DRAFT 4.19.18					
ECO-FUNCTIONING SPACES: Criteria for Design, Operations, Maintenance, and Performance (Site Selection/Construction Practices Also Below)					
DESIGN SPECIFICATIONS/REQUIREMENTS FOR ECO-FUNCTIONING SPACES			EFS Baseline	*EFS Optimized*	Value Enhancer/ Cash Saver
EFS are designed to:					
I. WATER MANAGEMENT PERFORMANCE		DEFINITIONS/NOTES/EXAMPLES			
I.a	Stormwater Capture/Retention/Treatment	Capture all rainfall from a 2" storm (and either infiltrate or reuse water)	*X*		$
		100% retention/infiltration of run-off from full drainage area entering the site, including onsite and offsite (for all 2" storms)		X	$
		Use of captured rain/stormwater is appropriately balanced between release on land for groundwater recharge and (ii) filtered for reuse in building as potable or graywater		X	
I.b	Watering	No water required -- Xeriscaping is used (watering only for establishment or highly unusual drought conditions)	*X*		$
		Eliminate potable water use (only graywater/rharvested water can be used for EFS)	X		$
I.c	Irrigation system	No fixed mechanical or electrical irrigation systems. This item does not include temporary and removable watering systems (Note: this item waived if system required by local law/regulations)		*X*	$
I.d	Restore natural water features (particularly those previously modified or piped by traditional construction practices)	Examples: daylighting buried streams, planting shade trees and deep rooted plants around stream buffers to cool water (where consistent with predevelopment habitat structure); restoring riparian buffers.		*X*	$
II. SOIL + VEGETATION + HABITAT/BIODIVERSITY PERFORMANCE		DEFINITIONS/NOTES/EXAMPLES			
II.a	Invasive Plants and Plant Management	EFS contain no invasive plants (or, if a highly invasive plant enters the site, a management plan is established and approved by UER)	X		
		Invasive plants that can be completely removed, should be removed and monitored to ensure no return. If invasive plants cannot be completely removed, invasive management plan will be developed.	*X*		
		Where management is necessary: Provide IPM strategies and procedure for identifying and monitoring for additional invasive species that may colonize the site, with responsible party identified.	*X*		
II.b	Native Plants	90% of vegetation in EFS are native to the eco-region specified by EPA (see exception for non-native plants under "support food webs")	X		$
		100% of all vegetation in EFS are native to the eco-region specified by EPA		X	$

		Natives are sourced from reputable nurseries with evidence of source of seeds/seedlings		X	
II.c	Healthy, "living" soils	In addition to conserving healthy soils, EFS shall be designed to promote living soils, maximize organic matter (e.g. leaf litter), soil porosity, and living organisms in soils. Note: also related to pesticide prohibition. Soils are also managed to maximize carbon sequestration -- limited/no tilling	*X*		$
II.d	Soil Amendments (mulches)	Generally not used post-establishment	X		$
II.e	Fertilizer/Nutrient Inputs	Not used	X		$
II.f	Replicate or restore native plant communities	DEFINITION: Native plant communities share a common environment that supports regional diversity of flora, provides habitat for native wildlife, and nourishes the physical environment. On sites with existing native plant communities, design site to minimize damage to existing healthy native plant communities.	*X*		$
		Replicate pre-development habitat vertical & horizontal structure and function (or such habitat as adapted to projected climate change)//Mimic pre-development land cover. (predevelopment habitat for the particular location)	*X*		$
		Conserve and restore existing on-site native plant communities and create new native plant communities that support EFS as a living system -- including natural plant community succession stages.		*X*	$
II.g	Support Food Webs/Food Chains/Native Wildlife	90% of plantings must be native (however, up to 30% of these may be non-native if shown to provide habitat to native insect and wildlife). [NOTE: Plant communities should be designed to provide food and shelter for native or migrating animals (including insect populations that are<u>not</u> vectors for infectious diseases, but provide food for birds and other animals)]. Plants of varying heights, logs, herbacious plants and leaf litter, as well as other forms of natural shelter, shall be maximized.	X		
