
Cata Dam	12,1	6,2	Irrigation	R10B	DWAF/AW
Waterdown Dam	36,6	16,5	Domestic supply & irrigation	S32E	DWAF
Bongolo Dam	6,95	0,7	Domestic Queenstown	S31F	Lukhanji LM

Name	Live Storage Capacity (million m <sup>3</sup> )	Yield* (million m <sup>3</sup> /a)	Purpose	Catchment	Owner/operator
Bushmanskrantz Dam	4,62	2,1	Irrigation	S32F	DWAF
Oxkraal Dam	17,8	6,2	Irrigation	S32G	DWAF
Shiloh Dam	0,52	0,3	Irrigation	S32G	DWAF
Thrift Dam	2,6	0,6	Irrigation	S32A	DWAF
Limietskloof	0,78	0,1	Irrigation	S32A	DWAF
Tentergate Dam	1,72	0,3	Irrigation	S32B	DWAF
Mitford Dam	0,89	0,1	Irrigation	S32C	DWAF
Glenbrock Dam	0,41	0,1	Irrigation	S32C	DWAF
Macubeni	1,85	1,5	Domestic	S10F	DWAF
Xonxa Dam	126,0	27,6	Irrigation	S10E	DWAF
Doring River Dam	17,84	3,4	Domestic water use, irrigation	S20A	DWAF
Lubisi Dam	135,0	28,5	Irrigation	S20C	DWAF
Ncora Dam	120,0	98,0	Hydropower Irrigation Small Domestic	S50E	DWAF
Tsojana	9,35	3,2	Domestic	S50F	DWAF
Sam Meyer Dam	0.608		Domestic/ Leisure	S40A	Amahlati LM
Xilinx Dam	14.5	9.4	Domestic Water Use	S70C	DWAF

\* Yields are at a reliability of 1 in 50 years (98% assurance).

## AMATOLE - KEI ISP

## LIST OF FLOW GAUGING STATIONS

Data Types

E = Electronic Data

C = Chart (Week Gear)

Cm = Chart (Month Gear)

R = Return

WQ = Water Quality Sample (analysed at IWQS)

DC = Data Collector

Station no.	Station Name	Data collected	Data processed	Data collector	Latitude	Longitude
R1H014 -A01	Tyume at Khayaletu - Yantola's Location	C+E+R+Q	C	Craddock DC	32°38'24"	26°56'10"
R 1H015 -A01	Keiskamma at Farm no.7	Cm + E +Q	E	Craddock DC	33°11'09"	27°23'27"
R 1H017 -A01	Keiskamma at Sandile Dam	C+ E + Q	C	Craddock DC	32°43'06"	27°05'56"
R 1H019 - M01	Pipeline from Sandile Dam	R	R	Sandile Dam	32°43'07"	27°06'24"
R 1H020 - M01	Pipeline from Binfield Park Dam	R	None	Craddock DC	32°41'13"	26°53'59"
R 1R001 - A01	Sandile Dam	C + E + R	C	Craddock DC	32°43'05"	27°06'23"
R 1R003 - A01	Binfield Park Dam	C + E + Q	C	Craddock DC	32°40'47"	26°54'13"
R 2H001 - A01	Buffels at Pirie Main Bos Res.	C + E + Q	C	Craddock DC	34°43'55"	27°17'37"
R 2H005 - A01	Buffels at King William's Town	C + E + Q	E	Craddock DC	32°52'30"	27°22'59"
R 2H006 - A06	Mqqakwebe at Msenge Ridge	C + E + Q	C	Craddock DC	32°51'24"	27°22'35"
R 2H008 - A01	Quencwe at Braunschweig (Edendale)	C + E + Q	C	Craddock DC	32°46'05"	27°22'27"
R 2H009 - A01	Mqqokweni at Sheshegu (Nqqokweni Loc)	C + E + Q	C	Craddock DC	32°55'00"	27°22'23"
R 2H010 - A01	Buffels at 135 K.W.T.Q. (Macintyre Bridge)	C + E + Q	E	Craddock DC	32°56'26"	27°27'41"
R 2H015 - A01	Yellowwoods at Fort Murray	C + E + Q	C	Craddock DC	32°55'54"	27°28'21"
R 2H016 - A01	Zwelitsha sloop at Malakalaka	C + E + Q	E	Craddock DC	32°56'05"	27°28'45"
R 2H017 - M01	Pipeline to purification works (Laing Dam)	R + Q	R	Laing Dam	32°58'04"	27°29'33"

