3.4 ENVIRONMENTAL STANDARDS

3.4.1 GENERAL

As mentioned in Chapter 1, Mason expects its Design Teams to employ the industry's best management practices and recommend innovative technologies, balanced with those that are time honored and proven. This is especially true in the highly dynamic environmental field.

In July 2007, George Mason University signed the American College and University Presidents' Climate Commitment, an initiative to promote sustainable development among institutions of higher education. As Mason takes steps towards its target of climate neutrality by 2050, it aims to educate its community in the process by integrating sustainability into its curricular and co-curricular activities. This includes showcasing innovative practices for the education of its students, as well as incorporating cutting edge research into its built environment.

Mason measures its progress in this area by the Association for the Advancement of Sustainability in Higher Education's (AASHE) Sustainability Tracking, Assessment, and Rating System (STARS). These commitments, in addition to others and regulatory issues, determine Mason's minimum environmental performance requirements.

In 2007, Mason's Board of Visitors established that all new buildings and renovations shall be built to, at minimum, the Leadership in Energy and Environmental Design (LEED) Silver certification level or its equivalent. Mason currently utilizes LEED, Virginia Energy Conservation and Environmental Standards (VEES), and Green Globes for its buildings, but has a preference for LEED since it is a well-established, industry-recognized, third-party certified, progressive standard. It is also the standard that is accepted and measured within STARS and other rating mechanisms which provide Mason its sustainability ratings. Once the project is completed, Mason expects its Design Teams to supply the built or renovated facilities' certification scorecard along with supporting documentation for Mason's records.

As stated in Mason's principles of sustainability, the university strives to manage its economic and natural resources responsibly and sustainably. This is reflected in Mason's goal to ensure that its programs utilize space in the most efficient and effective way. Mason expects its Design Teams to adhere to the spirit of these commitments and priorities in their design of Mason's buildings and renovations.

3.4.2 REGULATORY ISSUES

- CPSM: http://dgs.virginia.gov/DivisionofEngineeringandBuildings/BCOM/CPSM/tabid/402/Default.aspx
- Corps of Engineers Wetlands Delineation Manual - 1987
- EPA Wetland Regulatory Authority – Regulatory Requirements: http://water.epa.gov/lawsregs/lawsguidance/cwa/wetlands/regs_index.cfm
- Guide for EPA's Evaluation of Phase I Watershed Implementation Plans
- DEB Notice 121510 – Virginia Energy Conservation & Environmental Standards – December 15, 2010
- Common Wealth of Virginia Office of the Governor – Number Nineteen (2010) – Conservation and Efficiency in the Operation of State Government
- VA Stormwater Act: www.dcr.virginia.gov/stormwater_management/documents/vaswmlaw.pdf

3.4.3 EFFICIENT AND LONG LASTING BUILDINGS

References:

- Mason Climate Action Plan 2010-2011: http://rs.acupcc.org/site_media/uploads/cap/84-cap.pdf

3.4.3.1 Goals and Objectives

The majority of greenhouse gas emissions on Mason's campuses are produced by its buildings. As the university's buildings are constructed for a minimum fifty year lifespan, it is important that they are constructed for endurance and designed to be as efficient as possible. Mason expects its Design Teams to integrate passive and active resource reduction strategies into the building design for optimal operations. In addition, the Design Team shall provide life cycle costs analysis in accordance with Building Owners and Managers Association (BOMA) standards when communicating various design and build options.

3.4.3.2 Direct Energy Consumption

In its 2010 Climate Action Plan, Mason committed to reducing its use of non-renewable electricity and natural gas per square foot of built space, and per full-time equivalent student, by 10% below 2006 levels by 2014—a major milestone on the path to climate neutrality.

3.4.3.2.1 Construction

- Goal: Mason seeks contractors that share our commitment to sustainability. It is the expectation that contractors operate according to that shared commitment, to continually improve, and to minimize their energy consumption during construction.
- Minimum Requirement: The contractor shall have mechanisms in place to measure and report their metered utilities use during construction.

