CLASSIFICATION OF SIGNIFICANT WATER RESOURCES IN THE OLIFANTS/DOORN WATER MANAGEMENT AREA

REVISED SCENARIOS

Public meeting 3
14 February 2012

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What is the purpose of classification

- Ensuring **long term** sustainable use of the water resources
  - Quality and quantity
- Bring regulatory certainty
  - Facilitate decision making
- Provide framework in which goals (resource quality objectives) can be set to measure regulatory performance and compliance (project already initiated)
  - Quality
  - Quantity
  - Habitat
  - Biota

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What do we need to consider to prepare for classification (1)

- **Ecological:**
  - Present Ecological State (PES) of the catchment (Category A – E)
    - Quaternary scale
    - 2011 updated PES data (compared with 1999 data)
  - Freshwater Ecosystem priority areas (FEPA)
    - 2011 draft Atlas
  - The ecological Reserve (historic approved Reserve determinations)
    - 2008 approved Reserve for the catchment

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What do we need to consider to prepare for classification (2)

- **Hydrology (Flow):**
  - **Natural flow**
    - Generated from rainfall data
    - WR2005 (updated WR90 data)
    - Raising of Clanwilliam dam hydrology study
    - Quaternary scale
  - Approved ecological Reserve (flow component)
  - Balance in the catchment for supplying the flow through the catchment
  - **Present day flow**

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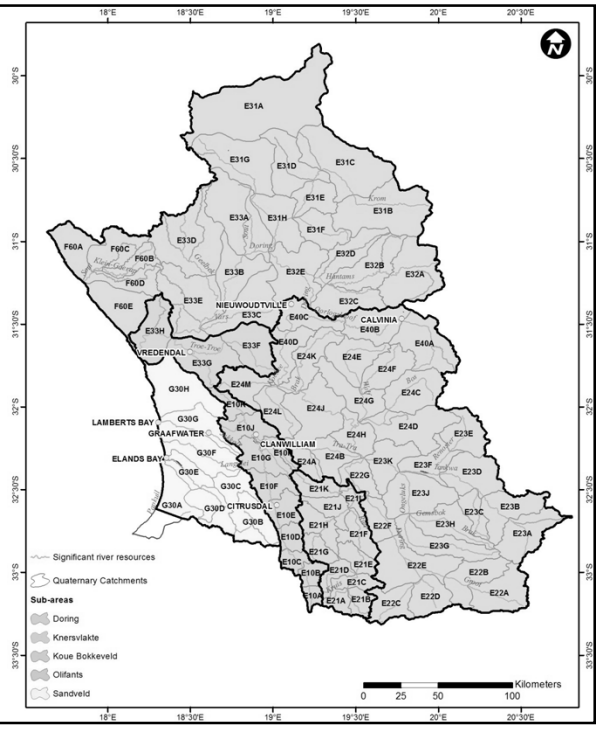
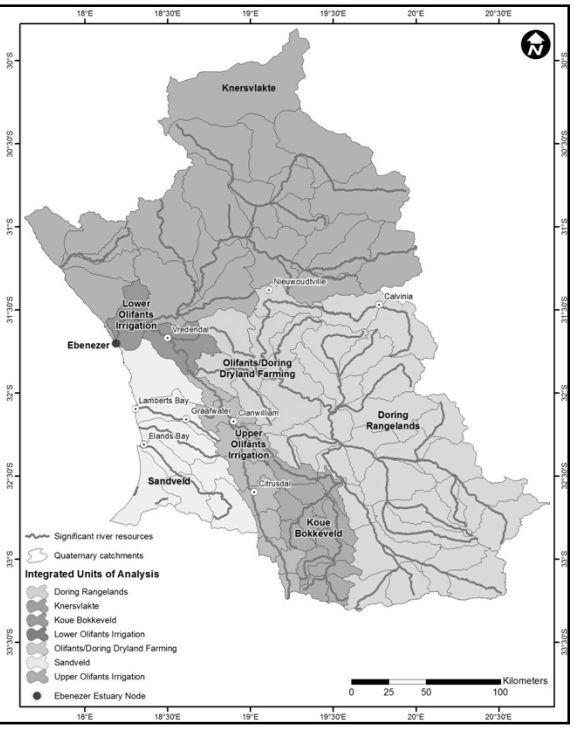
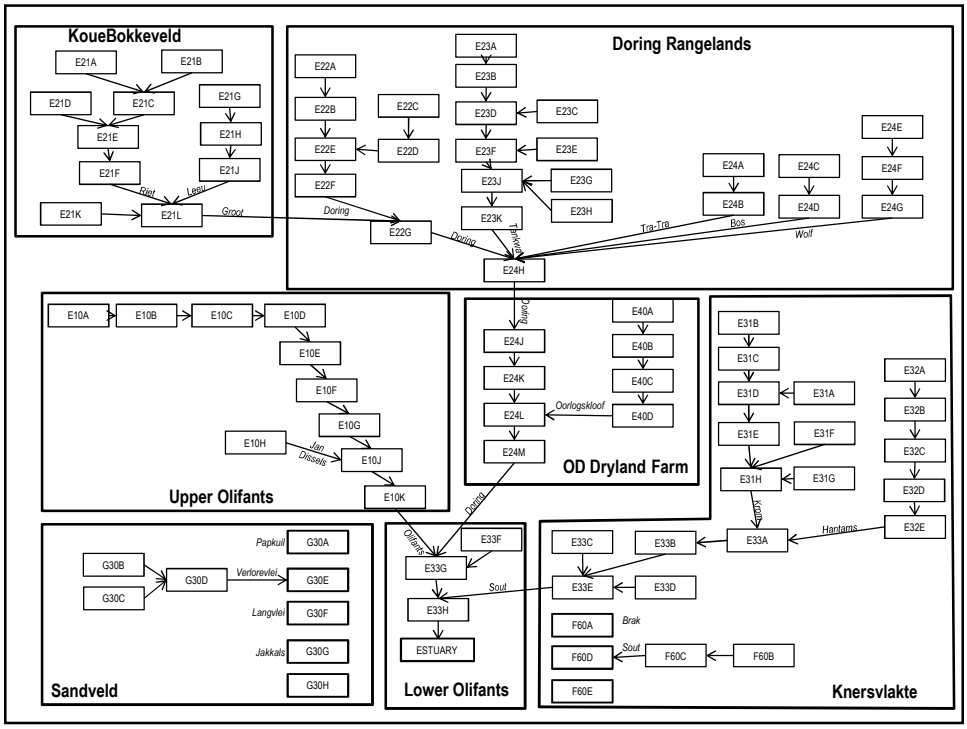
Quaternary catchment boundaries
88 quaternary units



