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APPENDIX I: SITES V2 RATING SYSTEM

The SITES V2 RATING SYSTEM is the latest rating system designed in 2014 for landscapes. The rating system employs the concept of ecosystem services and to ensure healthy ecosystems and human well-being. This rating system will be used to rate the proposal in the end, to make sure that the project is addressing all the necessary services and ultimately being a resilient landscape.

The SITES program’s central message is that any project—whether the site of a university campus, large subdivision, shopping mall, park, commercial center, or even a home—holds the potential to protect, improve, and regenerate the benefits and services provided by healthy ecosystems.

The Sustainable Sites Initiative sets out goals and guiding principles for a resilient landscape.

SITES GOALS:

Create Regenerative Systems and Foster Resiliency

- Protect and restore natural resources such as soil, water, and vegetation.
- Encourage biodiversity.
- Enhance landscapes to provide multiple ecosystem services such as cleaning air and water, providing habitat, and storing carbon.
- Mitigate for evolving hazards and natural disasters.
- Plan for monitoring and adaptive management.

Ensure Future Resource Supply and Mitigate Climate Change

- Minimize energy consumption and encourage use of low carbon and renewable energy sources.
- Minimize or eliminate greenhouse gas emissions, heavy metals, chemicals, and other pollutants.
- Reduce, reuse, recycle, and upcycle materials and resources.
- Conserve water.
- Increase the capacity of carbon sinks through re-vegetation.

Transform the Market through Design, Development, and Maintenance Practices

- Foster leadership in industry and professional practice.
- Use a systems-thinking, integrative and collaborative design approach.
- Use lifecycle analyses to inform the design process.
- Support local economies and sustainability policies.

Enhance Human Well-Being and Strengthen Community

- Reconnect humans to nature.
- Improve human health (physical, mental, and spiritual).
- Foster stewardship by providing education that promotes the understanding of natural systems, and recognizes the value of landscapes.
- Encourage cultural integrity and promote regional identity.
- Provide opportunities for community involvement and advocacy.

ECOSYSTEM SERVICES

Researchers have developed various lists of ecosystem benefits and services. The Sustainable Sites Initiative has consolidated the research into the following list of ecosystem services that a sustainable site can protect or regenerate through sustainable land development and management practices.

These services have been purposefully incorporated into the landscape design proposal, detail of which is discussed and shown in Chapters 6 - 8.

1. Global climate regulation

- *Maintaining balance of atmospheric gases at historic levels*
- *Maintaining healthy air quality*
- *Sequestering carbon*

2. Local climate regulation

- *Regulating local temperature, precipitation, and humidity through shading, evapotranspiration, and windbreaks*

3. Air & water cleansing

Removing and reducing pollutants in air and water
Water supply retention

4. Water supply & retention

Storing and conserving water within watersheds and aquifers

5. Erosion & sediment control

- *Retaining soil within an ecosystem*
- *Preventing damage from erosion and siltation*

4. Hazard mitigation

Reducing vulnerability to damage from flooding, storm surge, wildfire, and drought

5. Pollination

Providing for the reproduction of crops and other plants

6. Habitat functions

Providing refuge and reproduction habitat to plants and animals, contributing to the conservation of biological and genetic diversity and evolutionary processes

7. Waste decomposition and treatment

- *Breaking down waste*
- *Cycling nutrients*

8. Human health & well-being

Enhancing physical, mental, and social well-being as a result of interaction with nature

9. Food & renewable non-food products

Producing food, fuel, energy, medicine, or other products for human use

10. Cultural benefits

Enhancing cultural, educational, aesthetic, and spiritual experiences as a result of interaction with nature