3.4.3.2.2 Design

- Goal: New buildings will aim to be net zero buildings and explore the feasibility of renewable energy production.
- Minimum Requirement: New buildings and existing building renovations shall achieve at least a 20% energy reduction from the current, applicable ASHRAE 90.1.
- Note that trees planted on the south side of structures help to reduce the building's energy needs.

3.4.3.2.3 Final Measurement and Verification: How Buildings Perform

- Minimum Requirement: The building shall be commissioned before occupied and a schedule for re-commissioning set in place for within one to three years of commissioning, and within every five years thereafter, to ensure the building operates as efficiently as intended in the long-run.

3.4.3.2.4 Creating User Awareness of Energy Use

- Goal: Mason's brand promise is to provide an exceptional educational experience that inspires innovation, fosters thought leadership, and cultivates success. This includes providing opportunities for building occupants to understand the ways in which their behavior may positively or negatively impact the campus's energy use.

- Minimum Requirement: Provide signage, mechanisms, educational tools, and/or ambient devices to engage and educate building stakeholders about their building and their impact within the building. The Design Team shall ensure that these reporting systems are installed and compatible with the existing technology infrastructure and building systems.

3.4.3.2.5 Renewable Energy

- Goal: The Commonwealth of Virginia has a voluntary renewable energy standard goal of 15% of power generated from renewable sources by 2025, from a 2007 baseline. As an institution of higher learning and one of the largest public institutions in Virginia, Mason has the responsibility to be a leader in the community. Within Mason's 2010 Climate Action Plan, Mason strives to have 10% of its electricity generated by renewable sources by 2014 as a milestone towards being climate neutral.

3.4.3.2.6 Controls Systems

Building utilities must be measurable so that they can be managed and controlled. Mason encourages collaborative decision-making processes that seek win-win solutions, as opposed to pitting one criteria against another. Technical elements of the Design Manual are not intended to limit opportunities to emplace proven energy saving measures.

- Goal: Measure and report utilities at the unit, system, or floor level (such as lighting, HVAC, plug-load, chilled/hot water, potable water, wastewater, irrigation). The Design Team shall ensure that these reporting systems are installed and compatible with the existing technology infrastructure and building systems.

- Minimum Requirement: In order to conserve and measure progress, campus utilities and energy use must be tracked at the level of individual buildings—at the minimum, for metered utilities such as electricity, chilled/hot water, natural gas, potable water, and wastewater. The Design Team shall ensure that these reporting systems are installed and compatible with the existing technology infrastructure and building systems.

3.4.3.3 Energy Efficiency Standards

As part of Mason's overall energy plan, energy efficiency standards have been adopted for the purchase of new equipment. Generally, the standards meet or exceed federal ENERGY STAR guidelines and specifications for energy efficiency. The Constructor is encouraged to visit www.energystar.gov for complete product specifications and updated lists of qualifying products. Due diligence must be completed by the Constructor to ensure that energy efficient products are used where feasible. The following equipment has been identified to have readily available inventory of its high energy efficiency product line: Energy Efficient Products List.

3.4.3.3.1 Energy Saving Performance Contract (ESPC)

Mason is currently replacing existing plumbing and lighting fixtures under an ESPC. The Design Team shall specify products that meet or exceed the efficiencies of these fixtures.

The ESPC specs are located on Mason's docushare site. Open either Internet Explorer, Firefox or Netscape and type the following url into the address window: https://docushare.Mason.edu, or simply click on the link. This will bring up the 'Xerox Docushare' website. Then navigate through the following steps:

1. Click on the 'Finance and Administration' folder

2. Click on the 'Facilities' folder

3. Click on the 'General Campus Information' folder
4. Click on the 'Energy Savings Performance Contract (ESPC)
5. Double click on the 'ESPC Specs.pdf' file to download to the HDD and use as necessary.

3.4.3.3.2 Water Efficiency

As water scarcity and rate pressures increase, Mason strives to be a responsible steward of its water resources and to lower its consumption.