7 Integrated Units of Analysis





Class	Class description
	Minimally used
	Moderately used
	Heavily used

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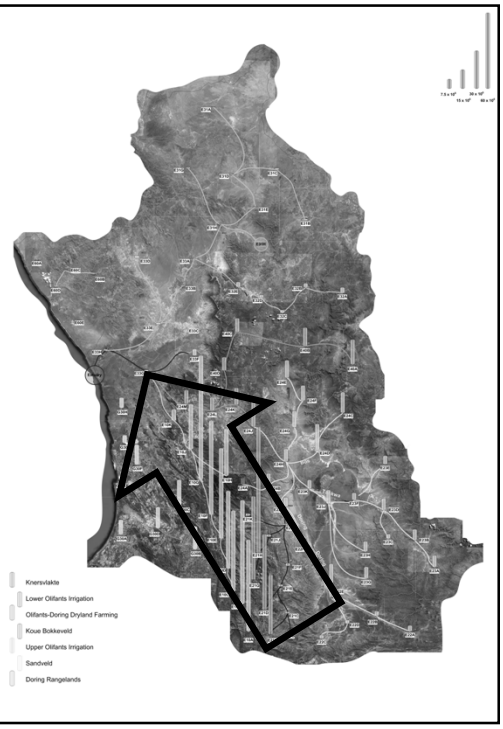
Natural Incremental flow summary for the Olifants Doorn WMA



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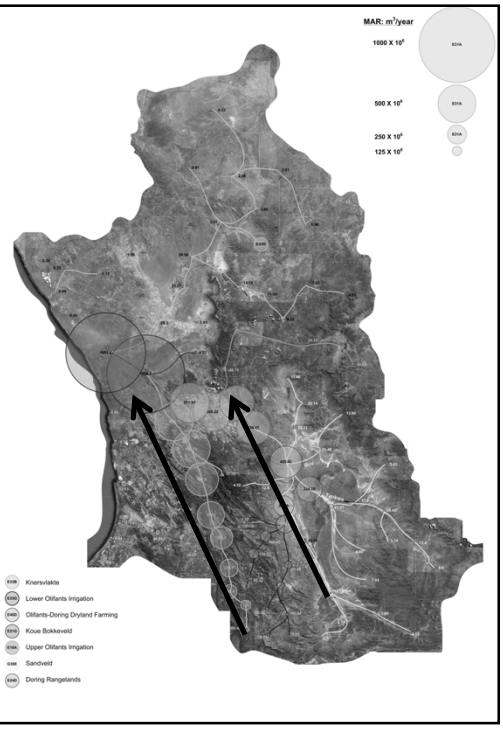
Natural Cumulative flow summary for the Olifants Doorn WMA