Station no.	Station Name	Data collected	Data processed	Data collector	Latitude	Longitude
R 2H020 -M01	Main pipeline from Rooikrantz Dam - right	R	R	Rooikrantz Dam	32°45'19"	27°19'41"
R 2H024 -M01	Pipeline to Trout Farm at Rooikrantz Dam	R	R	Rooikrantz Dam	32°45'19"	27°19'32"
R 2H025 -A01	Canal before Yellowwoods (Wriggleswade Dam)	C + E	C	Wriggleswade Dam	32°42'52"	27°33'15"
R 2H 027 -A01	Buffels at Bridledrift	Cm + E + Q	E	Cradock DC	32°59'37"	27°38'24"
R 2H029 -A01	Buffalo at Bridledrift Dam	E	E	Cradock IT	32°59'29"	27°43'45"
R 2R001 - A01	Laing Dam	C + E + R + Q	C	Cradock DC	32°58'05"	27°29'39"
R 2R001 - K01	River outlet from Laing Dam	R	R	Laing Dam	32°58'05"	27°29'39"
R 2R001 - K02	River outlet from Laing Dam	R	R	Laing Dam	32°58'05"	27°29'39"
R 2R002 - A01	Rooikrantz Dam	C + E + R + Q	C	Cradock DC	32°45'19"	27°19'41"
R 2R003 - A01	Bridle Drift Dam	E + R + Q	E	Bridledrift Dam	32°59'24"	27°43'57"
R 3H001 - A01	Gqunube at Outspan	Cm + E + Q	E	Cradock DC	32°48'07"	27°51'21"
R 3H003 - A01	Nahoon River at Farm 305 (Nahoon Dam)	C + E + Q	C	Nahoon Dam	32°45'34"	27°48'41"
R 3H004 - M01	Pipeline to purification works Nahoon Dam	R + Q	R	Nahoon Dam	32°45'34"	27°48'41"
R 3H005 - A01	Canal from Wriggleswade Dam before Nahoon outlet	C + E	C	Wriggleswade Dam	32°41'55"	27°33'54"
R 3H006 - A06	Tunnel from Wriggleswade Dam	C + E + Q	C	Wriggleswade Dam	32°38'43"	27°34'54"
R 3R001 - A01	Nahoon Dam	C + E + R + Q	C	Nahoon Dam	32°54'35"	27°48'41"
S 1R001 - A01	Xonxa Dam	R + E + Q	E	Cradock DC	31°50'17"	27°10'03"
S 2H005 -A01	Indwe at Mote Farm (Lubisi Dam)	C + E + R + Q	C	Dept. Observer	31°47'45"	27°25'52"
S 2H006 - A01	Doring River Dam at Indwe (Doring River Dam)	C + E + Q	C	Doring River Dam	31°30'47"	27°20'05"
S 2H007 - M01	Pipeline to Indwe at Doring River Dam	R	R	Doring River Dam	31°30'47"	27°20'05"
S 2H008 - M01	Pipeline to dam terrain at Doring River Dam	R	R	Doring River Dam	31°30'47"	27°20'05"
S 2R001 - A01	Lubisi Dam	C + E + R + Q	C	Dept. Observer	31°47'45"	27°25'52"
S 2R002 - A01	Doring River Dam	C + R + Q	C	Doring River Dam	31°30'47"	27°20'05"
S 3H002 - Q01	Klaas Smits at Weltevreden (Grobbelaar)	Q	None	Cradock DC	31°44'39"	26°35'04"