- Goal: Mason appreciates the assistance of its Design Teams to evaluate and integrate innovative technologies to address the challenges of harvesting, storing, reclaiming, and reusing its water resources. Design Teams may need to collaborate with and address concerns of local governing authorities in certain locations and situations.
- Minimum Requirement: Water use in new buildings and existing building renovations shall be 30% below the Energy Policy Act of 1992 standards. Therefore, all new construction and existing building renovations shall have water efficient fixtures and products installed, such as low-flow faucets, showerheads, toilets, and appliances.

3.4.4 SUSTAINABLE SITES

References:

- Current University Master Plan: http://facilities.gmu.edu/masterplans/universitymasterplan.pdf
- Current Master Transportation Plan: http://facilities.gmu.edu/masterplans/GMU_FairfaxCampus_TransMgmtPlan_Final.pdf
- North Sector Plan: http://facilities.gmu.edu/masterplans/NorthSectorPlan.pdf
- Sustainable Sites Initiative (SITES)
- Current University Stormwater Master Plan

Mason recognizes the significant and long-term impact that site development has on the surrounding landscape–especially considering that each facility is expected to operate for fifty years or more. The Design Team shall utilize passive design strategies to create resource efficient buildings and to address important issues such as site impact, connectivity, water quality, and habitat protection.

3.4.4.1 Goals and Objectives

3.4.4.1.1 Site Development

Mason strives to be efficient with its resources, including physical facilities, financial assets, and natural resources. The university also understands that once development occurs, it may be challenging to restore that habitat to its natural and original state. Therefore, Mason wants to honor its land use plans by showcasing—and restoring, where possible—the innate and historical features of the landscape. Consequently, before new buildings are constructed on campus, Mason asks its Design Teams to assist in determining whether the program utilizes space in the most effective way.

- Goal: Reuse or regenerate developed sites and/or underutilized land assets over green field sites. Consider the redevelopment of poorly used sites, including creating new open spaces, or reviving existing open spaces, to promote a sense of community with people and nature.

- Goal: Build close to existing infrastructure to minimize the need for tertiary development. For example, minimize utility runs. If infrastructure is not present, consider other sites.

- Goal: Choose building renovations over new construction. Consider solutions other than new construction to meet organizational and operational needs.

- Goal: Preserve special, protected, endangered, and critical habitats.

3.4.4.1.1.1 Siting to Encourage Energy Savings

The location of a building, including its orientation, may affect the operation and comfort of the building occupants. Therefore, Mason asks its Design Teams to design its facilities to maximize the benefits of the building's location and orientation. Some examples include:

- Minimize energy use by using solar gain or shading to the maximum extent possible.

- Utilize natural ventilation techniques.

- Evaluate the feasibility of geothermal capability.

- Maximize views and spaces for peaceful contemplation by capitalizing on the surrounding natural beauty.

The exterior of the building also affects the environmental impact of the overall building footprint. This includes the hardscape, exterior light poles, and exterior furnishings.

3.4.4.1.1.2 Hardscape (permeable pavements, high-albedo (reflective) paving materials)

- Goal: Reduce the heat island effect.

- Minimum Requirement: Where possible, use generous shade tree plantings on streets and paved areas. The use of light-colored reflective materials will also contribute to cooler summertime temperatures, potentially saving on air conditioning costs and countering the effects of climate change. Within LEED certification, solar PV can also be considered to reduce heat island effects.

3.4.4.1.1.3 Lighting (energy efficient fixtures; reduced light pollution)

- Goal: Minimize light pollution and increase lighting efficiency.

- Minimum Requirement: Street and site lighting shall be designed to minimize light pollution while providing a safe and attractive civic environment.

    - Use glare shields and light angles to reduce potential glare into the nighttime sky.

    - Specify energy efficient and solar powered exterior lights to reduce energy consumption.

    - Consider using streetlights with 100% cutoff range and LED lights in pedestrian areas.

- Consider directing exterior lights at items that will not reflect that light back up to the sky. For example, direct lights towards greenscape rather than towards light-colored exterior surfaces that will reflect the light back up to the sky.
- Consider using lighting that is self-powering, using solar panels and battery backup.

