MEMORANDUM
Town of Nags Head
Planning & Development Department

To: Planning Board

From: Kate Jones, Senior Environmental Planner
Kelly Wyatt, Planning Director

Date: January 14, 2022

Subject: Unified Development Ordinance (UDO) Section 11 Part I and III text amendments

Earlier this year planning staff drafted and presented updates to the Town of Nags Head Low Impact Development and Stormwater Reference Manual for consideration by the Planning Board and Board of Commissioners. At their May 5, 2021, meeting, the Board of Commissioners unanimously passed a motion to continue consideration of these updates to the first meeting in July 2021 in order to review potential changes with several Nags Head homebuilders. Since then, the following meetings have taken place:

- June 16, 2021: Initial meeting with Nags Head homebuilders, Planning board member Meghan Vaughn and Town staff.
- September 15, 2021: Initial meeting with representatives from the Outer Banks Homebuilders Association and Town staff.
- September 21, 2021: Planning Board meeting, An update on the stormwater review process and associated meetings was provided.
- September 22, 2021: Town of Nags Head staff held a conference call with Wes Haskett, Planning Director for the Town of Southern Shores.
- October 6, 2021: Board of Commissioner's meeting, The Board desires the residential stormwater ordinance to be simple and easy to understand and implement.
- October 7, 2021: Town staff met with representatives of the Outer Banks Homebuilders Association and reviewed two ordinance options.
- December 7, 2021; Town staff met with representatives of the Outer Banks Homebuilders Association and further reviewed the preferred option.
- January 10, 2022: Town staff met with representatives of the Outer Banks Homebuilders Association and further reviewed the preferred option.

Staff drafted new non-volume based ordinance language established through discussion at these meetings as well as practical experience applying stormwater regulations throughout residential areas in the town. Some modifications to the ordinance were necessary outside of Section 11.5, General Standards for Residential Development on Individual Lots for consistency and clarity, therefore, Article 11, Part 1 was reviewed as a whole. For consistency, it was also necessary to update Article 11, Part III, Flood Damage Prevention, to reflect the changes to the fill requirements and consolidate to one location. In addition to this, changes have been drafted to UDO Appendix A. definitions which change the way onsite material may be used to achieve fill height, offer consistency with respect to fill terminology, as well as adds a relevant stormwater definition that was previously discussed. Lastly, the Town of Nags Head Low Impact Development Manual draft document has been updated for consistency with the overall residential stormwater ordinance changes.

Updated Fill definitions:

Fill is the depositing of soil, rock, or other earthen materials by artificial means, but not including poured slab, asphalt, porous pavement, Turfstone ™ , or other manmade materials or surfaces designed in association with construction. Excavated material moved or relocated onsite is not considered fill for the purposes of determining fill height.

Fill ~~depth~~ height is the difference between the post-development surface elevation and the pre-development surface elevation.

Additional Definition related to stormwater:

Stormwater improvement is a change or addition made on or to the land, excluding buildings, that improve infiltration into the ground and the retention of stormwater runoff.

Attachments:

(A) Article 11. Environmental Regulations Part 1. Stormwater, Fill and Runoff Management
(B) Article 11. Part III. Flood Damage Prevention. (See Section 11.44.3.11. Fill/Grading)
(C) Town of Nags Head Low Impact Development Manual + Appendix A: Residential Stormwater Cut Sheets

Attachment A

Section 11.1 Purpose and Intent.

The purpose of this Part is to proactively protect, maintain and enhance the public health, safety, environment and general welfare by establishing requirements and procedures to effectively manage the site development process including the use of fill, site grading, and stormwater management ~~control the adverse effects of fill, land disturbance and increased post-development stormwater runoff~~ for the purposes of both water quantity management for flood prevention and water quality protection with the goals to:

11.1.1. Control and minimize impacts associated with stormwater runoff from all development and redevelopment.

11.1.2. Mitigate current stormwater problems and prevent future problems associated with stormwater runoff.

11.1.3. Preserve water quality through proactive management practices.

11.1.4. Facilitate public understanding of stormwater management.

11.1.5. Encourage the use of pilings and open foundations and minimize the use of fill, consistent with FEMA's coastal construction recommendations.

11.1.6. Improve stormwater management through use of low impact development techniques.

11.1.7. Establish requirements for on-going management and maintenance of stormwater management practices.

11.1.8. Establish application and enforcement procedures that address land disturbance, sedimentation and erosion control, the use of fill, and stormwater management practices consistent with associated Town ordinances and state and federal laws and regulations, to include:

11.1.8.1. Soil erosion and sedimentation control provisions (Article 11, Part II);

11.1.8.2. Excavations (Chapter 18 of the Town Code of Ordinances);

11.1.8.3. Flood damage prevention provisions (Article 11, Part III);

11.1.8.4. NCDEQ stormwater management (NCAC T15: 02H .1000);

11.1.8.5. NCDEQ soil erosion and sedimentation control (G.S. 113A-50—113A-71);

11.1.8.6. NCDEQ and Dare County Health Department subsurface, ground-absorption wastewater effluent disposal (NCAC T15A: 18A. 1900).

11.1.9. Establish public awareness of potential surface and subsurface water drainage problems recognizing that development potential of some land may be limited.

11.1.10. Regulate development and redevelopment which may create additional stormwater related burdens to the Town or adjacent properties.

11.1.11 Cause every development and redevelopment employing Stormwater Control Measures to develop a maintenance plan, and place responsibility for maintenance with the property owners.

Section 11.2 Applicability of Article 11, Part I Provisions and Exceptions.

11.2.1. The provisions of this Part are applicable to all development and/or redevelopment within the jurisdiction of the Town, except for land disturbance associated with investigation services, (i.e., lot or boundary survey), the evaluation of a property for septic suitability, or repair of existing septic systems.

11.2.2. No development activity, including clearing, grading of a lot, the deposition of fill or the stockpiling of material for future use, shall occur except in compliance with the provisions, conditions, and limitations of a land disturbance permit as issued by a UDO Administrator. Other permits and plans may also be required, such as a floodplain permit, a sedimentation and erosion control permit, responsibility form, or sedimentation and erosion control plan, zoning, and building permits, in accordance with federal, state or local laws.

11.2.3. The applicable permit shall govern the design, installation, and construction of stormwater management and control practices on the site. Compliance after project construction is governed by the maintenance provisions of this ordinance and may require submission of a maintenance report upon request of the Town.

11.2.4. The Town shall establish a fee schedule and stormwater review policy which may be amended and updated at the Board of Commissioners' direction.

11.2.5. Applications must be complete and submitted to the Planning Department along with the appropriate fee established pursuant to this section. If the Stormwater Administrator or his or her designee finds that an application is incomplete, the applicant shall be notified of the deficient elements and shall be provided with an opportunity to submit a complete application. Before a land disturbance permit application is deemed complete, the Town or the applicant may request a consultation on a concept for the post-construction stormwater management system to be utilized in the proposed development project.

11.2.6. Upon completion of a project, and before a certificate of compliance may be granted, the applicant shall certify that ~~best management practices~~ Stormwater Improvements and/or Stormwater Control Measures have been constructed in accordance with the approved stormwater management plans. For all projects other than single-family and two-family uses, best management practices shall be documented on the construction record filed with the Town for certificates of compliance.

11.2.7. Installation of all stormwater management practices installed under the requirements of this ordinance shall be made prior to certificate of compliance unless financially guaranteed. The Town may enter into an agreement with the permit holder whereby the permit holder shall agree to complete all required improvements as specified on the approved land disturbance permit or stormwater plan, within a reasonable timeframe as determined by the Town. To secure this agreement, the permit holder shall provide a guarantee not exceeding 1.25 times (or 125 percent of) the projected cost of the improvements in the form of a performance bond with cost estimates to be reviewed and approved by the UDO Administrator. The surety performance bond shall be obtained from a surety bonding company authorized to do business in North Carolina and shall be payable to the Town of Nags Head. The duration of the bond shall be until such time as the improvements are approved by the Town, or three years.

11.2.8. An approved land disturbance permit expires if work does not commence within six months of the date of issuance, or if work is discontinued for a period of more than one year, or the expiration or completion of a building permit. A new land disturbance permit shall be obtained to replace the expired permit before work can commence or re-commence unless the UDO Administrator grants a single, one-year extension of this time limit, for good cause shown, upon receiving a written request from the applicant before the expiration of the approved plan.

(Ord. No. 21-06-012 , Art. III, Pt. XII(Att. L), 6-2-2021)

Section 11.3 Administration.

11.3.1. Designation of Stormwater Administrator.
The UDO Administrator or his/her designee(s) is hereby appointed to administer and implement the provisions of this Part.

11.3.2. Duties and Responsibilities of the Stormwater Administrator.
Duties of the Stormwater Administrator shall include, but not be limited to:

11.3.2.1. Managing land disturbance permit applications and review of associated plans in accordance with the standards of this Part;

11.3.2.2. Issuance of land disturbance permits through the supervision of zoning administration and building inspections, so that land disturbance permits are integrated within site plan approval and any conditions placed upon a floodplain or development permit;

11.3.2.3. Coordinating the application of this Part with the Town's engineer and zoning administration, building inspections, public works, floodplain management, and sedimentation and erosion control program functions;

11.3.2.4. Ensuring the enforcement of this Part, including plan review, issuance of notices of violations, and monitoring of operations and maintenance requirements on an on-going basis;

11.3.2.5. Maintaining up to date resource materials including the current edition of the ~~North Carolina Best Management Practices Manual, the Town of Nags Head Best Management Manual, and the Town of Nags Head Recommended Standard Details Manual;~~ North Carolina NC DEQ Stormwater Design Manual and the Town of Nags Head Low Impact Development Manual;

11.3.2.6. Promoting public education and reference materials on stormwater management, flood prevention and water quality protection.

Section 11.4 General Standards for Commercial, Mixed use, and All Non-Single Family or Non-Two-Family Residential Development, including Multi-Family Development.

11.4.1. Redevelopment of property with existing commercial uses, mixed land uses or residential uses other than single-family or two-family residential uses does not require submission of a stormwater plan under the following circumstances:

11.4.1.1. The redevelopment is consistent with the zoning regulations of this UDO relating to redevelopment and nonconformities.

11.4.1.2. The redevelopment does not result in a net gain in built upon area.

11.4.1.3. The redevelopment does not include the importation of any fill material that results in elevation gain higher than pre-demolition grade.

11.4.1.4. The redevelopment includes a stormwater retrofit associated with flood mitigation property improvements which limits the importation of earthen fill material to no greater than 12 inches in depth.

11.4.2. All redevelopment of property with commercial uses, mixed land uses or residential uses other than single-family or two-family residential uses resulting in a net gain in built upon area requires submission of a stormwater plan showing that the stormwater runoff generated by the increase will be directed into an approved stormwater management system designed to accommodate 4.3 inches of rainfall and that any best management practices constructed for the additional runoff comply with the same commercial standards established in subsection 11.4.3, below.

11.4.3. All other development or redevelopment of property with commercial uses, mixed land uses or residential uses other than single-family or two-family residential uses requires submission of a stormwater plan showing that the development will meet or exceed the following standards:

11.4.3.1. All runoff from the project's built-upon area must be directed into an approved stormwater management system designed to accommodate the volume of runoff generated by a 4.3-inch design storm.

11.4.3.2. Infiltration systems shall provide a minimum of one foot of vertical clearance from the seasonal high water table and must be located in soils classified as sandy texture soils with a minimum infiltration rate of 0.52 inches per hour. Infiltration systems shall maintain a maximum retention time of five days for the 4.3-inch design storm.

11.4.3.3. Wet retention systems shall maintain a minimum retention time of 48 hours and a maximum retention time of five days for the 4.3-inch design storm.

11.4.3.4. Overflows and discharges from best management practices shall discharge to an established drainage outfall or drainage way which is maintained by a government entity or the subdivision homeowner's association or as approved by the Town or other appropriate federal, state or local entity.

11.4.3.5. All required state and federal permits shall be acquired prior to the establishment of a discharge into a drainage way. In no instance shall the system discharge to adjoining private property without the written consent of the adjoining property owner, establishment of appropriate easements, and filing of maintenance agreements with the Town.

11.4.3.6. Fill shall not be permitted to exceed ~~base flood elevation~~ the regulatory flood protection elevation (RFPE), ~~except in cases where it is placed directly beneath a slab that is designed to meet the regulatory flood protection elevation as defined in Appendix A, Definitions. In these instances, fill may exceed the base flood elevation by up to 12 inches to support a turn-down or thickened edge slab or beneath a slab that is supported by a ring-wall style foundation. Fill placed above the base flood elevation shall not extend beyond the outside edge of the slab. In areas in which there is no base flood, fill shall not exceed~~ the amount ~~required~~ for wastewater permits required by the Dare County Health Department, or two (2) feet above pre-development surface elevation, whichever is higher.

In no case shall fill be placed or a lot be graded such that off-site drainage patterns are altered to direct stormwater runoff onto another property unless part of an approved plan with appropriate agreements or easements.

11.4.3.7. Copies of operations and maintenance agreements must be filed with the Town prior to the issuance of the certificate of compliance.

11.4.3.8. During construction, to prevent adverse effects onto adjoining properties or rights-of-way, temporary and/or permanent runoff control measures shall be installed after placement of fill. This can be achieved via implementation of:

11.4.3.8.1. Installation of earthen diversion berms along the periphery of the property, or

11.4.3.8.2. Installation of permanent Stormwater Control Measures which shall be maintained and kept operational for the duration of construction, or

11.4.3.8.3. Other approved methods of erosion and Stormwater Control Measures.

11.4.3.9. On-site permanent runoff control measures shall be installed, in conjunction with other on-site stormwater management practices, to intercept rainfall runoff from driveways that are sloped or graded towards the street or right-of-way. On-site permanent runoff control practices include, but are not limited to, slotted drains, ~~driveway speed bumps~~ or other approved methods of diverting, collecting and managing on-site runoff.

11.4.4. Allowance for partial, temporary retention of stormwater within parking lots on all commercial sites. Up to 20 percent of a site's parking area may retain runoff up to 48 hours after a 4.3-inch rainfall event, so long as:

11.4.4.1. Accessible parking spaces, as required by the American Disabilities Act (ADA), shall not be affected.

11.4.4.2. Drive aisles, fire lanes, loading zones, ingress and egress facilities, traffic ways, pedestrian ways and other site access features shall not be affected.

11.4.4.3. No impacts of stormwater shall be allowed to entities other than parking spaces and stormwater BMPs.

11.4.5. Allowance for stormwater control and conveyance facilities built by others on Town rights-of-way or on adjacent or Town-owned properties upon approval of the Board of Commissioners. If as part of development or redevelopment there is an opportunity to improve, mitigate or correct a drainage problem caused by stormwater runoff from the site under review, the Board of Commissioners may approve stormwater management improvements outside of the subject property boundary if:

11.4.5.1. An encroachment agreement and/or easement is put in place to allow for construction and use of the stormwater management improvements; and

11.4.5.2. A maintenance agreement is filed with the Town establishing maintenance responsibilities and enforcement methods.

(Ord. No. 21-06-012 , Art. III, Pt. XII(Att. L), 6-2-2021)

Section 11.5 General Standards for Residential Development on Individual Lots.

11.5.1. Stormwater Management Plan Applicability.

Stormwater management requirements shall apply to the following types of development:

11.5.1.1. New detached single-family and two-family residential properties;

11.5.1.2. Existing single-family and two-family residential properties where more than 500 square feet of new built-upon area is being added. In such cases, the stormwater management requirements shall apply only to the new built-upon area;

11.5.1.3. Removal and replacement of driveways. In instances where an existing driveway and parking area not meeting the standards of this section is being removed and replaced, the new driveway and/or parking area shall be designed so as to minimize ~~limitlimit~~ the discharge of stormwater into the right-of-way or onto adjacent properties.

11.5.2. Stormwater Management Standards.

~~**11.5.2.1.** All runoff from the project's built-upon area shall be directed into an approved stormwater management system designed with a storage volume of 15 cubic feet for every 100 square feet of built-upon area.~~

11.5.2.1 Projects that add built-upon area, as defined in Appendix A of the UDO, in excess of section 11.5.1.2., shall be designed so that runoff is not directly discharged onto adjacent properties or into the street and/or street right-of-way.

~~**11.5.2.2.** Stormwater control management (SCM) measures may include a variety of techniques used in combination to achieve the storage volume requirement. These include:~~

~~**11.5.2.2.1.** Rainwater harvesting to include cisterns and/or rain barrels~~

~~**11.5.2.2.2.** Subsurface drainage systems to include dry wells, french drains and infiltration galleries/panels~~

~~**11.5.2.2.3.** Permeable pavements~~

~~**11.5.2.2.4.** Tree/open space preservation credits~~

~~**11.5.2.2.5.** Bioretention or rain gardens~~

~~**11.5.2.2.6.** Landscaped swales~~

~~**11.5.2.2.7.** Infiltration basins~~

~~**11.5.2.2.8.** Other methods as approved by the stormwater administrator~~

11.5.2.2 Stormwater management plans that are prepared and submitted in accordance with section 11.5.4., which may include Stormwater Improvements as shown in Appendix A of the Town's Low-Impact Development Manual and/or which are approved by the Stormwater Administrator, may be incorporated into the project design to demonstrate compliance. Alternatively, the following techniques may be utilized in lieu of constructing Stormwater Improvements:

11.5.2.2.1. Stormwater runoff may be directed or rerouted to stabilized open space areas on the lot where the discharge area is at least 25 feet from all lot lines. If the discharge area contains significant stands of vegetation, the setback may be reduced to ten feet from all lot lines. Stormwater shall not be directly discharged onto an onsite wastewater system drain field.

11.5.2.2.2. No Stormwater Improvements shall be required in cases where the at-grade elevation measured ten (10) feet beyond the property line onto the adjacent property is equal to or higher than the proposed finished grade elevation. This shall be measured from either the top of the slab or from the proposed elevation under the building if no slab is proposed.

11.5.2.2.3. The Public Works Director may approve discharge of runoff into street right-of-way as part of the overall drainage plan and right-of-way drainage infrastructure improvements.

11.5.2.3. ~~Guidance for applying and calculating the techniques listed above can be found in the Town of Nags Head Recommended Standard Details Manual.~~ Stormwater Improvements shall be maintained in a manner consistent with the applicable requirements of the issued permit.

11.5.2.4. On-site permanent runoff control ~~measures~~ improvements shall be installed, ~~in conjunction with other on-site stormwater management practices,~~ to intercept rainfall runoff from driveways that are sloped or graded towards the street or right-of-way. On-site permanent runoff control practices include, but are not limited to, permeable pavement ribbons, slotted drains, ~~driveway speed bumps~~ or other approved methods of diverting, collecting and managing on-site runoff. ~~Measures to control runoff from driveways may be combined with other stormwater management techniques to meet the~~ stormwater volume requirement.

11.5.2.5. ~~In no instance shall~~ Open drainage systems shall not be located beneath a building.

~~**11.5.2.6.** Storage capacity (interstitial storage) within existing soils and/or fill material shall not be counted towards the volume requirement for the stormwater management design.~~

~~***11.5.2.7. Reduction of built-upon area.*** Certain stormwater management practices are encouraged and shall reduce the site's built-upon area in accordance with the following standards:~~

~~**11.5.2.7.1.** Paved surfaces which are designed to be permeable in accordance with the Town of Nags Head Recommended Standard Details Manual or as otherwise approved by the stormwater administrator shall not count as built-upon area.~~

~~**11.5.2.7.2.** The water surface area of pools, wood slatted decks, and non-compacted, clean gravel and stone areas shall not count as built-upon area.~~

~~**11.5.2.7.3.** Preservation and/or planting of vegetation shall reduce built-upon area in accordance with the following schedule:~~

~~**11.5.2.7.3.1.** Existing trees receive a 100 square foot reduction in built-upon area (min. 6" diameter breast height).~~

~~**11.5.2.7.3.2.** New trees receive a 50 square foot reduction in built-upon area (, min. 6' tall).~~

~~**11.5.2.7.3.3.** Trees must comply with list of approved species included in the Town's Vegetative Planting Guidelines.~~

~~**11.5.2.7.4.** Projects that reduce the overall limits of disturbance and designate areas of preserved open space shall receive a reduction in built-upon area.~~

~~**11.5.2.7.4.1.** Open space areas and the credit for the reduction of built-upon area shall be calculated at a 2:1 ratio. For example, for every two square feet of preserved open space, built-upon area shall be reduced by one square foot.~~

~~**11.5.2.7.4.2.** Individual pockets or areas of preserved open space shall be a minimum of 250 square feet in area.~~

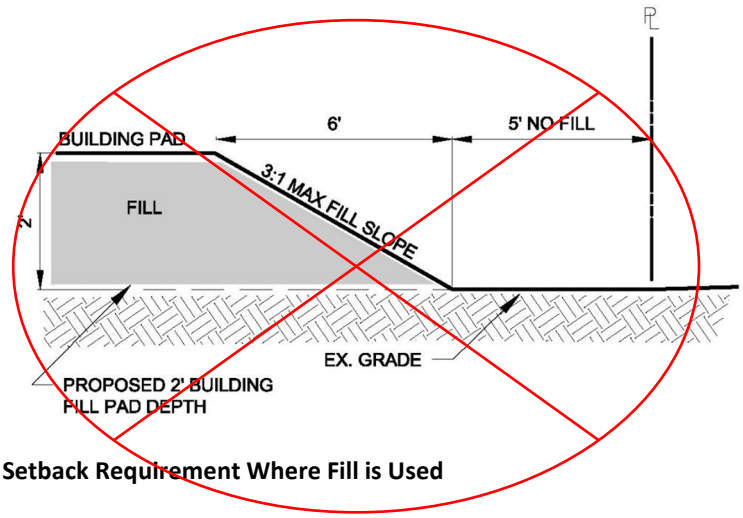
~~**11.5.2.7.4.3.** Preserved open space shall not be applied in areas of the lot that are typically excluded from development including , ponds, or areas that are excluded from development by other agencies.~~

~~**11.5.2.7.4.4.** Preserved open space shall contain significant examples of locally adaptive and/or native trees and/or shrubs and shall be located in areas that create natural vegetative filtering or retention between built-upon areas and adjacent properties or rights-of-way.~~

~~**11.5.2.7.5.** Total tree credit and/or open space preservation credits in combination shall not reduce total built-upon area by more than percent.~~

~~**11.5.2.7.6.** Projects that incorporate or more of the stormwater control measures listed in subsection 11.5.2.2 above shall receive a 15 percent built-upon area reduction. This reduction shall be applied in addition to the built-upon area reductions already provided by this section. To receive this credit, each measure shall individually account for a minimum of 15 percent of the project's overall storage volume.~~

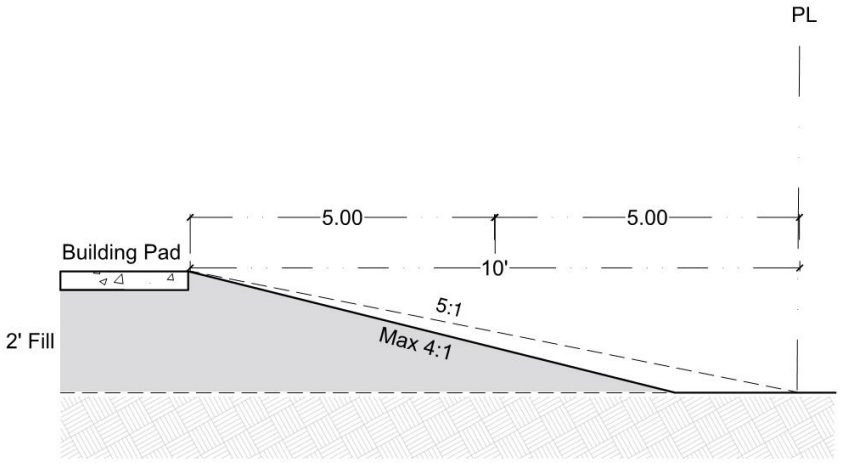
~~**11.5.2.8.** Fill shall not be placed within five feet of a property line, except for the grading of driveway entrances, such that runoff from a fill slope is not "pitched" onto adjoining properties. A maximum of a 3:1 horizontal to vertical fill slope shall be maintained. Setback area may be used to accommodate an approved stormwater control measure. See diagram below.~~



Setback Requirement Where Fill is Used

11.5.2.6. A stormwater plan designed by a registered design professional to retain a 1.5-inch storm shall satisfy the requirements of Section 11.5.2.

