

APPENDIX D
Probabilistic Modelling Data

DATA SHEET FOR KHAN -SWAKOP MODEL			Ameib - Usukos				Ameib - Usukos
		Distribution Type	Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			26000		26000
Effective Breadth of Reach	m	none			80		80
maximum Depth of reach	m	none			15		15
hydraulic gradient	m/m	none			7.69E-03		0.00769
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T_sat	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			2.21
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.22
River Characteristics							
Effective channel width	m	uniform	80	16			75.82
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.02
Effective channel length	m	none			26000		26000
Channel Slope	m/m	none			7.69E-03		0.0077
Depression Storage Loss	m	uniform	0.075	0.05			0.06
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.06
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.06
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.41
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	1000000	999990			0.90
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				2.38		2.38
Area of nat kolle when	m2				0		0
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform		0.119			0.119
Minimum allowable drawdown	% of max ca	none			25		25
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			6.5E+08		650000000
MAP	m/annum	uniform	0.4	0.2			0.24
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.05	0.01			0.05
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annu	m2	uniform	0.01	0.001			0.01
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			3.4		3.40
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.79
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.38
Depression Storage							

DATA SHEET FOR KHAN -SWAKOP MODEL			Ameib - Usukos				Ameib - Usukos
		Distribution Type	Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.12
Structural Characteristics							
Khan Dam Fetch	m	none					
Khan Dam Capacity	Mm3	none					
Barrier Effective permeability reduction factor	n/a	uniform					
Recharge field length	m	none					
Swakoppoort Dam Capacity	Mm3	none					
Barrier permeability	m/day	uniform					
Sand Mining annual excavation rate	m3/annum	none					
Maximum compartment storage volume	Mm3						3503585.9
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			347.38
Initial aquifer water TDS	mg/litre	uniform	3000	1000			2729.49
Base inflow TDS	mg/litre	uniform	1500	1000			1291.94
Tributary TDS	mg/litre	uniform	10000	5000			6087.61
Average annual TDS concentration effluent	mg/litre	uniform	1	0.9			0.94
Average annual effluent flux	Mm3	uniform	1E-07	1E-09			0.00

DATA SHEET FOR KHAN -SWAKOP MODEL			Usukos - Khan Dam				Usukos - Khan Dam
		Distribution Type	Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			77000		77000
Effective Breadth of Reach	m	none			100		100
maximum Depth of reach	m	none			18		18
hydraulic gradient	m/m	none			5.80E-03		0.0058
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T_sat	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			2.99
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.21
River Characteristics							
Effective channel width	m	uniform	100	20			69.35
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.02
Effective channel length	m	none			77000		77000
Channel Slope	m/m	none			5.80E-03		0.0058
Depression Storage Loss	m	uniform	0.075	0.05			0.07
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.03
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.08
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.41
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	1747631	1747614			1.57
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				2.38		2.38
Area of nat kolle when	m2				400000		400000
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform		0			0
Minimum allowable drawdown	% of max ca	none			25		25
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			1.92E+09		1920000000
MAP	m/annum	uniform	0.05	0.04			0.05
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.05	0.01			0.02
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annu	m2	uniform	0.01	0.001			0.01
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			2.7		2.70
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.76
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.38
Depression Storage							

DATA SHEET FOR KHAN -SWAKOP MODEL			Usukos - Khan Dam				Usukos - Khan Dam
		Distribution Type	Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.17
Structural Characteristics							
khan Dam Fetch	m	none			6000		6000
Khan Dam Capacity	Mm3	none			11.25		11.25
Barrier Effective permeability reduction factor	n/a	uniform					
Recharge field length	m	none					
Swakoppoort Dam Capacity	Mm3	none					
Barrier permeability	m/day	uniform					
Sand Mining annual excavation rate	m3/annum	none					
Maximum compartment storage volume	Mm3						14410819.37
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			256.70
Initial aquifer water TDS	mg/litre	uniform	5000	2000			3735.50
Base inflow TDS	mg/litre	uniform	5000	2000			2965.26
Tributary TDS	mg/litre	uniform	20000	10000			14303.21
Average annual TDS concentration effluent	mg/litre	uniform	1	0.9			0.96
Average annual effluent flux	Mm3	uniform	1E-07	1E-09			0.00