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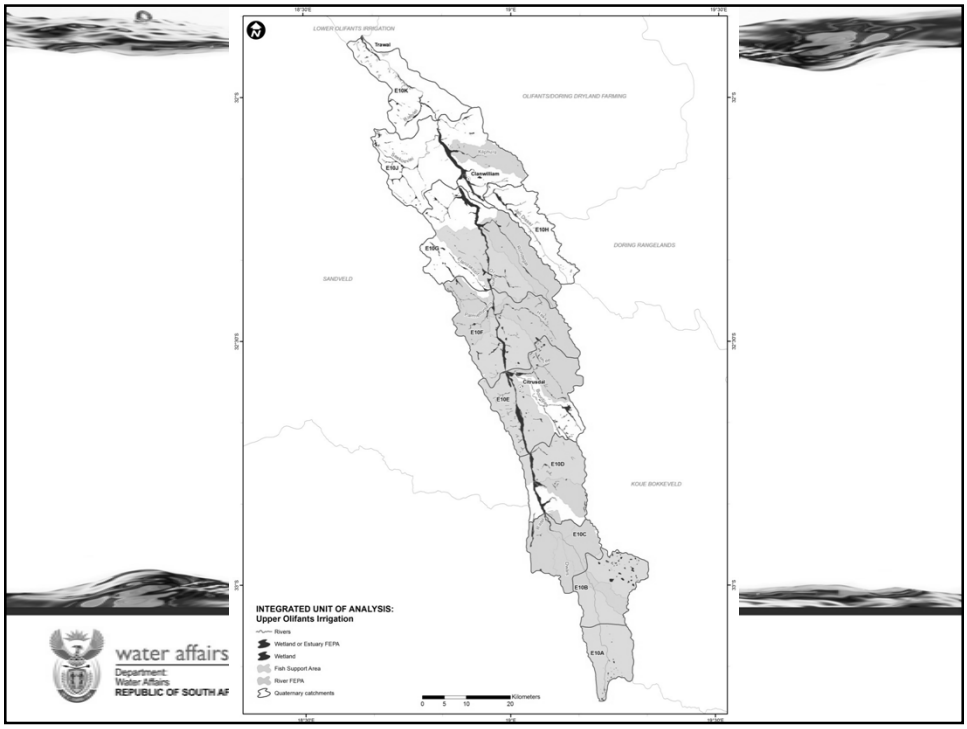
LOWER OLIFANTS IRRIGATION
OLIFANTSDORING DRYLAND FARMING
DORING RANGELANDS
SANDVELD
KOUE BOKKEVELD
Trawal
Clanwilliam
Citrusdal
E10K
E10J
E10H
E10G
E10F
E10E
E10D
E10C
E10B
E10A
INTEGRATED UNIT OF ANALYSIS:
