Sustainability

Guidelines for sustainability can provide a framework to help ensure responsible resource use, improve energy efficiency, reduce costs, protect biodiversity, reduce carbon emissions, manage natural resources, and mitigate increasing risks from climate change. There are many different options and opportunities to apply sustainability to a wide array of project types - solutions should be targeted to fit the specific project goals while still providing the most benefit per investment. Not all sustainability options may be applicable or appropriate for each project.

Richmond Sustainable Design Standards (RSDS)

Applicability

The Richmond Sustainable Design Standards (RSDS) provide a framework to ensure that new City projects integrate City goals of environmental responsibility, economic resilience, and social equity.

The Richmond City Council requires that the RSDS be applied to all new City projects that meet a certain threshold. The RSDS only applies to City projects and not private development.

RSDS Highlights

The RSDS is designed to be flexible enough to allow projects of many different sizes, budgets, and types to maximize opportunities for sustainability. The RSDS gives goals for projects, with several possible paths to achieving them. However, certain things are prioritized and some of these may be important for the UDC's Location, Character, Extent review.

The following are highlights from the standards:

- Projects that meet a certain threshold will be required to meet, or exceed, LEED Silver. "Envision" certification is required for horizontal projects such as roads or major utilities, as an equivalent to LEED.
- Level 2 electric vehicle charges may be required for City and/or citizen use.
- Building projects may include at a minimum 10% of the total building energy as renewable on-site energy production. Rooftop-mounted solar is preferred and – all parking garages should provide a solar canopy on their top level.
- All exterior lighting should comply with international Dark Sky standards, utilizing solar panels and responsive lighting sensors where possible.

- Street-to-door ingress/egress routes should be provided for foot, wheelchair, and bicycle traffic and sidewalk should be provided along the full street frontage adjacent to the parcel of the project. Connect walkways to trail systems and transit stops where available. Provide amenities such as shade trees, bicycle parking and sharing, signage, public art, street furniture, and pedestrian lighting as appropriate to enhance walkability and improve pedestrian crossings.
- Provide space for recumbent bicycles and scooters at key destinations + pavement space for potential future bike share stations.
- Provide and prioritize the location and quantity of parking spaces for bicycles, EVs, mobility-impaired and Purple Heart drivers, ride-sharing, compact cars and motorcycles. Provide marked, dedicated curb space for deliveries and ride-share drop-offs.
- Where pavement is necessary, install permeable pavers to the greatest extend possible, including in the public ROW.

Green Site Design

RVA 300 Objective 2.1 – Complete Neighborhoods (Pg.116) Implement green infrastructure measures and other measures outlined in RVA H20 Plan and in the Clean Water Goal of Richmond 300 to improve water quality and reduce stormwater runoff.

RVA300 Objective 4.1 – Complete Neighborhoods (Pg.126) Protect and restore natural resources.

RVA300 Objective 15.2 – Thriving Environment (Pg.186) Installation of renewable energy (solar, wind, hydro, geothermal) on City buildings and land (methane-capture at landfill and wastewater treatment plant).

RVA300 Objective 16.1 – Thriving Environment (Pg.190) Explore programs to daylight streams and deculvert streams.

RVA300 Objective 17.4 – Thriving Environment (Pg.198) Expand the community garden program by developing standards and guidelines for community gardens on public lands to ensure transparency, continuity of use, community benefit, and access to a water source.

RVA300 Objective 17.5 – Thriving Environment (Pg.202) Reduce impervious surfaces.

Richmond 300 Objective 4.1 -High Quality Places (P.126) Ensure that building materials are durable, sustainable, and create a lasting addition to the built environment, and provide maximum adaptability for environmental change, change of use, and efficiency.

Green site design focuses on integrating environmentally based infrastructure and Low Impact Development (LID) into existing projects to manage stormwater, reduce heat, and enhance community well-being. Unlike "gray infrastructure" (pipes and concrete), green design mimics natural processes to absorb and filter water where it

falls. Achieving project goals through green site design should be a priority and should be considered as the primary way to achieve project goals, not as an additional add-on feature.

Preserving existing natural resources, such as existing tree stands or extreme slopes with existing natural ground cover, is a goal of the Master Plan. Natural areas in close proximity to water ways, creeks, and drainage areas should be prioritized.

The reduction of impervious surface is a primary goal. Redundant or unneeded pavement should be removed when possible. Where pavement is necessary, pervious pavers can be installed or adjacent green stormwater facilities can be used to address rainfall. In more natural settings and areas with low usage or turnover, gravel or similar surfaces could be considered.