SITES v2 Scorecard									
Estimate points below (they at bottom)		PRE-REQUISITE OR CREDIT #	TITLE	CASE / OPTION / THRESHOLD	POINTS	POSSIBLE POINTS PER CREDIT			
YES	?	NO				Possible Points:			
13	0	0	1: SITE CONTEXT			Possible Points:		13	
Y			CONTEXT P1.1	Limit development on farmland	Case 1: Sites without farmland soils Case 2: Sites with farmland soils - VSPZ Case 3: Sites with farmland soils - Mitigation				
Y			CONTEXT P1.2	Protect floodplain functions	Case 1: Sites without floodplain Case 2: Previously developed and brownfield sites within floodplain Case 3: Greenfield sites within floodplain				
Y			CONTEXT P1.3	Conserve aquatic ecosystems	Case 1: Sites without aquatic ecosystems Case 2: Sites with naturally occurring aquatic ecosystems Case 3: Sites with naturally occurring poor quality aquatic ecosystems				
Y			CONTEXT P1.4	Conserve habitats for threatened and endangered species	Case 1: Brownfields and previously developed sites Case 2: Greenfield sites				
6			CONTEXT C1.5	Redevelop degraded sites	Case 1: Previously developed sites Case 2: Brownfield sites	6		3 to 6	
4			CONTEXT C1.6	Locate projects within existing developed areas		4		4	
3			CONTEXT C1.7	Connect to multi-modal transit networks	Option 1: Pedestrian and bicycle network Option 2: Transit network	3		2 to 3	
3	0	0	2: PRE-DESIGN ASSESSMENT + PLANNING			Possible Points:		3	
Y			PRE-DESIGN P2.1	Use an integrative design process					
Y			PRE-DESIGN P2.2	Conduct a pre-design site assessment					
Y			PRE-DESIGN P2.3	Designate and communicate Vegetation and Soil Protection Zones					
3			PRE-DESIGN C2.4	Engage users and stakeholders		3		3	
14	0	0	3: SITE DESIGN - WATER			Possible Points:		23	
Y			WATER P3.1	Manage precipitation on site					
Y			WATER P3.2	Reduce water use for landscape irrigation					
4			WATER C3.3	Manage precipitation beyond baseline	80th percentile precipitation event 90th percentile precipitation event 95th percentile precipitation event	4 5 6		4 to 6	
0			WATER C3.4	Reduce outdoor water use	Option 1: Reduce outdoor water use Option 2: Significantly reduce outdoor water use Option 3: Eliminate outdoor water use	5 5 4		4 to 6	
5			WATER C3.5	Design functional stormwater features as amenities	50% of stormwater features 100% of stormwater features	5 5		4 to 5	
5			WATER C3.6	Restore aquatic ecosystems (project must have existing feature)	No aquatic ecosystems present on site 30% of the geographic extent 60% of the geographic extent 90% of the geographic extent	4 4 4 4		4 to 6	
32	0	0	4: SITE DESIGN - SOIL + VEGETATION			Possible Points:		40	
Y			SOIL+VEG P4.1	Create and communicate a soil management plan					
Y			SOIL+VEG P4.2	Control and manage invasive plants	Case 1: No invasive plants found on site Case 2: Invasive plants identified on site				
Y			SOIL+VEG P4.3	Use appropriate plants					
5			SOIL+VEG C4.4	Conserve healthy soils and appropriate vegetation (project must have existing feature)	No healthy soils and/or appropriate vegetation present on site 50% of the site's existing vegetated area 75% of the site's existing vegetated area 95% of the site's existing vegetated area	4 5 6 6		4 to 6	
4			SOIL+VEG C4.5	Conserve special status vegetation (project must have existing feature)		4		4	
6			SOIL+VEG C4.6	Conserve and use native plants	20% total native plant score 40% total native plant score 60% total native plant score	6 6 6		3 to 6	
6			SOIL+VEG C4.7	Conserve and restore native plant communities	20% total native plant community score 40% total native plant community score 60% total native plant community score	6 6 6		4 to 6	
5			SOIL+VEG C4.8	Optimize biomass	minimal point score low point score mid point score high point score	1 3 5 6		1 to 6	
4			SOIL+VEG C4.9	Reduce urban heat island effects		4		4	
2			SOIL+VEG C4.10	Use vegetation to minimize building energy use (project must have building on site)	No buildings present on site Option 1: Reduce energy use - 5% reduction Option 1: Reduce energy use - 7% reduction Option 2: Provide shade structures - 30% shaded Option 2: Provide shade structures - 60% shaded Option 3: Provide a windbreak - one row Option 3: Provide a windbreak - two or more rows	2 4 4 4 3 4		1 to 4	
0			SOIL+VEG C4.11	Reduce the risk of catastrophic wildfire (project must be located in fire-prone area)	Project not in a fire-prone area Project is in a fire-prone area	4 4		4	
27	0	0	5: SITE DESIGN - MATERIALS SELECTION			Possible Points:		41	
Y			MATERIALS P5.1	Eliminate the use of wood from threatened tree species					