Station no.	Station Name	Data collected	Data processed	Data collector	Latitude	Longitude
S 3H003 - Q01	Black Kei at Doornkraal	Q	None	Cradock DC	32°12'00"	26°29'00"
S 3H004 - A01	Black Kei Cathcarts Gift (Endwell)	C + E + Q	C	Cradock DC	32°03'00"	26°47'23"
S 3H005 -A01	Oxkraal at Whittlesea	Q	-	Cradock DC	32°10'52"	26°49'15"
S 3H006 - A06	Klaas Smits at Weltevreden (Queenstown)	C + E + Q	C	Cradock DC	31°55'24"	26°47'11"
S 3H008 -Q01	Black Kei at Doornkraal	Q	None	Cradock DC	32°12'00"	28°29'00"
S 3H010 - A01	Klipplaat River at Waterdown Dam	C + E + Q	C	Cradock DC	32°17'06"	24°51'37"
S 3H011 - M03	Pipeline from Waterdown Dam	R	R	Waterdown Dam	32°17'06"	26°51'37"
S 3H011 - M04	Pipeline from Waterdown Dam	R	R	Waterdam Dam	32°17'16"	26°51'37"
S 3H012 - A01	Oxkraal at Oxkraal Dam	C + E +Q	C	Cradock DC	32°12'37"	26°44'02"
S 3R001 - A01	Waterdown Dam	C + E +R + Q	C	Waterdown Dam	32°17'06"	26°51'37"
S 3R003 - A01	Oxkraal Dam	C + E + Q	C	Cradock DC	32°12'20"	26°45'31"
S 5H002 - A02	Tsomo at Wyk Maduma	E + R + Q	E	Dept. Observer	32°02'36"	27°49'22"
S 5H004 - A01	Tsomo at Famini Loc. (Ncora Dam)	C + E + R +Q	C	Dept. Observer	31°47'37"	27°41'12"
S 5R001 - A01	Ncora Dam	E + R + Q	R	Dept. Observer	31°47'15"	27°40'45"
S 6H001 - A01	Kubusi at Stutterheim	C + E + Q	C	Cradock DC	32°34'45"	27°22'00"
S 6H003 - A01	Toise at Forkroad	Cm + E + Q	E	Cradock DC	32°30'58"	27°31'25"
S 6H004 - A01	Gubu at Farm 253 (Gubu Dam)	C + E +Q	C	Gubu Dam	32°34'37"	27°16'46"
S 6H005 - A01	Kubusi at Wriggleswade	C + E + Q	C	Wriggleswade Dam	32°34'34"	27°33'57"
S 6H005 - B01	Kubusi at Wriggleswade Dam	C + E	C	Wriggleswade Dam	32°34'34"	27°35'57"
S R6R001 - A01	Gubu Dam	C + E + R + Q	C	Gubu Dam	32°34'37"	27°16'46"
S 6R002 - A01	Wriggleswade Dam	C + E +R + Q	C	Wriggleswade Dam	32°34'44"	27°33'40"
S7H00? -M01	Pipeline to purification Works at Butterworth (Gcuwa Dam)	R	R	Dept. observer	32°34'44"	27°33'40"
S 7H001 - A01	Gcuwa at Butterworth	E + R + Q	E	Dept observer	32°19'39"	28°08'41"
S 7R001 - A01	Gcuwa Dam	R + Q	R	Dept. Observer	32°19'26"	28°08'26"
S 7R002 - A01	Xilinx Dam (to be closed)	R	None	Dept. Observer	32°08'23"	28°05'53"
S 7H004 - A01	Groot Kei at Springs B	Cm +E +Q	E	Cradock DC	32°31'00"	28°01'07"
S 7H004 - B01	Groot Kei Springs at B	Cm + E	Cm	Cradock DC	32°31'00"	28°01'07"

## AMATOLE KEI ISP MAJOR INFRASTRUCTURE AND TRANSFER SCHEMES

### WATER TREATMENT WORKS (Ref. 5 and 24)

ISP AREA	QUATS	NAME	OWNER/OPERATOR	CAPACITY (MI/d)
AMATOLE				
	R10B	Keiskammahoek	Amatole DM / Amatole Water	2.2
	R10C	Sandile RWSS	DWAF / Amatola Water	18
	R10E	Debe	Amatole DM	1.5
	R10G	Alice Binfield Park Dam Pleasant View	Amatole DM DWAF / Amatola Water Amatole DM	3.8 4.8 0.75
	R10L	Peddie RWSS	Amatole DM / Amatola Water	6.6
	R20A	Rooikrantz	DWAF / Amatola Water	1.2
	R20B	King William's Town	DWAF / Amatola Water/Buffalo City Municipality	7.0/13?
	R20E	Laing Dam	DWAF / Amatola Water	27.3
	R20F	Ncera Coastal / Needs Camp	Amatole DM ?	0.8
	R20G	Umzoniana	Buffalo City Municipality	120
	R30B	Cintsa	Amatole DM	0.48
	R30E	Kei Road	DWAF / Amatola Water	0.30
	R30F	Nahoon	DWAF / Amatola Water	33.7
	R50A	Wesley	Amatole DM	3.8