3.4.4.1.1.4 Site Furnishings and Materials (benches with recycled content, bike racks to support bicycle commuting)

- Goal: Use locally produced materials for paving, street furniture and site walls thereby supporting the local economy, local environmental oversight of production and reducing energy needs for transport. Mason favors materials that are recycled or produced or harvested in a sustainable manner.
- Minimum Requirement: Utilize inert and low toxicity in site building materials and piping. Reuse construction and demolition debris such as masonry and paving materials as bedding for roads and paths.

3.4.4.1.1.5 Transportation Support Systems

With new construction comes an increase in mobility demands from the building occupants. Within its 2011 Transportation Master Plan and 2010 Climate Action Plan, Mason pledged to reduce its single occupancy vehicle (SOV) use by 5% by 2014, 10% by 2020, and to provide more sustainable transportation options for the Mason community. This has numerous benefits, including emissions reductions and better stormwater management. It also minimizes the heat island effect; promotes a walkable campus; and provides access to affordable transportation options. Mason is working on transportation infrastructure improvements as well as educational outreach and expects the Design Team to design and plan Mason's facilities in support of these efforts. This includes the provision of:

- A sufficient pedestrian network around campus and connecting to surrounding communities. This concept also includes other non-motorized modes of transportation, if applicable.
- Adequate biking facilities such as bike racks, bike shelters, bike signage, lockers, and showers for bicyclists. At a minimum, compliance with Fairfax County's Bicycle Parking Guidelines is required.
- Connections to existing or planned bicycle and mass transit plans from area transportation providers such as the Washington Metropolitan Area Transit Authority, Virginia Railway Express, city and county transit providers, and the like.
- Linkage with Mason's shuttle system.
- Opportunities to utilize carpool, vanpool, and/or alternative fueled vehicles.
- Access and education about virtual interaction and technology opportunities, such as video conferencing, within or close to the building to minimize need for additional travel.

3.4.4.1.1.6 Stormwater Management

Mason's campuses are located within the Chesapeake Bay watershed, so our actions have a direct impact on the health of the Bay. Mason's Fairfax campus is situated at a nexus point where three locally significant watersheds of the Potomac come together, including the upper watersheds of the Accontink Creek, Popes

Head Creek, and the Pohick Creek. In addition, the core of campus is almost entirely encompassed by two sub-watersheds of the Rabbit Branch Creek which feeds into the Pohick watershed. Consequently, Mason aspires to be a good steward of its water resources and aims to use low-impact design and construction, responsible stormwater management principles, best management practices, and innovative rain capture and harvesting techniques to protect and restore the watersheds. Many of the rules and regulations to maintain the health of the Chesapeake Bay will likely be above and beyond most standards. Please refer to those rules and regulations for compliance as well as Mason's Stormwater Management Master Plan.

- Goal: Mason appreciates the assistance of its Design Teams to evaluate and integrate innovative technologies to address the challenges of harvesting, storing, reclaiming, and reusing its water resources. Design Teams may need to collaborate with and address concerns of local governing authorities in certain locations and situations.

- Goal: Engage in reforestation as a part of overall stormwater management strategies. Practice good forest management practices to balance habitat and ground recharge. Provide reforestation for areas that are disturbed but not part of the active use area on the project.

- Minimum Requirement: Use life-cycle cost and life-cycle quantity/quality control modeling to determine the best application of particular best management practices (traditional or low impact development).

- Goal: Use bio-retention cells to absorb and filter runoff, retain stormwater, and replenish the aquifer. Best management practices should be implemented for erosion and sedimentation control during and after construction to preserve top soil and prevent sedimentation of existing streams.

- Goal: It is Mason’s preference to have more pervious surfaces on campus than impervious surfaces. Currently, 49% of Mason’s campuses are covered with impervious surfaces. Porous pavement for parking, pathways, and plazas increase stormwater runoff time of concentration. Where possible, Mason encourages aquifer replenishment by allowing water to filter slowly into the groundwater table. Where it is feasible, use open channel storm drainage and vegetated swales for stormwater conveyance instead of pipes. Refer to detail 3.4-1 for examples of porous paving, rain gardens and streetside bioswales.