11.5.2.7. No fill material shall be re-distributed or placed on a lot in the rear or side setback areas unless the final horizontal to vertical slope is 4:1 or less. This shall be calculated from the finished final grade to the rear and side property lines. All burden shall be on the applicant to confirm this condition.



Setback Requirement Where Fill is Used. A Stormwater measure may be required as per 11.5.2.2. Setbacks vary by zoning district.

~~**11.5.2.9.8.** The five-foot Fill setback requirements may be varied or waived as part of a multi-lot development of contiguous properties, or between adjacent properties if and only if a dedicated easement is established to accommodate a shared drainage swale or other SCM~~ Stormwater Improvement ~~between adjacent properties as approved by the UDO Administrator.~~

11.5.2.~~10.~~8. The construction and use of bulkheads, walls, and other structural controls to retain the placement of fill on property shall only be permitted:

11.5.2.~~10~~8.1. In the immediate area of the on-site sewage disposal system as approved by the Dare County Health Department for the installation of such system, or

11.5.2.~~10~~8.2. In those areas of the property where the naturally occurring slope exceeds 3:1 or greater in steepness, or

11.5.2.~~10~~8.3. In those areas of where a retaining wall is necessary to achieve ~~a five-foot setback of fill from~~ compliance with the fill requirement in 11.5.2.7. ~~as relates to adjacent property boundary.~~ Retaining walls used on fill slopes ~~shall not be tiered~~, shall not retain more than two feet of fill, and shall not exceed two feet ~~in~~ total ~~maximum~~ height from original ~~final~~ grade~~.~~

11.5.2.~~11.~~9. The allowable depth or elevations for fill are in subsection 11.5.3 of this section.

11.5.3. Standard for Depth or Elevation of Fill.

Any residential development or redevelopment which utilizes fill shall be limited to the following standards:

11.5.3.1. Properties East of NC 12 and SR 1243.

11.5.3.1.1. The placement of site-compatible, non-structural fill under or around an elevated building is limited to two (2) feet. Fill greater than two (2) feet must include an analysis prepared by a qualified registered design professional demonstrating no harmful diversion of floodwaters or wave runup and

wave deflection that would increase damage to adjacent elevated buildings and structures. Excavated material moved or relocated onsite is considered fill.

11.5.3.1.2. The fill material must be similar and consistent with the natural soils in the area.

11.5.3.1.3. Minor grading and the placement of minor quantities of nonstructural fill, outside the areas referenced in 11.5.3.1.1., may be permitted for landscaping and for drainage purposes and for support of parking slabs, pool decks, patios and walkways.

11.5.3.1.4 Nonstructural fill with finished slopes that are steeper than five (5) units horizontal to one (1) unit vertical shall be permitted only if an analysis prepared by a qualified registered design professional demonstrates no harmful diversion of floodwaters or wave runup and wave deflection that would increase damage to adjacent elevated buildings and structures.

~~**11.5.3.1.1.** Fill shall be subject to the provisions of Section 11.44.3.11.~~

~~**11.5.3.1.2.** Areas of fill exceeding the height of existing grade shall not exceed ten (10) percent of the lot area (see Article 8, District Development Standards), excluding the footprint of the active drainfield and septic system as approved by the Dare County Health Department in accordance with the septic permit. Lot area is defined as that portion of the lot landward of the first line of stable vegetation as defined by CAMA.~~

11.5.3.1.~~3~~5. No bulkheads are allowed.

11.5.3.1.6. Within the Village at Nags Head, only parcels with direct frontage on the Atlantic Ocean/ocean beach shall be considered a Coastal High Hazard area with an RFPE of 12.

11.5.3.2. Properties West of NC 12 and SR 1243.

~~**11.5.3.2.1.** In areas where the most recent Flood Insurance Rate Map (FIRM) provides a base flood elevation for a subject property, fill shall not exceed the amount required for wastewater permits required by the Dare County Health Department, or the base flood elevation, whichever is greater. However, when fill is proposed to be placed directly beneath a slab that is designed to meet the base flood elevation depicted on the FIRM, fill may exceed the base flood elevation by up to twelve inches (12") to support a turn-down or thickened edge slab or beneath a slab that is supported by a ring-wall style foundation; when designed in this manner, fill placed above the base flood elevation shall not extend beyond the outside edge of the slab.~~

11.5.3.2.1. Fill shall not be permitted to exceed the regulatory flood protection elevation (RFPE), the amount for wastewater permits required by the Dare County Health Department, or two (2) feet above pre-development surface elevation, whichever is higher.

~~**11.5.3.2.2.** In areas where the most recent Flood Insurance Rate Map (FIRM) provides no base flood elevation, fill shall not exceed the Regulatory Flood Protection Elevation (RFPE), the amount required for wastewater permits required by the Dare County Health Department, or two feet (2') above pre-development surface elevation, whichever is greater.~~

11.5.3.3 Pre-development surface elevations shall be taken at the four corners of the building footprint. These elevations shall be averaged for the purposes of determining fill height. In cases where the building footprint is irregular and has more than four sides, pre-development surface elevations shall be taken using the four outermost building corners.

~~**11.5.3.3.2.** No ground elevation anywhere on the lot, including beneath the final house footprint location, may be increased by more than 2 feet, the Regulatory Flood Protection Elevation (RFPE), or as required by the Dare County Health Department permit.~~

11.5.3.4. Lot depressions ~~that are interior to the lot a minimum of 5 feet from all lot lines~~ may be filled, either by grading materials from other locations on the lot or by bringing in like-kind material, no higher than to the level of the directly adjacent pre-disturbance elevation completely surrounding the depression. The post-fill condition shall be considered as the pre-development surface elevation for the purpose of determining fill height.

11.5.4. Plan Submittal, Review and Approval for Residential Development on Individual Lots.

It is the responsibility of an applicant to provide sufficient information in the plan so that the Town or its agents may reasonably evaluate the environmental characteristics of the affected areas, the potential and predicted impacts of the proposed activity on area surface waters, and the effectiveness and acceptability of those measures proposed by the applicant for reducing adverse impacts. The applicant shall provide, as necessary, maps, tables, photographs, narrative descriptions and explanations to demonstrate compliance with the Town's stormwater management standards.

11.5.4.1. The stormwater management plan shall be submitted as part of the application for a building permit or land disturbance permit.

11.5.4.2. The stormwater management plan need not be prepared by a registered design professional. However, the Town will consider plans and additional alternatives to meet the stormwater requirements if prepared by a registered design professional. An on-site meeting with the Stormwater Administrator or his/her designee is strongly encouraged prior to plan preparation.

11.5.4.3. The stormwater management design information may be depicted on a site survey that is also utilized for zoning, CAMA, or other Town approvals. At a minimum the plan shall include:

11.5.4.3.1. Existing Conditions. The conditions of the site shall be described in general, including the following:

11.5.4.3.1.1. The direction of flow of stormwater runoff under existing conditions.

11.5.4.3.1.2. The location of areas on the site where stormwater collects or infiltrates into the ground.

11.5.4.3.1.3. A survey of the site, including topography. The survey shall be prepared by a licensed surveyor and shall include the minimum required elevation information as referenced in the ~~Town of Nags Head Recommended Standard Details Manual~~ Town of Nags Head's Minimum Required Survey Information Template which can be found in Appendix A of the Town's Low Impact Development Manual. The survey must also show the location of drainage ditches within the area surveyed, and the location of wetlands, and ponds.

11.5.4.3.1.4. Approximate elevation of seasonal high-water table. "Seasonal high wetness condition" as indicated by the Dare County Health Department site evaluation is acceptable for determining vertical separation compliance of ~~SCMs~~ Stormwater Improvements on single family and two-family residential projects. Also, include any fill requirements provided with the Dare County Health Department septic approval.

11.5.4.3.2. Proposed Alterations. Proposed alterations of the site shall be described, including:

11.5.4.3.2.1. Change(s) in topography. The proposed final elevations shall be shown in a manner that can be distinguished from the existing elevations. If there are abrupt changes in elevations, these should be clearly identified in the plans. These should be plotted on a scale that is easy to read and in a form that conveys the nature of changes that are proposed.

11.5.4.3.2.2. Identification and quantification of the area(s) that will be covered with built-upon area and a description of the surfacing material(s).

~~**11.5.4.3.2.3.** The proposed area to be preserved and/or planted with vegetation as well as any designated open space. This shall include the location of any trees and/or open space that will be utilized to reduce the built-upon area calculations.~~

11.5.4.3.2.3. The proposed area to be preserved and/or planted with vegetation as well as any significant existing vegetation. ~~This shall include the location of any tree greater than six inches in diameter at breast height (dbh) or 4.3 feet above the ground.~~

11.5.4.3.2.4. Identification and quantification any other site improvements such as pools, wood slatted decks, and permeable pavement.

11.5.4.3.2.5. The size and location of any buildings or other structures, including bulkheads or retaining walls.

~~**11.5.4.3.2.6.** Stormwater Runoff Features. All SCMs intended to receive stormwater runoff from the proposed built-upon areas on the site shall be described and their location identified on the survey.~~

11.5.4.3.2.6. Stormwater Improvements shall be described, and their location identified on the survey.

11.5.4.3.2.7. Erosion and Sediment Control Measures. A description of the measures that will be put in place for the control of erosion and sedimentation shall be provided.

11.5.4.3.2.8. Other Information. The applicant shall provide other information which the Town or its designated agent deems necessary for an evaluation of the development proposal for compliance with this chapter.

11.5.4.4. Elevation data shall be provided on the foundation survey as required, and/or on the as built survey so as to determine compliance with the maximum fill height requirements of this chapter.

11.5.4.5. Upon completion of stormwater management improvements, the Stormwater Administrator or his/her designee shall verify compliance via field inspection. Once a project is completed, stormwater management features shall be maintained in accordance with the approved plan and subsequent certificate of compliance.

(Ord. No. 20-06-008 , Art. II, Pt. VII, 6-3-2020; Ord. No. 20-09-013 , Art. III, Pt. I, 9-2-2020; Ord. No. 21-06-012 , Art. III, Pt. XII(Att. L), 6-2-2021)

Section 11.6 General Standards for Subdivisions.

11.6.1. Commercial Subdivisions.

All runoff from the subdivision's built-upon area~~, including proposed streets,~~ must be directed into an approved stormwater management system designed to accommodate the runoff generated by a 4.3-inch design storm. Overflow shall not be conveyed off-site to private property or public rights-of-way for disposal except upon the establishment of appropriate easements and maintenance agreements among all impacted parties and upon Town approval.

11.6.2. Residential Subdivisions.

All runoff from the subdivision's built-upon area, including proposed streets, must be directed into an approved stormwater management system designed to accommodate the runoff generated by a 1.5-inch design storm. Overflow shall not be conveyed off-site to private property or public rights-of-way for disposal except upon the establishment of appropriate easements and maintenance agreements among all impacted parties and upon Town approval.

11.6.3. Future Phase Development.
Management of stormwater from part or all of the future development on commercial or residential sites may be deferred in a phased plan until a given phase is subject to site plan review. The subdivision plat shall clearly identify the specific areas of future phase development and the extent to which management of stormwater is deferred.

11.6.4. ROW/Common Areas.
Use of fill within proposed rights-of-way or other common areas shall not exceed the ~~base flood elevation~~ Regulatory Flood Protection Elevation (RFPE) ~~base flood elevation~~ for the zone in which the fill is proposed.

11.6.5. Operation and Maintenance Agreement.
All stormwater plans must include an operation and maintenance agreement that provides for on-going maintenance of the proposed stormwater management system and which assigns responsibility to an owners association as part of any covenants or deeds that run with the individual parcels.

Section 11.7 Stormwater Management Plan Submittal and Approval Requirements.

11.7.1. Preparer's Certification.
Commercial, mixed-use or multi-lot development such as a subdivision, stormwater management plans and supporting technical documents shall be prepared by a qualified and registered design professional knowledgeable within the field of work for the performance of the design, construction, and operation and maintenance of what is being proposed.

11.7.2. Supporting Documentation.
Supporting plans and documentation including assumptions, methodology, calculations and conclusions shall be submitted to the Town as part of the application.

11.7.2.1. For all subdivisions and commercial applications, a stormwater management plan with all supporting documentation meeting all Town requirements and standards shall be submitted with the plat or site plan application for approval by the Town Engineer.

11.7.2.2. For special uses, a preliminary stormwater management plan shall be submitted with the special use permit application. A stormwater management plan with all supporting documentation meeting all Town requirements and standards shall be submitted with, or in advance of, the application for a building permit.

11.7.3. Submittal Requirements.
The stormwater management plan shall include engineered drawings, non-engineered drawings, maps, assumptions, calculations and narrative statements, including:

11.7.3.1. Existing Conditions. Sheets or maps indicating existing features, including buildings, ground surface elevations, landforms, parking areas, roadways, structures, subsurface utilities, surface utilities, surface waters, watercourses, vegetation, and other significant elements. Elevations shall be provided in sufficient detail to determine the efficacy of proposed Stormwater Improvements and compliance with all stormwater and fill requirements. At a minimum, pre-disturbance spot elevations shall be provided beneath proposed improvements and along property lines adjacent to any fill slopes.

11.7.3.2. Project boundaries clearly depicted and labeled, including any staging areas.

11.7.3.3. Locations and elevations of the adjoining street pavement, shoulder, ditches, and drainage systems, as well as upstream and downstream driveway culverts.

11.7.3.4. Approximate elevation of seasonal high-water table. "Seasonal high wetness condition" as indicated by the Dare County Health Department site evaluation is acceptable for determining vertical separation compliance of BMPs on single family and two-family residential projects. Also include any fill requirements provided with the Dare County Health Department septic approval.

11.7.3.5. Distance Measurements. Lateral and vertical separation distances from AECs, state surface waters, subsurface water conditions, above ground and underground utilities, or other separation distances as required by existing federal, state or local laws clearly depicted.

11.7.3.6. Proposed Conditions. Sheets or maps indicating location of proposed features including areas where fill will be placed including the toe of fill slopes, buildings, ground surface elevations, landforms, parking areas, roadways, structures, subsurface utilities, landscaping, and other significant elements.

11.7.3.7. Drawings shall describe the proposed elements and their association with existing elements with spot elevations depicted in areas of proposed fill and finished floor elevations for all proposed buildings/structures described. Notational information shall be provided which includes existing surface elevation at each site element, proposed maximum fill depths for each site element, and maximum fill depth within the project site.

11.7.3.8. Location and description of stormwater BMPs proposed to capture runoff from all surfaces within a given drainage area.

11.7.3.9. Location of erosion control measures relative to fill slopes and disturbed areas. This shall include any temporary measures that will be necessary to retain stormwater or other construction related water discharges on the property during construction prior to the installation of final Stormwater Improvements.

11.7.4. Operations and Maintenance Agreement.

An operations and maintenance agreement shall be submitted to and be approved by the Town. The operations and maintenance agreement shall address sediment removal, mowing and re-vegetation, immediate repair of eroded areas, debris removal, and unclogging of any structures. The operations and maintenance agreement may provide for access by the Town and its agents to all stormwater management measures at the site for the purposes of inspection, maintenance, reporting, and repair operations. The operations and maintenance plan shall run with the property and compliance shall be the responsibility of the property owner.

11.7.5. Easements/Covenants.

Copies of all recorded easements or covenants that run with the property and are necessary for continued function of the best management practices utilized for plan approval.

11.7.6. Certification.

Upon completion of construction, stormwater management facilities shall be certified by the stormwater plan preparer or a qualified and authorized professional as having been constructed in substantial conformity with the Town-approved plans and specifications. The acceptability of a certification by any other person than the person who prepared the original design shall be at the sole discretion of the Town. A copy of this documentation shall be submitted to the Town prior to the issuance of a certificate of compliance.

11.7.7. Construction Record or As-Built Plans.

The construction record survey or plan shall include any on-site stormwater management measures and shall be prepared once final construction has been completed. These plans shall be prepared by a licensed surveyor and shall include all of the elements shown as proposed on the approved construction plans and depict sufficient topographic information to demonstrate compliance with the approved plans. These shall be submitted to the Town prior to the issuance of a certificate of compliance.

(Ord. No. 21-06-012 , Art. III, Pt. XII(Att. L), 6-2-2021)

Section 11.8 Operations and Maintenance Requirements.

11.8.1. For All Projects Other than Residential Development on Individual Lots.

11.8.1.1. An operations and maintenance agreement based on the operations and maintenance plan shall be executed by the owner or amongst the owners and approved by the Town prior to issuance of a certificate of compliance.

11.8.1.2. The operations and maintenance agreement:

11.8.1.2.1. Shall require the owner or owners to maintain, repair, and if necessary, reconstruct the stormwater management features, and

11.8.1.2.2. Shall state the terms, conditions, and schedule of maintenance for the stormwater management features, and

11.8.1.2.3. May grant to the Town a right of entry into the property to inspect, monitor, maintain, repair, or reconstruct the stormwater management features. However, in no case shall the right of entry confer an obligation on the Town to assume responsibility for the stormwater management features.

11.8.1.3. Operations and maintenance agreement recordation requirements. Prior to issuance of a certificate of compliance for any project served by stormwater management features required by this ordinance, the operations and maintenance agreement shall be recorded as a deed restriction or protective covenant with the Dare County Register of Deeds Office binding all subsequent property owners to compliance with the agreement.

11.8.2. Approval Required.
The Town-approved stormwater management system shall not be altered without approval of the Town Engineer.

11.8.3. Maintenance.
Failure to maintain on-site stormwater management facilities shall be grounds for a notice of violation, civil penalties and possible revocation of occupancy permits in accordance with Section 1.10, Violation of UDO Regulations.

(Ord. No. 21-06-012 , Art. III, Pt. XII(Att. L), 6-2-2021)

Section 11.9 Reference Documents.

11.9.1. The Town has prepared a ~~Town of Nags Head Recommended Standard Details Manual~~ Low Impact Development Manual which includes guidance on specific Stormwater ~~control measures,~~ Improvements and other requirements of this ordinance. The Town will make copies of the most current ~~Town Recommended Standard Details Manual and the most current NCDEQ BMP manual~~ Town of Nags Head Low Impact Development Manual and the most current NCDEQ Stormwater Design manual available to applicants.

11.9.2. Applicants for permits under this Part shall refer to the most current editions of the ~~NCDEQ BMP manual~~ NCDEQ Stormwater Design Manual and the Town's Low Impact Development Manual if citing them for the design, construction and maintenance management practices on the site associated with the application. Stormwater treatment practices that are designed, constructed, and maintained in accordance with the ~~NCDEQ BMP manual~~ NCDEQ Stormwater Design Manual and the Town's Low Impact Development Manual will be presumed to meet the minimum water quality and quantity performance standards of this Part.

11.9.3. Applicants for permits under this Part may propose utilization of a stormwater management practice or practices which are not designed, constructed, or maintained in accordance with the ~~NCDEQ BMP manual and the Town Recommended Standard Details Manual~~NCDEQ Stormwater Design Manual and the Town Low Impact Development Manual. In such cases, the applicant shall have the burden of demonstrating that the practice(s) will satisfy the minimum water quality and quantity performance standards of this ordinance and the practices must be approved by the UDO Administrator.