Installation of renewable energy is a priority of the Richmond300 Master Plan, as well as the RSDS. Geothermal heating and cooling can be considered on sites with green space or large parking areas, or with a lake or pond. Solar heating and cooling can be considered on buildings with roofs that are not visible from the street.

When possible, the reuse of existing materials should be prioritized. Materials could be reused from onsite or even from other projects.

Stormwater Management and Low Impact Design

RVA300 Objective 4.1 – Complete Neighborhoods (Pg.126) Encourage development that respects and preserves the natural features of the site through sensitive site design, avoids substantial changes to the topography, and minimizes property damage and environmental degradation resulting from disturbance of natural systems.

RVA300 Objective 16.4 – Thriving Environment (Pg.191) Increase green stormwater infrastructure throughout the city, prioritizing areas with a high heat vulnerability index score.

RVA300 Objective 16.4 – Thriving Environment (Pg.191) Identify opportunities for green infrastructure on public lands and rights-of-way; explore creating green infrastructure guidelines within the Better Streets manual.

Low Impact Development (LID) is an innovative stormwater management approach that tries to manage rainfall as nature would, at the source and with smaller scale interventions. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff. Almost all components of the urban environment have the potential to serve as part of the storm water management process in a Low Impact Development. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians. Natural settings such as meadows and small forested areas can operate as part of stormwater management (among many other benefits) and can be preserved or re-introduced on sites where possible; and prioritized in neighborhoods with high heat vulnerability index scores. Underutilized spaces make great opportunities for LID planting and simple open lawn should be avoided where public use is not expected.

Green design elements should be used to meet a portion of landscaping requirements since such items also make up an important part of stormwater infrastructure. LID, green roofs, and bioretention planter beds/tree wells can be prioritized in urban areas and sites with limited space. Bioretention planter beds/tree wells can be used within the street ROW and prioritized in neighborhoods with high heat vulnerability index scores.

Permeable pavement systems intended as infiltration devices often have difficulty operating in urban settings due to compacted soil. Permeable pavement often works best operating as a holding system, with an underdrain and underground water storage. Permeable "pavers" should be prioritized over permeable "pavement" due to better operating efficiency and lower maintenance costs. Such systems work well in parking areas and streets or alleys with low traffic to reduce maintenance costs from the weight of vehicles. Permeable sidewalks may not be needed in in certain situations, such as a sidewalk in the middle of a park since it is already surrounded by greenspace.

When rain and snow fall on surfaces like roads or sidewalks, they can pick up pollutants like dirt, nutrients, bacteria, or chemicals, which then flow into our waterways resulting in stormwater pollution. Stormwater can be routed through onsite green areas to help filter pollutants using the following:

- Locate stormwater facilities outside of streams and wetlands, maintaining natural drainage ways, and preserving riparian buffers;
- Preserve the natural cover on as much of the site as possible;
- Route runoff so that it drains from impervious cover to pervious cover (i.e. downspouts draining to the yard, not the driveway);
- Use cisterns and rain barrels to increase the travel time of water from the site;
- Utilize soil management/enhancement techniques to increase soil absorption;
- Revegetate all cleared and graded areas and consider using "engineered swales" and bioretention areas for conveyance in lieu of curb and gutter where appropriate; and
- Utilize level spreading of flow into natural open space.

Urban Heat

RVA300 Objective 17.3 – Thriving Environment (Pg.196) Reduce urban heat, prioritizing areas with a high heat vulnerability index rating, as shown in Figure 47.

RVA300 Objective 17.3 – Thriving Environment (Pg.196) Encourage lighter-colored surfaces for roads and roofs to reflect sunlight.

The City of Richmond Office of Sustainability has created a "Richmond Cool Kit"

reference guide to reduce urban heat effect. The document identifies urban greening, shade, smart surfaces, and depaving as primary avenues to reduce urban heat. These can include street trees, reforestation, bioretention, mini-parks, water features, shade structures, building design, reflective/cool roofs, green roods, solar roofs, cool pavement, heat resistant materials, and removal of unneeded existing hard surfaces.

Landscaping is one of the best ways to reduce heat island effects. Light colored materials can also reduce heat island effect by reflecting sunlight. Rooftops can be painted white to reduce heat burden on buildings. Sidewalks and streets can use lighter colored materials, but should avoid the lightest shades, which can lead to glare for pedestrian and drivers. Shade can be incorporated into building design and shade structures can be used for pedestrians when landscaping is limited, especially for bus stops. Wide expanses of open space or open plaza should be avoided without installation of shade opportunities, with priority on shade from landscaping. Shade should be provided for seating areas, but some opportunities to sit in the sun should still be found.