- Goal: The university has publically committed to being a leader in the field of SWM. Where practical, the university strives to achieve a level of treatment that exceeds State and Federal minimum requirement.

- Goal: Areas where stream channels are currently deeply incised and eroded. The stream bed should be raised to meet the floodplain thereby minimizing the impact of the restoration and returning the stream to its pre-development elevation.

- Minimum Requirement: Similar to buildings, stormwater features will degrade over time and so operational costs and a schedule for updating those assets will be set in place for every five years thereafter to ensure the features operates as efficiently as intended in the long-run.

3.4.4.1.2 Habitat and Wildlife Protection

In its 2002 Master Plan, George Mason University outlined its commitment to employ strategies to efficiently use its land resources for development; promote a pedestrian and bicycle friendly campus; and strategically preserve its woodlands, wetlands, and waterways to maintain the campus image and provide for ecological diversity. It also established 'ecological corridors’ following drainage ways, streams, and topography, that

buffered development, preserved essential natural features and provided for a connective network of walking trails and bikeways. In addition, Mason's 2009 North Sector Master Plan and Design Guidelines encourages a park concept and retention of natural species and habitat. The Design Teams shall help Mason to honor the spirit of its Master Plans by emphasizing the natural beauty of its woodlands, wetlands, and waterways. In addition, educational signage shall be posted to describe the purpose of the natural areas and community space areas and how they should be respected

- Minimum Requirement: Mason will designate conservation areas so that when university-owned forested land is developed, new trees, of the same character and quality as those being removed and in a ratio of two planted to one removed, will be replanted in compliance with reforestation guidelines within Mason's landscaping standards.

3.4.4.1.2.1 Open Space (grassy areas, lawns, Mason Pond landscape)

- Goal: Encourage the reforestation of George Mason University property.

- Minimum Requirement: Lawns are often treated with pesticides and chemicals and require irrigation for proper maintenance. These areas provide minimal wildlife habitat and minimal stormwater infiltration. For these reasons, lawn shall be used only as necessary for public gathering spaces and recreation, not as a general ground cover. The university has a strict Nutrient Management Plan based on the Maximum Nutrients Loading a turf area can sustain. Any maintenance plan shall comply with Mason’s Nutrient Management Plan.

3.4.4.1.2.2 Woodlands (campus buffer woodlands, clumps of trees, Mason Pond woods, riparian buffers)

- Goal: Retain the highest possible number of healthy existing trees and preserve natural areas.

- Goal: Establish protected wildlife corridors and provide passages (tunnels) under roads suitable for wildlife movement. This will also provide educational opportunities for students.

3.4.4.1.2.3 Planted Vegetation (planting beds, wildflower areas, native plants)

- Goal: Cultivate Mason's available natural resources to further understanding of environmental benefits and engagement of Mason's community. This includes concepts such as community gardens, edible gardens, apiculture, etc.

- Minimum Requirement: All plantings shall be native, cultivars of native plants, and noninvasive exotics. Native plantings are adapted to the local environment and are used to provide wildlife habitat, minimize or eliminate chemical fertilizers and pesticides and affirm a sense of place.

3.4.5 OCCUPANT ENGAGEMENT AND WELL-BEING

Mason's top priority is to provide students with a transformational learning experience that supports their growth as individuals, scholars, and professionals. In addition, Mason's brand promise is to provide an exceptional educational experience that inspires innovation, fosters thought leadership, and cultivates success. For these reasons, it is Mason’s intent to educate its community on the challenges and opportunities for fostering a sustainable world.

- Goal: Since buildings have a significant impact on the environment, Mason would like to raise awareness of its institutional commitments and activities as well as inform students on how they can participate in reducing their own and Mason's environmental footprint.

- Minimum Requirement: Design Teams shall provide interactive signage, mechanisms, tools, and/or ambient devices to engage the Mason community in the sustainability dialogue and help them to understand the impacts of their individual and collective actions. Most areas in the Design Manual Include an educational outreach and engagement component.

