CHAPTER 10

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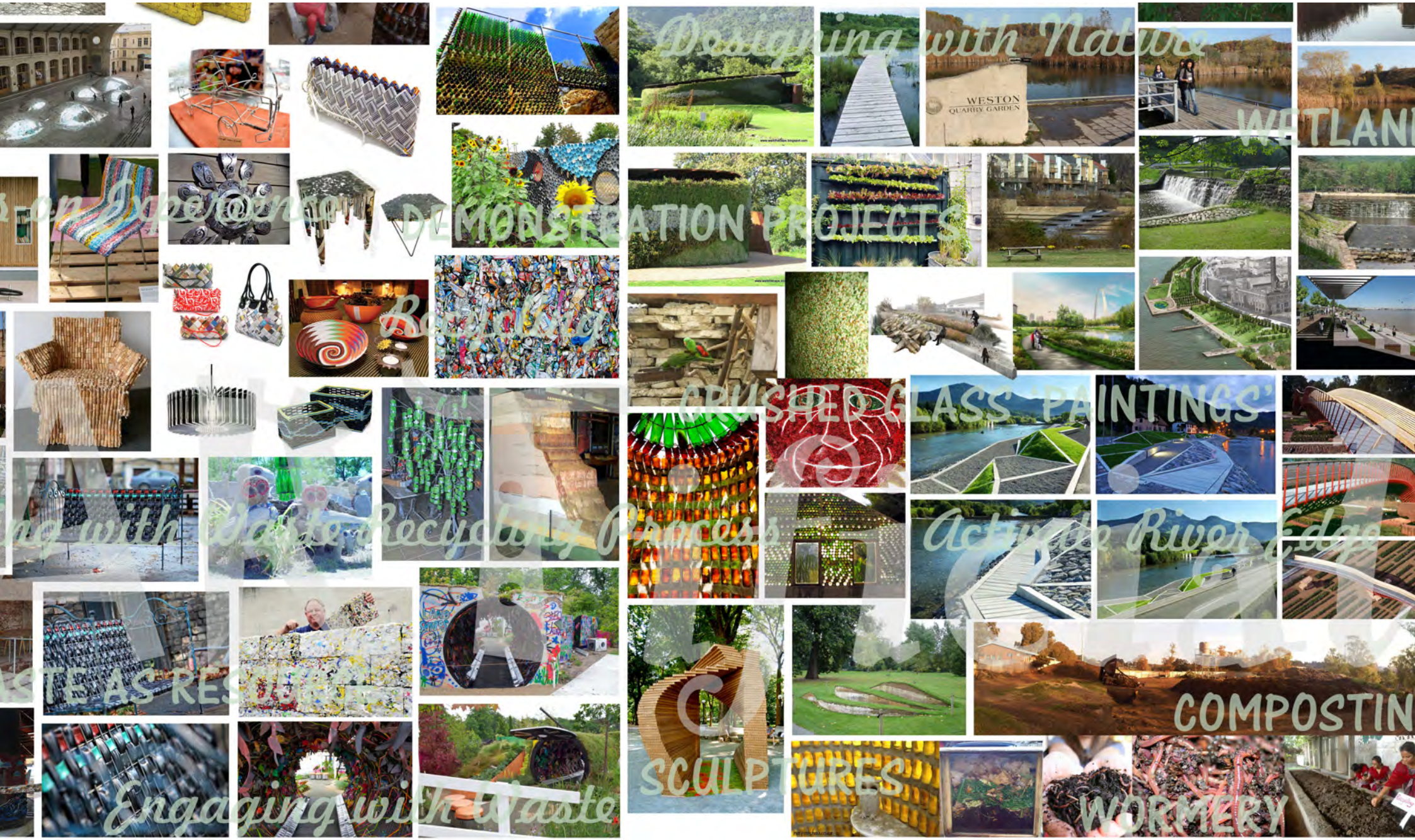
CHAPTER 11

Appendices

Fig. 195: Story board (Author, 2012)


Designing with Nature
WESTON
QUARRY GARDEN
DEMONSTRATION PROJECTS
CRUSHED GLASS PAINTINGS
Engaging with Waste
SCULPTURES
WORMERY