11.9.4. Upon review and evaluation of an application for a permit under this Part, the Stormwater Administrator may recommend management practices regarding a particular site. If upon review and inspection the UDO Administrator determines that the environmental conditions of a particular site will not support the management practices proposed by an applicant, the UDO Administrator may require reasonable changes to the application, professional certification of a particular design and/or evaluation of the proposal by the Town Engineer. The UDO Administrator may require any reasonable changes to an application proposed by the Town Engineer.

Section 11.10 Discharge of Stormwater, Pool Water, Hot Tub Water, and De-Watering Effluent.

11.10.1. It shall be prohibited to discharge or direct water onto adjoining properties without appropriate easements or agreements from any source under the control of the owner of the premise, to include retained stormwater runoff, swimming pools, hot tubs, heating and air conditioning systems, or groundwater from de-watering activities.

~~**11.10.2.** Temporary discharge of retained stormwater or water from other sources into the Town right-of-way is allowable only with the permission of the Town Manager, Public Works Director or Town Engineer.~~

11.10.2. Discharge of retained stormwater or water from other sources into the Town right-of-way is allowable only with the~~express~~ written permission of the Town Manager, Public Works Director or Town Engineer.

11.10.3. Temporary discharge of retained stormwater or water from other sources into the NCDOT right-of-way is allowable only with permission of NCDOT and a properly executed NCDOT encroachment agreement.

11.10.4. Upon a determination that this section is being violated, the Stormwater Administrator may immediately issue a notice of violation and civil citation without need for a warning citation under Section 1.10, Violation of UDO Regulations or Town Code 1-6. Upon receipt of the notice of violation, the violator shall immediately cease and desist the activity which is in violation of this section. In the event that a violation imminently affects public safety, health or welfare, the Town may take action to abate the violation in a manner which appropriately balances the need for public safety with the need for due process of law.

(Ord. No. 21-06-012 , Art. III, Pt. XII(Att. L), 6-2-2021)

Section 11.11 Public/Private Conflicts.

Where it has been determined that stormwater runoff from Town rights-of-way or Town-owned facilities contributes to a stormwater runoff problem on private property, a landowner may file a written request to the Board of Commissioners to consider landowner's concerns or to propose a solution. The Town Board may consider requests and determine whether or not to take any action.

Section 11.12 Drainage within Town Rights-of-Way.

11.12.1. An un-obstructed flow path for drainage infrastructure along Town rights-of-way shall be maintained. Town rights-of-way are necessary for legal/uncontested access by local government to drainage courses and infrastructure so that they may be constructed, maintained and improved to enhance public health and safety. Improperly installed fencing, landscaping, or the creation of other impediments or changes within the right-of-way may interfere with drainage along the roadway.

11.12.2. Construction or installation of permanent or temporary structures, landscaping, grading alterations, or other encroachments within, under, above, or upon any public right-of-way, are prohibited without the express permission from the Town.

11.12.3. Homeowners shall be responsible for maintenance of Town approved right-of-way encroachments, including culverts, other stormwater Improvements, driveway maintenance, routine grounds maintenance such as grass mowing, and trash or debris removal that may impede the flow of water within drainage conveyances.

11.12.4. Upon approval by the Board of Commissioners, the Town may allow and may accept for maintenance, stormwater control and conveyance facilities built by others on Town rights-of-way or on Town-owned properties.

11.12.4.1. The design of such facilities shall be approved by the Town at the sole discretion of the Town, and the construction of such facilities shall be in strict conformity with the approved design.

11.12.4.2. Approval can only be granted after an identification and evaluation analysis of significant cumulative impacts on the entire drainage system, up to the ultimate point of disposal, utilizing such supporting information, documents, evaluations, studies and other resources as the Town may deem necessary.

11.12.4.3. The Town may establish and impose review fees to cover the cost of design review and construction inspection, and facility fees to cover the cost of capital impacts resulting from the proposed facilities.

11.12.4.4. The operation and maintenance of facilities accepted by the Town for maintenance on Town rights-of-way or Town-owned property shall be at the expense of the Town.

Section 11.13 Penalties for Violation of Article 11, Part I.

Violation of this Article 11, Part I shall subject the offender to remedies prescribed in Section 1.10, Violation of UDO Regulations or Chapter 1-6 of the Town Code.

Section 11.14 Variances, Waivers, and Appeals.

Variances, Waivers, and appeals to Part I, Stormwater, Fill, and Runoff Management shall be granted in accordance with Article 3, Legislative/Quasi-Judicial Procedures.

Section 11.15 Conflict with Other Laws.

Where this Part imposes greater restrictions or higher standards than required in any federal or state statute or other local ordinance or regulation, the provisions of this Part shall govern. When the provisions of any other statute or local ordinance impose greater restrictions or higher standards than are required by the provisions of this Part, the provisions of that statute or ordinance shall govern.

Section 11.16 Validity.

If any section, subsection, sentence, clause or phrase of this Part is for any reason held to be invalid, that decision shall not affect the validity of the remaining portions of this Part. The Board of Commissioners declares that it would have passed the ordinance and each section, clause and phrase of it even if any one or more sections, sentences, clauses or phrases may be declared invalid.

Sections 11.17—11.20 Reserved.

PART III. FLOOD DAMAGE PREVENTION

Section 11.41 Statutory Authorization, Findings of Fact, Purpose and Objectives.

11.41.1. Statutory Authorization.

The Legislature of the State of North Carolina has in Part 6, Article 21 of Chapter 143; Article 6 of Chapter 153A; Article 8 of Chapter 160A; and Article 7, 9, and 11 of Chapter 160D (Effective January 1, 2021) of the North Carolina General Statutes, delegated to local governmental units the authority to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. Therefore, the Board of Commissioners does ordain as follows in this Article 11, Part III.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.41.2. Findings of Fact.

11.41.2.1. The flood prone areas of the Town are subject to periodic inundation which results in loss of life, property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.

11.41.2.2. These flood losses are caused by the cumulative effect of obstructions in floodplains causing increases in flood heights and velocities, and by the occupancy in flood prone areas of uses vulnerable to floods or other hazards.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.41.3. Statement of Purpose.

It is the purpose of this Article 11, Part III to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions within flood prone areas by provisions designed to:

11.41.3.1. Restrict or prohibit uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

11.41.3.2. Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

11.41.3.3. Control the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of floodwaters;

11.41.3.4. Control filling, grading, dredging and other development which may increase erosion or flood damage; and

11.41.3.5. Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters, or which may increase flood hazards to other lands.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.41.4. Objectives.

The objectives of this article are to:

11.41.4.1. Protect human life, safety and health;

11.41.4.2. Minimize expenditure of public money for costly flood control projects;

11.41.4.3. Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

11.41.4.4. Minimize prolonged business losses and interruptions;

11.41.4.5. Minimize damage to public facilities and utilities, such as water and gas mains, electric, telephone, cable and sewer lines, streets and bridges, located in flood prone areas;

11.41.4.6. Minimize damage to private and public property due to flooding;

11.41.4.7. Make flood insurance available to the community through the National Flood Insurance Program (NFIP);

11.41.4.8. Maintain the natural and beneficial functions of floodplains;

11.41.4.9. Help maintain a stable tax base by providing for the sound use and development of flood-prone areas; and

11.41.4.10. To ensure that potential homebuyers are notified that property is in a Special Flood Hazard Area (SFHA) or other areas prone to flooding.

11.41.4.11. Mitigate flood risks in Nags Head by implementing local elevation standards for all Special Flood Hazards Areas and Shaded X and X flood zones.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

Section 11.42 General Provisions.

11.42.1. Lands to Which this Article 11, Part III Applies.

This Article 11, Part III shall apply to all areas within the jurisdiction of the Town, including Extra-Territorial Jurisdictions (ETJs) as allowed by law.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.42.2. Basis for Establishing the Special Flood Hazard Areas.

The special flood hazard areas are those identified under the Cooperating Technical State (CTS) agreement between the State of North Carolina and FEMA in its Flood Insurance Study (FIS) dated June 19, 2020 for Town of Nags Head, Dare County and associated DFIRM panels, including any digital data developed as part of the FIS, which are adopted by reference and declared a part of this ordinance, and all revisions thereto after January 1, 2021. Future revisions to the FIS and DFIRM panels that do not change flood hazard data within the jurisdictional authority of the Town of Nags Head are also adopted by reference and declared a part of this ordinance. Subsequent Letter of Map Revisions (LOMRs) and/or Physical Map Revisions (PMRs) shall be adopted within 3 months.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.42.3. Establishment of a Local Elevation Standard (LES)

The Local Elevation Standard means a locally adopted elevation level used as the Regulatory Flood Protection Elevation (RFPE) to mitigate flood hazards in the Shaded X, X, AE, AO, VE, as depicted on the FIRMs for Nags Head. These areas may be vulnerable to flooding from storm surge, wind-driven tides, and excessive rainfall. Many of these areas have repetitively flooded and continue to remain at risk to flooding. Therefore, an elevation standard and other floodplain development standards are needed to meet the objectives of this Section as identified in 11.41.4.

11.42.3.1. In Nags Head the RFPE is as defined as:

11.42.3.1.1. Coastal High Hazard Areas (CHHA)- Properties located to the east of NC 12 and SR 1243 are located in an active oceanfront environment that is vulnerable to storm surge, erosion, sea level rise, and other hazards. These areas have special flood hazards associated with high velocity waters from storm surges or seismic activity and, therefore, the RFPE is 12 feet NAVD 1988.

11.42.3.1.2. Properties west of NC 12 and SR 1243- The RFPE for properties located west of NC 12 and SR 1243 and in flood zones Shaded X, X, or AE, is 9 feet NAVD 1988. This includes properties abutting US 64, also known as the Causeway.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.42.4. Establishment of Floodplain Development Permit.
A floodplain development permit shall be required in conformance with the provisions of this Part prior to the commencement of any development activities within the AE, AO, VE, Shaded X or X zone.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.42.5. Compliance.
No structure or land shall hereafter be located, extended, converted, altered or developed in any way without full compliance with the terms of this Part and other applicable regulations.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.42.6. Abrogation and Greater Restrictions.
This Part is not intended to repeal, abrogate or impair any existing easements, covenants or deed restrictions. However, where this Part and another provision conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.42.7. Interpretation.
In the interpretation and application of this Part, all provisions shall be considered as minimum requirements; liberally construed in favor of the Board of Commissioners; and deemed neither to limit nor repeal any other powers granted under state statutes.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.42.8. Warning and Disclaimer of Liability.
The degree of flood protection required by this Part is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur; actual flood heights may be increased by manmade or natural causes. This Part does not imply that land outside the special flood hazard areas or uses permitted within such areas will be free from flooding or flood damages. This Part shall not create liability on the part of the Town or by an officer or employee thereof for any flood damages that result from reliance on this Part or any administrative decision lawfully made thereunder.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.42.9. Penalties for Violations.
Violation of the provisions of this Part or failure to comply with of its requirements, including violation of conditions and safeguards established in connection with grants of variance or special exceptions, shall constitute a Class 1 misdemeanor pursuant to NC G.S. § 143-215.58. Any person who violates this article or fails to comply with any of its requirements shall, upon conviction thereof, be fined not more than $500.00 or imprisoned for not more than 30 days, or both. Each day such violation continues shall be considered a separate offense. Nothing herein contained shall prevent the Town from taking such other lawful action as it necessary to prevent or remedy

any violation. Other lawful actions may include, but shall not be limited to, those provisions in Section 1.10, Violation of UDO Regulations.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

Section 11.43 Administration.

11.43.1. Designation of Floodplain Administrator.

The Chief Building Inspector or his designee, hereinafter referred to as the "Floodplain Administrator", is hereby appointed to administer and implement the provisions of this Part. In instances where the Floodplain Administrator receives assistance from others to complete tasks to administer and implement this ordinance, the Floodplain Administrator shall be responsible for the coordination and community's overall compliance with the National Flood Insurance Program and the provisions of this ordinance.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.43.2. Duties and Responsibilities of the Floodplain Administrator.

Duties of the floodplain administrator shall include, but not be limited to:

11.43.2.1. Review all floodplain development applications and issue permits for all proposed development Shaded X, X, AE, AO, and VE flood zones to assure that all requirements of this Part have been satisfied.

11.43.2.2. Review all proposed development to assure that all necessary local, state and federal permits have been received, including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334.

11.43.2.3. Notifying adjacent communities and the North Carolina Department of Public Safety, Division of Emergency Management, State Coordinator for the National Flood Insurance Program prior to any alterations or relocation of a watercourse and submitting evidence of such notification to FEMA.

11.43.2.4. Assuring that maintenance is provided within the altered or relocated portion of such watercourse so that the flood-carrying capacity is maintained.

11.43.2.5. Obtaining the actual elevation (in relation to NAVD 1988) of the reference level (including the basement) and all attendant utilities of all new or substantially improved structures in accordance with subsection 11.43.5.1 of this section.

11.43.2.6. Obtaining the actual elevation (in relation to NAVD 1988) to which all new or substantially improved structures and utilities have been floodproofed in accordance with subsection 11.43.5.1 of this section.

11.43.2.7. Obtain actual elevation (in relation to NAVD 1988) of all public utilities in accordance with subsection 11.43.5.1 of this section.

11.43.2.8. When floodproofing is utilized for a particular structure, the floodplain administrator shall obtain certifications from a registered professional engineer or architect in accordance with subsection 11.43.5.2 of this section and subsection 11.44.2.2.

11.43.2.9. Where interpretation is needed as to the exact location of the boundaries of the special flood hazard areas (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) or Shaded X or X flood zones, the floodplain administrator shall make the necessary interpretation. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in this Part.

11.43.2.10. When the lowest floor and the lowest adjacent grade of a structure or the lowest ground elevation of a parcel or structure in a special flood hazard area is above the base flood elevation, advise the

property owner of the option to apply for a letter of map amendment (LOMA) from FEMA. However, if the property is to be removed from the V Zone it must not be located seaward of the landward toe of the primary frontal dune. Maintain a copy of the letter of map amendment (LOMA) issued by FEMA in the floodplain development permit file.

11.43.2.11. Making on-site inspections of work in progress. As the work pursuant to a floodplain development permit progresses, the floodplain administrator shall make as many inspections of the work as may be necessary to ensure that the work is being done according to the provisions of this article and terms of the permit. In exercising this power, the floodplain administrator has a right, upon presentation of proper credentials, to enter on any premises within the jurisdiction of the Town at any reasonable hour for the purposes of inspection or other enforcement action.

11.43.2.12. Issue stop work orders as required. Whenever a building or part thereof is being constructed, reconstructed, altered, or repaired in violation of this Part, the floodplain administrator may order the work to be immediately stopped. The stop-work order shall be in writing and directed to the person doing the work. The stop-work order shall state the specific work to be stopped, the specific reasons(s) for the stoppage, and the conditions(s) under which the work may be resumed. Violation of a stop-work order constitutes a misdemeanor.

11.43.2.13. Revoke floodplain development permits as required. The floodplain administrator may revoke and require the return of the floodplain development permit by notifying the permit holder in writing stating the reason(s) for the revocation. Permits shall be revoked for any substantial departure from the approved application, plans, or specifications; for refusal or failure to comply with the requirements of state or local laws; or for false statements or misrepresentations made in securing the permit. Any floodplain development permit mistakenly issued in violation of any applicable state or local law may be revoked.

11.43.2.14. Permanently maintain all records pertaining to the administration of this Part and making these records available for public inspection, recognizing that such information may be subject to the Privacy Act of 1974, as amended.

11.43.2.15. Providing the North Carolina Department of Public Safety, Division of Emergency Management, State Coordinator for the National Flood Insurance Program with two copies of the maps delineating new corporate limits within six months from date of annexation or change in corporate boundaries.

11.43.2.16. Make periodic inspections throughout the jurisdiction of the Town. The floodplain administrator and each member of his or her inspections department shall have a right, upon presentation of proper credentials, to enter on any premises within the territorial jurisdiction of the department at any reasonable hour for the purposes of inspection or other enforcement action.

11.43.2.17. Follow through with corrective procedures of subsection 11.43.6.

11.43.2.18. Review, provide input, and make recommendations for variance requests.

11.43.2.19. Maintain a current map repository to include, but not limited to, historical and effective FIS report, historical and effective FIRM and other official flood maps and studies adopted in accordance with subsection 11.42.2 of this Part, including any revisions thereto including letters of map change, issued by FEMA. Notify state and FEMA of mapping needs.

11.43.2.20. Coordinate revisions to FIS reports and FIRMS, including letters of map revision based on fill (LOMR-F) and letters of map revision (LOMR).

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.43.3. Floodplain Development Application Requirements.

Application for a floodplain development permit shall be made to the floodplain administrator on forms prior to

any development activities. The following items shall be presented to the floodplain administrator to apply for a floodplain development permit:

11.43.3.1. Two copies of a plot plan drawn to scale, along with an electronic version, which shall include, but shall not be limited to, the following specific details of the proposed floodplain development; at the discretion of the floodplain administrator, such plot plans shall be certified by a North Carolina registered land surveyor or professional engineer:

11.43.3.1.1. The nature, location, dimensions, and elevations of the area of development/disturbance; existing and proposed structures, utility systems, grading/pavement areas, location of fill materials, storage areas, drainage facilities, and other development;

11.43.3.1.2. The boundary of any special flood hazard area or any Shaded X or X Zone as delineated on the FIRM or other flood map as determined in subsection 11.42.2 or a statement that the entire lot is within the special flood hazard area;

11.43.3.1.3. Flood zone(s), including any Shaded X or X zone, designation of the proposed development area as determined on the FIRM or other flood map as determined in subsection 11.42.2;

11.43.3.1.4. The base flood elevation (BFE) and/or the Regulatory Flood Protection Elevation (RFPE) where provided as set forth in subsection 11.42.2;

11.43.3.1.5. The old and new location of any watercourse that will be altered or relocated as a result of proposed development; and

11.43.3.1.6. The boundary and designation date of the CBRS area or OPA, if applicable.

11.43.3.2. Proposed elevation, and method thereof, of all development including but not limited to:

11.43.3.2.1. The elevation in relation to NAVD 1988 of the proposed reference level (including the basement) of all new and substantial improvements; and

11.43.3.2.2. Elevation in relation to NAVD 1988 to which any non-residential structure in zone AE, AO, Shaded X, or X Zone will be floodproofed; and

11.43.3.2.3. Elevation in relation to NAVD 1988 to which any proposed utility systems will be elevated or floodproofed.

11.43.3.3. If floodproofing, a floodproofing certificate (FEMA Form 086-0-34) with supporting data, an operational plan, and an inspection and maintenance plan that includes, but is not limited to, installation, exercise, and maintenance of floodproofing measures.

11.43.3.4. A foundation plan, drawn to scale, which shall include details of the proposed foundation system to ensure all provisions of this Part are met. These details include but are not limited to:

11.43.3.4.1. The proposed method of elevation, if applicable (i.e., fill, solid foundation perimeter wall, solid backfilled foundation, open foundation, open foundation on columns/posts/piers/piles/shear walls).

11.43.3.4.2. Openings to facilitate equalization of hydrostatic flood forces on walls in accordance with subsection 11.44.2.4 when solid foundation perimeter walls are used in zones AE or Shaded X or X Zone.

11.43.3.4.3. The following, in coastal high hazard areas, in accordance with subsection 11.44.2.4.4 and subsection 11.44.3:

11.43.3.4.3.1. V-Zone certification with accompanying plans and specifications verifying the engineered structure and any breakaway wall designs (breakaway wall designs are only for accessory structures). In addition, prior to the Certificate of Compliance/Occupancy issuance, the

floodplain administrator may require a registered professional engineer or architect to certify that the finished construction is compliant with the design, specifications and plans for VE Zone construction if determined necessary.

11.43.3.4.3.2. Plans for open wood lattice or insect screening, if applicable.

11.43.3.4.3.3. Plans for non-structural fill, if applicable. If non-structural fill is proposed, it must demonstrate through coastal engineering analysis that the proposed fill would not result in any increase in the base flood elevation or otherwise cause adverse impacts by wave ramping and deflection onto the subject structure or adjacent properties.

11.43.3.5. Usage details of any enclosed areas below the regulatory flood protection elevation.

11.43.3.6. Plans and/or details for the protection of public utilities and facilities such as sewer, gas, electrical, and water systems to be located and constructed to minimize flood damage.

11.43.3.7. Certification that all other local, state and federal permits required prior to floodplain development permit issuance (wetlands, endangered species, erosion and sedimentation control, Coastal Area Management Act (CAMA), riparian buffers, mining, etc.) have been received.

11.43.3.8. Documentation for placement of recreational vehicles and/or temporary structures, when applicable, to ensure subsections 11.44.2.3 and 11.44.2.5 of this Part are met.

11.43.3.9. A description of proposed watercourse alteration or relocation, when applicable, including an engineering report on the effects of the proposed project on the flood-carrying capacity of the watercourse and the effects on properties located both upstream and downstream; and a map (if not shown on the plot plan) showing the location of the proposed watercourse alteration and relocation.

11.43.3.10. In Shaded X and X zones, a survey prepared by a licensed North Carolina surveyor may be used to demonstrate the natural grades of the parcel relative to the RFPE.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.43.4. Floodplain Development Permit Requirements.

The Floodplain Development Permit shall include, but not be limited to:

11.43.4.1. A complete description of all the development to be permitted under the floodplain development permit. (e.g. house, garage, pool, septic, bulkhead, cabana, pier, bridge, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials, etc.).