- Goal: In addition to the building occupants being informed and engaged in the impacts of their behavior, all spaces shall support occupant comfort and wellbeing, as well as a healthy, enjoyable environment in which its occupants thrive.

3.4.5.1 Indoor Environmental Quality

- Goal: Mason seeks to minimize the energy consumption of its systems while maintaining comfort and wellness for building occupants. Mason wants to ensure that the appropriate amount of outdoor air is brought into its building systems to maintain a comfortable and healthy environment.

- Minimum Requirement: For indoor air quality, comply with ANSI's ventilation standards. Refer to Section 3.3.1 – HVAC Systems for the appropriate ventilation standards for each type of room. Refer to ASHRAE 55 for thermal comfort.

- Minimum Requirement: Construction cleanup and pre-occupancy cleaning must be coordinated with Mason's project manager to ensure the use of low toxicity products, equipment and techniques.

- Goal: Building occupants benefit from being able to control their environment.

- Goal: Mason welcomes ideas from the Design Team to promote wellness activities for building occupants. This may include the design of certain elements such as clearly identified, aesthetically pleasing, easily accessible staircases for occupants to use instead of elevators; walking trails or connections; or areas for quiet contemplation and meditation

3.4.6 MATERIALS AND RESOURCES

Mason is committed to minimizing its environmental footprint, which includes reducing, reusing, and recycling. Mason values innovative solutions from its Design Teams to help lessen the impact throughout a building's life cycle—from construction, to purchasing, to disposal, and remediation. As technology advances in this dynamic field, Mason’s ultimate goal is to be a zero waste institution. Current research has shown institutions of higher education can maintain a 70% or higher diversion rate. At the minimum, Mason aims to recycle at least 25% of its waste.

3.4.6.1 Renovation over new build

- Goal: Mason wants its Design Teams to evaluate and consider creative reuse and/or recycling of existing building materials. This may include, but is not limited to, salvaging materials and repurposing existing products.

- Minimum Requirement: For new construction and existing building renovations, Mason strives for a minimum 50% construction diversion rate. Contractors must provide proof of their construction diversion.

3.4.6.2 Recycling Infrastructure

- Minimum Standards: That each building occupant has easy, convenient access to a recycling collection site and that each common area, trash room, or lobby has enough designated space for a recycling center that accommodates all the streams of recycling collected at Mason.

- Minimum Requirement: For every trash receptacle, a recycling receptacle shall be co-located with it.

3.4.6.3 Purchasing

- Goal: As stated in the Virginia Public Procurement Act in 2010, preferences may be given to goods produced in Virginia, goods or services or construction provided by Virginia person, firms, or corporations. Preference may also be given to businesses that are small, women-owned, and minority-owned businesses. Mason wants to support the local economy and local businesses.

- Minimum Standards: Within Virginia's Executive Order 19 (2010), it states that state institutions need to follow the waste hierarchy to reduce, reuse, or recycle whenever possible. It also states that as much as possible, materials and supplies purchased by the state, including paper, should be made from recycled and or renewable materials, and be provided with a minimum of packaging. Durable products, rather than disposable, should be used whenever practical. If disposables must be used, they should be biodegradable or recyclable. The use of remanufactured components should be maximized. If disposable plastics must be used, they should, when practicable, be recyclable plastics only. Paper and other office supplies should be reused and only when beyond viable reuse, recycled. Vendors offering take-back programs for packaging or spent products should also be favored. Buy products that:

    - Minimize packaging.
    - Use recycled content.
    - Use materials that minimize or have no off gassing (with a strong preference for those that do not off-gas at all)
    - Minimize use of toxic chemicals throughout their lifecycle. Use lighter Materials to minimize energy/transportation costs.
    - Use local materials, local vendors.
    - Are organically derived or have biodegradable waste streams.
    - Minimize water use.
    - Minimize energy use.
    - Minimize energy and paper use in procurement/contract management measures.
    - Minimize deliveries, minimize removal from campus.