Upper Olifants Irrigation
Rivers
Wetland or Estuary FEPA
Wetland
Fish Support Area
River FEPA
Quaternary catchments
Kilometers
0 5 10 20
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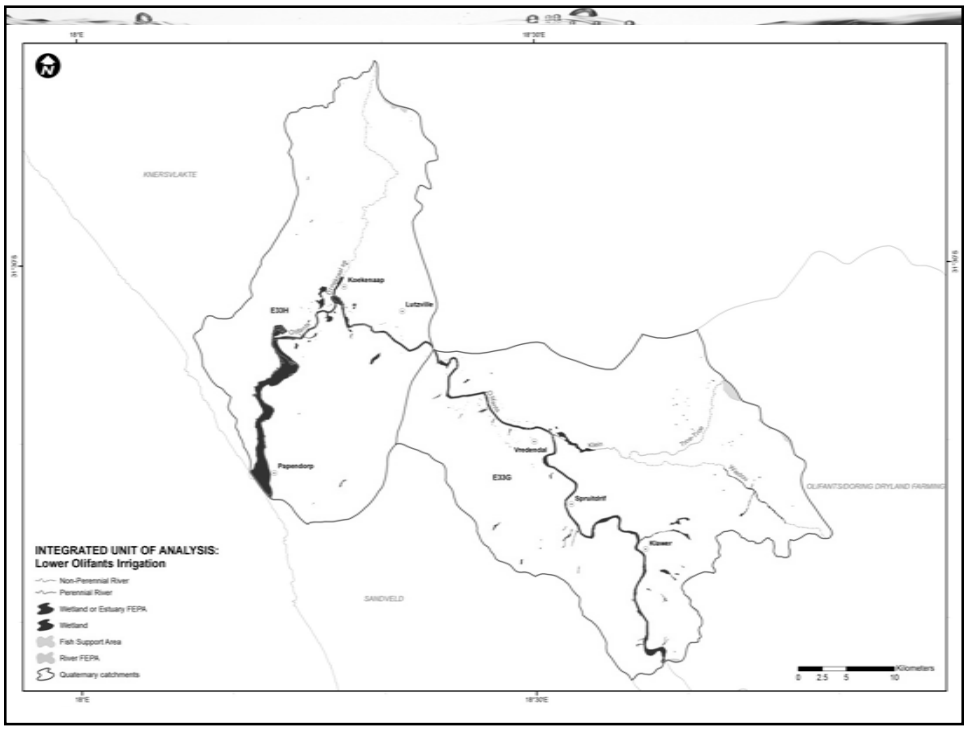
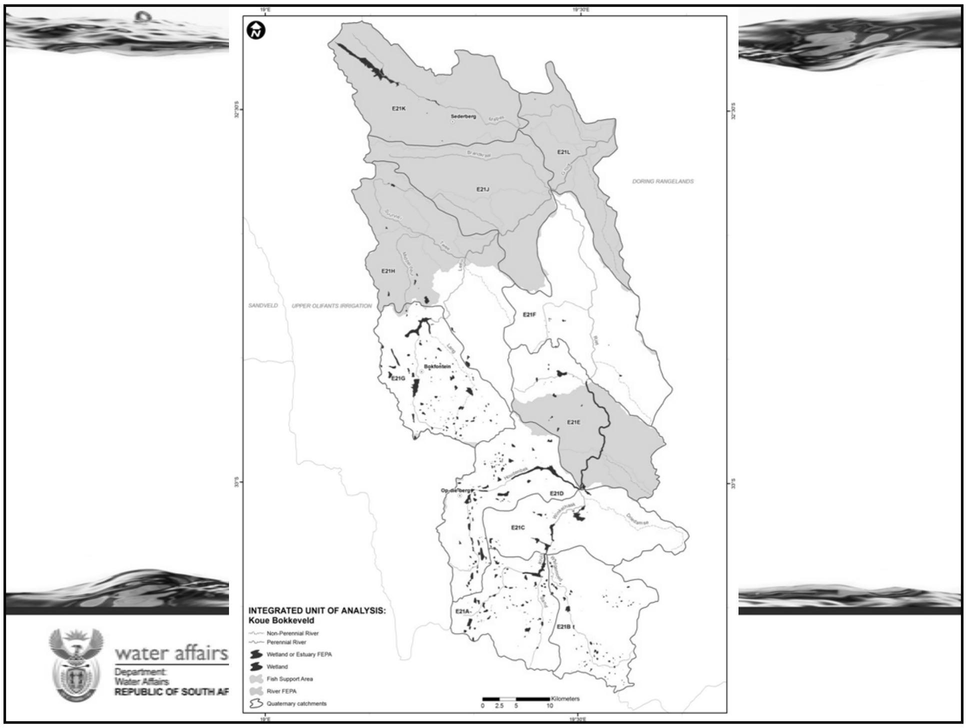