ISP AREA	QUATS	NAME	OWNER/OPERATOR	CAPACITY (MI/d)
KEI				
	S10F/G	Cacadu	DWAF (?)	3.5
	S20A	Indwe	Lukhanji LM	?
	S31F	Queenstown	Chris Hani DM / Lukanji Municipality	40
	S32G	Sada	Chris Hani DM / Lukanji Municipality	11.25
	S40A	Cathcart	Amatole DM / Amahlati Municipality	?
	S50C	Cala	Sakhisizwe Municipality	1.8
	S50E	Ncora	DWAF (?)	?
	S50F	Tsojana	DWAF/ Intsika Yethu (?)	0.47
	S50J	Tsomo	Chris Hani / Intsika Yethu	0.50
	S60A	Stutterheim	Amahlati LM	2.5
	S70A	Kei River (Komga)	Amatole DM / Great Kei Municipality	1.2
	S70C	Xilinx	Amatole DM / Mngquma Municipality	?
	S70E	Butterworth	Amatole DM / Mngquma Municipality	18

**BOREHOLE SUPPLIES**

ISP AREA	QUATS	SCHEME NAME	TOWN
<b>AMATOLE</b>			
	R10M	Hamburg	Hamburg
	R30A/B/D	East Coast Resorts	Between Gonubie & Cefane
	R30A/B	Mooiplaas	15 Rural villages
	R30B/D	Kwelera	7 Rural villages
	R30E	Macleantown	Macleantown
	R40A	West Coast Resorts	Between Cove Rock & Gxulu River
<b>KEI</b>			
	S31A	Sterkstroom	Sterkstroom
	S32B/C/F/H	Hewu	48 Rural villages
	S32J	Ilinge	Ilinge and rural villages
	S60C	Wartburg	6 Rural villages
	S60D	Mgwali Heckel	6 Rural villages
	S70D/S50J	Nqamakwe	Nqamakwe

**TRANSFER SCHEMES (Raw Water)**

ISP AREA	QUATS	SOURCE TO SUPPLY END
<b>AMATOLE</b>		
	R10L to R50A	Keiskamma River to Birha River (Wesley Scheme now replaced by Peddie RWSS)
<b>KEI</b>		
	S32E to S31F	Waterdown Dam to Queenstown
	S50E	Ncora Dam to Mbashe Catchment (Eskom)
	S50F to S50H	Tsojana Dam to Cofimvaba
	S60B to R20B	Wriggleswade Dam to Buffalo River (or Nahoon River)

**PIPELINES**

Waterdown Dam to Queenstown. Pumped line with a present capacity of 0,265m<sup>3</sup>/s (23MI/d).

**CANALS**

ISP AREA	QUATERNARY	SOURCE TO SUPPLY END
<b>AMATOLE</b>		
<b>KEI</b>		
	S20D	Lubisi Dam – Qamata Irrigation Scheme 28.5 km long canal from Lanti weir
	S60B to R20B	Wriggleswade Canal

## **POTABLE WATER SUPPLY SCHEMES (1995) (Ref. 24)**

SCHEME NAME	RAW WATER SOURCE	POPULATION SUPPLIED	SCHEME CAPACITY			CATCHMENT No.
			(million m <sup>3</sup> /a)	(l/c/d)	Limiting Factor	
Amatole System	Bridle Drift, Nahoon, Laing, Rooikrantz, Maden, Gubu, Wriggleswade	725 000	57,0	215	Treatment capacity	R20A, B, C, D, E, F, G R30D, E, F
Komga	Boreholes, Kei River	5 100	0,50	268	Treatment capacity	S70A
Butterworth	Xilinx Dam	36 450	5,45	188	Treatment capacity	S70E
Tsomo	Tsomo River	2 050	0,12	160	Treatment capacity	S50J
Nqamakwe	Boreholes	2 050	0,05	66	Source	S50J
Cathcart	Sam Meyer Dam	8 000	0,50	172	Source	S40A
Mgwali Heckel Scheme	Boreholes	4 500	0,42	255	Source	S60D
Wartburg Scheme	Boreholes	5 000	0,27	148	Source	S60C
Kwelera Scheme	Boreholes	18 000	0,88	133	Source	R30B, D
Mooiplaas Scheme	Boreholes	30 000	0,60	55	Source	R30A, B
Alice (Tyume Valley Scheme)	Binfield Park Dam	15 300	1,1	195	Treatment capacity	R10H
Debe Regional Water Supply Scheme	Debe Dam	29 000	0,45	43	Treatment capacity	R10E, J ,K
Keiskammahoek Water Supply Scheme	Mnyameni Dam	12 000	0,88	200	Treatment capacity	R10B
Wesley Regional Water Supply Scheme	Keiskamma River	700	1,15	N/A	Treatment capacity	R10M R50A, B
Sandile Regional Water Supply Scheme	Sandile Dam	104 000	5,4	142	Treatment capacity	R10D, E, K R20C, D
Hamburg	Boreholes	1 700	Unknown			R10M
Indwe	Doring River Dam	6 350	0,35	151	Treatment capacity	S20A
Cala	Tsomo River, Boreholes	13 350	0,55	111	Treatment capacity	S50A
Queenstown	Waterdown Dam,	50 450	8,9	483	Source	S31F