11.43.4.2. The flood zone determination for the proposed development per available data specified in subsection 11.42.2.

11.43.4.3. The regulatory flood protection elevation required for the reference level and all attendant utilities.

11.43.4.4. The regulatory flood protection elevation required for the protection of all public utilities.

11.43.4.5. All certification submittal requirements with timelines.

11.43.4.6. The flood openings requirements, if in zones AE, Shaded X, or X Zone.

11.43.4.7. Limitations of use of the enclosures below the lowest floor, not to exceed 300 square feet in area, (i.e. parking, building access and limited storage only).

11.43.4.8. A statement, if in zone VE, that there shall be no alteration of sand dunes which would increase potential flood damage.

11.43.4.9. A statement, if in zone VE, that there shall be no fill used for structural support.

11.43.4.10 A statement, that all materials below BFE/RFPE must be flood resistant materials.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.43.5. Floodplain Development Certification Requirements.

11.43.5.1. Elevation Certificates for AE, AO, VE, Shaded X, and X Zones.

11.43.5.1.1. An elevation certificate (FEMA Form 086-0-33) may be required prior to the actual start of any new construction if determined necessary by the floodplain administrator. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of elevation of the reference level, in relation to NAVD 1988. The floodplain administrator shall review the certificate data submitted. Deficiencies detected by such review shall be corrected by the permit holder prior to the beginning of construction. Failure to submit the certification or failure to make required corrections shall be cause to deny a floodplain development permit.

11.43.5.1.2. An elevation certificate (FEMA 086-0-33) is required after the reference level is established. Within 21 calendar days of establishment of the reference level elevation, it shall be the duty of the permit holder to submit to the floodplain administrator a certification of the elevation of the reference level, in relation to NAVD 1988. Any work done within the 21 calendar-day-period and prior to submission of the certification shall be at the permit holder's risk. The floodplain administrator shall review the certificate data submitted. Deficiencies detected by such review shall be corrected by the permit holder immediately and prior to further work being permitted to proceed. Failure to submit the certification or failure to make the required corrections shall be cause to issue a stop-work order for the project.

11.43.5.1.3. A final Finished Construction elevation certificate (FEMA 086-0-33) is required after construction is completed and prior to certificate of compliance/occupancy issuance. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of final as-built construction of the elevation of the reference level and all attendant utilities. The floodplain administrator shall review the certificate data submitted. Deficiencies detected by such review shall be corrected by the permit holder immediately and prior to certificate of compliance/occupancy issuance. In some instances, another certification may be required to certify corrected as-built construction. Failure to submit the certification or failure to make required corrections shall be cause to withhold the issuance to a certificate of compliance/occupancy. The Finished Construction Elevation Certificate certifier shall provide at least 2 photographs showing the front and rear of the building taken within 90 days from the date of certification. The photographs must be taken with views confirming the building description and diagram number provided in Section A. To the extent possible, these photographs should show the entire building including foundation. If the building has split-level or multi-level areas, provide at least 2 additional photographs showing side views of the building. In addition, when applicable, provide a photograph of the foundation showing a representative example of the flood openings or vents. All photographs must be in color and measure at least 3" × 3". Digital photographs are acceptable.

11.43.5.1.4. For Shaded X and X flood zones east of NC 12 and SR 1243, the submission of the under construction elevation certificate may be waived if a survey of the parcel was used to certify the natural grade of the parcel was to or above 12 feet at the time of permit application. For Shaded X and X flood zones west of NC 12 and SR 1243, the submission of the under construction elevation certificate may be waived if a survey of the parcel was used to certify the natural grade of the parcel was to or above 9 feet at the time of permit application. In all cases, a finished construction elevation certificate is required at the completion of the project.

11.43.5.2. Floodproofing Certificate. If non-residential floodproofing is used to meet the regulatory flood protection elevation requirements, a floodproofing certificate (FEMA 086-0-33), with supporting data, an

operational plan, and an inspection and maintenance plan is required prior to the actual start of any new construction. It shall be the duty of the permit holder to submit to the floodplain administrator a certification of the floodproofed design elevation of the reference level and all attendant utilities in relation to NAVD 1988. Floodproofing certification shall be prepared by or under the direct supervision of a professional engineer or architect and certified by same. The floodplain administrator shall review the certificate data, the operational plan, and the inspection and maintenance plan. Deficiencies detected by such review shall be corrected by the applicant prior to permit approval. Failure to submit the certification or failure to make required corrections shall be cause to deny a floodplain development permit. Failure to construct in accordance with the certified design shall be cause to withhold the issuance of a certificate of compliance/occupancy.

11.43.5.3. A final Finished Construction Floodproofing Certificate (FEMA Form 086-0-34), with supporting data, an operational plan, and an inspection and maintenance plan are required prior to the issuance of a Certificate of Compliance/Occupancy. It shall be the duty of the permit holder to submit to the Floodplain Administrator a certification of the floodproofed design elevation of the reference level and all attendant utilities, in relation to NAVD 1988. Floodproofing certificate shall be prepared by or under the direct supervision of a professional engineer or architect and certified by same. The Floodplain Administrator shall review the certificate data, the operational plan, and the inspection and maintenance plan. Deficiencies detected by such review shall be corrected by the applicant prior to Certificate of Occupancy. Failure to submit the certification or failure to make required corrections shall be cause to deny a Floodplain Development Permit. Failure to construct in accordance with the certified design shall be cause to deny a Certificate of Compliance/Occupancy.

11.43.5.4. If a watercourse is to be altered or relocated, a description of the extent of the watercourse alteration or relocation, a professional engineer's certified report on the effects of the proposed project on the flood-carrying capacity of the watercourse and the effects to properties located both upstream and downstream; and a map showing the location of the proposed watercourse alteration or relocation shall be submitted by the permit applicant prior to issuance of a floodplain development permit.

11.43.5.5. Certification Exemptions. The following structures, if located within zones AE, AO, and Shaded X or X, are exempt from the elevation/floodproofing certification requirements specified in subsections 11.43.5.1.1 and 11.43.5.1.2 above:

11.43.5.5.1. Recreational vehicles meeting requirements of subsection 11.44.2.3;

11.43.5.5.2. Temporary structures meeting requirements of subsection 11.44.2.5; and

11.43.5.5.3. Accessory structures less than 150 square feet meeting or $5,000 or less and meeting requirements of requirements of subsection 11.44.2.6.

11.43.5.6. A V-Zone certification with accompanying design plans and specifications is required prior to issuance of a floodplain development permit within coastal high hazard areas. It shall be the duty of the permit applicant to submit to the floodplain administrator said certification to ensure the design standards of this Part are met. A registered professional engineer or architect shall develop or review the structural design, plans and specifications for construction and certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of this Part. This certification is not a substitute for an elevation certificate. In addition, prior to the Certificate of Compliance/Occupancy issuance, the floodplain administrator may require a registered professional engineer or architect to shall certify that the finished construction is compliant with the design, specifications and plans for VE Zone construction if determined necessary.

11.43.5.7. Determinations for existing buildings and structures. For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, change of occupancy, additions, rehabilitations, renovations, substantial improvements, repairs of

substantial damage, and any other improvement of or work on such buildings and structures, the Floodplain Administrator, in coordination with the Building Official, shall:

11.43.5.7.1. Estimate the market value, or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made;

11.43.5.7.2. Compare the cost to perform the improvement, the cost to repair a damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, if applicable, to the market value of the building or structure;

11.43.5.7.3 Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage; and

11.43.5.7.4. Notify the applicant if it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the NC Building Code and this ordinance is required.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.43.6. Corrective Procedures.

11.43.6.1. Violations to be corrected. When the floodplain administrator finds violations of applicable state and local laws, it shall be his duty to notify the owner or occupant of the building of the violation. The owner or occupant shall immediately remedy each of the violations of law cited in such notification.

11.43.6.2. Actions in event of failure to take corrective action. If the owner of a building or property shall fail to take prompt corrective action, the floodplain administrator shall give the owner written notice, by certified or registered mail, to his last known address or by personal service that:

11.43.6.2.1. The building or property is in violation of the flood damage prevention regulations;

11.43.6.2.2. A hearing will be held before the floodplain administrator at a designated place and time, not later than ten (10) working days after the date of the notice, at which time the owner shall be entitled to be heard in person or by counsel and to present arguments and evidence pertaining to the matter; and

11.43.6.2.3. Following the hearing, the floodplain administrator may issue such order to alter, vacate or demolish the building; or to remove fill as appears appropriate.

11.43.6.3. Order to take corrective action. If, upon a hearing held pursuant to the notice prescribed above, the floodplain administrator shall find that the building or development is in violation of this Part, he or she shall issue an order in writing to the owner, requiring the owner to remedy the violation within such period not less than sixty (60) days, nor more than one hundred and eighty (180) calendar days, as the floodplain administrator may prescribe; provided, however, that where the floodplain administrator finds that there is imminent danger to life or other property, he or she may issue an order that corrective action be taken in such lesser period as may be feasible.

11.43.6.4. Appeal. Any owner who has received an order to take corrective action may appeal the order to the board of adjustment by giving notice of appeal in writing to the floodplain administrator and the Town Clerk within ten (10) days following issuance of the final order. In the absence of an appeal, the order of the floodplain administrator shall be final. The Board of Adjustment shall hear an appeal within a reasonable time and may affirm, modify and affirm, or revoke the order.

11.43.6.5. Failure to comply with order. If the owner of a building or property fails to comply with an order to take corrective action from which no appeal has been taken, or fails to comply with an order of the board

of adjustment following an appeal, the owner shall be guilty of a misdemeanor and shall be punished in the discretion of the court.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.43.7. Variance Procedures.

Variance procedures shall be applied in AE, AO, VE, and Shaded X and X flood zones in accordance with Section 3.10, Variances of this UDO and the following additional provisions:

11.43.7.1. The Board of Adjustment, as established by the Town, shall hear and decide requests for variances from the requirements of this Part.

11.43.7.2. Any person aggrieved by the decision of the Board of Adjustment may appeal such decision to superior court, as provided in NCGS Chapter 7A.

11.43.7.3. Variances may be issued for:

11.43.7.3.1. The repair or rehabilitation of historic structures upon the determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

11.43.7.3.2. Functionally dependent facilities if determined to meet the definition as stated in Appendix A, provided provisions of subsections 11.43.7.10.2 and 11.43.7.10.3 have been satisfied, and such facilities are protected by methods that minimize flood damages during the base flood and create no additional threats to public safety; or

11.43.7.3.3. Any other type of development provided it meets the requirements stated in this section.

11.43.7.4. In passing upon variances, the Board of Adjustment shall consider all technical evaluations, all relevant factors, all standards specified in other sections of this Part and the:

11.43.7.4.1. Danger that materials may be swept onto other lands to the injury of others;

11.43.7.4.2. Danger to life and property due to flooding or erosion damage;

11.43.7.4.3. Susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

11.43.7.4.4. Importance of the services provided by the proposed facility to the community;

11.43.7.4.5. Necessity to the facility of a waterfront location as defined under Appendix A as a functionally dependent facility, where applicable;

11.43.7.4.6. Availability of alternative locations, not subject to flooding or erosion damage, for the proposed use;

11.43.7.4.7. Compatibility of the proposed use with existing and anticipated development;

11.43.7.4.8. Relationship of the proposed use to the Town's Comprehensive Plan and floodplain management program for that area;

11.43.7.4.9. Safety of access to the property in times of flood for ordinary and emergency vehicles;

11.43.7.4.10. Expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site; and

11.43.7.4.11. Costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical and water systems, and streets and bridges.

11.43.7.5. A written report addressing each of the above factors shall be submitted with the application for a variance.

11.43.7.6. Upon consideration of the factors listed in subsection 11.43.7.4 of this Part and the purposes of this Part, the Board of Adjustment may attach such conditions to the granting of variances as it deems necessary to further the purposes of this Part.

11.43.7.7. Any applicant to whom a variance is granted shall be given written notice specifying the difference between the RFPE and the elevation to which the structure is to be built and that such construction below the RFPE increases risks to life and property, and that the issuance of a variance to construct a structure below the RFPE will result in increased premium rates for flood insurance up to $25.00 per $100.00 of insurance coverage. Such notification shall be maintained with a record of all variance actions, including justification for their insurance.

11.43.7.8. The floodplain administrator shall maintain the records of all appeal actions and report any variances to the Federal Emergency Management Agency and the State of North Carolina upon request.

11.43.7.9. Conditions for variances.

11.43.7.9.1. Variances shall not be issued when the variance will make the structure in violation of other federal, state or local laws, regulations or ordinances.

11.43.7.9.2. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

11.43.7.9.3. Variances shall only be issued prior to development permit approval.

11.43.7.9.4. Variances shall only be issued upon:

11.43.7.9.4.1. A showing of good and sufficient cause;

11.43.7.9.4.2. A determination that failure to grant the variance would result in exceptional hardship; and

11.43.7.9.4.3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, or extraordinary public expense, create nuisance, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances

11.43.7.10. A variance may be issued for solid waste disposal facilities or sites, hazardous waste management facilities, salvage yards, and chemical storage facilities that are located in special flood hazard areas provided that all of the following conditions are met:

11.43.7.10.1. The use serves a critical need in the community;

11.43.7.10.2. No feasible locations exist for the use outside the SFHA;

11.43.7.10.3. The reference level of any structure is elevated or floodproofed to at least the RFPE;

11.43.7.10.4. The use complies with all other applicable federal, state and local laws; and

11.43.7.10.5. The Town has notified the Secretary of the North Carolina Department of Public Safety of its intention to grant a variance at least 30 calendar days prior to granting the variance.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

Section 11.44 Provisions for Flood Hazard Reduction.

11.44.1. General Standards. The following provisions are required in Shaded X, X, AE, AO, and VE flood zones:

11.44.1.1. All new construction and substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure.

11.44.1.2. All new construction or substantial improvements shall be constructed with materials and utility equipment resistant to flood damage in accordance with the FEMA Technical Bulletin 2, Flood Damage-Resistant Materials Requirements.

11.44.1.3. All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damages.

11.44.1.4. All new electrical, heating, ventilation, plumbing, air conditioning equipment and other service facilities shall be located at or above the RFPE or designed and/or installed so as to prevent water from entering or accumulating within the components during occurrence of base flood. These include, but are not limited to, HVAC equipment, water softener units, bath/kitchen fixtures, ductwork, electric/gas meter panels/boxes, utility, cable boxes, appliances (washers, dryers, refrigerators, freezers, freezers, etc.), hot water heaters, and electric outlets/switches.

11.44.1.4.1. Replacements that are part of a substantial improvement, electrical, heating, ventilation, plumbing, air conditioning equipment, and other service equipment shall also meet the above provisions.

11.44.1.4.2. Replacements that are for maintenance and not part of a substantial improvement, may be installed at the original location provided the addition and/or improvements only comply with the standards for new construction consistent with the code and requirements for the original structure.

11.44.1.5. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems.

11.44.1.6. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

11.44.1.7. On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding.

11.44.1.8. Nothing in this ordinance shall prevent the repair, reconstruction, or replacement of a building or structure existing on the effective date of this ordinance and located totally or partially within the floodway, non-encroachment area, or stream setback, provided there is no additional encroachment below the Regulatory Flood Protection Elevation in the floodway, non-encroachment area, or stream setback, and provided that such repair, reconstruction, or replacement meets all of the other requirements of this ordinance.

11.44.1.9. New solid waste disposal facilities and sites, hazardous waste management facilities, salvage yards, and chemical storage facilities shall not be permitted except by variance as specified in subsection 11.43.7.10. A structure or tank for chemical or fuel storage incidental to an allowed use or to the operation of a water treatment plant or wastewater treatment facility may be located in an SFHA only if the structure or tank is either elevated or floodproofed to at least the regulatory flood protection elevation and certified according to subsection 11.43.5 of this Part.

11.44.1.10. All subdivision proposals and other development proposals shall be consistent with the need to minimize flood damage.

11.44.1.11. All subdivision proposals and other development proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage.

11.44.1.12. All subdivision proposals and other development proposals shall have adequate drainage provided to reduce exposure to flood hazards.

11.44.1.13. All subdivision proposals and other development proposals shall have received all necessary permits from those governmental agencies for which approval is required by federal or state law, including Section 404 of the Federal Water Pollution Control Act Amendment of 1972, 33 U.S.C. 1334.

11.44.1.14. When a structure is partially located in a Special Flood Hazard Area or Shaded X or X flood zone, the entire structure shall meet the requirements for new construction and substantial improvements.

11.44.1.15. When a structure is located in multiple flood hazard zones or in a flood hazard risk zone with multiple base flood elevations, the provisions for the more restrictive flood hazard risk zone and the highest RFPE shall apply.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.44.2. Specific Standards.

In Shaded X, X, AE, AO, and VE flood zones as set forth in subsection 11.42.2 and 11.42.3, the following provisions, in addition to subsection 11.44.1 of this section are required:

11.44.2.1. Residential Construction. New construction or substantial improvement of any residential structure shall have the reference level, including the basement, elevated no lower than the regulatory flood protection elevation, as defined in Appendix A.

11.44.2.2. Non-Residential Construction. New construction and substantial improvement of any commercial, industrial, or other non-residential structure shall have the reference level, including basement, elevated no lower than the regulatory flood protection elevation, as defined in Appendix A. Structures located in AE, AO, Shaded X, and X zones may be floodproofed to the regulatory flood protection elevation in lieu of elevation provided that all areas of the structure, together with attendant utility and sanitary facilities, below the regulatory flood protection elevation are watertight with walls substantially impermeable to the passage of water, using structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. For AO Zones, the floodproofing elevation shall be in accordance Section 11.44.3. and 11.44.5. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied. Such certification shall be provided to the floodplain administrator as set forth in subsection 11.43.5, along with the operational and the inspection and maintenance plan.

11.44.2.3. Recreational Vehicles. Recreational vehicles placed on sites shall either:

11.44.2.3.1. Be on-site for fewer than 180 days; or

11.44.2.3.2. Be fully licensed and ready for highway use (a recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick-disconnect type utilities, and has no permanently attached additions); or

11.44.2.3.3. Meet all the requirements for new construction, including anchoring and elevation requirements of subsection 11.42.3 and subsections 11.44.1 of this section.

11.44.2.4. Elevated Buildings. Fully enclosed areas of new construction and substantially improved structures, which are below the regulatory flood protection elevation in AE, AO, Shaded X, or X Zones:

11.44.2.4.1. Shall not be designed or used for human habitation, but shall only be used for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment (standard exterior door), or entry to the living area (stairway or elevator). The interior portion of such enclosed area shall not be finished or partitioned into separate rooms, except to enclose storage areas;

11.44.2.4.2. Shall not be temperature-controlled or conditioned Non-temperature controlled dehumidifiers may be used in enclosed areas and shall not result in the enclosed area being determined to be conditioned space;

11.44.2.4.3. Shall be constructed entirely of flood-resistant materials, up to the regulatory flood protection elevation;

11.44.2.4.4. Shall not, in areas governed by the local elevation standard, exceed 300 "square feet in area" below the reference level with the exception of crawl space construction, and shall also include flood openings to automatically equalize hydrostatic flood forces on walls by allowing for the entry and exit of floodwaters. For the purposes of this requirement, enclosures shall be measured to the outside of the wall framing (to calculate floor area) excluding the thickness of sheathing, siding, or trim applied to the outside of the framing. To meet this requirement, the openings must either be certified by a professional engineer or architect or meet or exceed the following minimum design criteria:

11.44.2.4.4.1. A minimum of two flood openings on different sides of each enclosed area subject to flooding;

11.44.2.4.4.2. The total net area of all flood openings must be at least one square inch for each square foot of enclosed area subject to flooding or a minimum of one engineered square inch for each square foot of enclosed area for an engineered opening;

11.44.2.4.4.3. If a building has more than one enclosed area, each enclosed area must have flood openings to allow floodwaters to automatically enter and exit;

11.44.2.4.4.4. The bottom of all required flood openings shall be no higher than one foot above the adjacent grade;

11.44.2.4.4.5. Flood openings may be equipped with screens, louvers, or other coverings or devices, provided they permit the automatic flow of floodwaters in both directions; and

11.44.2.4.4.6. Enclosures made of flexible skirting are not considered enclosures for regulatory purposes, and, therefore, do not require flood openings. Masonry or wood underpinning, regardless of structural status, is considered an enclosure and requires flood openings as outlined above.

11.44.2.4.5. Shall allow, in coastal high hazard areas (zones VE), open wood latticework or insect screening, provided it is not part of the structural support of the building and is designed so as to breakaway, under abnormally high tides or wave action, without causing damage to the structural integrity of the building.

11.44.2.4.6. Property owners shall be required to execute and record a non-conversion agreement prior to issuance of a building permit declaring that the area below the lowest floor shall not be improved, finished or otherwise converted to habitable space; The Town of Nags Head will have the right to inspect the enclosed area .This agreement shall be recorded with the Dare County Register of Deeds and shall transfer with the property in perpetuity.

11.44.2.4.7. Release of restrictive covenant. If a property which is bound by a non-conversion agreement is modified to remove enclosed areas below BFE, then the owner may request release of restrictive covenant after staff inspection and submittal of confirming documentation.

11.44.2.5. Temporary Non-Residential Structures. Prior to the issuance of a floodplain development permit, for a temporary structure, all applicants must submit to the floodplain administrator a plan for the removal of such structures in the event of a hurricane, flash flood or other type of flood warning notification. The following information shall be submitted in writing to the floodplain administrator for review and written approval:

11.44.2.5.1. A specified time period for which the temporary use will be permitted. The time specified should not exceed three months, renewable up to one year;

11.44.2.5.2. The name, address and phone number of the individual responsible for the removal of the temporary structure;

11.44.2.5.3. The time frame prior to the event at which a structure will be removed (i.e.: minimum of 72 hours before landfall of a hurricane or immediately upon flood warning notification);

11.44.2.5.4. A copy of the contract or other suitable instrument with a trucking company to ensure the availability of removal equipment when needed; and

11.44.2.5.5. Designation, accompanied by documentation, of a location outside the Special Flood Hazard Area to which the temporary structure will be moved.