KNERSVLAKTE
SANDVELD
OLIFANTSDORING DRYLAND FARMING
Koekenaap
Lutzville
Papendorp
Vredendal
Spruitdrift
Klawer
E33H
E33G
INTEGRATED UNIT OF ANALYSIS:
Lower Olifants Irrigation
Non-Perennial River
Perennial River
Wetland or Estuary FEPA
Wetland
Fish Support Area
River FEPA
Quaternary catchments
Kilometers
0 2.5 5 10


INTEGRATED UNIT OF ANALYSIS:
Koue Bokkeveld
Non-Perennial River
Perennial River
Wetland or Estuary FEPA
Wetland
Fish Support Area
River FEPA
Quaternary catchments
E21K
Sederberg
E21L
E21J
DORING RANGELANDS
E21H
SANDVELD
UPPER OLIFANTS IRRIGATION
E21F
E21G
E21E
E21D
E21C
E21A
E21B
Kilometers
0 2.5 5 10
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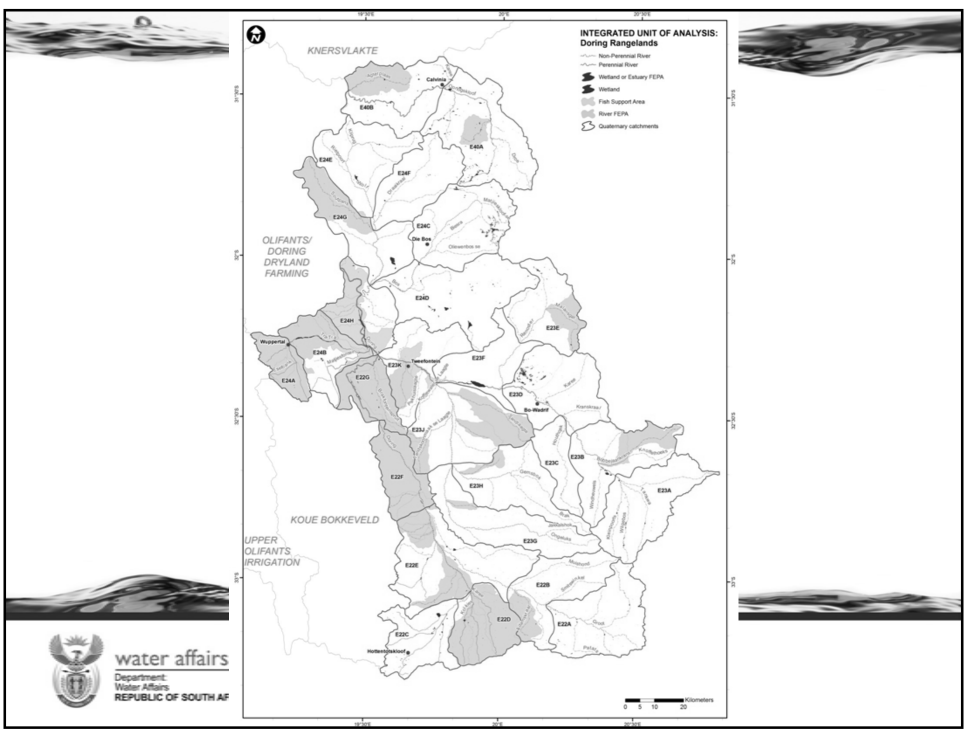
INTEGRATED UNIT OF ANALYSIS:
Doring Rangelands
Non-Perennial River
Perennial River
Wetland or Estuary FEPA
Wetland
Fish Support Area
River FEPA
Quaternary catchments