II.h	EFS size in relation to site area	Area (in square feet/acres) of EFS must be at least 20% of site area or at least 10% above any regulatory requirement for open space on site (whichever is larger)	X		
		FOR OPTIMIZED EFS, OVER 80% OF WALKABLE AREAS (I.E. FLAT AND ACCESSIBLE) OF SITE ARE EFS		X	
II.i	On-site composting	Provide facilities for collection and processing of vegetation trimmings and food waste to generate compost and mulch. Sites with limited space for composting can utilize neighborhood facilities and programs to process organic matter.		*X*	$
II.j	Hardscaping within EFS	No more than 10% of the area of an EFS may be hardscaped (regardless of permeability), unless otherwise required by ADA (or as otherwise agreed by UER)	*X*		$
II.k	Plan for deer management (or other localized, known threat to plants/structure)	Possible methods may include use of plant cages or other enclosures to ensure protection for plants subject to deer grazing (until a set level of plant maturity).	X		$
III. AIR FILTRATION PERFORMANCE		**DEFINITIONS/NOTES/EXAMPLES**			

III.a	Optimize carbon sequestration/climate change mitigation	EFS must sequester 48 lbs of CO_2 equivalent per 100 sq ft. of EFS Assume that a mature canopy tree [i.e. 52 cm DBH and stem height of 12m] can absorb 48 lbs of CO_2 per year	X		
		EFS must sequester 48 lbs of CO_2 equivalent per 20 sq ft. of EFS, OR EFS on the site must offset all carbon equivalent emissions produced on-site (or as a result of on-site energy usage). Assume that a mature canopy tree [i.e. 52 cm DBH and stem height of 12m] can absorb 48 lbs of CO_2 per year.		X	
III.b	Optimize GHG uptake	Trees on site must include a mix of tree ages (if existing trees are in same age range, new and younger trees must be added)		X	$
III.c	Removal of airborne contaminants/Particulate matter (ozone/VOC) [UNDER CONSIDERATION]	Select native tree species with broad & waxy leaf types and/or native conifers (with leaves year round) like Eastern Red Cedar. Avoid Poplar and Black Gum in densely urbanized (high impervious cover) areas (due to potential contribution to VOC levels).		X	$
IV. HEAT + ENERGY + LIGHTING		**DEFINITIONS/NOTES/EXAMPLES**			
IV.a	Reduce building energy usage	Building energy use reduced by at least 3% compared to a baseline with no EFS. (Note: deciduous trees planted to maximize summer shading - ideally shading a southern and/or west-facing wall)	*X*		$
IV.b	Prohibit production of light pollution (Source E)	EFS cannot be lighted during night hours in such a way as to allow light to escape the property. Any lighting must be motion-sensored or covered to project lights downward.	*X*		$
IV.c	EFS does not consume grid-sourced energy unless it must perform certain in-building or site-level functions	EFS cannot consume energy unless either (i) powered by self-contained renewable energy systems or (ii) runs off building energy in order to support the function of the building or overall site. For example, if an EFS includes a constructed wetland that cycles water through filtration systems, energy consumption is allowable -- off-grid preferred. (primarily related to water features)	*X*		$
IV.d	Reduce urban heat island effects *EFS allows only plants, planted structures, or green roofs to achieve credit*	Replace some existing hardscape with vegetation or add plantings that shade a material amount of hardscaping within 5 years	*X*		$
		Replace at least 50% of existing hardscape with vegetation or shade 50% of new hardscape and/or building with vegetation		*X*	$
V. HUMAN HEALTH + WELL-BEING + EDUCATION		**DEFINITIONS/NOTES/EXAMPLES**			
V.a	Provide enjoyment and/or education (about ecosystem services)	The functional amenities of EFS are designed to enhance user experience. EFS are managed interfaces between people and nature.	*X*		$
V.b	Pesticides or chemicals	General rule: Do not use. Pesticide use only allowed if necessary (with no other viable alternative) to save integrity of EFS or manage highly invasive alien plants or animals	*X*		$