DATA SHEET FOR KHAN -SWAKOP MODEL			Khan Dam - Mine Front				Khan Dam - Mine Front
		Distribution Type	Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			14500		14500
Effective Breadth of Reach	m	none			120		120
maximum Depth of reach	m	none			23		23
hydraulic gradient	m/m	none			5.58E-03		0.00558
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T_sat	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			3.18
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.22
River Characteristics							
Effective channel width	m	uniform	120	24			93.96
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.02
Effective channel length	m	none			14500		14500
Channel Slope	m/m	none			5.58E-03		0.0056
Depression Storage Loss	m	uniform	0.075	0.05			0.07
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.05
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.09
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.41
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	302000	301997			0.27
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				1.89		1.89
Area of nat kolle when	m2				0		0
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform			2.2		2.2
Minimum allowable drawdown	% of max ca	none			30		30
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			1.87E+08		187000000
MAP	m/annum	uniform	0.05	0.04			0.05
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.05	0.01			0.04
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annu	m2	uniform	0.01	0.001			0.00
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			2.7		2.70
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.71
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.39
Depression Storage							

DATA SHEET FOR KHAN -SWAKOP MODEL			Khan Dam - Mine Front				Khan Dam - Mine Front
		Distribution Type	Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.12
Structural Characteristics							
Khan Dam Fetch	m	none					
Khan Dam Capacity	Mm3	none					
Barrier Effective permeability reduction factor	n/a	uniform	0.1	0.05			0.07
Recharge field length	m	none			12000		12000
Swakoppoort Dam Capacity	Mm3	none					
Barrier permeability	m/day	uniform					19.00
Sand Mining annual excavation rate	m3/annum	none					
Maximum compartment storage volume	Mm3						4390227
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			301.85
Initial aquifer water TDS	mg/litre	uniform	5000	2000			2675.18
Base inflow TDS	mg/litre	uniform	5000	2000			4912.33
Tributary TDS	mg/litre	uniform	20000	10000			10940.70
Average annual TDS concentration effluent	mg/litre	uniform	1	0.9			0.96
Average annual effluent flux	Mm3	uniform	1E-07	1E-09			0.00

DATA SHEET FOR KHAN -SWAKOP MODEL			Mine Front to Confluence				Mine Front to Confluence
		Distribution Type	Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			30000		30000
Effective Breadth of Reach	m	none			200		200
maximum Depth of reach	m	none			23		23
hydraulic gradient	m/m	none			5.90E-03		0.0059
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T_sat	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			3.68
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.23
River Characteristics							
Effective channel width	m	uniform	200	40			74.33
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.02
Effective channel length	m	none			30000		30000
Channel Slope	m/m	none			5.90E-03		0.0059
Depression Storage Loss	m	uniform	0.075	0.05			0.07
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.03
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.09
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.47
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	925925	925915.7			0.83
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				2.38		2.38
Area of nat kolle when	m2				0		0
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform			0		0
Minimum allowable drawdown	% of max ca	none			30		30
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			4.25E+08		425000000
MAP	m/annum	uniform	0.05	0.04			0.05
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.05	0.01			0.02
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annum	m2	uniform	0.01	0.001			0.00
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			2.7		2.70
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.74
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.30
Depression Storage							

DATA SHEET FOR KHAN -SWAKOP MODEL			Mine Front to Confluence				Mine Front to Confluence
		Distribution Type	Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.18
Structural Characteristics							
Khan Dam Fetch	m	none					
Khan Dam Capacity	Mm3	none					
Barrier Effective permeability reduction factor	n/a	uniform					
Recharge field length	m	none			30000		30000
Swakoppoort Dam Capacity	Mm3	none					
Barrier permeability	m/day	uniform					
Sand Mining annual excavation rate	m3/annum	none					
Maximum compartment storage volume	Mm3						15695308.3
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			272.17
Initial aquifer water TDS	mg/litre	uniform	5000	2000			4340.35
Base inflow TDS	mg/litre	uniform	5000	2000			3798.65
Tributary TDS	mg/litre	uniform	20000	10000			15957.45
Average annual TDS concentration effluent	mg/litre	uniform			10000		10000.00
Average annual effluent flux	Mm3	uniform			0.04		0.04