RESOURCE / SUPPLY

RAINWATER

Stormwater calculations of Catchment area 1 - Shopping centre

						Shopping centre Catchment Area (m^2)	18 451.75	
	Average rain (mm)	Ave. Rain (m)	Evaporation (mm)	Evaporation (m)	Rain - evapo (m)	**Paving (A= 0.8)**	Runoff (m^3)	Runoff (ℓ)
January	136	0.136	35	0.035	0.101	8 852.08	715.25	715 248.06
February	75	0.075	35	0.035	0.04	8 852.08	283.27	283 266.56
March	82	0.082	35	0.035	0.047	8 852.08	332.84	332 838.21
April	51	0.051	35	0.035	0.016	8 852.08	113.31	113 306.62
May	13	0.013	35	0.035	-0.022	8 852.08	-155.80	-155 796.61
June	7	0.007	35	0.035	-0.028	8 852.08	-198.29	-198 286.59
July	3	0.003	35	0.035	-0.032	8 852.08	-226.61	-226 613.25
August	6	0.006	35	0.035	-0.029	8 852.08	-205.37	-205 368.26
September	22	0.022	35	0.035	-0.013	8 852.08	-92.06	-92 061.63
October	71	0.071	35	0.035	0.036	8 852.08	254.94	254 939.90
November	98	0.098	35	0.035	0.063	8 852.08	446.14	446 144.83
December	110	0.11	35	0.035	0.075	8 852.08	531.12	531 124.80
Average rainfall per year	674					**Total**	**1 798.74**	
per week	12.96	0.013	35	0.035	-0.022	8 852.08	-97.54	-97 543.11

Average runoff per month 149.90

Source: http://www.pretoria-south-africa.com/pretoria-weather.html

	Average rain (mm)	Ave. Rain (m)	Evaporation (mm)	Evaporation (m)	Rain - evapo (m)	**Roofs (A= 0.9)**	Runoff (m^3)	Runoff (ℓ)
January	136	0.136	35	0.035	0.101	8 402.21	763.76	763 760.89
February	75	0.075	35	0.035	0.04	8 402.21	302.48	302 479.56
March	82	0.082	35	0.035	0.047	8 402.21	355.41	355 413.48
April	51	0.051	35	0.035	0.016	8 402.21	120.99	120 991.82
May	13	0.013	35	0.035	-0.022	8 402.21	-166.36	-166 363.76
June	7	0.007	35	0.035	-0.028	8 402.21	-211.74	-211 735.69
July	3	0.003	35	0.035	-0.032	8 402.21	-241.98	-241 983.65
August	6	0.006	35	0.035	-0.029	8 402.21	-219.30	-219 297.68
September	22	0.022	35	0.035	-0.013	8 402.21	-98.31	-98 305.86
October	71	0.071	35	0.035	0.036	8 402.21	272.23	272 231.60
November	98	0.098	35	0.035	0.063	8 402.21	476.41	476 405.31
December	110	0.11	35	0.035	0.075	8 402.21	567.15	567 149.18
Average rainfall per year	674					**Total**	**1 920.75**	
per week	12.96	0.013	35	0.035	-0.022	8 402.21	-92.59	-92 585.89

Average runoff per month 160.06

Table 11: Storm water calculations for Catchment 1 (Author, 2012)

	Average rain (mm)	Ave. Rain (m)	Evaporation (mm)	Evaporation (m)	Rain - evapo (m)	**Gardens (A= 0.13)**	Runoff (m^3)	Runoff (ℓ)
January	136	0.136	35	0.035	0.101	1 197.46	15.72	15 722.65
February	75	0.075	35	0.035	0.04	1 197.46	6.23	6 226.79
March	82	0.082	35	0.035	0.047	1 197.46	7.32	7 316.48
April	51	0.051	35	0.035	0.016	1 197.46	2.49	2 490.72
May	13	0.013	35	0.035	-0.022	1 197.46	-3.42	-3 424.74
June	7	0.007	35	0.035	-0.028	1 197.46	-4.36	-4 358.75
July	3	0.003	35	0.035	-0.032	1 197.46	-4.98	-4 981.43
August	6	0.006	35	0.035	-0.029	1 197.46	-4.51	-4 514.42
September	22	0.022	35	0.035	-0.013	1 197.46	-2.02	-2 023.71
October	71	0.071	35	0.035	0.036	1 197.46	5.60	5 604.11
November	98	0.098	35	0.035	0.063	1 197.46	9.81	9 807.20
December	110	0.11	35	0.035	0.075	1 197.46	11.68	11 675.24
Average rainfall per year	674					**Total**	**39.54**	
per week	12.96	0.013	35	0.035	-0.022	1 197.46	-13.20	-13 195.09

Water Budget Calculations	
CATCHMENT 1 – water harvested by storage dam	
	Harvestable water / month (m^3)
January	1 494.73
February	591.97
March	695.57
April	236.79
May	-
June	-
July	-
August	-
September	-
October	532.78
November	932.36
December	1 109.95
	5 594.14

Table 12: Water budget for Catchment 1 (Author, 2012)