		No use of pesticides or fertilizers		*X*	$
V.c	Prohibit smoking on site	Smoking is not allowed on any portion of EFS	*X*		
V.d	Support mental restoration and stress reduction	EFS should allow for quiet contemplation by site users and can include benches or other seating that provides respite from work or noise of urban area		*X*	$
V.e	Provide optimum site accessibility, safety, and wayfinding	EFS is welcoming and accessible to people with mobility impairments and people of all ages		*X*	$
V.f	Promote equitable site use	Public access granted at all times or during certain days and times during the week		*X*	
V.g	Support physical activity	Design of EFS permits both passive and active recreation including walking and running paths as well as climbing or hiking opportunities		*X*	$
V.h	Support social connection	Design and programming of EFS promotes site user interactions including social gatherings for residents or tenants		*X*	$

V.i	Provide on-site food production	Food production must support biodiversity and habitat creation		*X*	
V.j	Promote sustainable awareness and education	EFS include educational and interpretive elements		*X*	
VI. DESIGN FOR RESILIENCE, ADAPTATION, AND CHANGE		**DEFINITIONS/NOTES/EXAMPLES**			
VI.a	Design for excess flood surge capacity	Note: Design must use best available data on sea level rise and flood zones (e.g use line for 500-year floodplain)		*X*	$
VI.b	Other Possible Options	Build area to accommodate 50-year storms; use stormwater treatment trains for extreme storms; use of planting plans that use climate-change-adjusted hardiness zones		*X*	$
PERFORMANCE OUTCOMES DURING OPERATIONS & MAINTENANCE (REQUIRED)			**EFS Baseline**	***EFS Optimized***	
VII. OPERATIONAL PERFORMANCE REQUIREMENTS & MONITORING		**DEFINITIONS/NOTES/EXAMPLES**			
VII.a	EFS becomes self-sustaining (NOTE: METRICS UNDER REVIEW)	EFS is designed to become self-sustaining after establishment period or within a period of no more than 3 years. Self-sustaining will be defined as minimal maintenance no more than 2x per year with a cost less than or equal to $1-$5 per square foot. This requirement does not pertain to the maintenance of technology or non-living/man-made products that support green infrastructure features.	*X*		$
VII.b	EFS provides net value to site owner (subjective assessment)//[[OR EFS provides net value to site and surrounding area]]	EFS adds value to the site taking into account all social/economic/environmental factors. [determined in collaboration with UER]	*X*		$
		EFS adds monetizable value to the site through any combination of increased property value, increased rents or access fees, reduced operating and maintenance costs, and reduced taxes.		*X*	$
		EFS adds monetizable value to the surrounding area.		*X*	$
VII.c	EFS performs to all EFS-related design standards//Long-term compliance with all baseline design requirements	All aspects of the EFS that satisfy baseline requirements must continue for agreed-upon term of years. The agreement shall be made with UER.	*X*		$
VII.d	EFS demonstrates innovation or exemplary performance	Innovation beyond the EFS optimized criteria that enhance or support one more more of the following principles: 1. Diverse forms of life live and work together interdependently; 2. Soils are covered and protected from the impacts of excessive wind, sun, and rain; 3. Rainfall is filtered, conserved in soils, and available to the ecosystem when needed; 4. Soil organisms are fed by the cycling and recycling of nutrients; 5. Humus holds fertility reserves within the upper layers of soil; 6. Diversity builds over time, keeping plant insect damage and diseases in check; 7. Plants supply fresh air, above and below ground, as well as cool shade; 8. The subsoil provides inorganic compounds required for living and nonliving processes; 9. Natural systems are dynamic and will change over time		*X*	$
VIII. DOCUMENTS TO UER		**DEFINITIONS/NOTES/EXAMPLES**			

VIII.a	EFS Maintenance Plan	Ensure long term site sustainability by developing a site maintenance plan outlining the project's strategies and required implementation tasks. The maintenance plan will cover each of the EFS Criteria categories including water, soil, vegetation, heat/energy/lighting, human health and well being, and education.	*X*		