	Bongolo Dam					
Sada/Whittlesea	Waterdown Dam	50 400	3,4	185	Treatment capacity	S32G, H
Yonda, Mbekweni	Bushmanskrantz Dam	9 200	0,10	30	Treatment capacity	S32F, G
Cacadu Rural Water Supply Scheme	Macubeni Dam	64 000	1,06	45	Source and Treatment capacity	S20A S10F, G
Hewu Groundwater Scheme	Boreholes and springs	48 000	0,53	30	Source	S32C, F
Ilinge Scheme	Boreholes	13 000	1,3	274	Source	S32J
Tsojana Scheme	Tsojana Dam	5 000	0,14	79	Treatment capacity	S50H





Towns	Water Consumption or Estimated Demand 2003 (million m <sup>3</sup> /a)	Assurance of Water Supply or Reliability of the Water Source	Current Supply Source	Problems with Current Supply	Need to Augment Current Supply	Comment on Demand Management Initiatives and its Results	Planned Water Schemes or Studies
- Sandile Regional (incl. Middledrift, Dimbaza and some 50 villages)	6,60	Adequate	Sandile Dam	Adequate	No	Unknown	No
- Tyume Valley (inc. Alice and rural villages)	1,30	Adequate	Binfield Park Dam	Adequate	No	Unknown	No
- Wesley Regional	1,01	Adequate (allocation not fixed)	Bulk water from Peddie RWSS	Adequate	No	Unknown	No
- Tqolomna Regional	?		Bulk water from Peddie RWSS	Problems with commissioning			No
Lady Frere (Cacadu)	0,92	Dam siltation reducing yield	Macubeni Dam	Adequate	Yes		No
Indwe	0,40	Adequate	Doring River Dam	Unknown	No		No
Sterkstroom	0,06	Inadequate	Boreholes/springs	Unknown	Yes		Unknown
Queenstown	8,50	Inadequate	Waterdown Dam (8,25 Mm <sup>3</sup> /a) Bongolo Dam (0,6 Mm <sup>3</sup> /a)	Inadequate bulk supply	Yes	Yes (?)	Feasibility Study 1997
Sada/Whittlesea	1,97	Adequate	Waterdown Dam	None	No	Unknown	Ditto
Cathcart	0,78	Unknown	Sam Meyer Dam	Unknown	Dam recently raised	Unknown	Unknown
Cala (outside area)	0,11	Adequate	Tsomo River	None (silt)	No	Unknown	No
Cofimvaba	?	?	Tsojana Dam	Unknown	No	Unknown	Unknown
Ncora	0,80	Adequate	Ncora Dam	Unknown	No	Unknown	Unknown
Tsomo	0,0164	Unknown	Tsomo River	Unknown	Unknown	Unknown	Unknown
Stutterheim	1,38	Adequate	Gubu Dam and River	None	No	Unknown	Proposed pipeline directly from Gubu Dam
Nqamakwe	0,14	Inadequate	Boreholes	Inadequate	Yes	Unknown	Proposed regional study 2004
Butterworth	7,40	Adequate	Xilinx and Gcuwa Dams	Siltation of Gcuwa Dam	No. Adequate until year 2009	Unknown	Unknown