IRRIGATION REQUIREMENTS / DEMAND

AGRICULTURE

Irrigation requirements for Demonstration gardens

	(m/month)	area (m^2)	irrigation/month (m^3)		irrigation/year (m^3)
Demonstration gardens	0.16	515	49.44		593.28
	(40mm/week)	**Total irrigation/year**			**593.28**
			54.38	(10% added)	682.27

Irrigation requirements for Proposed Community-based Agriculture

	(m/month)	area (m^2)	irrigation/month (m^3)		irrigation/year (m^3)
Earth mound Agriculture	0.16	1 145	109.92		1 319.04
	(40mm/week)	**Total irrigation/year**			**1 319.04**
			120.91	(10% added)	1 516.90

Irrigation requirements for Proposed Agriculture

	(m/month)	area (m^2)	irrigation/month (m^3)		irrigation/year (m^3)
Agriculture	0.16	2 345	225.12		2 701.44
	(40mm/week)	**Total irrigation/year**			**2 701.44**
			247.63	(10% added)	3 106.66

Irrigation requirements for Roof vegetable garden

	(m/month)	area (m^2)	irrigation/month (m^3)		irrigation/year (m^3)
Agriculture	0.16	575	55.20		662.40
	(40mm/week)	**Total irrigation/year**			**662.40**
			60.72	(10% added)	761.76

Table 13: Irrigation requirements for Demonstration gardens and agriculture (Author, 2012)

WASTE MANAGEMENT

Irrigation requirements for Composting area

	(m/month)	area (m^2)	irrigation/month (m^3)	irrigation/year (m^3)
Composting area	0.28	1 050	176.40	2 116.80
	(70mm/week)	**Total irrigation/year**		**2 116.80**
			194.04 (10% added)	2 434.32

Irrigation requirements for Worm bins

	(m/month)	area (m^2)	irrigation/month (m^3)	irrigation/year (m^3)
Worm bins	0.75	12	5.40	64.80
	(180mm/week)	**Total irrigation/year**		**64.80**
			5.94 (10% added)	74.52

Irrigation requirements for Waste wash-up area

	(m/month)	area (m^2)	irrigation/month (m^3)	irrigation/year (m^3)
Waste wash-up	1.12	24	16.13	193.54
	(40mm/day)	**Total irrigation/year**		**193.54**
	(280mm/week)		17.74 (10% added)	222.57

RECREATION

Irrigation requirements for Recreation area

	(m/month)	area (m^2)	irrigation/month (m^3)	irrigation/year (m^3)
Recreation area	0.16	5 303	509.09	6 109.06
	(40mm/week)	**Total irrigation/year**		**6 109.06**
			560.00 (10% added)	7 025.41

Irrigation requirements for Soccer field

	(m/month)	area (m^2)	irrigation/month (m^3)	irrigation/year (m^3)
Recreation area	0.16	2 690	258.24	3 098.88
	(40mm/week)	**Total irrigation/year**		**3 098.88**
			284.06 (10% added)	3 563.71

Table 14: Irrigation requirements for Composting and Recreation area (Author, 2012)

RESOURCE / SUPPLY			
Stormwater calculations of Catchment area 2 (7602 m²)			
Stormwater calculations of Demonstration gardens			
	Areas (m²)	**Harvestable water/ month**	
	Cultivated (A= 0.3)	Runoff (m³)	Runoff (ℓ)
January	515.00	15.60	15 604.50
February	515.00	6.18	6 180.00
March	515.00	7.26	7 261.50
April	515.00	2.47	2 472.00
May	515.00	-3.40	-3 399.00
June	515.00	-4.33	-4 326.00
July	515.00	-4.94	-4 944.00
August	515.00	-4.48	-4 480.50
September	515.00	-2.01	-2 008.50
October	515.00	5.56	5 562.00
November	515.00	9.73	9 733.50
December	515.00	11.59	11 587.50
		39.24	**39 243.00**

Stormwater calculations of Proposed Community-base Agriculture			
	Areas (m²)	**Harvestable water/ month**	
	Cultivated (A= 0.3)	Runoff (m³)	Runoff (ℓ)
January	1 145.00	34.69	34 693.50
February	1 145.00	13.74	13 740.00
March	1 145.00	16.14	16 144.50
April	1 145.00	5.50	5 496.00
May	1 145.00	-7.56	-7 557.00
June	1 145.00	-9.62	-9 618.00
July	1 145.00	-10.99	-10 992.00
August	1 145.00	-9.96	-9 961.50
September	1 145.00	-4.47	-4 465.50
October	1 145.00	12.37	12 366.00
November	1 145.00	21.64	21 640.50
December	1 145.00	25.76	25 762.50
		87.25	**87 249.00**

Table 15: Storm water calculations for catchment 2 (Author, 2012)