11.44.2.6. Accessory Structure. Accessory structures (sheds, detached garages, etc.), shall meet the following criteria:

11.44.2.6.1. Accessory structures with floor area located below the regulatory flood protection elevation shall not be used for human habitation, (including working, sleeping, living, cooking or restroom areas).

11.44.2.6.2. Accessory structures shall not be temperature controlled.

11.44.2.6.3. Any portion of an accessory structure located below the regulatory flood protection elevation shall not exceed 300 "square feet in area."

11.44.2.6.4. Accessory structures shall be designed to have low flood damage potential.

11.44.2.6.5. Accessory structures shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters.

11.44.2.6.6. Accessory structures shall be firmly anchored in accordance with subsection 11.44.1.1 of this section.

11.44.2.6.7. All service facilities such as electrical and heating equipment shall be installed in accordance with subsection 11.44.1.4 of this section.

11.44.2.6.8. Flood openings to facilitate automatic equalization of hydrostatic flood forces shall be provided below regulatory flood protection elevation in conformance with subsection 11.44.2.4.3 of this section.

11.44.2.6.9. An accessory structure with a footprint less than 150 square feet or that is a minimal investment of $5,000 or less and that satisfies the criteria outlined above does not require an elevation or floodproofing certificate. Elevation or floodproofing certifications are required for all other accessory structures in accordance with subsection 11.43.5.

11.44.2.6.10. Other secondary structures located on the same parcel, in addition to a principal use structure, which feature conditioned, temperature-controlled areas elevated above the regulatory flood protection elevation shall be constructed consistent with Section 11.44.1. General Standards and 11.44.2. Specific Standards. The certification requirements of 11.43.5.1. Elevation Certificates shall apply.

11.44.2.6.11. Accessory structures, regardless of the size or cost, shall not be placed below elevated buildings in Coastal High Hazard Areas (CHHA).

11.44.2.7. Additions/Improvements/Conversions.

11.44.2.7.1. Additions and/or improvements to pre-FIRM structures when the addition and/or improvements in combination with any interior modifications to the existing structure are:

11.44.2.7.1.1. Not a substantial improvement, the addition and/or improvements must be designed to minimize flood damages and must not be any more nonconforming than the existing structure.

11.44.2.7.1.2. A substantial improvement, with modifications/rehabilitations/improvements to the existing structure or the common wall is structurally modified more than installing a doorway, both the existing structure and the addition and/or improvements must comply with the standards for new construction.

11.44.2.7.2. Additions to pre-FIRM or post-FIRM structures with no modifications to the existing structure other than a standard door in the common wall shall require only the addition to comply with the standards for new construction.

11.44.2.7.3. Additions and/or improvements to post-FIRM structures when the addition and/or improvements in combination with any interior modifications to the existing structure are:

11.44.2.7.3.1. Not a substantial improvement, the addition and/or improvements only must comply with the standards for new construction consistent with the code and requirements for the original structure.

11.44.2.7.3.2. A substantial improvement, both the existing structure and the addition and/or improvements must comply with the standards for new construction.

11.44.2.7.4. Where an independent perimeter load-bearing wall is provided between the addition and the existing building, the addition(s) shall be considered a separate building and only the addition must comply with the standards for new construction.

11.44.2.7.5. Any combination of repair, reconstruction, rehabilitation, addition or improvement of a building or structure taking place during a 365 day period, the cumulative cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started must comply with the standards for new construction. For each building or structure, the 365 day period begins on the date of the first improvement or repair of that building or structure subsequent to the effective date of this ordinance. If the structure has sustained substantial damage, any repairs are considered substantial improvement regardless of the actual repair work performed. The requirement does not, however, include either:

11.44.2.7.6. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the building official and that are the minimum necessary to assume safe living conditions.

11.44.2.7.7. Any alteration of a historic structure provided that the alteration will not preclude the structure's continued designation as a historic structure.

11.44.2.7.8. Areas in existing structures shall not be converted for use as conditioned, temperature controlled space unless the reference level is located to or above the RFPE.

11.44.2.7.9. Additional Standards in Shaded X and X Flood Zones

11.44.2.7.9.1. The substantial improvement/substantial damage definitions as established in Appendix A, Definitions, do not apply to Shaded X and X zones.

11.44.2.7.9.2. In structures located west of NC 12 and SR 1243 where the reference level of existing conditioned, temperature controlled space is located below the RFPE, such space may be increased at the same level, without having to be elevated to or above the RFPE.

11.44.2.7.9.3. Remodeling or renovations of existing habitable area in structures with the reference level located below the current applicable RFPE that do not increase the footprint of the structure may be authorized at the existing reference level or higher.

11.44.2.7.9.4. Reconstruction of damaged portions of a structure may be authorized at the existing reference level or higher. However, if a structure is entirely demolished, for whatever reason, the replacement structure shall be constructed to or above the RFPE.

11.44.2.7.9.5. Structures that are relocated on the same site or to another site shall be elevated to or above the applicable RFPE of the lot or to or above the RFPE of the new site.

11.44.2.7.9.6. Areas in existing structures shall not be converted for use as conditioned, temperature controlled space unless the reference level is located to or above the RFPE.

11.44.2.8. Tanks. When gas and liquid storage tanks are to be placed within the Shaded X, X, AE, AO, or VE flood zones, the following criteria shall be met:

11.44.2.8.1. Underground tanks. Underground tanks in flood hazard areas shall be anchored to prevent flotation, collapse or lateral movement resulting from hydrodynamic and hydrostatic loads during conditions of the design flood, including the effects of buoyancy assuming the tank is empty;

11.44.2.8.2. Above-ground tanks, elevated. Above-ground tanks in flood hazard areas shall be elevated to or above the Regulatory Flood Protection Elevation on a supporting structure that is designed to prevent flotation, collapse or lateral movement during conditions of the design flood. Tank-supporting structures shall meet the foundation requirements of the applicable flood hazard area;

11.44.2.8.3. Above-ground tanks, not elevated. Above-ground tanks that do not meet the elevation requirements of Section 11.44.2.2. of this ordinance shall not be permitted in V or VE Zones. Tanks may be permitted in other flood hazard areas provided the tanks are designed, constructed, installed, and anchored to resist all flood-related and other loads, including the effects of buoyancy, during conditions of the design flood and without release of contents in the floodwaters or infiltration by floodwaters into the tanks. Tanks shall be designed, constructed, installed, and anchored to resist the potential buoyant and other flood forces acting on an empty tank during design flood conditions.

11.44.2.8.4. Tank inlets and vents. Tank inlets, fill openings, outlets and vents shall be:

11.44.2.8.4.1. At or above the Regulatory Flood Protection Elevation or fitted with covers designed to prevent the inflow of floodwater or outflow of the contents of the tanks during conditions of the design flood; and

11.44.2.8.4.2. Anchored to prevent lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy, during conditions of the design flood.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.44.3. Coastal High Hazard Areas (Zones VE) and Properties East of NC 12 and SR 1243.

Coastal high hazard areas are special flood hazard areas established in subsection 11.42.2 and designated as zones VE. Properties located to the east of NC 12 and SR 1243 are located in an active oceanfront environment that is vulnerable to storm surge, erosion, sea level rise, and other hazards. These areas have special flood hazards associated with high velocity waters from storm surges or seismic activity and, therefore, in addition to meeting all requirements of Part III Flood Damage Prevention, the following provisions shall apply:

11.44.3.1 All new construction and substantial improvements shall:

11.44.3.1.1. Be located landward of the reach of mean high tide;

11.44.3.1.2. Be located landward of the first line of stable natural vegetation; and

11.44.3.1.3. Comply with all applicable Coastal Area Management Act (CAMA) setback requirements.

11.44.3.2. All new construction and substantial improvements shall be elevated so that the bottom of the lowest horizontal structural member of the lowest floor (excluding pilings or columns) is no lower than the regulatory flood protection elevation. Floodproofing shall not be utilized on any structures in VE zones to satisfy the regulatory flood protection elevation requirements.

11.44.3.3. All new construction and substantial improvements, including properties with elevations above the regulatory flood protection elevation, shall have the space below the bottom of the lowest horizontal structural member of the lowest floor either be free of obstruction or constructed with open wood latticework or insect screening so as not to impede the flow of floodwaters, provided they are not part of the structural support of the building and are designed so as to breakaway, under abnormally high tides or wave action without causing damage to the elevated portion of the building or supporting foundation system or otherwise jeopardizing the structural integrity of the building in accordance with subsection 11.43.3. The following design specifications shall be met:

11.44.3.3.1. Design plans shall be submitted in accordance with subsection 11.43.3.

11.44.3.3.2. Material shall consist of open wood or plastic lattice having at least 40 percent of its area open, or insect screening.

11.44.3.4. All new construction and substantial improvements shall be securely anchored to an open "pile or column foundation" to allow floodwaters and waves to pass beneath the structure. "All pilings and columns and the structures attached thereto shall be anchored to resist flotation, collapse and lateral movement due to the effect of wind and water loads acting simultaneously on all building components."

11.44.3.4.1. Water loading values used shall be those associated with the base flood.

11.44.3.4.2. Wind loading values used shall be those required by the current edition of the North Carolina State Building Code.

11.44.3.5. All new construction, initiated after the adoption of this UDO, located east of NC 12 and SR 1243 shall limit the total enclosed habitable living space of individual structures to 5,000 square feet. Enclosed habitable living space for large residential dwellings shall also include any enclosed habitable space that may be present in any accessory structure or accessory dwelling that is located on the same lot as the principal structure.

11.44.3.6. For concrete pads, including patios, decks, parking pads, walkways, driveways, pool decks, etc. the following is required:

11.44.3.6.1. Shall be structurally independent of the primary structural foundation system of the structure and shall not adversely affect structures through redirection of floodwaters or debris; and

11.44.3.6.2. Shall be constructed to breakaway cleanly during design flood conditions, shall be frangible, and shall not produce debris capable of causing damage to any structure. (The installation of concrete in small segments (approximately 4 feet x 4 feet) that will easily break up during the base flood event, or score concrete in 4 feet x 4 feet maximum segments is acceptable to meet this standard); and

11.44.3.6.3. Reinforcing, including welded wire fabric, shall not be used in order to minimize the potential for concreted pads being a source of debris; and

11.44.3.6.4. Pad thickness shall not exceed 4 inches; or

11.44.3.6.5. Provide a Design Professional's certification stating the design and method of construction to be used meet the applicable criteria of this section.

11.44.3.7. For swimming pools and spas, the following is required:

11.44.3.7.1. Be designed to withstand all flood-related loads and load combinations.

11.44.3.7.2. Be elevated so that the lowest horizontal structural member is elevated above the RFPE; or

11.44.3.7.3. Be designed and constructed to break away during design flood conditions without producing debris capable of causing damage to any structure; or

11.44.3.7.4. Be sited to remain in the ground during design flood conditions without obstructing flow that results in damage to any structure.

11.44.3.7.5. Registered design professionals must certify to local officials that a pool or spa beneath or near a VE Zone building will not be subject to flotation or displacement that will damage building foundations or elevated portions of the building or any nearby buildings during a coastal flood.

11.44.3.7.6. Pool equipment shall be located above the RFPE whenever practicable. Pool equipment shall not be located beneath an elevated structure.

11.44.3.8. All elevators, vertical platform lifts, chair lifts, etc., the following is required:

11.44.3.8.1. Elevator enclosures must be designed to resist hydrodynamic and hydrostatic forces as well as erosion, scour, and waves.

11.44.3.8.2. Utility equipment in Coastal High Hazard Areas (VE Zones) must not be mounted on, pass through, or be located along breakaway walls.

11.44.3.8.3. The cab, machine/equipment room, hydraulic pump, hydraulic reservoir, counter weight and roller guides, hoist cable, limit switches, electric hoist motor, electrical junction box, circuit panel, and electrical control panel are all required to be above RFPE. When this equipment cannot be located above the RFPE, it must be constructed using flood damage-resistant components.

11.44.3.8.4. Elevator shafts/enclosures that extend below the RFPE shall be constructed of reinforced masonry block or reinforced concrete walls and located on the landward side of the building to provide increased protection from flood damage. Drainage must be provided for the elevator pit.

11.44.3.8.5. Flood damage-resistant materials can also be used inside and outside the elevator cab to reduce flood damage. Use only stainless steel doors and door frames below the BFE. Grouting in of door frames and sills is recommended.

11.44.3.8.6. If an elevator is designed to provide access to areas below the BFE, it shall be equipped with a float switch system that will activate during a flood and send the elevator cab to a floor above the RFPE.

11.44.3.9. Accessory structures, regardless of size or cost, shall not be permitted below elevated structures.

11.44.3.10. A registered professional engineer, professional land surveyor, or architect shall certify that the design, specifications and plans for construction are in compliance with the provisions contained in subsection 11.43.2, subsections 11.44.3.1 and 11.44.3.2, subsection 11.44.3.4 and subsection 11.44.3.6 of this Part on the current version of the North Carolina "National Flood Insurance Program V-Zone Certification" form or equivalent local version. In addition, prior to the Certificate of Compliance/Occupancy issuance, the floodplain administrator may require a registered professional engineer or architect to certify the finished construction is compliant with the design, specifications and plans for VE Zone construction if determined necessary.

11.44.3.11. Fill/Grading

11.44.3.11.1. Fill shall conform to Section 11.5.3.1. ~~The placement of site-compatible, non-structural fill under or around an elevated building is limited to two (2) feet. Fill greater than two (2) feet must include an analysis prepared by a qualified registered design professional demonstrating no harmful~~

~~diversion of floodwaters or wave runup and wave deflection that would increase damage to adjacent elevated buildings and structures. Excavated material moved or relocated onsite is considered fill.~~

~~**11.44.3.11.2.** The fill material must be similar and consistent with the natural soils in the area.~~

~~**11.44.3.11.3.** Minor grading and the placement of minor quantities of nonstructural fill, outside the areas referenced in 11.44.3.11.1., may be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.~~

~~**11.44.3.11.4.** Nonstructural fill with finished slopes that are steeper than five (5) units horizontal to one (1) unit vertical shall be permitted only if an analysis prepared by a qualified registered design professional demonstrates no harmful diversion of floodwaters or wave runup and wave deflection that would increase damage to adjacent elevated buildings and structures.~~

11.44.3.12. There shall be no alteration of sand dunes or mangrove stands which would increase potential flood damage.

11.44.3.13. Recreational vehicles may be permitted in coastal high hazard areas provided that they meet the recreational vehicle criteria of subsection 11.44.2.3 of this section and the temporary structure provisions of subsection 11.44.2.5 of this section.

11.44.3.14. A deck that is structurally attached to a building or structure shall have the bottom of the lowest horizontal structural member at or above the Regulatory Flood Protection Elevation and any supporting members that extend below the Regulatory Flood Protection Elevation shall comply with the foundation requirements that apply to the building or structure, which shall be designed to accommodate any increased loads resulting from the attached deck. The increased loads must be considered in the design of the primary structure and included in the V-Zone Certification required under Section 11.43.5.6.

11.44.3.15. A deck or patio that is located below the Regulatory Flood Protection Elevation shall be structurally independent from buildings or structures and their foundation systems, and shall be designed and constructed either to remain intact and in place during design flood conditions or to break apart into small pieces to minimize debris during flooding that is capable of causing structural damage to the building or structure or to adjacent buildings and structures.

11.44.3.16. In coastal high hazard areas, development activities other than buildings and structures shall be permitted only if also authorized by the appropriate state or local authority; if located outside the footprint of, and not structurally attached to, buildings and structures; and if analyses prepared by qualified registered design professionals demonstrate no harmful diversion of floodwaters or wave runup and wave deflection that would increase damage to adjacent buildings and structures. Such other development activities include but are not limited to:

11.44.3.16.1. Bulkheads, seawalls, retaining walls, revetments, and similar erosion control structures;

11.44.3.16.2. Solid fences and privacy walls, and fences prone to trapping debris, unless designed and constructed to fail under flood conditions less than the design flood or otherwise function to avoid obstruction of floodwaters.

11.44.3.16.3. Docks, piers, and similar structures.

11.44.3.17. No more than four (4) electrical outlets and no more than four (4) electrical switches may be permitted below RFPE unless required by building code.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.44.5. Standards for Areas Of Shallow Flooding (Zone AO).

Located within the Special Flood Hazard Areas established in Article 3, Section B, are areas designated as shallow flooding areas. These areas have special flood hazards associated with base flood depths of one (1) to three (3)

feet where a clearly defined channel does not exist and where the path of flooding is unpredictable and indeterminate. In addition to Sections 11.44.1. and 11.44.2., all new construction and substantial improvements shall meet the requirements of Section 11.44.3. Coastal High Hazard Areas (Zones VE) and Properties East of NC 12 and SR 1243.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

Section 11.45 Remedies.

Any violation of this Article 11, Part III shall be subject to the remedies as stated in Section 1.10, Violation of UDO Regulations of this UDO.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

Section 11.46 Legal Status Provisions.

11.46.1. Effect on Rights and Liabilities Under the Existing Flood Damage Prevention Ordinance.
This Article 11, Part III in part comes forward by re-enactment of some of the provisions of the flood damage prevention ordinance enacted February 3, 1975 as amended, and it is not the intention to repeal but rather to re-enact and continue to enforce without interruption of such existing provisions, so that all rights and liabilities that have accrued thereunder are reserved and may be enforced. The enactment of this Article 11, Part III shall not affect any action, suit or proceeding instituted or pending. All provisions of the flood damage prevention ordinance of the Town of Nags Head enacted on February 3, 1975, as amended, which are not reenacted herein are repealed.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.46.2. Effect Upon Outstanding Floodplain Development Permits.
Nothing herein contained shall require any change in the plans, construction, size, or designated use of any development or any part thereof for which a floodplain development permit has been granted by the floodplain administrator or his or her authorized agents before the time of passage of this Article 11, Part III; provided, however, that when construction is not begun under such outstanding permit within a period of six (6) months subsequent to the date of issuance of the outstanding permit, construction or use shall be in conformity with the provisions of this Article 11, Part III.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

11.46.3. Severability.
If any section, clause, sentence, or phrase of the Ordinance is held to be invalid or unconstitutional by any court of competent jurisdiction, then said holding shall in no way effect the validity of the remaining portions of this Ordinance.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

Section 11.47 Effective Date.

This ordinance shall become effective June 19, 2020.

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

Section 11.48 Adoption Certification.

I hereby certify that this is a true and correct copy of the Flood Damage Prevention Ordinance as adopted by the Board of Commissioners of the Town of Nags Head, North Carolina, on the 3rd day of June, 2020.

WITNESS my hand and the official seal of the Town of Nags Head by Town Clerk Carolyn F. Morris; this the 9th day of June 2020.

_____
(signature)

(Ord. No. 20-06-008 , Art. II, Pt. I, 6-3-2020)

Sections 11.49, 11.50 Reserved.

LID

Low Impact Development Manual

and stormwater reference manual

TOWN OF NAGS HEAD

P.O. Box 99
Nags Head, NC 27959
www.nagsheadnc.gov

North Carolina Coastal Federation
Working Together for a Healthy Coast

637 Harbor Rd.
Wanchese, NC 27981
www.nccoast.org

Second Edition- MAY 2021

Acknowledgements

In 2013, the Town of Nags Head began work with the N.C. Coastal Federation to develop a Low Impact Development manual as a reference document for local citizens and developers as part of Town efforts to improve stormwater management and as a technical resource for application of Town Stormwater regulations. This project is based on the LID manual for the coastal towns of Columbia, Cedar Point and Cape Carteret. The Town of Columbia worked in direct partnership with the N.C. Coastal Federation to complete an LID manual. The Town of Cedar Point worked in partnership with the Town of Cape Carteret, the N.C. Coastal Federation, engineering consultants WithersRavenel, N.C. Division of Water Quality and the LID Technical Review Team to complete the Cedar Point/Cape Carteret manual. We would like to thank these three communities and their partners for sharing their work and providing a model for us to follow.

In 2019, the Town of Nags Head initiated an update of the Low Impact Development Manual with assistance from the N.C. Coastal Federation to reflect modifications to the Town's residential stormwater management ordinance.

We would like to specifically thank the following individuals involved in the development and review of the Town of Nags Head Stormwater Management Regulations. We would also like to thank those individuals and organizations who provided photographs and technical information for the manual.