				No structures or paving present on site					
3		MATERIALS C5.2	Maintain on-site structures and paving (project must have existing feature)	10% of the total existing built surface area 20% of the total existing built surface area 30% of the total existing built surface area	2 3 4		2 to 4		
3		MATERIALS C5.3	Design for adaptability and disassembly	30% of total materials cost, excluding plants, rocks, and soils 60% of total materials cost, excluding plants, rocks, and soils	2 2		3 to 4		
4		MATERIALS C5.4	Use salvaged materials and plants	10% of total materials cost, excluding soils 20% of total materials cost, excluding soils	2 2		3 to 4		
3		MATERIALS C5.5	Use recycled content materials	20% of total materials cost, excluding plants and soils 40% of total materials cost, excluding plants and soils 30% of total materials cost	2 3 5		3 to 4		
5		MATERIALS C5.6	Use regional materials	40% of total materials cost 90% of total materials cost	5 5		3 to 5		
1		MATERIALS C5.7	Support responsible extraction of raw materials	Option 1: Advocate for sustainable extraction of raw materials Option 2: Support suppliers that disclose environmental data Option 3: Support suppliers that meet extraction standards	1 3 5		1 to 5		
0		MATERIALS C5.8	Support transparency and safer chemistry	Option 1: Advocate for transparency and safer chemistry Option 2: Support manufacturers that disclose chemical data Option 3: Support manufacturers with chemical hazard assessments	1 3 5		1 to 5		
3		MATERIALS C5.9	Support sustainability in materials manufacturing	Option 1: Advocate for sustainable materials manufacturing Option 2: Support manufacturers that disclose data on sustainable practices Option 3: Support manufacturers that achieve sustainable practices	3 4 5		1 to 5		
5		MATERIALS C5.10	Support sustainability in plant production	Option 1: Advocate for sustainable plant production Option 2: Support producers that disclose data on sustainable practices Option 3: Support producers that achieve sustainable practices	3 4 5		1 to 5		

18	0	0	6: SITE DESIGN - HUMAN HEALTH + WELL-BEING		Possible Points:		30		
3			HHWB C6.1	Protect and maintain cultural and historic places (project must have existing feature)	No cultural or historic places present on site Option 1: Historic buildings, structures, or objects Option 2: Historic or cultural landscapes	3 3 3	2 to 3		
0			HHWB C6.2	Provide optimum site accessibility, safety, and wayfinding		2	2		
2			HHWB C6.3	Promote equitable site use		2	2		
2			HHWB C6.4	Support mental restoration		2	2		
2			HHWB C6.5	Support physical activity		2	2		
2			HHWB C6.6	Support social connection		2	2		
3			HHWB C6.7	Provide on-site food production	Option 1: Food production Option 2: Food production and regular distribution	3 4	3 to 4		
0			HHWB C6.8	Reduce light pollution		4	4		
0			HHWB C6.9	Encourage fuel efficient and multi-modal transportation		4	4		
1			HHWB C6.10	Minimize exposure to environmental tobacco smoke	Option 1: Designate smoke-free zones Option 2: Prohibit smoking on site	1 2	1 to 2		
3			HHWB C6.11	Support local economy		3	3		

14	0	0	7: CONSTRUCTION		Possible Points:		17		
Y			CONSTRUCTION P7.1	Communicate and verify sustainable construction practices					
Y			CONSTRUCTION P7.2	Control and retain construction pollutants					
Y			CONSTRUCTION P7.3	Restore soils disturbed during construction					
4			CONSTRUCTION C7.4	Restore soils disturbed by previous development	low point score mid point score high point score	3 4 5	3 to 5		
4			CONSTRUCTION C7.5	Divert construction and demolition materials from disposal	50% of structural materials + 95% of roads / infrastructure materials 75% of structural materials + 95% of roads / infrastructure materials	3 4	3 to 4		
4			CONSTRUCTION C7.6	Divert reusable vegetation, rocks, and soil from disposal	100% of land-clearing materials retained for use within 50 miles 100% of land-clearing materials retained on site	3 4	3 to 4		
2			CONSTRUCTION C7.7	Protect air quality during construction	50% total run-time hours from Tier 2 or higher engines 50% total run-time hours from Tier 3 or higher engines 50% total run-time hours from Tier 4 or higher engines	2 3 4	2 to 4		