Stormwater calculations of Wetland 2			
	Areas (m^2)	Harvestable water/ month	
	Cultivated (A= 0.3)	Runoff (m^3)	Runoff (ℓ)
January	680.00	20.60	20 604.00
February	680.00	8.16	8 160.00
March	680.00	9.59	9 588.00
April	680.00	3.26	3 264.00
May	680.00	-4.49	-4 488.00
June	680.00	-5.71	-5 712.00
July	680.00	-6.53	-6 528.00
August	680.00	-5.92	-5 916.00
September	680.00	-2.65	-2 652.00
October	680.00	7.34	7 344.00
November	680.00	12.85	12 852.00
December	680.00	15.30	15 300.00
		51.82	**51 816.00**

Stormwater calculations of Paving			
	Areas (m^2)	Harvestable water/ month	
	Paving (A= 0.8)	Runoff (m^3)	Runoff (ℓ)
January	-2 340.00	-189.07	-189 072.00
February	-2 340.00	-74.88	-74 880.00
March	-2 340.00	-87.98	-87 984.00
April	-2 340.00	-29.95	-29 952.00
May	-2 340.00	41.18	41 184.00
June	-2 340.00	52.42	52 416.00
July	-2 340.00	59.90	59 904.00
August	-2 340.00	54.29	54 288.00
September	-2 340.00	24.34	24 336.00
October	-2 340.00	-67.39	-67 392.00
November	-2 340.00	-117.94	-117 936.00
December	-2 340.00	-140.40	-140 400.00
		-475.49	**-475 488.00**

Water Budget Calculations	
CATCHMENT 2 - water harvested by wetland 2	
	Harvestable water / month (m^3)
January	496.07
February	196.46
March	230.85
April	78.59
May	-
June	-
July	-
August	-
September	-
October	176.82
November	309.43
December	368.37
	1 856.58

Table 16: Water budget for catchment 2 (Author, 2012)

Stormwater calculations of Catchment area 3

Stormwater calculations of Proposed Agriculture

	Areas (m^2)	Harvestable water/ month	
	Cultivated (A= 0.3)	Runoff (m^3)	Runoff (ℓ)
January	2 345.00	71.05	71 053.50
February	2 345.00	28.14	28 140.00
March	2 345.00	33.06	33 064.50
April	2 345.00	11.26	11 256.00
May	2 345.00	-15.48	-15 477.00
June	2 345.00	-19.70	-19 698.00
July	2 345.00	-22.51	-22 512.00
August	2 345.00	-20.40	-20 401.50
September	2 345.00	-9.15	-9 145.50
October	2 345.00	25.33	25 326.00
November	2 345.00	44.32	44 320.50
December	2 345.00	52.76	52 762.50
		178.69	**178 689.00**

Stormwater calculations of Composting area

	Areas (m^2)	Harvestable water/ month	
	Composting/ soil (A= 0.2)	Runoff (m^3)	Runoff (ℓ)
January	1 050.00	21.21	21 210.00
February	1 050.00	8.40	8 400.00
March	1 050.00	9.87	9 870.00
April	1 050.00	3.36	3 360.00
May	1 050.00	-4.62	-4 620.00
June	1 050.00	-5.88	-5 880.00
July	1 050.00	-6.72	-6 720.00
August	1 050.00	-6.09	-6 090.00
September	1 050.00	-2.73	-2 730.00
October	1 050.00	7.56	7 560.00
November	1 050.00	13.23	13 230.00
December	1 050.00	15.75	15 750.00
		53.34	**53 340.00**

Stormwater calculations of Wash-Up area

	Areas (m^2)	Harvestable water/ month	
	Paving (A= 0.8)	Runoff (m^3)	Runoff (ℓ)
January	24.00	1.94	1 939.20
February	24.00	0.77	768.00
March	24.00	0.90	902.40
April	24.00	0.31	307.20
May	24.00	-0.42	-422.40
June	24.00	-0.54	-537.60
July	24.00	-0.61	-614.40
August	24.00	-0.56	-556.80
September	24.00	-0.25	-249.60
October	24.00	0.69	691.20
November	24.00	1.21	1 209.60
December	24.00	1.44	1 440.00
		4.88	**4 876.80**

Stormwater calculations of Lawn areas

	Areas (m^2)	Harvestable water/ month	
	Lawn (A= 0.2)	Runoff (m^3)	Runoff (ℓ)
January	450.00	9.09	9 090.00
February	450.00	3.60	3 600.00
March	450.00	4.23	4 230.00
April	450.00	1.44	1 440.00
May	450.00	-1.98	-1 980.00
June	450.00	-2.52	-2 520.00
July	450.00	-2.88	-2 880.00
August	450.00	-2.61	-2 610.00
September	450.00	-1.17	-1 170.00
October	450.00	3.24	3 240.00
November	450.00	5.67	5 670.00
December	450.00	6.75	6 750.00
		22.86	**22 860.00**