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Webb Fuller, Commissioner, Town of Nags Head
Mike Siers, Mayor Pro-Tem, Town of Nags Head
Kevin Brinkley, Commissioner, Town of Nags Head

Table of Contents

Chapter 1

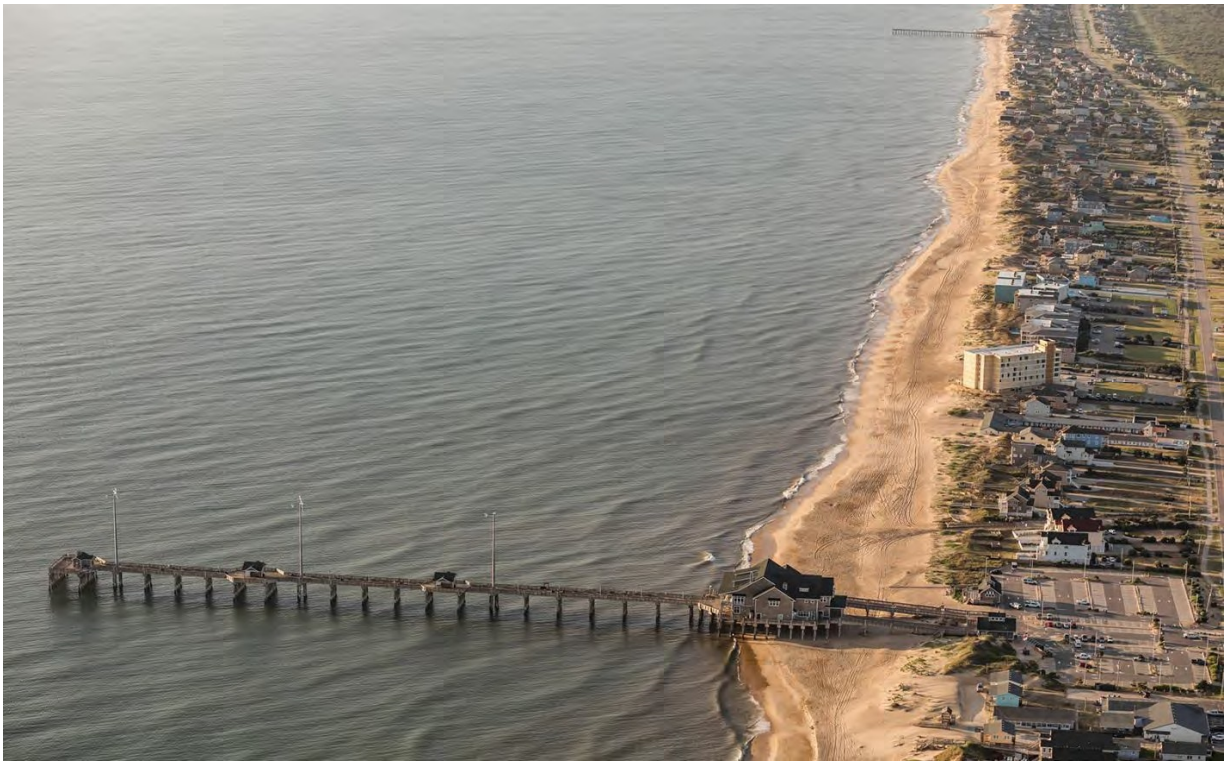
Introduction

The Town of Nags Head is a unique resort community that takes pride in its clean water, low density of development and vast open spaces. Residents and visitors alike rely on the Town's abundant water resources to live, work and play. Nags Head's economic prosperity is dependent on the availability and health of its water resources.

Due to the various ways we use our water, it is essential for us to protect our water resources. To achieve this goal, actively managing stormwater runoff is essential. An effective approach to managing stormwater runoff is through Low Impact Development (LID).

Town of Nags Head Facts

- Nags Head has 11 miles of oceanfront coastline and an equivalent amount of estuarine shoreline.
- Approximately 90% of the properties are developed.
- Approximately 50% of the developed properties were developed prior to 1980.
- About 55 miles of drainage infrastructure within the Town boundaries.
- Approximately 80% of the developed properties are served by on-site wastewater.



A view of the Nags Head oceanfront shoreline near Jennette's Pier (Photo credit: Great Lakes Dredge and Dock Company, LLC)

Background

The Town of Nags Head is located on Bodie Island, east of Roanoke Island in Dare County, North Carolina. The 6.7 square mile township is bounded by the Roanoke Island to the west, Atlantic Ocean to the east, Town of Kill Devil Hills to the north, and Cape Hatteras Seashore to the south. Incorporated in 1961, the Town of Nags Head has developed into a popular vacation destination. Over the last 40 years development within Nags Head has accelerated creating an increased burden on the Town's resources. As development occurs, the additional impervious surfaces create more stormwater runoff and less availability for infiltration into the surrounding sandy soils. The increase in stormwater runoff can contribute to roadway and property flooding as well as the degradation of the water quality of the surrounding waterbodies.

The existing stormwater drainage system for the Town relies heavily on (5) ocean outfalls maintained by the North Carolina Department of Transportation (NCDOT). The outfalls were originally constructed to provide drainage for ocean overwash events when the storm surge from the ocean overtops the dunes. As development has occurred, additional stormwater drainage systems were connected to the outfall. In most instances the outfall pipes were not designed to convey flows from the drainage systems that are currently connected to the outfalls.

The existing outfall system operation primarily serves as a mechanism to provide flood relief for roadways. However, providing flood relief by draining runoff towards surrounding waterbodies can degrade the water quality of the receiving waters as pollutants from impervious surfaces are conveyed through the stormwater outfalls.

Preserving water quality is critical to the Town of Nags Head as we strive to be good stewards of the environment in our mission "to provide for the health, safety and welfare of the citizens, property owners and visitors to the Town." In order to protect this vital resource, stormwater management strategies can be employed to reduce the volume of untreated stormwater discharging to receiving waters. Low Impact Development is a specific management strategy that can be applied to mitigate both flood related impacts and water quality treatment.

Figure 1.1 Town of Nags Head Map

Purpose

This manual is intended to provide a broad application of Low Impact Development techniques to new, existing and redevelopment sites. The level and types of applications will vary from site to site. It is intended to provide property owners, builders, developers and the general public with guidance on integrating LID at various scales. Stakeholders can use this manual as technical guidance to design, construct and maintain specific LID measures.

This manual can also be used as a reference for those who seek compliance with the provisions of the Town of Nags Head Unified Development Ordinance, Chapter 11, Environmental Regulations, Part 1 Stormwater, Fill and Runoff Management. To proactively manage stormwater and protect water quality, it will take the support of all stakeholders involved to successfully, communicate, coordinate and educate to implementing LID into the community.

Application of Manual

This document provides technical guidance on the application of LID practices as an acceptable approach to meet state and local stormwater management objectives. The information contained within the manual is intended as a starting point to provide guidance in the application of LID practices.

For new development and redevelopment projects requiring permits, this manual should be used in conjunction with applicable current local, state and federal laws, rules, codes, ordinances and standards.

Existing property owners and community members play a vital role in protecting the health and welfare of coastal water quality. This manual provides simple solutions that can be implemented on a lot by lot basis. Town staff can advise and assist property owners on smaller scale residential projects.

A view of the Nags Head oceanfront (Photo courtesy of Town of Nags Head)

Chapter 2

Stormwater Management

Clean water resources are essential to the economic vitality of Nags Head. Proper stormwater management is an essential component of water quality protection. Low impact development is the cornerstone of stormwater management and a mechanism to protecting our water resources.

Hydrologic Cycle

A key component to protecting water resources is to keep the water cycle in balance. The movement of rainfall from the atmosphere to the land and then back to the atmosphere is a naturally continuous process to humans and virtually all other forms of life. The balanced water cycle of precipitation, evapotranspiration, infiltration and groundwater recharge sustains Nags Heads vast but fragile water resources.

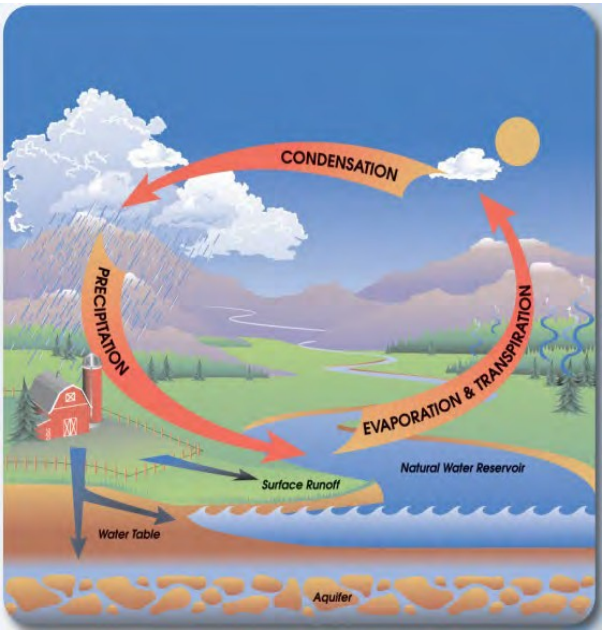


Figure 2.1 Water Cycle Graphics courtesy of the NC Wildlife Resources Commission

In the Town of Nags Head, most of the annual rainfall infiltrates, (soaks into), the underlying sandy soils. Infiltration is the result of precipitation percolating downward through the soil until it reaches the water table. The water table moves laterally and downgradient, through the influence of gravity, ultimately intersecting with channels, wetlands and surface waters.

Over half of the annual rainfall returns to the atmosphere through evapotranspiration. Surface vegetation, especially trees, transpire water to the atmosphere. Evapotranspiration rates for vegetation vary by season, with peak evapotranspiration rates occurring during the spring and summer growing season.

Land development and construction activities change the land surface and impacts the water cycle. Altering one component of the water cycle results in changes in other elements of the cycle. Impervious surfaces, such as roads, buildings and parking lots, prevent rainfall from infiltrating into the soil and significantly increases the amount of rainfall that runs off. Research shows that soil compaction resulting from land development activities produces a greater amount of runoff than pre-development conditions. When natural vegetation is removed, the amount of evapotranspiration decreases. As impervious areas increase, runoff increases and can result in the decrease of groundwater recharge.

Impacts of Development

Stormwater runoff is precipitation which sheds off improved or unimproved surfaces that is released into channels, wetlands, estuaries and surface waters. Problems related to stormwater runoff are most evident in developed areas. A change in the water cycle can have a dramatic effect on our

water resources. The impact is based on both the quantity and quality of stormwater runoff reaching our sounds and oceans.

When rain reaches the ground, it typically infiltrates into the soil until the point where the soil can become completely saturated. The infiltration process naturally filters the water before it settles into aquifers or makes its way as groundwater flow to estuaries, the sound, or the ocean. The sandy soils of the Outer Banks generally absorb rainfall efficiently into the ground. However, some periods of rainfall may exceed the ground's ability to collect and filter the water. Precipitation onto saturated ground can result in surfacing groundwater and localized flooding.

Development activities that result in the removal of trees and other vegetation can effectively reduce natural and passive stormwater measures such as evapotranspiration, (plant uptake). This can result in less absorption of precipitation into the ground, or used by plants, thereby increasing the potential for stormwater to concentrate and collect pollutants with discharges to the bodies of water that we depend on for food, income, and recreation.

Residential and commercial development can alter natural drainage patterns and increase impervious surfaces such as parking lots, driveways, or rooftops that do not absorb water. As precipitation falls and flows from an impervious surface, the runoff collects chemicals, oil, antifreeze and refuse from parking lots, or fertilizers, pesticides, and sediment from lawns and gardens. Runoff can also pick up loose soil or scour the ground, producing erosion. Sediment and silt carried by stormwater can impede drainage flow resulting in reduced system effectiveness.

Impervious surfaces are warmed by the sun. Runoff from warmed surfaces increase the temperature of water entering our estuaries,

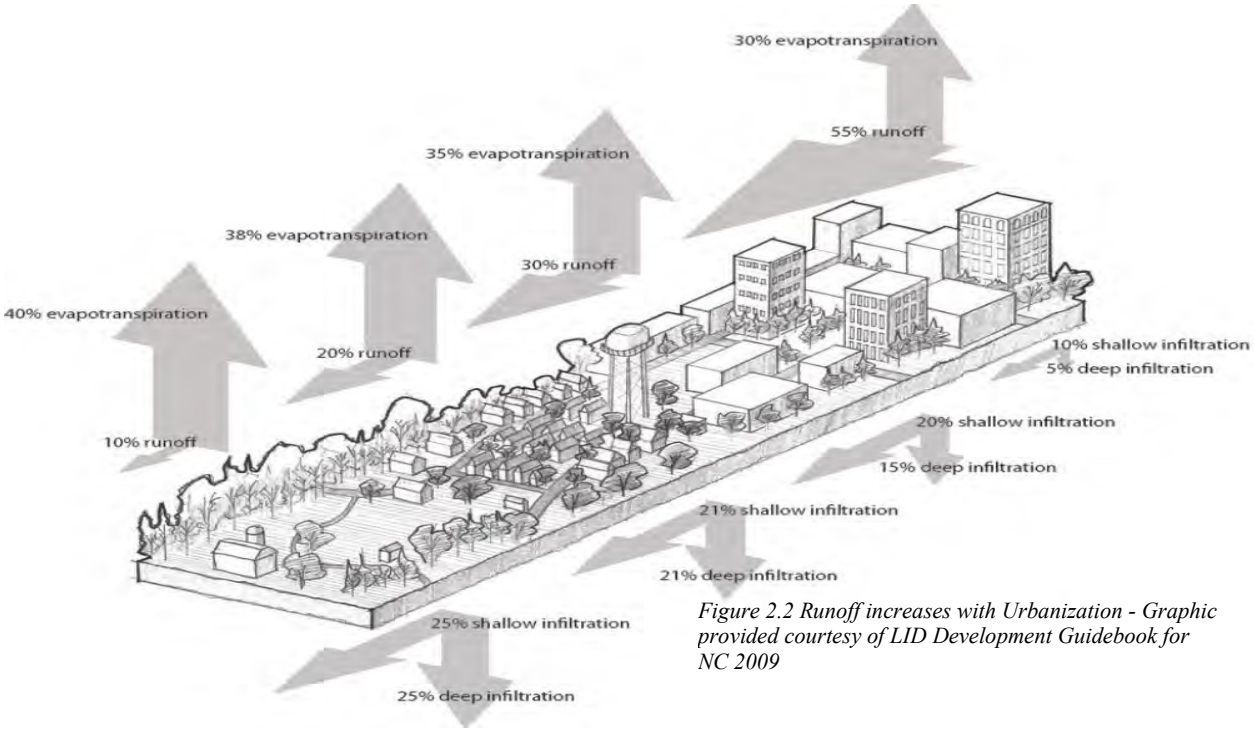


Figure 2.2 Runoff increases with Urbanization - Graphic provided courtesy of LID Development Guidebook for NC 2009

sounds and ocean. Erosive flows and increased water temperature will negatively impact the diversity of aquatic habitat.

Stormwater runoff can negatively impact water resources in many ways leading to diminished economic and recreational opportunities.

Low Impact Development

The term low impact development (LID) refers to systems and practices that are implemented in such a manner that the post-development hydrologic response mimics the predevelopment response (quantity, character and constituents). From a stormwater management perspective, LID is the application of techniques to emulate the natural water cycle. The basic principle is modeled after nature and manage rainfall runoff close to its source.

Low impact development techniques are based on the premise that stormwater is a resource and not to be quickly transported and disposed of. Instead conveyance/ management/ treatment in large costly end-of-pipe facilities, LID addresses stormwater through small, cost-effective and integrated landscape features that can be implemented at various scales.

With the change in land surface from construction and land development activities, not only does the peak runoff rate increase, but the total volume of runoff can dramatically increase. LID focuses on both peak rates and total volumes of runoff.

LID application techniques are designed to attenuate peak rates of runoff for larger storms and prevent runoff volume increases for more frequent smaller storms. Thus, natural flow patterns are kept in balance, minimizing the adverse impacts associated with stormwater runoff.

This manual focuses on Low Impact Development (LID) approaches to managing stormwater. LID uses techniques to capture and store stormwater as close to the source as possible to promote infiltration and treatment, thereby reducing runoff and the amount of pollution that runoff can convey. LID practices include site planning that provides small, decentralized management practices and approaches that are versatile and site specific.

LID Practices

Strive to replicate all components of the hydrologic cycle by:

- Minimizing total runoff volume
- Controlling peak runoff rate
- Maximizing infiltration and groundwater recharge
- Maximizing evapotranspiration
- Protecting water quality

For new development, an LID approach identifies natural features and strategically places buildings, driveways and parking areas advantageously to allow for a stormwater management system that works with existing natural features and drainages.

In redevelopment, LID includes forming an inventory of built and natural areas that can incorporate strategies and technologies to handle existing conditions and maximize infiltration in existing open space.

LID Principles

1. Focus on Prevention
   - Protect wetlands, floodplains and coastal habitats
   - Maintain slopes and flow paths
   - Minimize grading and tree clearing

2. Work with the Landscape
   - Identify environmentally sensitive areas
   - Outline a plan to protect those areas
   - Use hydrologic features of the site

3. Keep it Simple
   - Use low-cost approaches to decentralize run-off
   - Micromanage stormwater close to where it falls
   - Direct runoff from impervious surfaces to landscaped areas and other small scaled techniques for infiltration

4. Practice multi-tasking
   - Use landscaping for a variety of purposes. Landscapes can capture and treat pollutants and provide curb appeal
   - Distribute management practices on a site so that they work together to reduce runoff and associated impacts

5. Maintain and Sustain
   - Maintain LID features so that they remain effective and provide long-term success

Vegetated swale – Photo provided by the Town of Nags Head

Rainwater Harvesting – Photo provided by Town of Nags Head

Rain Garden – Photo provided by Town of Nags Head

Stormwater Control Measures (SCM)

Stormwater Control Measures (SCMs) are structural measures that are used to capture, control and treat stormwater runoff. Stormwater Control Measures and Best Management Practices (BMPs) are essentially interchangeable terms that describe techniques to manage stormwater.

An individual SCM or combination of SCMs can effectively treat and reduce pollutants contained within stormwater runoff. SCMs provide an effective and practicable means to meet water quality standards or goals by reducing the volume of stormwater runoff and concentration of pollutants contained therein when implemented as designed and appropriately maintained.

SCMs are physical structures that are designed to remove pollutants from stormwater runoff while simultaneously improving water quality, reducing flooding, erosion, and promoting groundwater recharge. An SCM can be designated either primary or secondary based on its level of Total Suspended Solid (TSS) removal. Primary or secondary SCMs can cooperate with each other to achieve more effective on-site stormwater management.

There is no single SCM that is suitable for every site, and one SCM might not provide the necessary measures to fully manage stormwater runoff in compliance with goals and regulations. Plus, unique land features or differences in development impact the effect of certain SCMs for proper stormwater management. There are different SCMs that are better suited for different aspects of stormwater management. The use of multiple SCMs and integration with the natural surroundings is highly recommended to meet stormwater management goals.

Grassed Swale – Photo provided by Town of Nags Head

Concrete Grid Pavers – Photo provided by Town of Nags Head

Infiltration Basin – Photo provided by Town of Nags Head

Chapter 3

Non-Structural Practices

Site Fingerprinting

A core concept of LID is managing stormwater runoff at the source by integrating site design and planning to preserve natural systems, protect open spaces, retain existing vegetation and maintain hydrologic functions. Site Fingerprinting is a practice that uses site design as a stormwater management tool by reducing land disturbance, preserving soil structure, and utilizing suitable natural areas (rather than expensive structural practices for runoff management). Rather than grading land to fit a desired development type, the type of development is dictated by the existing conditions of the site, resulting in a developed site which uses the land to maintain and protect the natural balance of the surrounding ecosystem.

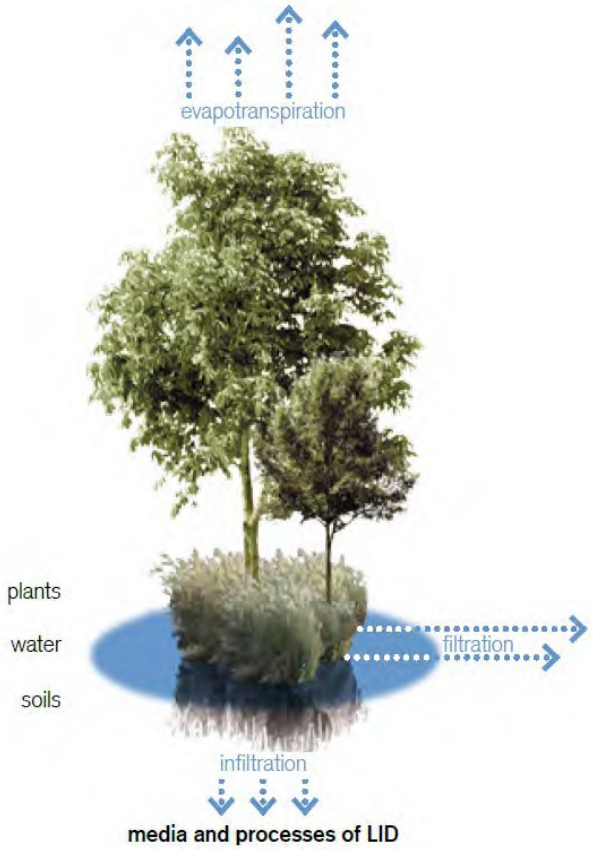
Site fingerprinting utilizes nonstructural Best Management Practices (BMP's) which take broader planning and design approaches that are less structural in nature. Examples of non-structural BMP's are:

Non-Structural BMP's

- **Cluster** development
- **Minimize** soil compaction
- **Minimize** disturbed areas
- Protect natural drainage pathways
- **Protect** riparian buffers
- **Protect** environmentally sensitive areas
- **Reduce** Impervious surfaces
- **Disconnect** stormwater connections

By fitting the development to the land, it is often easier to preserve existing vegetation, giving a more established look to new developments. Incorporating Site Fingerprinting into the site development planning process includes many benefits which include:

- Reduced land clearing costs,
- Reduced costs for total infrastructure,
- Reduced costs for stormwater management,
- Reduced runoff volumes discharged into our waterways, and
- Enhanced community and individual lot aesthetics.



Graphic courtesy of UACDC Low Impact Design a design manual for urban areas

Re-Routing Downspouts

A downspout or roof drainpipe is a vertical pipe that conveys rainfall runoff from roof gutter collection system. Typically, downspouts are directed to driveways or to a storm sewer system which conveys flow to either the Atlantic Ocean or the Roanoke Sound. By disconnecting your downspout and redirecting runoff to a landscaped area or lawn, you can create opportunities for infiltration reducing impacts to our vital water resources. Alternatively, roof runoff can also be directing into a rain barrel or a cistern. It is a simple and effective way to reduce stormwater runoff.