DATA SHEET FOR KHAN -SWAKOP MODEL			Swakoppoort Dam - Dorstrivier				Swakoppoort Dam - Dorstrivier
		Distribution Type	Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			117000		117000
Effective Breadth of Reach	m	none			300		300
maximum Depth of reach	m	none			15		15
hydraulic gradient	m/m	none			4.10E-03		0.0041
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T_sat	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			4.27
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.21
River Characteristics							
Effective channel width	m	uniform	180	15			122.53
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.03
Effective channel length	m	none			117000		117000
Channel Slope	m/m	none			4.10E-03		0.0041
Depression Storage Loss	m	uniform	0.075	0.05			0.06
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.07794528
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.08
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.46
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	12624796	12624670			11.36
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				2.1		2.1
Area of nat kolle when	m2				0		0
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform			0.17		0.17
Minimum allowable drawdown	% of max ca	none			30		30
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			7.11E+09		7112000000
MAP	m/annum	uniform	0.3	0.1			0.17
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.1	0.05			0.07
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annu	m2	uniform	0.01	0.001			0.00
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			3		3.00
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.78
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.49
Depression Storage							

DATA SHEET FOR KHAN -SWAKOP MODEL			Swakoppoort Dam - Dorstrivier				Swakoppoort Dam - Dorstrivier
		Distribution Type	Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.17
Structural Characteristics							
khan Dam Fetch	m	none					
Khan Dam Capacity	Mm3	none					
Barrier Effective permeability reduction factor	n/a	uniform					
Recharge field length	m	none					
Swakoppoort Dam Capacity	Mm3	none			69		69
Barrier permeability	m/day	uniform					
Sand Mining annual excavation rate	m3/annum	none					
Maximum compartment storage volume	Mm3						55729759.7
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			239.26
Initial aquifer water TDS	mg/litre	uniform	1500	1000			1073.01
Base inflow TDS	mg/litre	uniform	1500	1000			1177.01
Tributary TDS	mg/litre	uniform	2	1			1.81
Average annual TDS concentration effluent	mg/litre	uniform	0	0			00'0
Average annual effluent flux	Mm3	uniform	0	0			00'0

DATA SHEET FOR KHAN -SWAKOP MODEL			Dorstrivier - Khan Confluence				Dorstrivier - Khan Confluence
		Distribution Type	Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			108000		108000
Effective Breadth of Reach	m	none			450		450
maximum Depth of reach	m	none			20		20
hydraulic gradient	m/m	none			5.00E-03		0.005
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T_sat	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			2.42
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.23
River Characteristics							
Effective channel width	m	uniform	270	45			50.13
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.03
Effective channel length	m	none			108000		108000
Channel Slope	m/m	none			5.00E-03		0.0050
Depression Storage Loss	m	uniform	0.075	0.05			0.06
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.07
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.09
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.49
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	11113784	11113673			10.00
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				2.38		2.38
Area of nat kolle when	m2				30000		30000
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform			0		0
Minimum allowable drawdown	% of max ca	none			30		30
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			4.2E+09		4200000000
MAP	m/annum	uniform	0.05	0.04			0.04
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.1	0.05			0.10
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annu	m2	uniform	0.01	0.001			0.01
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			3.4		3.40
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.77
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.43
Depression Storage							

DATA SHEET FOR KHAN -SWAKOP MODEL			Dorstrivier - Khan Confluence				Dorstrivier - Khan Confluence
	Distribution Type		Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.20
Structural Characteristics							
khan Dam Fetch	m	none					
Khan Dam Capacity	Mm3	none					
Barrier Effective permeability reduction factor	n/a	uniform					
Recharge field length	m	none					
Swakoppoort Dam Capacity	Mm3	none					
Barrier permeability	m/day	uniform					
Sand Mining annual excavation rate	m3/annum	none					
Maximum compartment storage volume	Mm3						110055157.7
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			223.78
Initial aquifer water TDS	mg/litre	uniform	5000	2000			4237.44
Base inflow TDS	mg/litre	uniform	5000	2000			3297.37
Tributary TDS	mg/litre	uniform	10000	5000			8165.48
Average annual TDS concentration effluent	mg/litre	uniform	0	0			0.00
Average annual effluent flux	Mm3	uniform	0	0			0.00