Towns	Water Consumption or Estimated Demand 2003 (million m <sup>3</sup> /a)	Assurance of Water Supply or Reliability of the Water Source	Current Supply Source	Problems with Current Supply	Need to Augment Current Supply	Comment on Demand Management Initiatives and its Results	Planned Water Schemes or Studies
Komga	0,34 -0,50	Adequate	Kei River Boreholes/spring	B/h & spring high nitrates	No	Unknown	No
Rural Villages							
- Mgwali/Heckel (7)	0,054	Adequate	Boreholes	None	No	Unknown	No
- Wartburg	0,092	Adequate	Boreholes	None	No	Unknown	No
- Xilinxá							
- Hewu	0,94	Unknown	Boreholes	Unknown	Unknown	Unknown	Unknown
- Ilinge	0,68	Adequate	Boreholes	None	No	Unknown	No

## AMATOLE - KEI ISP

### GENERAL AUTHORISATIONS (SURFACE/GROUNDWATER)

#### Purpose of General Authorisation:

The purpose of general authorisation is the need to replace the necessity for a water user to apply for a licence in terms of the National Water Act for the abstraction or storage of water from a water resource, provided that the abstraction or storage is within the limits and conditions set out in this authorisation. The tables below indicate the areas in the Amatole - Kei catchments permitted in terms of Government Gazette No: 20626 of 8 October 1999.

**TABLE 1.1 Areas excluded from General Authorization for surface water abstraction**

Primary	Secondary/Tertiary/Quaternary drainage	Description of main river in drainage region
R	R20 R30A, B, C & D R30E & F	Buffalo River Kwenxura, Kwelera, Gonubie Rivers Nahoon River
S	S10 A & E S20A to C S32A to C S32D & E S32F S40A, B & C S50A, B & C S60A & B S60C & D S70C	White Kei River upstream of the Xonxa Dam Indwe River upstream of the Lubisi Dam Black Kei River upstream of the Klipplaat confluence Klipplaat River upstream of Waterdown Dam Oxkraal River upstream of Oxkraal Dam Thorn, Thomas Rivers Tsomo, Kwa-Qokwama and Mbokotwa Rivers Kubusi River upstream of Wriggleswade Dam Toise River Xilinx River upstream of the Xilinx Dam

**TABLE 1.2 Groundwater Abstraction Zones: Tertiary and Quaternary Drainage Regions**

ZONE A No water may be abstracted from these drainage regions except as set out under Schedule 1	ZONE B 45m <sup>3</sup> per hectare per annum may be abstracted from these drainage regions	ZONE C 75m <sup>3</sup> per hectare per annum may be abstracted from these drainage regions
	R10A, B & F R20A & C	R10C-E, G, H, J-M R20B, D-G R30A-F R40A-C R50A-H, J
	S20A S31B, C & E S32D & E	S20B, D-G S31A, D, F, G S32A-C, F-H, J-M S40A-F S50A-C, E-H, J S60C-E S70A-F
	S50D S60A & B	

**TABLE 1.3: Wastewater limit values applicable to discharge of wastewater into a water resource**

SUBSTANCE/PARAMETER	GENERAL LIMIT	SPECIAL LIMIT
Faecal Coliforms (per 100ml)	1000	0
Chemical Oxygen Demand (mg/l)	75*	30*
pH	5,5-9,5	5,5-7,5
Ammonia (ionised and un-ionised) as Nitrogen (mg/l)	3	2
Nitrate/nitrite as Nitrogen (mg/l)	15	1.5
Chlorine as Free Chlorine (mg/l)	0.25	0
Suspended Solids (mg/l)	25	10
Electrical Conductivity (mS/m)	70mS/m above intake to a maximum of 150mS/m	50 mS/m above background receiving water, to a maximum of 100mS/m
Ortho-Phosphate as phosphorous (mg/l)	10	1 (median) and 2,5 (maximum)
Fluoride (mg/l)	1	1
Soap, oil or grease (mg/l)	2.5	0
Dissolved Arsenic (mg/l)	0.02	0.01
Dissolved Cadmium (mg/l)	0.005	0.001
Dissolved Chromium (VI) (mg/l)	0.05	0.02
Dissolved Copper (mg/l)	0.01	0.002
Dissolved Cyanide (mg/l)	0.02	0.01
Dissolved Iron (mg/l)	0.3	0.3
Dissolved Lead (mg/l)	0.01	0.006
Dissolved Manganese (mg/l)	0.1	0.1
Mercury and its components (mg/l)	0.005	0.001
Dissolved Selenium (mg/l)	0.02	0.02
Dissolved Zinc (mg/l)	0.1	0.04
Boron (mg/l)	1	0.5