Table 17: Storm water calculations for catchment 3 (Author, 2012)

Stormwater calculations of Wetland 1			
	Areas (m^2)	Harvestable water/ month	
	Cultivated (A= 0.3)	Runoff (m^3)	Runoff (ℓ)
January	1 230.00	37.27	37 269.00
February	1 230.00	14.76	14 760.00
March	1 230.00	17.34	17 343.00
April	1 230.00	5.90	5 904.00
May	1 230.00	-8.12	-8 118.00
June	1 230.00	-10.33	-10 332.00
July	1 230.00	-11.81	-11 808.00
August	1 230.00	-10.70	-10 701.00
September	1 230.00	-4.80	-4 797.00
October	1 230.00	13.28	13 284.00
November	1 230.00	23.25	23 247.00
December	1 230.00	27.68	27 675.00
		93.73	**93 726.00**

Stormwater calculations of Paving - Pathways			
	Areas (m^2)	Harvestable water/ month	
	Paving (A= 0.8)	Runoff (m^3)	Runoff (ℓ)
January	1 540.00	124.43	124 432.00
February	1 540.00	49.28	49 280.00
March	1 540.00	57.90	57 904.00
April	1 540.00	19.71	19 712.00
May	1 540.00	-27.10	-27 104.00
June	1 540.00	-34.50	-34 496.00
July	1 540.00	-39.42	-39 424.00
August	1 540.00	-35.73	-35 728.00
September	1 540.00	-16.02	-16 016.00
October	1 540.00	44.35	44 352.00
November	1 540.00	77.62	77 616.00
December	1 540.00	92.40	92 400.00
		312.93	**312 928.00**

Stormwater calculations of Paving			
	Areas (m^2)	Harvestable water/ month	
	Paving (A= 0.8)	Runoff (m^3)	Runoff (ℓ)
January	-4 684.00	-378.47	-378 467.20
February	-4 684.00	-149.89	-149 888.00
March	-4 684.00	-176.12	-176 118.40
April	-4 684.00	-59.96	-59 955.20
May	-4 684.00	82.44	82 438.40
June	-4 684.00	104.92	104 921.60
July	-4 684.00	119.91	119 910.40
August	-4 684.00	108.67	108 668.80
September	-4 684.00	48.71	48 713.60
October	-4 684.00	-134.90	-134 899.20
November	-4 684.00	-236.07	-236 073.60
December	-4 684.00	-281.04	-281 040.00
		-951.79	**-951 788.80**

Water Budget Calculations	
CATCHMENT 3 - water harvested by wetland 1	
	Harvestable water / month (m^3)
January	778.15
February	308.18
March	362.11
April	123.27
May	-
June	-
July	-
August	-
September	-
October	277.36
November	485.38
December	577.84
	2 912.30

Table 18: Water budget for catchment 3 (Author, 2012)

Stormwater calculations of Catchment area 4 (8665 m²)			
Stormwater calculations of Recreation			
	Areas (m²)	Harvestable water/ month	
	Lawn (A= 0.2)	Runoff (m³)	Runoff (ℓ)
January	5 303.00	107.12	107 120.60
February	5 303.00	42.42	42 424.00
March	5 303.00	49.85	49 848.20
April	5 303.00	16.97	16 969.60
May	5 303.00	-23.33	-23 333.20
June	5 303.00	-29.70	-29 696.80
July	5 303.00	-33.94	-33 939.20
August	5 303.00	-30.76	-30 757.40
September	5 303.00	-13.79	-13 787.80
October	5 303.00	38.18	38 181.60
November	5 303.00	66.82	66 817.80
December	5 303.00	79.55	79 545.00
		269.39	**269 392.40**

Stormwater calculations of Paving			
	Areas (m²)	Harvestable water/ month	
	Paving (A= 0.8)	Runoff (m³)	Runoff (ℓ)
January	-7 993.00	-645.83	-645 834.40
February	-7 993.00	-255.78	-255 776.00
March	-7 993.00	-300.54	-300 536.80
April	-7 993.00	-102.31	-102 310.40
May	-7 993.00	140.68	140 676.80
June	-7 993.00	179.04	179 043.20
July	-7 993.00	204.62	204 620.80
August	-7 993.00	185.44	185 437.60
September	-7 993.00	83.13	83 127.20
October	-7 993.00	-230.20	-230 198.40
November	-7 993.00	-402.85	-402 847.20
December	-7 993.00	-479.58	-479 580.00
		-1 624.18	**-1 624 177.60**