11	0	0	8. OPERATIONS + MAINTENANCE		Possible Points:		22		
Y			O+M P8.1	Plan for sustainable site maintenance					
Y			O+M P8.2	Provide for storage and collection of recyclables					
3			O+M C8.3	Recycle organic matter	100% of vegetation trimmings recycled / composted off site within 50 miles 100% of vegetation trimmings recycled / composted on site 100% of vegetation trimmings + food waste recycled / composted on site	3 4 5	3 to 5		
4			O+M C8.4	Minimize pesticide and fertilizer use	Option 1: Plant health care plan Option 2: Best management practices for plant health care	4 5	4 to 5		
2			O+M C8.5	Reduce outdoor energy consumption	30% reduction from baseline energy use for outdoor equipment 60% reduction from baseline energy use for outdoor equipment 90% reduction from baseline energy use for outdoor equipment	2 3 4	2 to 4		
0			O+M C8.6	Use renewable sources for landscape electricity needs	Option 1: On-site - 50% annual outdoor site electricity Option 1: On-site - 100% annual outdoor site electricity Option 2: Green power - 50% annual outdoor site electricity	3 4 3	3 to 4		
2			O+M C8.7	Protect air quality during landscape maintenance	Option 1: Scheduled maintenance Option 2: Low-emitting equipment Option 3: Manual or electric powered maintenance equipment	2 3 4	2 to 4		
4	0	0	9. EDUCATION + PERFORMANCE MONITORING		Possible Points:		11		

APPENDIX II: WATER CALCULATIONS

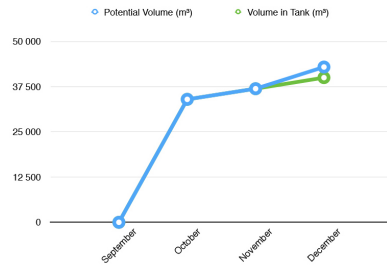
YIELD:

CATCHMENT 1 - RECREATIONAL DAM		Coeffi- cient	Area (m2)	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
RAINFALL (m)				0,136	0,075	0,082	0,051	0,013	0,007	0,003	0,006	0,022	0,071	0,088	0,11	0,664
Surface run-off around the site		0,1	130 500	1 775	979	1 070	666	170	91	39	78	287	927	1 148	1 436	8 665
Paving		0,8	16 946	1 844	1 017	1 112	691	176	95	41	81	298	963	1 193	1 491	9 002
Roofs		0,9	34 587	4 233	2 335	2 553	1 588	405	218	93	187	685	2 210	2 739	3 424	20 669
Hockey Field (artificial lawn)		0,7	9 447	899	496	542	337	86	46	20	40	145	470	582	727	4 391
Open Water Body		1	3 563	485	267	292	182	46	25	11	21	78	253	314	392	2 366
TOTAL				9 236	5 093	5 569	3 463	883	475	204	407	1 494	4 822	5 976	7 470	45 093
CATCHMENT 2 - RETENTION DAM		Coeffi- cient	Area (m2)	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
RAINFALL (m)				0,154	0,075	0,082	0,051	0,013	0,007	0,003	0,006	0,022	0,071	0,098	0,150	
Lawn area		0,1	5 768	89	43	47	29	7	4	2	3	13	41	57	87	422
Paving		0,8	4 380	540	263	287	179	46	25	11	21	77	249	343	506	2 565
Open Water Body		1	2 767	426	208	227	141	36	19	8	17	61	196	271	415	2 025
TOTAL				1 055	514	562	349	89	48	21	41	151	486	671	1 027	5 013
CATCHMENT 3 - STORAGE TANK		Coeffi- cient	Area (m2)	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
RAINFALL (m)				0,154	0,075	0,082	0,051	0,013	0,007	0,003	0,006	0,022	0,071	0,098	0,150	
Lawn - Field A		0,1	11 764	181	88	96	60	15	8	4	7	26	84	115	176	861
Lawn - Fields B & C		0,1	19 096	294	143	157	97	25	13	6	11	42	136	187	286	1 398
Paving		0,8	18 200	2 242	1 092	1 194	743	189	102	44	87	320	1 034	1 427	2 184	10 658
Roof		0,9	8 535	1 183	576	630	392	100	54	23	46	169	545	753	1 152	5 623
Agriculture		0,1	10 531	162	79	86	54	14	7	3	6	23	75	103	158	771
Wetland & Bioswale		1	2 818	434	211	231	144	37	20	8	17	62	200	276	423	2 063
TOTAL				4 497	2 190	2 394	1 489	380	204	88	175	642	2 073	2 861	4 380	21 373
TOTAL YIELD FOR ALL CATCHMENTS				14 787	7 797	8 525	5 302	1 351	728	312	624	2 287	7 381	9 509	12 877	71 479