**TABLE 1.4: Listed water resource**

14	Buffalo River from its source to where it enters the municipal area
15	Klipplaat River from its source to Waterdown Dam
16	Black Kei River to its confluence with the Klipplaat River
18	Bongola River to Bongola Dam
19	Kubusi River to Stutterheim municipal boundary
22	Little Tsomo River

## AMATOLE - KEI ISP

## ESTUARIES (Ref. 18 and 28)

ESTUARY NAME	CONDITION	CLASSIFICATION	INFORMATION	COMMENTS
Mpekweni	Good	Temp. open / closed	Poor	Hotel manipulates estuary
Mtati	Excellent	Temp. open / closed	Poor	New resort development at mouth
Mgwalana	Excellent	Temp. open / closed	Poor	Small resort near mouth
Bira	Excellent	Temp. open / closed	Poor	Northern bank artificially stabilized
Gqutywa	Excellent	Temp. open / closed	Poor	Declared conservation area
Ngculura	Good	Temp. open / closed	Poor	Catchment degradation
Mtana	Excellent	Temp. open / closed	Poor	Vehicle access on estuary bank
Keiskamma	Fair	Permanently open	Moderate	Increasing fresh water abstraction and human impacts in catchment
Ngqinisa	Excellent	Temp. open / closed	Poor	Undeveloped
Kiwane	Excellent	Temp. open / closed	Poor	Undeveloped
Tyolomnqa	Good	Temp. open / closed	Poor	State forest reserve on western bank
Shelbertsstroom	Fair	Temp. open / closed	Poor	Floodplain disturbed by construction of car park
Lilyvale	Good	Temp. open / closed	Poor	Resort development to east at Christmas Rock
Ross' Creek	Good	Temp. open / closed	Poor	Farmlands and resort development to east
Ncera	Excellent	Temp. open / closed	Poor	Weir at head of estuary
Mlele	Good	Temp. open / closed	Poor	Weir at head of estuary
Mcantsi	Good	Temp. open / closed	Poor	Kidd's Beach on south bank
Gxulu	Fair	Temp. open / closed	Poor	Resort on floodplain
Goda	Excellent	Temp. open / closed	Poor	Resort on northern bank
Hlozi	Good	Temp. open / closed	Poor	Farmlands in catchment
Hickmans	Fair	Temp. open / closed	Poor	Causeway and resort development in floodplain
Buffalo	Poor	Permanently open	Poor	Urban and rural pollution
Blind	Poor	Temp. open / closed	Poor	Serious urban pollution
Hlaze	Poor	Temp. open / closed	Poor	Serious urban pollution
Nahoon	Fair	Permanently open	Moderate	NB environmental asset and recreation

<b>ESTUARY NAME</b>	<b>CONDITION</b>	<b>CLASSIFICATION</b>	<b>INFORMATION</b>	<b>COMMENTS</b>
Quinera	Good	Temp. open / closed	Poor	NB environmental asset and recreation
Gqunube	Good	Permanently open	Poor	NB environmental asset and recreation
Kwelera	Good	Permanently open	Poor	Resorts on north bank
Bulura	Good	Temp. open / closed	Poor	Resorts on north bank
Cunge	Good	Temp. open / closed	Poor	Low Oxygen levels in bottom waters
Cintsa	Good	Temp. open / closed	Poor	Extensive resort development
Cefane	Excellent	Temp. open / closed	Poor	Possible coastal reserve
Kwenxura	Excellent	Temp. open / closed	Poor	Possible coastal reserve
Nyara	Excellent	Temp. open / closed	Poor	Possible coastal reserve
Haga Haga	Excellent	Temp. open / closed	Poor	Increased freshwater extraction for resort
Mtendwe	Excellent	Temp. open / closed	Poor	Catchment and estuary in excellent condition
Quko	Excellent	Temp. open / closed	Poor	Conservation area
Morgan	Good	Temp. open / closed	Poor	Increased freshwater extraction for resort
Cwili	Good	Temp. open / closed	Poor	Old bridge in estuary
Great Kei	Fair	Permanently open	Moderate	Heavy siltation due to catchment degradation

**APPENDIX C**

**STUDY AREA MAPS**

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