VIII.b	Composting Plan	100% of vegetation trimmings recycled / composted off site within 50 miles	*X*		
		100% of vegetation trimmings recycled / composted on site		*X*	
VIII.c	List of machinery for landscape maintenance	Must use low-emitting equipment	*X*		
		Use of manual or electric/solar powered maintenance equipment		*X*	
UER SITE CONTEXT SELECTION CRITERIA*					
*any remaining undisturbed, pre-development ecosystems in good condition are always acceptable as EFS					
SITE CONTEXT (APPLICABLE TO EFS IN NEW CONSTRUCTION OR FOOTPRINT-ALTERING PROJECTS)		**DEFINITIONS/NOTES/EXAMPLES**			
Existing Conditions -- Disfavored					
A	**Development on existing farmland disfavored (agricultural use is *Existing Condition)***	**Any development on farmland must be justified by compelling reasons and must use cluster or conservation development principles**			
B	**Development in floodplain disfavored (floodplain is *Existing Condition)***	**Includes previously developed and brownfield sites within floodplain as well as greenfield site within floodplain -- if all hardscape and building footprint is outside of floodplain but EFS will go in floodplain, then UER will consider it.**			
C	**Development in/over aquatic ecosystems disfavored (aquatic ecosystem is *Existing Condition)***	**Includes sites with naturally occurring aquatic ecosystems regardless of ecosystem quality**			
D	**Development of habitats for threatened and endangered species is disfavored - (sensitive habitat is *Existing Condition)***	**Where listed on U.S. federal or state threatened or endangered lists or on the International Union for Conservation of Nature "Red List of Threatened Species", protect all listed animals and plants from damage or removal.**			
E	**Development on native forested lands is disfavored (where forest is *Existing Condition)***	**Development may be considered if development is less than 30% of forested site area. If forested portion of site is less than 50% of site area, then no development on forested area is permitted.**			
Existing Conditions - Favored					
F	**Proposed EFS expands area (or magnifies environmental impact) of other existing EFS (on or off site)**	**Must connect either to adjacent EFS or to ecologically-interdependent EFS (i.e. related by airflows, waterflows, or migratory species).**			
G	**Proposed EFS can magnify environmental impact of local public investments in green infrastructure**	**Same as I.f except that the subject EFS expands impact of other EFS that are supported by public investments**			
H	**Location has been previously developed (is no longer in pre-development condition) or has been degraded ecologically due to human or invasive species interference**	**If the site includes development of a greenfield, see above for disfavored existing conditions.**			

PREFERRED CONSTRUCTION METHODS		**DEFINITIONS/NOTES/EXAMPLES**	**EFS Baseline**	***EFS Optimized***	
A	Communicate and verify sustainable construction practices			*X*	
B	Control and retain construction pollutants			*X*	
C	Restore soils disturbed during construction			*X*	
D	Divert construction and demolition materials from disposal			*X*	
E	Retain or Divert reusable vegetation, rocks, and soil from disposal			*X*	
F	Protect air quality during construction			*X*	
G	Existing special status vegetation is preserved	Protect or relocate some of each species of "special status" vegetation	*X*		
		Protect all special status vegetation on-site		*X*	
H	Existing native plants are conserved and native plants are used	Conserve and incorporate any native plants already on site into EFS		*X*	
I	Existing healthy soils are conserved	Where healthy soils are located in the proposed building footprint area, at least 50% of those soils are preserved and incorporated on site	*X*		
		Where healthy soils are located in the designated EFS area, 100% of those soils are retained and used on-site		*X*	
		Where healthy soils are located on a portion of the site and building footprint is located to area not impacting those healthy soils		*X*	