DATA SHEET FOR KHAN -SWAKOP MODEL			Swakop/Khan Confluence to Farming Zone				Swakop/Khan Confluence to Farming Zone
	Distribution Type		Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			26000		26000
Effective Breadth of Reach	m	none			300		300
maximum Depth of reach	m	none			25		25
hydraulic gradient	m/m	none			3.88E-03		0.00388
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T_sat	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			4.25
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.22
River Characteristics							
Effective channel width	m	uniform	180	15			155.88
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.02
Effective channel length	m	none			26000		26000
Channel Slope	m/m	none			3.88E-03		0.0039
Depression Storage Loss	m	uniform	0.075	0.05			0.06
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.06
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.08
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.46
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	6267028	6266965			5.64
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				2.38		2.38
Area of nat kolle when	m2				0		0
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform			0		0
Minimum allowable drawdown	% of max ca	none			30		30
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			2.95E+08		294500000
MAP	m/annum	uniform	0.05	0.04			0.04
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.1	0.05			0.05
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annum	m2	uniform	0.01	0.001			0.01
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			2.7		2.70
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.80
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.29
Depression Storage							

DATA SHEET FOR KHAN -SWAKOP MODEL			Swakop/Khan Confluence to Farming Zone				Swakop/Khan Confluence to Farming Zone
		Distribution Type	Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.12
Structural Characteristics							
khan Dam Fetch	m	none					
Khan Dam Capacity	Mm3	none					
Barrier Effective permeability reduction factor	n/a	uniform					
Recharge field length	m	none					
Swakoppoort Dam Capacity	Mm3	none					
Barrier permeability	m/day	uniform					
Sand Mining annual excavation rate	m3/annum	none			0		
Maximum compartment storage volume	Mm3						20999843.63
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			271.89
Initial aquifer water TDS	mg/litre	uniform	5000	2000			2172.77
Base inflow TDS	mg/litre	uniform	5000	2000			4113.09
Tributary TDS	mg/litre	uniform	10000	5000			9744.26
Average annual TDS concentration effluent	mg/litre	uniform	0	0			0'00
Average annual effluent flux	Mm3	uniform	0	0			0'00

DATA SHEET FOR KHAN -SWAKOP MODEL			Farming Zone - Start of Swakopmund Zone				Farming Zone
		Distribution Type	Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			11200		11200
Effective Breadth of Reach	m	none			500		500
maximum Depth of reach	m	none			20		20
hydraulic gradient	m/m	none			4.55E-03		0.00455
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T_sat	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			2.45
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.21
River Characteristics							
Effective channel width	m	uniform	300	10			216.80
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.03
Effective channel length	m	none			11200		11200
Channel Slope	m/m	none			4.55E-03		0.0046
Depression Storage Loss	m	uniform	0.075	0.05			0.06
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.04
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.05
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.47
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	3715481	3715444			3.34
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				1.89		1.89
Area of nat kolle when	m2				40000		40000
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform		0.727			0.727
Minimum allowable drawdown	% of max ca	none			30		30
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			1.58E+08		158000000
MAP	m/annum	uniform	0.05	0.04			0.04
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.1	0.05			0.08
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annu	m2	uniform	100	10			23.94
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			2.7		2.70
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.73
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.48
Depression Storage							

DATA SHEET FOR KHAN -SWAKOP MODEL			Farming Zone - Start of Swakopmund Zone				Farming Zone
		Distribution Type	Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.19
Structural Characteristics							
khan Dam Fetch	m	none					
Khan Dam Capacity	Mm3	none					
Barrier Effective permeability reduction factor	n/a	uniform					
Recharge field length	m	none					
Swakoppoort Dam Capacity	Mm3	none					
Barrier permeability	m/day	uniform					
Sand Mining annual excavation rate	m3/annum	none			50000		50000
Maximum compartment storage volume	Mm3						11588063.41
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			264.16
Initial aquifer water TDS	mg/litre	uniform	5000	2000			3481.04
Base inflow TDS	mg/litre	uniform	5000	2000			3353.03
Tributary TDS	mg/litre	uniform	10000	5000			6008.36
Average annual TDS concentration effluent	mg/litre	uniform	0	0			0.00
Average annual effluent flux	Mm3	uniform	0	0			0.00