Stormwater calculations of Soccerfield			
	Areas (m²)	Harvestable water/ month	
	Lawn (A= 0.2)	Runoff (m³)	Runoff (ℓ)
January	2 690.00	54.34	54 338.00
February	2 690.00	21.52	21 520.00
March	2 690.00	25.29	25 286.00
April	2 690.00	8.61	8 608.00
May	2 690.00	-11.84	-11 836.00
June	2 690.00	-15.06	-15 064.00
July	2 690.00	-17.22	-17 216.00
August	2 690.00	-15.60	-15 602.00
September	2 690.00	-6.99	-6 994.00
October	2 690.00	19.37	19 368.00
November	2 690.00	33.89	33 894.00
December	2 690.00	40.35	40 350.00
		136.65	**136 652.00**

Table 19: Storm water calculations for catchment 4 (Author, 2012)

Water Budget Calculations	
CATCHMENT 4 - water harvested by soccer field	
	Harvestable water / month (m³)
January	215.76
February	85.45
March	100.40
April	34.18
May	-
June	-
July	-
August	-
September	-
October	76.90
November	134.58
December	160.22
	807.48

Table 20: Water budget for catchment 4 (Author, 2012)

Stormwater calculations of Catchment area 5 - Water going directly back to storage dam

Stormwater calculations of Paving - Market area

	Areas (m^2)	Harvestable water/ month	
	Paving (A= 0.8)	Runoff (m^3)	Runoff (ℓ)
January	6 575.00	531.26	531 260.00
February	6 575.00	210.40	210 400.00
March	6 575.00	247.22	247 220.00
April	6 575.00	84.16	84 160.00
May	6 575.00	-115.72	-115 720.00
June	6 575.00	-147.28	-147 280.00
July	6 575.00	-168.32	-168 320.00
August	6 575.00	-152.54	-152 540.00
September	6 575.00	-68.38	-68 380.00
October	6 575.00	189.36	189 360.00
November	6 575.00	331.38	331 380.00
December	6 575.00	394.50	394 500.00
		1 336.04	**1 336 040.00**

Stormwater calculations of Paving (workshops & infront of buildings)

	Areas (m^2)	Harvestable water/ month	
	Paving (A= 0.8)	Runoff (m^3)	Runoff (ℓ)
January	4 000.00	323.20	323 200.00
February	4 000.00	128.00	128 000.00
March	4 000.00	150.40	150 400.00
April	4 000.00	51.20	51 200.00
May	4 000.00	-70.40	-70 400.00
June	4 000.00	-89.60	-89 600.00
July	4 000.00	-102.40	-102 400.00
August	4 000.00	-92.80	-92 800.00
September	4 000.00	-41.60	-41 600.00
October	4 000.00	115.20	115 200.00
November	4 000.00	201.60	201 600.00
December	4 000.00	240.00	240 000.00
		812.80	**812 800.00**

Stormwater calculations of Roofs - Entrance Building (planted)

	Areas (m^2)	Harvestable water/ month	
	Cultivated (A= 0.3)	Runoff (m^3)	Runoff (ℓ)
January	615.00	18.63	18 634.50
February	615.00	7.38	7 380.00
March	615.00	8.67	8 671.50
April	615.00	2.95	2 952.00
May	615.00	-4.06	-4 059.00
June	615.00	-5.17	-5 166.00
July	615.00	-5.90	-5 904.00
August	615.00	-5.35	-5 350.50
September	615.00	-2.40	-2 398.50
October	615.00	6.64	6 642.00
November	615.00	11.62	11 623.50
December	615.00	13.84	13 837.50
		46.86	**46 863.00**

Stormwater calculations of All Roofs

	Areas (m^2)	Harvestable water/ month	
	Roofs (A= 0.9)	Runoff (m^3)	Runoff (ℓ)
January	2 360.00	214.52	214 524.00
February	2 360.00	84.96	84 960.00
March	2 360.00	99.83	99 828.00
April	2 360.00	33.98	33 984.00
May	2 360.00	-46.73	-46 728.00
June	2 360.00	-59.47	-59 472.00
July	2 360.00	-67.97	-67 968.00
August	2 360.00	-61.60	-61 596.00
September	2 360.00	-27.61	-27 612.00
October	2 360.00	76.46	76 464.00
November	2 360.00	133.81	133 812.00
December	2 360.00	159.30	159 300.00
		539.50	**539 496.00**

Table 21: Storm water calculations for catchment 5 (Author, 2012)