Additional benefits of downspout re-routing include:

- Reduced runoff volume and water quality impacts on downstream resource areas,
- Directs water to landscaped areas saving on the cost of irrigation,
- Can be combined with other SCM's to create an effective stormwater management plan, and
- It's cost effective.

Helpful Hints

Receiving Area length should be a minimum of half of the roof length that is directed to it.

Receiving Area width should be at least half of the overall length.

Avoid diverting runoff onto neighboring properties or onto your septic system or drainfield area**.**

Use pop-up emitters to disperse runoff onto landscaped areas.

Helpful Hints (continued)

Link downspouts to rain barrels or cisterns for rainwater harvesting.

Direct downspouts to areas where water can infiltrate into the ground such as lawns, and landscaped areas.

Receiving Area should be lower than the elevation around building foundation and graded at least 5 ft. from the dwelling.

Avoid adding downspout connections across a walkway, patio or driveway to avoid creating a tripping hazard**.**

Homeowners show how to add a diverter to redirect drainage from downspouts away from sidewalks and driveways towards lawns, natural areas, or rain gardens - photo courtesy of N.C. Coastal Federation

Living Shorelines

A Living Shoreline is a natural solution for shoreline erosion and protection. It also provides retrofits for common practices, such as bulkheads, which are temporary measures to combat shoreline erosion. A living shoreline system implements native marsh plants and sometimes oyster or rock sills to create a more natural and productive shore. It also provides a stabilization method for erosion with the changing tides and storms while simultaneously enhancing and preserving natural ecosystems. There are stormwater control measures that can benefit from living shorelines like backyard wetlands. A living shoreline is a secondary technique for a SCM. The protection of shorelines from erosion allows the native marsh vegetation and soils to reduce pollutant loads, help improve water quality though plant uptake and infiltration, and water filtration where oyster sills are in place.

Living Shoreline at the North Carolina Coastal Federation's office in Wanchese, NC, Photo courtesy of N.C. Coastal Federation

Several different techniques can be employed for the construction of a living shoreline This includes

- Hybrid techniques: Combination of structural and non-structural practices. (Example: Rock sills and edging, oyster sills)
- Non-structural techniques: implements native features of the land and vegetation. (Example: Planting native vegetation to marshlands, edging)

Helpful Hints

Wave Energy is a primary factor in determining living shoreline placement and type of technique, (i.e. hybrid or non-structural) to be employed.

Excessive wave energy may impede growth and development of newly planted vegetation.

Consider the type of technique to be employed how (i.e. hybrid or non-structural) and how it will be adapted to the existing landscape.

Use native vegetation when possible, to maintain natural habitat and features.

There are many benefits to utilizing living shorelines that include:

- Reduced erosion and wave energy
- Maintained natural marsh
- Protected coastal habitat
- Filtered and improved water quality
- Buffered shore for changing water levels

If considering a living shoreline please contact the N.C. Division of Coastal Management representative for permit guidance. The N.C. Coastal Federation or a licensed design professional can be an additional resource for design assistance.

Backyard Wetlands

Backyard wetlands are depressed wet areas that are planted with native wetland plants. They are well suited for areas that are usually wet for several days following a rain event. Backyard wetlands are designed to capture and treat stormwater similar to a rain garden but in locations with high-water tables and soggy soils. They are meant to mimic natural wetlands by using physical, chemical, and biological processes to treat stormwater. The temporarily stored stormwater will support emergent and riparian vegetation.

Constructed stormwater wetland in Manteo, NC, Photo courtesy of N.C. Coastal Federation

A man-made backyard wetland can provide the same benefit of natural wetlands providing an ideal, natural matrix that aids in pollutant removal and nutrient reduction. A wetland will temporarily store, filter, and clean runoff water from your roof, lawn, and other impervious surfaces reducing runoff peak flows, reducing velocities to adjacent natural wetlands, streams and surface waters.

Helpful Hints

Locate the backyard wetland away from high traffic areas and where it is not likely to attract unattended children.

Choose areas of your lawn that include naturally occurring wet spots for siting of the wetland**.**

Review existing state and local regulations for horizontal setbacks and to determine appropriateness of backyard wetlands**.**

Consider tributary drainage area being conveyed to backyard wetlands.

Ponding depth of the wetland should be no greater than 9 inches in depth.

Use native plants and vegetation that are suitable for saturated soil conditions. Utilize a diverse range of native plants to mimic a natural habitat. Transplanting of nursery stock obtained from a local aquatic plant nursery may yield the best results. Refer to *Common Wetland Plants of North Carolina or Seacoast Plants of the Carolinas* for reference.

Optimal planting period is between April to mid-June.

Maintain a stable groundcover adjacent to the wetland area to reduce sediment loads.

Aside from the water quantity and quality benefits, backyard wetlands can provide for an enhanced landscape feature and habitat for birds & butterflies.

If considering a backyard wetland please contact the N.C. Coastal Federation, Town of Nags Head or a licensed design professional for assistance.

Chapter 4

Non-residential Stormwater Management

Stormwater Management for Commercial, Mixed Use, and all Non-Single Family or Non-Duplex Residential development, including Multi-Family development is regulated by Article 11.4, Environmental Regulations of the Town of Nags Head Unified Development Ordinance. This section shall serve as a supplement to these set of regulations to provide technical guidance and specifically to describe design methods to calculate the level of control to meet the regulations set forth in Article 11.4.

Non-residential stormwater management differs from single-family residential individual lot development in that stormwater management plans and supporting technical documents shall be prepared by a qualified and registered design professional knowledgeable within the field of work for the performance of the design, construction, operation and function of the stormwater facilities. Development and redevelopment of property with commercial uses, mixed land uses or residential uses other than single-family or duplex residential uses require the submission of a stormwater management plan with the exception of the following:

- Is consistent with the zoning regulations of the UDO related to redevelopment & nonconformities;
- Does not result in the net gain of built upon area;
- Does not include the importation of any fill material;
- A stormwater retrofit for an existing property for flood mitigation limiting the import of fill to 12 inches or less.

All other development or redevelopment that results in a net gain in built-upon area requires the submission of a stormwater plan demonstrating that the stormwater runoff generated from the project's built-upon area shall be directed into an approved stormwater management system designed to accommodate the volume of runoff generated by a 4.3-inch design storm event.

The manual is intended to provide guidance in the selection of appropriate structural control measures (SCM's), design criteria to meet applicable stormwater regulations. However, this manual does not cover every situation or potential solutions. The design professional is responsible for exercising professional judgement when selecting, siting and designing SCM's to meet applicable local and state regulations. Additional guidance can be found at North Carolina Department of Environmental Quality Stormwater Design Manual, (NCDEQ 2017).

Designers should review state stormwater requirements for applicability. If greater than 10,000 sf of built upon area or greater than 1.0 ac. of land disturbance activities are proposed, state regulatory requirements may apply. For those cases where the developer is required to submit stormwater management applications to meet both local and state requirements, copies of the NCDEQ state approved plans in conjunction with fully executed operation and maintenance agreements shall be provided to the Town.

In general, if any part of this manual differs from any other ordinance, rule, regulation or provision of law, whichever provision that imposes the higher protective standard shall control.

Stormwater Management Calculations

Stormwater programs in North Carolina require high density development projects to treat to a design storm depth in a SCM. To size the SCM, the designer shall calculate the volume of runoff that will drain to it. Stormwater rules do not reference any specific calculation methods. This chapter provides technical guidance for stormwater calculation methods that are typically used at both the state and local levels.

Rational Method for Peak Flow

$$Q_p = C*I*A$$

Q_P= Peak Flow for design storm (cfs)
C = Composite runoff coefficient
I = Rainfall intensity for design storm (in/hr)
A = Drainage Area (ac.)

The peak flow is often calculated using the Rational Method. The composite runoff coefficient, C, reflects the runoff potential for the area. The range of runoff coefficients typically varies between 0.35 to 0.95, with the higher values representing the greater runoff potential. The composite runoff coefficient is the weighted average of all the land uses in the drainage area. Table 1 presents values of runoff coefficients for various surfaces.

Table 1: Rational Runoff Coefficients by Land Use (ASCE 1975,Viessman, et.al.1996, Malcom 1999)

Surface Description	Runoff Coefficient (C)
Unimproved Areas	0.35
Asphalt	0.95
Concrete	0.95
Brick	0.85
Roofs, inclined	1.00
Roofs, flat	0.90
Lawns, sandy soil, flat (<2%)	0.10
Lawns, sandy soil, avg. (2-7%)	0.15
Lawns, sandy soil, steep (>7%)	0.20
Lawns, heavy soil, flat (<2%)	0.15
Lawns, heavy soil, avg. (2-7%)	0.20
Lawns, heavy soil, steep (>7%)	0.30
Wooded Areas	0.15
Pervious Pavement	0.67
SCM urface Area	1.0

The rainfall intensity for stormwater management plans prepared to meet the Town of Nags Head requirements is 2.15 in/hr. The storm duration is 2 hrs. It should be noted that the Rational Method is the most applicable to drainage areas that are 20 acres or less.

Steps for using the Rational Method for Peak Flow:

Step 1: Delineate the tributary drainage area (**A**) that will be directed to the SCM, calculated in (ac.).

Step 2: Define the individual land use surface areas located within the boundaries of the tributary drainage area noted in **Step 1**.

Individual land use surface type descriptions are located in **Table 1.**

Step 3: Multiply the individual land use surface areas from **Step 2** by the associative land use runoff coefficient (unitless) shown in **Table 1.**

Step 4: Add the calculated values from **Step 3** and divide by the tributary drainage area (**A**) from **Step 1** to obtain the composite runoff coefficient (**C**).

Step 5: To obtain **Q** (cfs), multiply **C** (from **Step 4**), by **I** (2.15 in/hr), by A (from **Step 1**).

Step 6: To obtain the minimum required storage volume **Rv,** multiply **Q** (cfs) by the duration of the storm event. The Nags Head storm duration is 2 hrs or 7200 seconds.

Simple Method for Runoff Volume (Schueler 1987)

$$R_v = 0.05 + 0.9*I_A$$

Rv= Runoff coefficient (unitless)
I_A = Impervious fraction (unitless)

$$D_v = 3630*R_d*R_v*A$$

D_V = Design Volume (cu ft)
Rd = Design storm depth (in.)
A = Drainage area (ac)

An alternate and more simplified method for computing stormwater runoff is the Simple Method (Schueler 1987). The required information is as follows: (1) tributary area A (sf) that drains to a SCM, (2) the percentage of drainage area that is impervious (%), (3) the desired depth of rainfall targeted for capture. The Simple Method calculation process is as follows:

Step 1: Calculate the proposed imperviousness **I_A** of the proposed site development plan, (as a percentage or fraction)

Step 2: Multiply the impervious fraction **I_A** by 0.9 and add to 0.05 to calculate the runoff coefficient **R_V** (unitless).

Step 3: The design storm depth **R_d** for Nags Head is 4.3 in..

Step 4: Multiply the tributary drainage area **A** by the runoff coefficient **R_V** calculated in **Step 2** by the design storm depth 4.3 in. in **Step 3** by 3630 to obtain the design volume **D_V** (cu ft).

Step 5: The SCM volume shall be based on **D_V** or the minimum volume of runoff to be controlled.

Discrete NRCS Curve Number for Runoff Depth

$$S = 1000/CN - 10$$

S= Maximum retention after rainfall begins (in)

CN = Curve number (unitless)

$$Q = \frac{(P-0.2S)^2}{(P+0.8S)}$$

Q = Runoff depth (in)

P = Rainfall depth (in.)

The steps for using the Discrete NRCS Curve Number are as follows:

Step 1: Divide the tributary drainage area into land uses and assign the appropriate curve number **CN**, to each one (see Table 4). The **CN** characterizes the amount of runoff generated by a drainage area based on its USGS Hydrologic Soil Group (HSG) and ground cover.

Step 2: Refer to **Table 3** to obtain the CN curve number by HSG and associative land use cover.

Step 3: Multiply the individual land use areas from **Step 1** by the assigned land use **CN** by HSG described in **Step 2**.

Step 4: Add the calculated values from **Step 3** and divide by the total tributary drainage area **A** from **Step 1** to obtain the composite curve number **CN**.

Step 5: Calculate the maximum retention after rainfall begins **S** (in) by dividing curve number **CN**-10 into 1000

Step 6: The rainfall depth **P** for Nags Head is 4.3 in.

Step 7: Compute the runoff depth **Q** by inputting the results of **Step 5 S** maximum retention after rainfall begins and **Step 6 P** into the Runoff Depth equation.

Step 8: Find the runoff volume by multiplying **Q** runoff depth from Step 7 times the tributary area **A** (sf) and dividing by 12.

Table 2: Hydrologic Soil Groups

Soil Group	Description
A	Low runoff potential and high infiltration rates even when thoroughly wetted. Consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission (greater than 0.30 in.hr). The textures of the sand are typically sand, loamy sand or sandy loam.
B	Moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep, well drained soils with moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission (0.15-0.30 in/hr). The textures of these soils are typically silt loam or loam.
C	Low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.10 in/hr). The soil texture is typically sandy clay loam.
D	High runoff potential and low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay layer at or near the surface and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0.0-0.05 in/hr). The textures of these soils are typically clay loam, silty clay loam, sandy clay, silty clay, or clay.

Additional information related to Hydrologic Soil Group can be referenced from the Soil Survey of Dare County, North Carolina, USDA SCS, March 1992

Table 3: Urban areas runoff curve numbers for SCS method by HSG

Cover Description	Curve Number by HSG			
	A	B	C	D
Fully developed urban areas				
Open space (lawns, parks, golf courses, etc.)				
Poor condition (<50% grass cover)	68	79	86	89
Fair condition (50%-75% grass cover)	49	69	79	84
Good condition (>75% grass cover)	39	61	74	80
Impervious Areas:				
Paved parking lots, roofs, driveways, etc.	98	98	98	98
Streets and roadways:				
Paved; curbs and storm sewers	98	98	98	98
Paved; open ditches	83	89	98	98
Gravel	76	85	89	91
Dirt	72	82	85	88
Developing urban areas				
Newly graded areas	77	86	91	94
Pasture (<50% ground cover or heavily grazed)	68	79	86	89

Pasture (50%-75% ground cover, moderately grazed)	49	69	79	84
Pasture (>75% ground cover, lightly grazed)	39	61	74	80
Meadow- continuous grass, protected from grazing, mowed for hay	30	58	71	78
Brush (,50% ground cover)	48	67	77	83
Brush (50% to 75% ground cover)	35	56	70	77
Brush (>75% ground cover)	30	48	65	73
Woods (forest litter, small trees and heavy grazing or regular burning)	45	66	77	83
Woods (some forest litter covering soil w/ moderate grazing but not burned, some	36	60	73	79
Woods (litter and brush cover the soil, no grazing)	30	55	70	77

Methodologies for Peak Runoff Rates

Many methodologies have been developed to estimate peak runoff rates and total runoff volume from land surfaces under many conditions. This Chapter describes methods that are most widely used in the State of North Carolina. This is not a complete list of procedures nor is it intended to discourage using alternative methods as they become available.

Additional Design Considerations

There are numerous factors that the designer should consider when undertaking a stormwater management plan in the coastal environment. These design factors should include, but are not limited to: pre-development conditions, topography, seasonal high water table and soil wetness conditions, site layout, impervious coverage, vegetative surface cover, environmental setbacks, grading, stormwater overflow, etc. Most of these items area covered within Article 11-Envirnmental Regulations -Part I Stormwater, Fill and Runoff Management. Several technical factors should be considered as part of the stormwater management planning process are not specifically noted in this Article of the Unified Development Ordinance. Additional guidance is provided below.

Storage capacity (interstitial storage) within existing soils and/or fill material shall not be counted towards the volume requirement for the stormwater management design. This is consistent with the standards for residential stormwater management plan development and with the NCDEQ Stormwater Design Manual. Interstitial storage calculations shall only be used to demonstrate excess storage above and beyond the local stormwater volume control requirement.

Site development proposals that include "piping in" of existing open drainage channels shall include design calculations that consider upstream tributary drainage areas for appropriate sizing of storm drainage infrastructure. All drainage facilities shall be encompassed within drainage easements to permit for maintenance activities.

Off-site flows into Town rights-of-ways or existing Town maintained drainageways shall provide supporting calculations demonstrating that post-development project outflows do not exceed pre-development project outflows OR a downstream analysis of existing facilities demonstrating that it can accommodate the proposed additional flows.

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Glossary

Annual plant - A plant that completes its entire life cycle in a single growing season.

Aquifer- A stratum of rock or soil that contains groundwater.

Base flow — Water flow in a stream or man-made channel between rainfall events. The source of the water flow is supplied by groundwater.

Best Management Practice (BMP) – Methods, measures or a practice or a combination of practices to prevent or reduce water pollution. Examples include treatment techniques, operating procedures, erosion control practices, fertilizer and animal waste management and runoff control.

Bioretention area — A water quality practice that utilizes landscaping and soils to treat stormwater bycollecting it in shallow depressions and then filtering it through aplanting soil media. (Also see rain garden.)

Buffer - An area of trees, shrubs and plants next to a waterbody that provides a permanent barrier against runoff from development, construction and other land uses. Buffers are designed to filter and protect the receiving waterbody from sediment and pollutants contained in storm water runoff. Buffers also function as habitat for migratory birds and aquatic and terrestrial wildlife.

Built Upon Area - means that portion of a development project that is covered by impervious materials or partially impervious surfaces and used to calculate stormwater runoff potential, including buildings; pavement and compacted gravel areas such as roads or parking lots, and paths and recreation facilities such as athletic courts and concrete pool decks. Built-upon area does not include the surface area of pools, wooden slatted decks, or un-compacted, washed gravel, or pervious or partially pervious paving material to the extent that the paving material absorbs water or allows water to infiltrate through the paving material. Built-upon area is distinct from "lot coverage" as defined herein.

Channel- means a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

Check dam - A small barrier built across the direction of water flow in a channel to retain excess water during heavy rains and toslow the speed of runoff traveling through the channel.

Deciduous plant - A plant that sheds or loses its foliage at the end of each growing season.

Detain (detention)- The temporary storage of stormwater prior to controlled release as runoff. (Contrast with retention.)

Disconnected impervious surfaces - Integration of treatment and management measures into developed areas to remove the links between hardscaped areas such as driveways, walkways, parking areas with the strategic placement of distributed lot-level controls that can be customized to more closely mimic a watershed's hydrology.

Ecosystem—An interactive system that includes the organisms of a natural community together with their abiotic, physical, chemical and geochemical environment.

Easement - A right, such as a right-of-way, afforded a person to make limited use of another's real property.

Estuary—Brackish-water area influenced by the tides where the mouth of the river meets the sea. Estuaries are breeding grounds for many species of fish and shellfish.

Evergreen plant - A plant that remains green and retains its foliage throughout the year.

Fecal coliform bacteria—Bacteria that are present in the intestines or feces of warm-blooded animals. The potential for contracting diseases from pathogens can be determined by testing for an "indicator" organism such as coliform bacteria. Testing of surface waters for coliform bacteria are often used as a measure of safe water quality levels.

Floodplain — Land areas adjacent to water courses, rivers or water bodies subject to recurring inundation.

Forebay — Stormwater design feature that uses a small basin to settle out incoming sediment delivered in runoff to a stormwater BMP.

Geographic information systems (GIS) — A computer system for capturing, storing, checking, integrating, manipulating, analyzing and displaying data related to positions on the Earth's surface. Typically, GIS is used for handling maps of one kind or another. These might be represented as several different layers where each layer holds data about a particular kind of feature (i.e. roads, waterbodies, etc.). Each feature is linked to a position on the graphical image of a map.

Groundwater - Water below the earth's surface, typically in aquifers, that supplies drinking wells and springs. Runoff can seep into the soil and recharge groundwater supplies.

Habitat - The specific area or environment where a plant or animal lives. A habitat must provide all of the basic requirements for life (food, water, shelter) and should be free of harmful contaminants and pollution.

Hydrologic Soil Group (HSG) - means a Natural Resource Conservation Service (NRCS) classification system in which soils are categorized into four groups of infiltration potential. The groups range from A soils, with high permeability and little runoff production, to D soils, which have low permeability and produce much more runoff.

Hydrology — Movement and distribution of groundwater and surface water in a system.

Impervious surface - Any hardened surface improvement that water cannot penetrate into (i.e. parking lots, streets, sidewalks, rooftops).

Infiltration – The process by which water drains or seeps into the soil matrix from the ground surface.

Infiltration Device - Any structure or measure designed to infiltrate retained water to the subsurface. These facilities may be above grade or below grade.

Land Use - The way land is used or developed, such as the types of buildings and activities permitted. Particular land uses are often associated with different types of pollution, such as erosion and sedimentation from construction activities.

Lot Coverage - means that portion of the lot area, expressed as a percentage, that is covered or occupied by impervious surfaces or structures. For the purposes of determining lot coverage, the following features shall be considered impervious: any principal or accessory use or structure located above the ground including decks; parking areas; vehicular use areas; roadways; access ways; and sidewalks or walkways that prevent the infiltration of rainwater. Lot coverage is utilized to determine zoning compliance and is distinct from the amount of built upon area used in stormwater management calculations.

Low impact development (LID) - Low impact development is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, transpire and detain runoff close to its source.

Mimic – Significantly equivalent in nature.

Mitigation - Actions taken to avoid, reduce, or compensate for the effects of human-induced environmental damage.

Native plant — A plant that naturally occurred in an area before disturbance by humans. Native plants are adapted to the weather, temperature and soil conditions of this region. Native plants require less (if any) fertilizers, pesticides or irrigation and tend to be disease and drought-tolerant.

Nonpoint source pollution (NPS) – Pollution that enters water bodies from a variety of sources. NPS pollution is caused by runoff from rainfall or snowmelt that moves over and through the ground, washing natural and human-made pollutants into surface waters and underground sources of drinking water Typical NPS pollutants are pet waste, lawn fertilizer, pesticides, car washing detergents, litter and sediment.