DATA SHEET FOR KHAN -SWAKOP MODEL			Start of Swakopmund Zone to Atlantic				Start of Swakopmund Zone to Atlantic
		Distribution Type	Max	Min	mean	sdev	P[f]
Aquifer Characteristics							
Effective Length of reach	m	none			10500		10500
Effective Breadth of Reach	m	none			400		400
maximum Depth of reach	m	none			15		15
hydraulic gradient	m/m	none			4.57E-03		0.00457
Aquifer horizontal permeability	m/day	none			268		268
Aquifer (saturated) vertical permeability	m/day	none			13.4		13.4
Exponent constant for T _{sat}	N/A	none	0.1	0.099			0.10
Initial depth to phreatic surface	m	uniform	5	2			2.29
Effective Storativity of reach	N/A	uniform	0.25	0.2			0.25
River Characteristics							
Effective channel width	m	uniform	240	8			162.91
Manning Roughness coefficient	N/A	uniform	0.03	0.02			0.02
Effective channel length	m	none			10500		10500
Channel Slope	m/m	none			4.57E-03		0.0046
Depression Storage Loss	m	uniform	0.075	0.05			0.07
Sediment Characteristics							
Proportion of sediment in flood	m3/m3	uniform	0.08	0.02			0.04
Proportion of silt size fraction in sediment	% by volume	uniform	0.1	0.05			0.08
Silt deposition velocity	m/s	none			0.36		0.36
Void Ratio (e) for Deposited Sediment	N/A	uniform	0.5	0.4			0.44
Vegetation Characteristics							
MAXIMUM Total Evapotranspiration rate	m3/annum	uniform	1114560	1114549			1.00
% of Maximum (calibration)	%	none					0.90
Power Term for Reduction in Evap T loss with depth to water							2
Wetlands							
Evaporation Rate from nat kolle areas	m/annum				1.89		1.89
Area of nat kolle when	m2				0		0
Borehole Abstractions							
Annual Borehole Abstraction Rate	Mm3/annum	uniform			0		0
Minimum allowable drawdown	% of max ca	none			30		30
Tributary Characteristics							
Total Catchment area of Tributaries	m2	none			84500000		84500000
MAP	m/annum	uniform	0.05	0.04			0.05
% MAP Entering Tributaries as Groundwater Flow	%	uniform	0.1	0.05			0.09
Trench/ Sand Pit Characteristics							
Total Area of trenches exposed to water table/annu	m2	uniform	0.01	0.001			0.00
Evaporation Characteristics							
Mean annual Evaporation	m/annum	none			2.7		2.70
Reduction Factor for pit evaporation	N/A	uniform	0.8	0.7			0.70
Depth sand wet sand which can dry over one year	m	uniform	0.5	0.25			0.46
Depression Storage							

Input Data

DATA SHEET FOR KHAN -SWAKOP MODEL			Start of Swakopmund Zone to Atlantic				Start of Swakopmund Zone to Atlantic
		Distribution Type	Max	Min	mean	sdev	P[f]
Depth of water lost due to ponding and evaporation from surface	m	uniform	0.2	0.1			0.12
Structural Characteristics							
khan Dam Fetch	m	none					
Khan Dam Capacity	Mm3	none					
Barrier Effective permeability reduction factor	n/a	uniform					
Recharge field length	m	none					
Swakoppoort Dam Capacity	Mm3	none					
Barrier permeability	m/day	uniform					
Sand Mining annual excavation rate	m3/annum	none			50000		50000
Maximum compartment storage volume	Mm3						7834605.1
Water Quality Parameters							
Flood Water TDS	mg/litre	uniform	400	200			387.64
Initial aquifer water TDS	mg/litre	uniform	5000	2000			3493.67
Base inflow TDS	mg/litre	uniform	5000	2000			4215.21
Tributary TDS	mg/litre	uniform	10000	5000			8371.06
Average annual TDS concentration effluent	mg/litre	uniform	0	0			0:00
Average annual effluent flux	Mm3	uniform	0	0			0:00