KNERSVLAKTE
Calvinia
E40B
E40A
E24E
E24F
E24G
E24C
Die Bos
OLIFANTS/
DORING
DRYLAND
FARMING
E24D
E24H
E23E
Wuppertal
E24B
E24A
E22G
E23K
Tweefontein
E23F
E23D
Bo-Wadrif
E23J
E23C
E23B
E22F
E23H
E23A
KOUE BOKKEVELD
UPPER
OLIFANTS
IRRIGATION
E23G
E22E
E22B
E22D
E22A
E22C
Hottentotskloof
Kilometers
0 5 10 20
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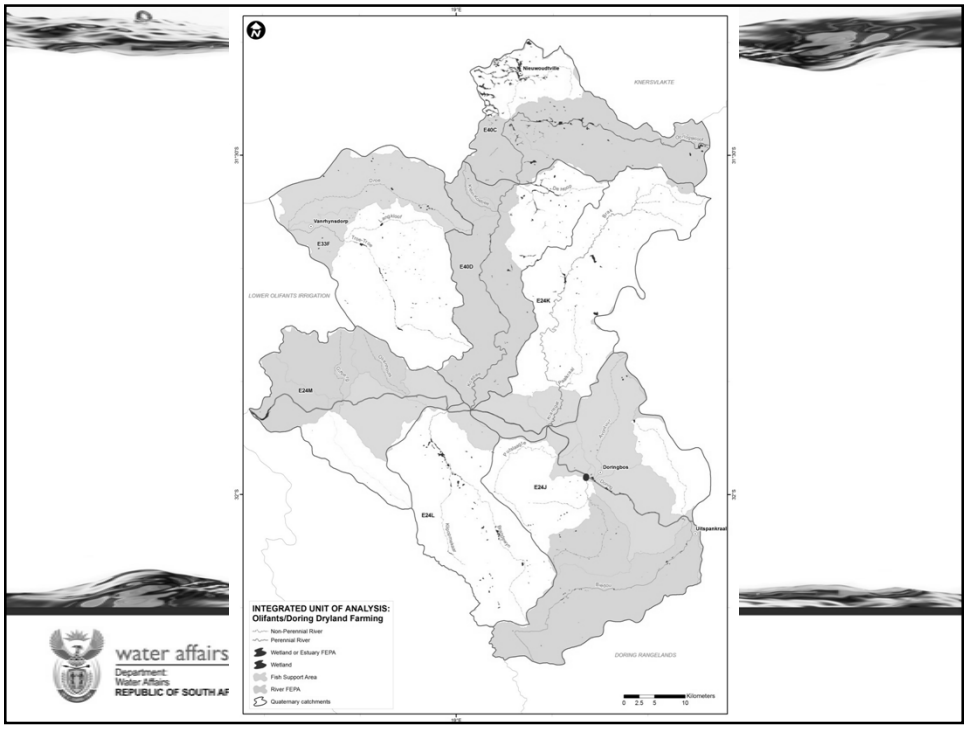
INTEGRATED UNIT OF ANALYSIS:
Olifants/Doring Dryland Farming
Non-Perennial River
Perennial River
Wetland or Estuary FEPA
Wetland
Fish Support Area
River FEPA
Quaternary catchments
KNERSVLAKTE
LOWER OLIFANTS IRRIGATION
DORING RANGELANDS
E40C
E33F
E40D
E24K
E24M
E24J
E24L
Vanrhynsdorp
Nieuwoudtville
Doringbos
Lutzputskraal
Kilometers
0 2.5 5 10
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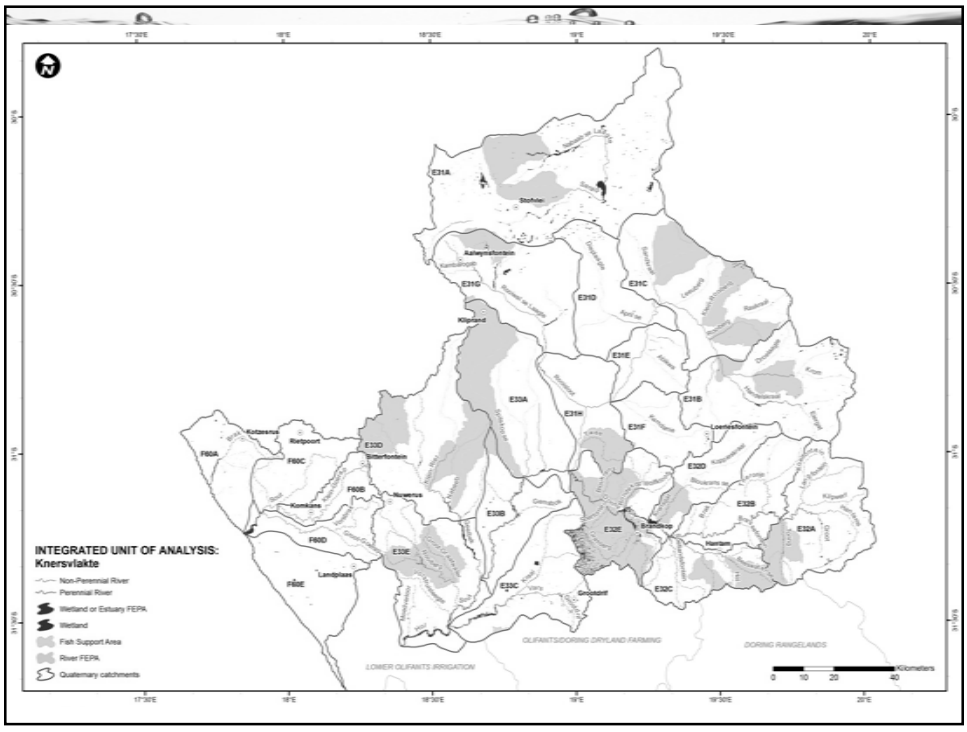
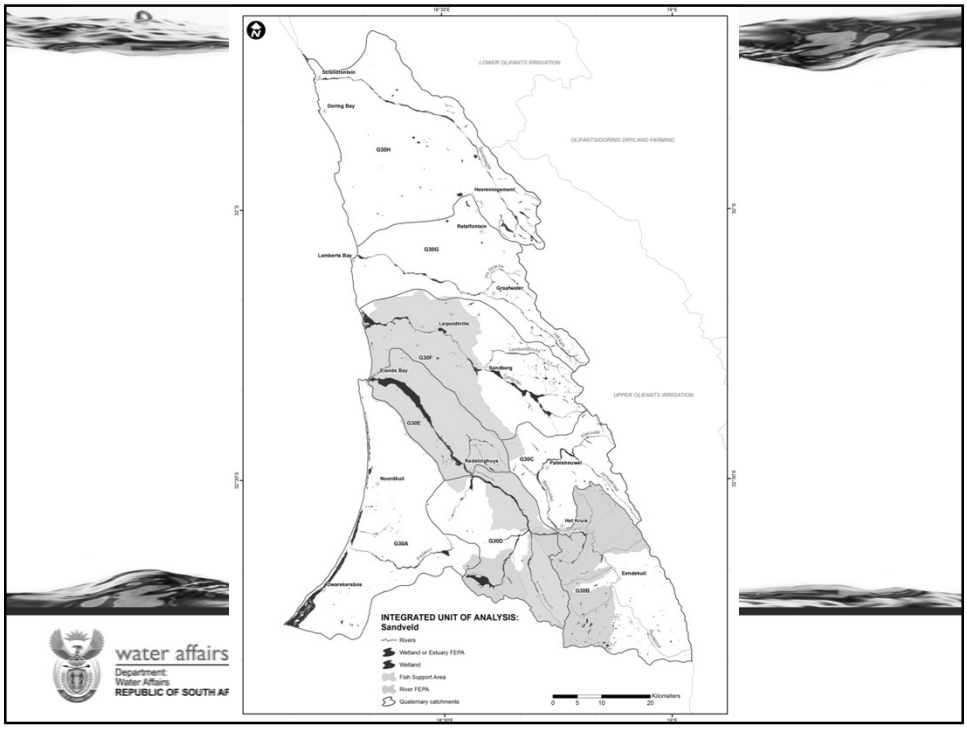