DEMAND:

	Irrigation Req (mm/ summer month)	Irrigation Req (mm/ winter month)	Area (m2)	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL (m3)
Lawn - Field A	0,14	0,08	11 764	1 647	1 647	1 647	1 647	1 647	941	941	941	1 647	1 647	1 647	1 647	17 646
Lawn - Fields B & C	0,14	0,08	19 096	2 673	2 673	2 673	2 673	2 673	1 528	1 528	1 528	2 673	2 673	2 673	2 673	28 644
Planting	0,02	0,01	1 550	31	31	31	31	31	16	16	16	31	31	31	31	326
Evaporation Rate p/month				0,04	0,35	0,25	0,20	0,15	0,10	0,10	0,20	0,30	0,35	0,35	0,40	
Evaporation			6 330	253	2 216	1 583	1 266	950	833	633	1 266	1 899	2 216	2 216	2 532	17 661
TOTAL (m3/month)				4 605	6 567	5 934	5 617	5 301	3 117	3 117	3 750	6 250	6 567	6 567	6 883	64 276
Urban Agriculture	0,1	0,1	10 531	1 053	1 053	1 053	1 053	1 053	1 053	1 053	1 053	1 053	1 053	1 053	1 053	12 637
Lawn - Recreational	0,08	0,04	5 333	427	427	427	427	427	213	213	213	427	427	427	427	4 480

WATER BUDGET:					
RESERVOIR CAPACITY (m³):	40000				
MIN VOLUME (m³):	34000				
WATER BUDGET: INITIATION PHASE					
MONTH	YIELD (m³/month)	DEMAND (m³/month)	MONTHLY BALANCE	POTENTIAL VOLUME (m³)	VOLUME IN TANK (m³)
September	2287,1	6250,4	-3963,3	0,0	0,0
October	7381,0	6566,9	814,1	34000,0	34000,0
November	9508,7	6566,9	2941,8	36941,8	36941,8
December	12877,2	6883,4	5993,8	42935,6	40000,0
	32053,9	26267,6	5786,3		



WATER BUDGET: YEAR 1					
MONTH	YIELD (m³/month)	DEMAND (m³/month)	MONTHLY BALANCE	POTENTIAL VOLUME (m³)	VOLUME IN TANK (m³)
January	14787,0	4604,6	10182,4	47124,3	40000,0
February	7796,8	6566,9	1229,9	48354,2	40000,0
March	8524,5	5933,9	2590,6	50944,8	40000,0
April	5301,8	5617,4	-315,6	50629,2	39684,4
May	1351,4	5300,9	-3949,5	46679,7	35735,0
June	727,7	3117,3	-2389,6	44290,1	34000,0
July	311,9	3117,3	-2805,4	41484,7	34000,0
August	623,7	3750,3	-3126,6	38358,2	34000,0
September	2287,1	6250,4	-3963,3	34394,8	34000,0
October	7381,0	6566,9	814,1	35208,9	34814,1
November	9508,7	6566,9	2941,8	38150,7	37755,9
December	12877,2	6883,4	5993,8	44144,5	40000,0
	71478,9	64276,2	7202,7		