Stormwater calculations of Roofs - North Building			
	Areas (m^2)	Harvestable water/ month	
	Roofs (A= 0.9)	Runoff (m^3)	Runoff (ℓ)
January	1 380.00	125.44	125 442.00
February	1 380.00	49.68	49 680.00
March	1 380.00	58.37	58 374.00
April	1 380.00	19.87	19 872.00
May	1 380.00	-27.32	-27 324.00
June	1 380.00	-34.78	-34 776.00
July	1 380.00	-39.74	-39 744.00
August	1 380.00	-36.02	-36 018.00
September	1 380.00	-16.15	-16 146.00
October	1 380.00	44.71	44 712.00
November	1 380.00	78.25	78 246.00
December	1 380.00	93.15	93 150.00
		315.47	**315 468.00**
		26.29	26 289.00

	Total capacity (ℓ)
∴ Jojo storage tank	27 000

Stormwater calculations of Roofs - South Building			
	Areas (m^2)	Harvestable water/ month	
	Roofs (A= 0.9)	Runoff (m^3)	Runoff (ℓ)
January	980.00	89.08	89 082.00
February	980.00	35.28	35 280.00
March	980.00	41.45	41 454.00
April	980.00	14.11	14 112.00
May	980.00	-19.40	-19 404.00
June	980.00	-24.70	-24 696.00
July	980.00	-28.22	-28 224.00
August	980.00	-25.58	-25 578.00
September	980.00	-11.47	-11 466.00
October	980.00	31.75	31 752.00
November	980.00	55.57	55 566.00
December	980.00	66.15	66 150.00
		224.03	**224 028.00**
		18.67	18 669.00

	Total capacity (ℓ)
∴ Jojo storage tank	18 000

GREYWATER

Greywater calculations

Greywater per family of 6 190 000 - 250 000 ℓ per year

	Occupants	(ℓ) Per day	(ℓ) per Month	(m^3) per month	(ℓ) per year	(m^3) per year
Greywater	1	136.38	4 227.78	4.23	49 778.70	49.78
North building	16	2 182.08	67 644.48	67.64	796 459.20	796.46
South building	22	3 000.36	93 011.16	93.01	1 095 131.40	1 095.13
Entrance building	8	1 091.04	33 822.24	33.82	398 229.60	398.23
Total		**6 409.86**	**198 705.66**		**2 339 598.90**	

	ℓ	m^3
Average Greywater for site/year	2 339 598.90	2 339.60
per month	198 705.66	198.71

Source: RSG Radio Interview - http://www.youtube.com/watch?v=UZcXm3gE1aQ&feature=player_detailpage

Table 22: Greywater calculations (Author, 2012)

Construction of Berea Park ~Organic Waste Recycling Park~			
THE SUSTAINABLE SITES INITIATIVE RATING SYSTEM 2009			
SECTION		POSSIBLE POINTS	RECEIVED POINTS
1. Site Selection	21 possible points		15
Select locations to preserve existing resources and repair damaged systems			
Prerequisite 1.1: Limit development of soils designated as prime farmland, unique farmland, and farmland of statewide importance **Prerequisite 1.2:** Protect floodplain functions **Prerequisite 1.3:** Preserve wetlands **Prerequisite 1.4**: Preserve threatened or endangered species and their habitats 24			
Credit 1.5: Select brownfields or greyfields for redevelopment		5 - 10	5
Credit 1.6: Select sites within existing communities		6	6
Credit 1.7: Select sites that encourage non-motorized transportation and use of public transit		5	4
2. Pre-Design Assessment and Planning	4 possible points		4
Plan for sustainability from the onset of the project			
Prerequisite 2.1: Conduct a pre-design site assessment and explore opportunities for site sustainability **Prerequisite 2.2:** Use an integrated site development process			
Credit 2.3: Engage users and other stakeholders in site design		4	4
3. Site Design - Water	44 possible points		29

Table 23: The Sustainable Sites Initiative rating for Berea Park (Author, 2012)

Protect and restore processes and systems associated with a site's hydrology		
Prerequisite 3.1: Reduce potable water use for landscape irrigation by 50 percent from established baseline		
Credit 3.2: Reduce potable water use for landscape irrigation by 75 percent or more from established baseline	2 - 5	3
Credit 3.3: Protect and restore riparian, wetland, and shoreline buffers	3 - 8	3
Credit 3.4: Rehabilitate lost streams, wetlands, and shorelines	2 - 5	2
Credit 3.5: Manage stormwater on site	5 - 10	8
Credit 3.6: Protect and enhance on-site water resources and receiving water quality	3 - 9	8
Credit 3.7: Design rainwater/stormwater features to provide a landscape amenity	1 - 3	3
Credit 3.8: Maintain water features to conserve water and other resources	1 - 4	2