INTEGRATED UNIT OF ANALYSIS:
Knersvlakte
Non-Perennial River
Perennial River
Wetland or Estuary FEPA
Wetland
Fish Support Area
River FEPA
Quaternary catchments
E31A
Stofvlei
Kallemsfontein
E31G
E31D
E31C
Klipland
E31E
E30A
E31H
E31B
E31F
Leeuwfontein
Kotzeesnus
Rietpoort
F80A
F80C
E32D
Silverfontein
F80B
Komkams
Nourivier
E32B
E30B
E32E
Brandkop
E32A
Hantam
F80D
E33E
Landplaas
F80E
E33C
Soebatsfontein
E32C
OLIFANTS/DORING DRYLAND FARMING
DORING RANGELANDS
LOWER OLIFANTS IRRIGATION
Kilometers
0 10 20 40



Quaternary	PES (2011)		FEPA (2011) % of Inc Quat Catchment Area			RECOMMENDED ECOLOGICAL CATEGORY		APPROVED RDM (2007)	
	Main stem	Tributaries	catchment area = FEPA river catchment	catchment area =Fish support catchment	% of catchment area =FEPA wetland area	Cumulative flow	INC (% of catchment area assigned to the category; Reserve verses FEPA flow requirement)	Cumulative	Incremental
E10A	C	C	0	98	0	C	C	D	C
E10B	B	C	21	77	0	C	C (80%); AB (20%)	B	B
E10C	B	B	97	2	1	C	AB (100%)	B	C
E10D	C	C	24	50	5	C	C (70%); AB (30%)	C	D
E10E	C	C	32	46	6	C	C (60%); AB (40%)	C	D
E10F	D	C	58	40	0	D	C (40%); AB (60%)	D	D
E10G	D	C	28	32	0	D	C (70%); AB (30%)	C	C
E10H	D	D	3	0	3	D	D (95%); AB (5%)	D	AB
E10J	D	D	16	0	1	D	D (80%); AB (20%)	D	D
E10K	D	D	1	0	2	D	D (95%); AB (5%)	D	D
E21A	E	C	0	0	0	D	C	D	C
E21B	D	D	0	0	0	D	D	C	AB
E21C	C	B	0	0	1	C	B	C	D
E21D	D	D	3	0	0	D	D (95%); AB (5%)	D	C
E21E	B	C	72	0	0	C	C (30%); AB (70%)	C	D
E21F	AB	C	2	0	0	C	C	C	D
E21G	D	D	1	1	0	D	D (95%); AB (5%)	C	AB
E21H	AB	B	61	0	0	AB	B (40%); AB (60%)	C	AB
E21J	AB	AB	98	0	0	AB	AB	C	AB
E21K	B	B	100	0	2	B	AB	C	D
E21L	AB	AB	100	0	0	AB	AB	C	D
E22A	B	AB	0	0	0	B	AB	B	B
E22B	AB	AB	16	0	0	AB	AB	B	B
E22C	AB	B	1	0	0	AB	AB	C	AB
E22D	B	AB	93	0	0	B	AB	C	AB

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Node	Quaternary Single	Quaternary Multiple	Directly linked nodes	Ecol Category (Node) D C B A/B	Cum PES	IncremFlow Category D C B AB (60	Increm input	Channel evap	Cumul flow	EWR at node	Balance
48	E21A		0		D		**5.096**		5.096	5.096	0.000
49	E21B		0		D		**0.138**		0.138	0.138	0.000
46	E21C		2 49,48		C		0.338	0.18	5.392	8.168	-2.776
45	E21D		0		D		**11.048**		11.048	6.490	4.558
43	E21E		2 46,45		B		0.323	0.40	16.363	18.359	-1.996
39	E21F		1 43		AB		0.406	0.71	16.059	20.821	-4.762
41	E21G		0		D		**12.148**		12.148	7.139	5.009
38	E21H	E21J	1 41		AB		*43.958*	0.15	55.957	51.481	4.476
37	E21K	E21L	2 38,39		B		*0.937*	0.60	72.353	69.645	2.708
50	E22C	E22D	0		B		***1.413***		1.413	0.711	0.702
36	E22A	E22B E22E E22F	1 50		B		*9.115*	1.77	8.758	5.427	3.331
28	E22G		2 37,36		B		2.242	1.26	82.093	47.204	34.889
32	E23A	E23B E23C E23D	0		AB		***8.629***		8.629	8.630	-0.001
31	E23E		0		B		**1.562**		1.562	1.562	0.000
29	E23F		2 32,31		B		1.310	0.56	10.941	9.895	1.046
30	E23G	E23H E23J	1 29		B		***7.994***		18.935	16.272	2.663
27	E23K		2 28,30		B		1.947	0.84	102.134	92.254	9.880
25	E24A		0		B		**1.197**		1.197	1.197	0.000

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Quaternary catchment	Incremental Natural MAR (1920 - 2004)	Cumulative Natural MAR (1920 - 2004)	Incremental present day demands (million m3/a)	Incremental Present day Use (Million m3/a)	Incremental Present day flows (million m3/a)	EWR	Balance/Water Available	Balance as % of Incremental MAR
E10A	60.5	60.5	7	4.4	56.1	12.1	44.0	72.8
E10B	68.5	129	11.3	5.8	62.8	19.2	43.6	63.7
E10C	53.4	182.4	5.3	3	50.4	32.0	18.4	34.4
E10D	51.4	233.8	13.4	9.8	41.6	16.4	25.2	49.0
E10E	59.7	293.5	16.7	12.2	47.6	21.5	26.1	43.7
E10F	62.1	355.6	11.8	8.6	53.5	27.3	26.2	42.2
E10G	81.7	437.3	21.6	15.8	66	26.1	39.9	48.8
E10H	31.1	31.1	0	0	31.1	6.8	24.3	78.0
E10J	29.8	498.2	0	0	29.8	8.3	21.5	72.0
E10K	7.6	505.7	0	0	7.6	1.7	5.9	78.1
E21A	39.4	39.4	12.7	8.8	30.6	7.8	22.8	57.7
E21B	1.2	40.7	4.7	3.2	0	0.1	-0.1	-11.5
E21C	1.3	41.9	3.6	2.5	0	0.3	-0.3	-26.0