Shade from landscaping and street trees should be prioritized. Natural plantings offer many other benefits in addition to shade, such as stormwater, health and livability benefits, and often consist of the most efficient investment. Street trees also provide shade during the summer, when most needed, but also allow light through during winter when warmth from the sun might also be beneficial.

Urban Tree Canopy

RVA300 Objective 17.2 – Thriving Environment (Pg.196) Increase city-wide tree canopy from 42% to 60% (see Figure 46) and seek to achieve a 30% tree canopy in all neighborhoods, prioritizing areas with a high heat vulnerability index rating and low tree canopy coverage.

RVA300 Objective 17.2 – Thriving Environment (Pg.196) Implement RVA Clean Water strategy to increase tree canopy on City property by 5%.

Managing trees and forests within urban areas strongly promotes environmental sustainability, along with social, health and economic benefits. Urban trees cool communities through evapotranspiration and shading and are essential infrastructure for heat resilience.

Many of the goals of using green infrastructure within these guidelines also include the use and planting of tree landscaping. Maximizing tree canopy may be an easy priority for most projects.

Native trees are, of course, a priority, but urban areas are notoriously difficult on species survivability. There may be instances where a species that is not native to the City of Richmond is the best choice. The City's Urban Forestry Department is a highly knowledgeable resource and does take part in most project design processes. It should also be noted that with climate change, trees species that once thrived in the Richmond region may begin to perform poorly. A shift to utilizing tree species from

southeastern states could prove an effective approach to adapting to the new climatic extremes

Disaster Resilience

RVA300 Objective 17.6 – Thriving Environment (Pg.202) Bury power lines and locate key energy network assets to enhance grid resilience.

RVA300 Objective 17.6 – Thriving Environment (Pg.202) Increase local renewable energy generation.

RVA300 Objective 17.6 – Thriving Environment (Pg.202) Evaluate transportation networks to identify emergency routes and promote redundancy.

RVA300 Objective 17.6 – Thriving Environment (Pg.202) Develop micro-grids with on-site energy storage for critical public facilities.

RVA300 Objective 17.6 – Thriving Environment (Pg.202) Support increased usage of energy storage technology, including small-scale storage systems in residential, commercial, and industrial buildings, vehicle-to-grid infrastructure, and larger stand-alone storage facilities where appropriate.

RVA300 Objective 17.6 – Thriving Environment (Pg.202) Identify community facilities to serve as resilience hubs and update systems to be more resilient.

Disaster Resilience through design means that the design reduces physical vulnerability to major weather events, government emergency responses maintain essential functions during a crisis, and citizens are able to access critical services in the aftermath of a disaster. Physical threats could include wind, flood, ice, and heat – many of which will be driven by climate change.

Providing shelter with critical needs and services to citizens after a disaster can be integral to disaster response. Community facilities can do double duty to provide those services in a time of need. Such facilities would need to be designed with higher levels of resilient systems. Space must also be made for storage of essential supplies. Buildings and critical infrastructure should be elevated above base flood levels or otherwise floodproofed. Archive space should be located on upper floors when in flood prone areas.

Electric power is essential to most critical functions during and after a disaster. Burying power lines can drastically reduce chances of damage. Priority should be given to trunk power lines that might serve a larger area, or power lines that serve primary facilities such as government services, grocery stores, or hospitals. Priority should also be given to lower income neighborhoods.

Onsite energy generation for City projects should be prioritized as well, and in conjunction with the City's Sustainability Guidelines. Renewable energy, tied to necessary batter infrastructure, is ideal because it does not use fuel which can become scarce in an emergency. Opportunities for energy storage through means

other than a chemical battery, such as pumped-hydro or heat storage, should be identified when opportunities arise. Fossil Fuel Generators may still be necessary and should be designed and located to avoid damage and maintain operation during emergency situations.

Additional Guidance

The City's Richmond300 Master Plan provides guidance on the preservation and enhancement of the City's natural environment through the "Thriving Environment" chapter beginning on page 183.

The City's RVAGreen 2050 plan is also a great reference. It includes a large amount of data and maps relevant to UDC review and analysis.

The City's 2017 RVA Clean Water Plan was completed by the Department of Public Utilities and references wastewater, stormwater, and drinking water. Many stormwater and utility projects reviewed by the UDC are generated by this plan.

All new parking areas and lots are subject to the off-street parking improvement requirements and landscaping standards found in the City of Richmond's Zoning Ordinance.

Additional landscaping and sustainability requirements may be present in the zoning code as well.

Projects located within Chesapeake Bay Preservation Areas must comply with the requirements of the City's Chesapeake Bay Preservation Program. Additional guidance is provided in the Chesapeake Bay Preservation Program's Public Information Manual.