4. Site Design - Soil and Vegetation	51 possible points		33
Protect and restore processes and systems associated with a site's soil and vegetation			
Prerequisite 4.1: Control and manage known invasive plants found on site **Prerequisite 4.2:** Use appropriate, non-invasive plants **Prerequisite 4.3:** Create a soil management plan			
Credit 4.4: Minimize soil disturbance in design and construction		6	3
Credit 4.5: Preserve all vegetation designated as special status		5	5
Credit 4.6: Preserve or restore appropriate plant biomass on site		3 - 8	5
Credit 4.7: Use native plants		1 - 4	4
Credit 4.8: Preserve plant communities native to the ecoregion		2 - 6	5

Credit 4.9: Restore plant communities native to the ecoregion	1 - 5	1
Credit 4.10: Use vegetation to minimize building heating requirements	2 - 4	2
Credit 4.11: Use vegetation to minimize building cooling requirements	2 - 5	2
Credit 4.12: Reduce urban heat island effects	3 - 5	3
Credit 4.13: Reduce the risk of catastrophic wildfire	3	3

5. Site Design - Materials Selection	36 possible points		28
Reuse/recycle existing materials and support sustainable production practices			
Prerequisite 5.1: Eliminate the use of wood from threatened tree species			
Credit 5.2: Maintain on-site structures, hardscape, and landscape amenities		1 - 4	1
Credit 5.3: Design for deconstruction and disassembly		1 - 3	1
Credit 5.4: Reuse salvaged materials and plants		2 - 4	2
Credit 5.5: Use recycled content materials		2 - 4	4
Credit 5.6: Use certified wood		1 - 4	3
Credit 5.7: Use regional materials		2 - 6	6
Credit 5.8: Use adhesives, sealants, paints, and coatings with reduced VOC emissions		2	2
Credit 5.9: Support sustainable practices in plant production		3	3
Credit 5.10: Support sustainable practices in materials manufacturing		3 - 6	6

6. Site Design - Human Health & Well-Being	32 possible points		29
Build strong communities and a sense of stewardship			
Credit 6.1: Promote equitable site development		1 - 3	3
Credit 6.2: Promote equitable site use		1 - 4	3
Credit 6.3: Promote sustainability awareness and education		2 - 4	4
Credit 6.4: Protect and maintain unique cultural and historical places		2 - 4	2
Credit 6.5: Provide for optimum site accessibility, safety, and wayfinding		3	3

Credit 6.6: Provide opportunities for outdoor physical activity	4 - 5	5
Credit 6.7: Provide views of vegetation and quiet outdoor spaces for mental restoration	3 - 4	4
Credit 6.8: Provide outdoor spaces for social interaction	3	3
Credit 6.9: Reduce light pollution	2	2

7. Construction	21 possible points		19
Minimize effects of construction-related activities			
Prerequisite 7.1: Control and retain construction pollutants **Prerequisite 7.2:** Restore soils disturbed during construction			
Credit 7.3: Restore soils disturbed by previous development		2 - 8	6
Credit 7.4: Divert construction and demolition materials from disposal		3 - 5	5
Credit 7.5: Reuse or recycle vegetation, rocks, and soil generated during construction		3 - 5	5
Credit 7.6: Minimize generation of greenhouse gas emissions and exposure to localized air pollutants during construction		1 - 3	3

8. Operations and Maintenance	23 possible points		16
Maintain the site for long-term sustainability			
Prerequisite 8.1: Plan for sustainable site maintenance **Prerequisite 8.2:** Provide for storage and collection of recyclables			
Credit 8.3: Recycle organic matter generated during site operations and maintenance		2 - 6	6
Credit 8.4: Reduce outdoor energy consumption for all landscape and exterior operations		1 - 4	1
Credit 8.5: Use renewable sources for landscape electricity needs		2 - 3	2
Credit 8.6: Minimize exposure to environmental tobacco smoke		1 - 2	2
Credit 8.7: Minimize generation of greenhouse gases and exposure to localized air pollutants during landscape maintenance activities		1 - 4	3
Credit 8.8: Reduce emissions and promote the use of fuel-efficient vehicles		4	2

9. Monitoring and Innovation	18 possible points		13
Reward exceptional performance and improve the body of knowledge on long-term sustainability			
Credit 9.1: Monitor performance of sustainable design practices		10	8
Credit 9.2: Innovation in site design		8	5

Total	**Possible points**	**250**	186

2009 Rating System:	**250 Points Total**
One Star:	100 points (40% of total points)
Two Stars:	125 points (50% of total points)
Three Stars:	150 points (60% of total points)
Four Stars:	200 points (80% of total points)

Rating	3 Stars

Fig. 196 - 198: Presentation Photos (Boshoff, 2013)

Fig. 199 - 201: Photos of Model (Author, 2013)