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Catchment configuration scenarios

- **Possible non-compliance with estuarine requirements:**
  - **Meeting on 25 November 2011**
    - Consider solutions to the identified "shortage"
    - Revise scenarios
    - **Generate additional scenarios for consideration**

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QUATERNARY	Area_km2	Recharge_Mm3	Total_Usage_Mm3a	Water_Balance	Surface Ecological Category	EWR Low Flow (MCM)	GW Available for use	GWAvail4Use	GWStressCat	Groundwater PES	Desired_status_category	Assumptions	Confidence
			Assumed to be ELU - based on WARMS		To provide baseflow contribution from groundwater	Surface Ecological Water Requirements - Low flow contibution from groundwater	Theoretical maximum		Groundwater Stress Index Category				
E10A	134	17.59	3.45	14.14	C	5.44	8.70	Adequate	Unstressed or low levels of stress	CLASS B: LARGELY NATURAL	B	Most of the agricultural activity is irrigated from groundwater.	low
E10B	202	20.61	3.73	16.88	C	6.78	10.10	Adequate	Unstressed or low levels of stress	CLASS B: LARGELY NATURAL	B	Most of the agricultural activity is irrigated from groundwater.	low
E10C	192	14.30	0.34	13.96	C	5.66	8.30	Adequate	Unstressed or low levels of stress	CLASS A: UNMODIFIED, NATU	A	Groundwater is a completely natural unimpacted state	low
E10D	235	13.69	3.58	10.11	C	5.74	4.37	Adequate	Moderate levels of stress	CLASS C: MODERATELY MODIF	B	Most of the agricultural activity is irrigated from groundwater.	low
E10E	366	14.68	0.27	14.41	C	7.35	7.06	Adequate	Unstressed or low levels of stress	CLASS A: UNMODIFIED, NATU	A	Most of the agricultural activity is irrigated from the Olifants River.	low
E10F	386	14.60	4.90	9.71	D	5.13	4.58	Adequate	Moderate levels of stress	CLASS C: MODERATELY MODIF	B	There is significant groundwater abstraction.	low
E10G	508	19.34	0.10	19.23	D	4.21	15.02	Minimal	Unstressed or low levels of stress	CLASS A: UNMODIFIED, NATU	A	Very little groundwater use. Water is obtained from the Clanwilliam Dam	low
E10H	162	9.08	1.04	8.04	D	1.51	6.53	Minimal	Unstressed or low levels of stress	CLASS B: LARGELY NATURAL	A	Very little groundwater used and this catchment needs to be kept as natural as possible.	low
E10J	468	8.74	1.95	6.79	D	1.63	5.16	Adequate	Moderate levels of stress	CLASS C: MODERATELY MODIF	C	The groundwater use needs to be carefully monitored within this catchment.	low
E10K	235	2.15	0.10	2.06	D	0.36	1.70	Minimal	Unstressed or low levels of stress	CLASS A: UNMODIFIED, NATU	A	The Olifants River is within the catchment and the assumption is that the bulk of the irrigation water is from the river.	low

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Flow and water use realities

- **Hydrology (Flow):**
  - **Disconnect between ecological condition and flow requirements ?**
  - **Flow data (includes high flow and floods) which can not be utilised and will flow to estuary**
  - **Yield are 0 in all quaternary catchment for run of river abstractions, even if the Ecological Reserve only require D category**
  - **Storage facilities will need to be constructed to increase the yield and to allow increase in use**
  - **Present day flows not accurately measured**

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Summary of Water Resource Class scenarios per Quaternary catchment area

IUA	Water Resource Class for IUA	Quat. Drainage Region	Water Resource Class for Quaternary	River name	Mainstem Ecological Category	Tributary Ecological Category* (% of Incremental quaternary area)	Wetland area and Ecological Category*	Groundwater Category
Upper Olifants Irrigation	II	E10A	III	Olifants	C	C	-	B
		E10B	II	Olifants	C	C (80%); AB (20%)	-	B
		E10C	II	Olifants	C	AB (100%)	wetland area 1.2% of quaternary, 85% in a AB condition	A
		E10D	II	Olifants	C	C (70%); AB (30%)	wetland area 5.4% of quaternary, 16% in a AB condition	B
		E10E	II	Olifants	C	C (60%); AB (40%)	wetland area 5.8% of quaternary, 10% in a AB condition	A
		E10F	III	Olifants	D	C (40%); AB (60%)	-	B
		E10G	II	Olifants/ Rondegat	D	C (70%); AB (30%)	-	A
		E10H	III	Jan Dissels	D	D (95%); AB (5%)	wetland area 3.3% of quaternary, 10% in a AB condition	A
		E10J	III	Olifants	D	D (80%); AB (20%)	wetland area 1.1% of quaternary, 5.5% in a AB condition	C
		E10K	III	Olifants	D	D (95%); AB (5%)	wetland area 1.9% of quaternary, 50% in a AB condition	A

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Agricultural economic implication of increase and decreased water use

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Thank you !!
Discussion, comments and questions

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