Nutrient — Substances such as nitrogen and phosphorous that are required by plants and animals for growth. In some circumstances, excessive nutrient additions to surface waters may result in excessive algal or plant growth and, subsequently, the accumulation and decay of increased organic matter.

Open Space - A vegetated, unoccupied, space open to the sky, without vertical structures or surfaces covered with pavements or other relatively impervious materials.

Outfall — Is a discharge point of stormwater system that exits the system and flows into a body of water. Outfalls include discharges from pipes, ditches, swales and other points of concentrated flows.

Pathogen - A disease-causing organism (viruses, bacteria, or fungi can be pathogenic organisms)

Perennial plant - A plant that grows and persists for more than one year. Perennial plants persist as vegetation from year to year or re-sprout from their rootstock annually.

Permeable - Soil or other material that allows the infiltration or passage of water or other liquids. This term is typically interchangeable with the term pervious.

Pervious paving – Is a stormwater control system that captures stormwater through voids in the pavement surface and filters water through an underlying aggregate reservoir. The reservoir can either infiltrate into the underlying soil subgrade or be designed to detain and release water to a stormwater conveyance system. Water-pervious materials such as a washed aggregate, concrete grid pavers, pervious concrete or pervious paving blocks for driveways, parking areas, walkways, and patios that minimize runoff from those areas, as well as increase infiltration.

Point source pollution - Pollution that can be traced to a single point, or output, such as a pipe.

Pollution - Any substance that exists in the environment that is undesirable or harmful for that environment.

Rain garden — A rain garden is a shallow depression planted with native plants, flowers or grass that captures and infiltrates rain before it becomes polluted runoff.

Receiving waters — Creeks, streams, rivers, lakes, estuaries and other bodies of water into which stormwater is discharged to.

Recharge – The downward movement of water through the soil matrix to below the limits of active evapotranspiration effects.

Retain (retention) – To facilitate full infiltration and/or evapotranspiration of stormwater, not allowing runoff.

River basin - Area encompassing all the land drained by streams and creeks flowing downhill into a major river. All water that falls within the basin flows into these streams and rivers.

Runoff -Water flowing across the land that does not infiltrate the soil, but drains into surface or groundwater, or when rainfall exceeds the infiltration capacity of the land.

Runoff volume - The volume of water that runs off the land development project from a prescribed storm event.

Sedimentation - Particles of soil, sand, silt, clay, or organic matter that are deposited onto the bottom of any surface water or are left behind when water leaves. Sedimentation often originates from land disturbance activities associated with construction sites or where bare land surfaces exist.

Storm drainage system – A network of structures, channels and underground pipes built to collect and transport runoff to streams, ponds, lakes, rivers and other water bodies. Storm drainage systems are completely separate from those that carry domestic and commercial wastewater (sanitary sewer system).

Stormwater Control Measures (SCMs) - "Stormwater Control Measure" or "SCM," also known as "Best Management Practice" or "BMP," means a permanent structural device that is designed, constructed, and maintained to remove pollutants from stormwater runoff by promoting settling or filtration; or to mimic the natural hydrologic cycle by promoting infiltration, evapotranspiration, post-filtration discharge, reuse of stormwater, or a combination thereof

Stormwater Management - The use of structural or nonstructural practices to

manage one or more components of hydrologic response (quantity, constituents, and character) from stormwater inputs**.**

Surface water — The water that rests on top of the earth in streams, lakes, rivers, oceans and reservoirs and is open to the atmosphere (i.e. rivers, lakes, creeks, streams, etc.).

Swales - Minor channels usually lined with grass used to transport runoff from less developed areas.

TMDL — Total maximum daily load is the calculation of the maximum amount of pollutants that a waterbody can receive and still meet water quality standards.

Tributary - A stream that flows into a larger stream or other body of water.

Water Cycle - The cycle in which water evaporates from surface waters, condenses into clouds, and falls again to the earth as rain or other forms of precipitation**.**

Water Quality — The biological, chemical and physical conditions of a waterbody; a measure of the ability of a waterbody to support designated uses.

Water Table – The depth at which the ground is saturated with water**.**

Watershed - Ecosystem consisting of three major components—stream channel, floodplain, and upland areas—that function together and drain to water bodies, including lakes, rivers, estuaries, wetlands, streams, and the surrounding landscape (groundwater recharge areas are also considered).

Wetland - Land whose soil is saturated with moisture either permanently or seasonally. They are generally distinguished from other water bodies or landforms based on saturated soil conditions for a period of time long enough season each year to support aquatic plants.

Web Resources

Rainwater Harvesting

NC Department of Environmental Quality *Stormwater Design Manual, Part C-7 Rainwater Harvesting* *https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permit-guidance/stormwater-bmp-manual*

North Carolina Coastal Federation, Smart Yards- Simple DIY Solutions: Rain Barrels, 2017 *https://www.nccoast.org/wp-content/uploads/2017/09/SmartYards_07-17.pdf*

Town of Nags Head Recommended Standard Details Manual- Rain Barrel- Detail 505 https://www.nagsheadnc.gov/938/Recommended-Standard-Details-Manual--Sto

Re-routing Downspouts

North Carolina Coastal Federation, Smart Yards- Simple DIY Solutions: Re-routing Downspouts, 2017 *https://www.nccoast.org/wp-content/uploads/2017/09/SmartYards_07-17.pdf*

NC Department of Environmental Quality *Stormwater Design Manual, Part C-10 Disconnect Impervious Surfaces* *https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permit-guidance/stormwater-bmp-manual*

North Carolina Cooperative Extension, Disconnect for Rainwater Dispersal, 2012 *https://wrri.ncsu.edu/docs/partnerships/bcwa/2.DISCONNECT.pdf*

Vegetated Swales

NC Department of Environmental Quality *Stormwater Design Manual, Part C-1 Infiltration Systems* *https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permit-guidance/stormwater-bmp-manual*

North Carolina Cooperative Extension, *Low Impact Development, A Guidebook for North Carolina, Swales* *http://www.onsiteconsortium.org/npsdeal/NC_LID_Guidebook.pdf*

North Carolina State University, NC State Extension, *Swale Terminology for Urban Stormwater Treatment, 2020,* *https://content.ces.ncsu.edu/swale-terminology-for-urban-stormwater-treatment*

Rain Gardens

North Carolina Cooperative Extension, Backyard Rain Garden,2014 *https://forsyth.ces.ncsu.edu/wp-content/uploads/2016/03/RGmanual2015.pdf?fwd=no*

North Carolina State Stormwater Engineering Group, *https://stormwater.bae.ncsu.edu/ search rain gardens.*

North Carolina Coastal Federation, Smart Yards- Simple DIY Solutions: Rain Gardens, 2017 *https://www.nccoast.org/wp-content/uploads/2017/09/SmartYards_07-17.pdf*

Contact your local nursery or Dare County Cooperative Extension for more assistance

Infiltration Trenches

NC Department of Environmental Quality *Stormwater Design Manual, Part C-1 Infiltration Systems* *https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permit-guidance/stormwater-bmp-manual*

North Carolina Cooperative Extension, Low Impact Development, A Guidebook for North Carolina, Infiltration Trench *http://www.onsiteconsortium.org/npsdeal/NC_LID_Guidebook.pdf*

Susdrain, *Component Infiltration trenches:* *https://www.susdrain.org/delivering-suds/using-suds/suds-components/infiltration/infiltration_trench.html*

Living Shorelines

North Carolina Coastal Federation, Smart Yards- Simple DIY Solutions: Living Shorelines, 2017 *https://www.nccoast.org/wp-content/uploads/2017/09/SmartYards_07-17.pdf*

North Carolina Coastal Federation, *Living Shorelines,* *https://www.nccoast.org/protect-the-coast/estuarine-shorelines/*

Living Shorelines Academy, *https://www.livingshorelinesacademy.org/index.php*

Virginia Institute of Marine Science (VIMS)-Living Shoreline Summit Presentations, 2006 *https://www.vims.edu/cbnerr/coastal_training/recent_workshops/ls_summit.php*

National Oceanic and Atmospheric Administration (NOAA) Living Shorelines Workgroup,2015, *https://www.habitatblueprint.noaa.gov/wp-content/uploads/2018/01/NOAA-Guidance-for-Considering-the-Use-of-Living-Shorelines_2015.pdf*

References

Currituck County *Stormwater Manual,* December 2017

Town of Nags Head *Stormwater Management Plan Volume II: Technical Report,* 2006

Southeast Michigan Council of Governments*, Low Impact Development Manual for Michigan, A Design Guide for Implementors and Reviewers,* 2008

North Carolina Cooperative Extension*, Low Impact Development A Guidebook for North Carolina,* 2009

North Carolina Department of Environmental Quality *Stormwater Design Manual,* 2017.

North Carolina State University*, Low Impact Development Fast Track Certification,* February 2011

Town of Nags Head *Recommended Standards Detail Manual,* 2019

Town of Cedar Point/Town of Cape Carteret *Low Impact Development (LID) Manual,* 2010

Georgia Department of Natural Resources, *Green Growth Guidelines*, 1st Edition, 2011

Urban Land Institute, *Environment and Development, Myth and Fact*, 2012

North Carolina Coastal Federation*, Low Impact Development: https://www.nccoast.org/protect-the-coast/restore/low-impact-development/*

Additional Resources

NC Water Resources Research Institute: https://wrri.ncsu.edu

NC Cooperative Extension: https://www.darenc.com/departments/planning/soil-and-water/rain-garden-information

Low Impact Development Center: http://www.lowimpactdevelopment.org/resources

North Carolina State University Stormwater Engineering Group*: https://stormwater.bae.ncsu.edu/*

FORMS

Residential Stormwater Checklist

Residential Stormwater Checklist

All new residential development on individual lots, and redevelopment of 500 square feet or more of new impervious area require a stormwater management plan. The stormwater plan shall be submitted as part of the application for a land disturbance or building permit. In addition to the information listed on the Minimum Required Survey Information which can be found in Appendix A, please identify the following information on your site plan/survey:

- ☐ Direction of flow of stormwater runoff under existing conditions.
- ☐ Location of areas on site where stormwater collects or infiltrates into the ground.
- ☐ Approximate elevation of the seasonal high water table.
- ☐ Proposed vegetation to be preserved, or planted.
- ☐ Proposed stormwater improvements, and their size.
- ☐ Erosion and Sediment control measures.

Who do I contact if I have questions?

For general permit questions, not necessarily related to stormwater, contact the planning department front desk at (252) 441-7016.

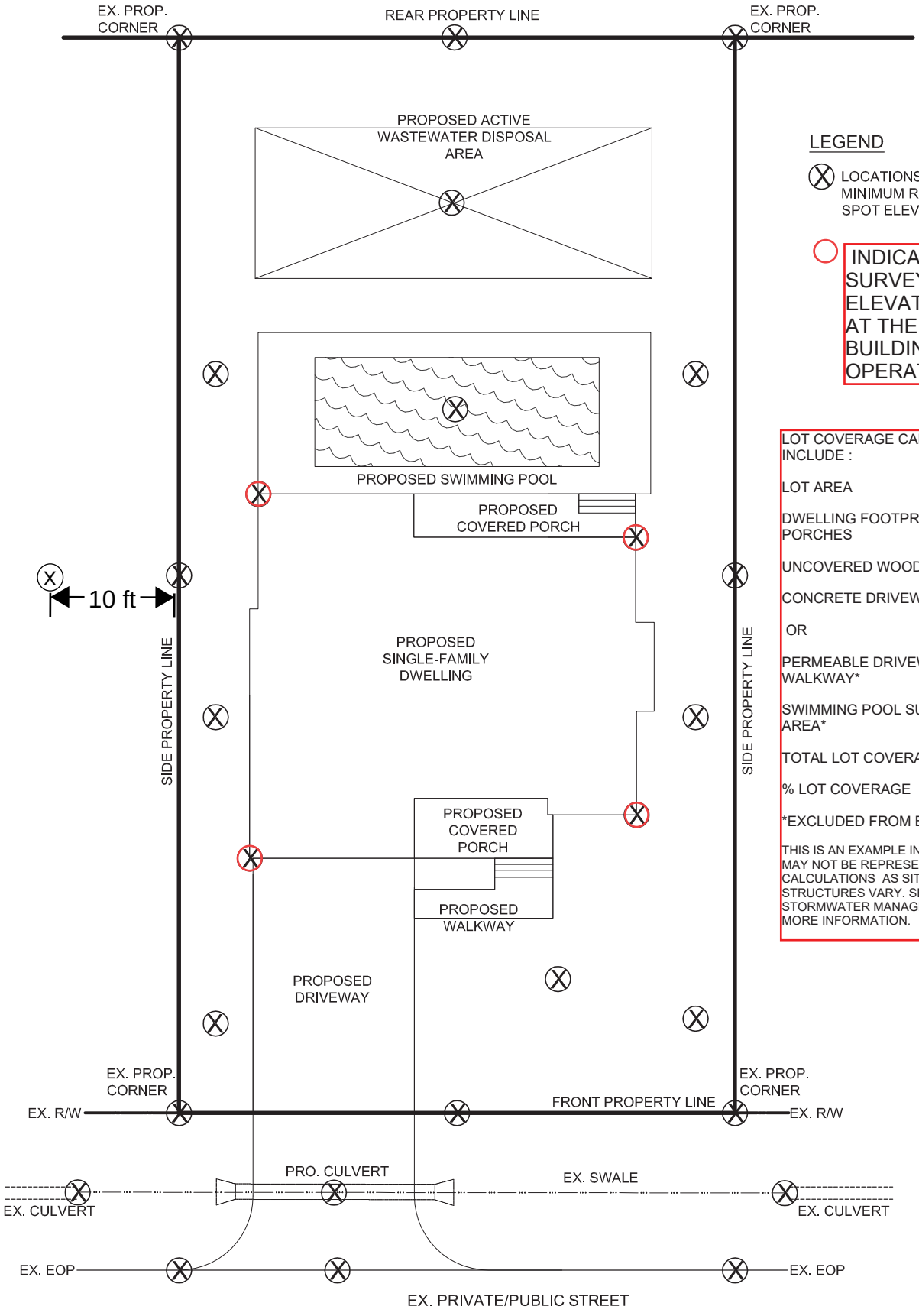
For specific questions related to residential stormwater management, contact
Kate Jones
Senior Environmental Planner
Email – kate.jones@nagheadnc.gov
(252) 449-4209

For specific questions related to residential and commercial subdivision, and general commercial stormwater management, contact
David Ryan
Town Engineer
Email – david.ryan@nagsheadnc.gov
(252) 441-6221

TOWN OF NAGS HEAD LOW IMPACT DEVELOPENT MANUAL - APPENDIX A

RESIDENTIAL STORMWATER IMPROVEMENTS

EXISTING SITE FEATURES (NON-STRUCTURAL)



LEGEND

⊗ LOCATIONS OF MINIMUM REQUIRED SPOT ELEVATIONS

○ INDICATES ADDITIONAL SURVEY SPOT ELEVATIONS REQUIRED AT THE COMPLETION OF BUILDING PAD FILL OPERATIONS.

LOT COVERAGE CALCULATIONS SHOULD INCLUDE :

LOT AREA

DWELLING FOOTPRINT W/ COVERED PORCHES

UNCOVERED WOOD DECKING*

CONCRETE DRIVEWAY, PATIO AND WALKWAY

OR

PERMEABLE DRIVEWAY, PATIO AND WALKWAY*

SWIMMING POOL SURFACE AREA*

TOTAL LOT COVERAGE

% LOT COVERAGE

*EXCLUDED FROM BUILT UPON AREA

THIS IS AN EXAMPLE INTENDED FOR GUIDANCE. IT MAY NOT BE REPRESENTATIVE OF ALL REQUIRED CALCULATIONS AS SITE LAYOUT , MATERIALS AND STRUCTURES VARY. SEE RESIDENTIAL STORMWATER MANAGEMENT APPLICATION FOR MORE INFORMATION.

MINIMUM REQUIRED SURVEY INFORMATION FOR RESIDENTIAL SITE DEVELOPMENT PLANS

SCALE: NONE

IN ACCORDANCE WITH TOWN CODE SECT. 34-8.C

NOTE:
THE INFORMATION DESCRIBED HEREON IS FOR REFERENCE PURPOSES ONLY. EXISTING SITE CONDITIONS MAY WARRANT A GREATER LEVEL OF DETAIL, I.E. TOPOGRAPHY, DITCHES, SURFACE IMPROVEMENTS, ETC. IT IS THE RESPONSIBILITY OF THE APPLICANT TO PROVIDE A SUFFICIENT LEVEL OF DETAIL IN ACCORDANCE WITH CHAPTER 34, STORMWATER, FILL AND RUNOFF MANAGEMENT.

THE TOWN OF 1961 NAGS HEAD N.C.

VEGETATED SWALE

A vegetated swale is a depression (about 6 to 12" inches deep) that collects storm water runoff from a roof, driveway or yard and allows it to infiltrate into the ground. Vegetated swales are typically planted with shrubs and perennials (natives are ideal), and can be colorful, landscaped areas in your yard.

MAINTENANCE

- Watering

During the establishment period of the first year, watering may be required on a more frequent basis. Once established, watering should not be necessary at all except in cases of extreme drought.

- Weeding

Weeding will be required during the first three years of establishment and will be less frequent after the three-year period.

- Remedial Measures

Annual maintenance is not different than traditional landscaping and includes removal of dead vegetation each spring, addition of mulch, periodic inspection of soil erosion and plant health.

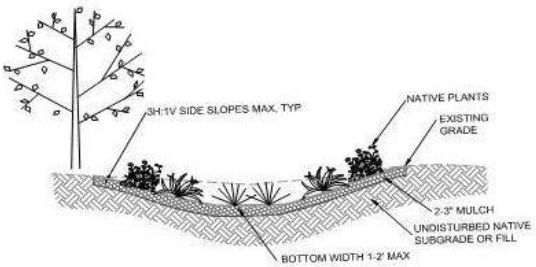
Topography: Vegetated swale are easiest to install in flat areas.

Soils: Well drained ; avoid placing swales in areas with existing standing water.

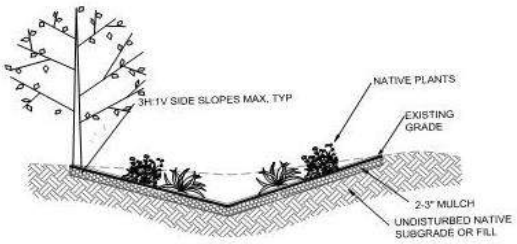
Setbacks: 5' from septic systems, 5-10' from buildings, decks and driveways. Can be placed adjacent to property line.

Vertical Separation: Recommended 12" from seasonal high water table.

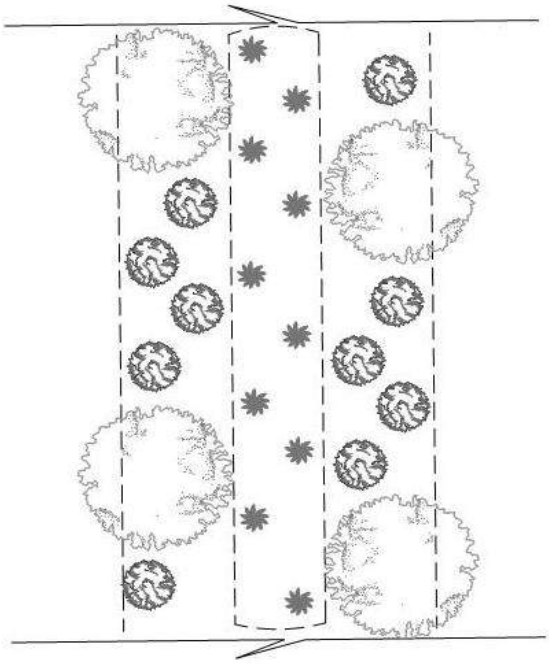
RESIDENTIAL STORMWATER MAGAGEMENT 252-449-4209

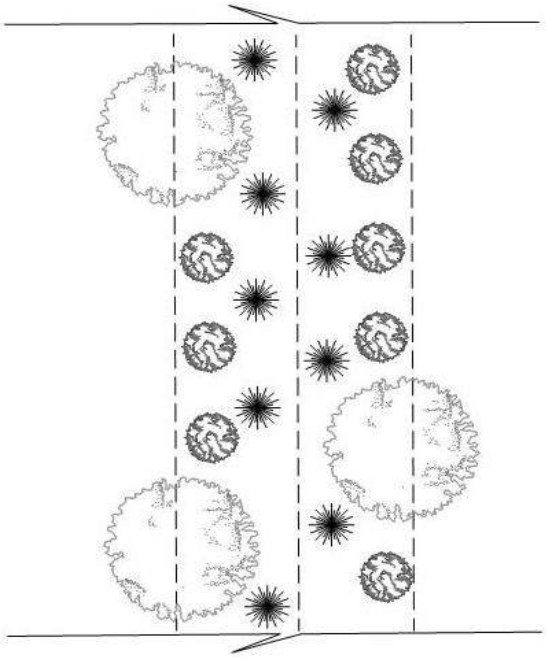


Trapezoidal



Triangular





Shrub

Tree

Grass

*Total # of plants varies with swale dimension. Trees are optional, but provide more water uptake. Please see the Plant List for more recommendation on types of plants.

RAIN GARDEN

A rain garden is a depression (about 6 inches to 1 foot deep) that collects storm water runoff from a roof, driveway or yard and allows it to infiltrate into the ground. Rain gardens are typically planted with shrubs and perennials (natives are ideal), and can be colorful, landscaped areas in your yard.

MAINTENANCE

- Watering

During the first year, watering may be required on a more frequent basis. Once established, watering should not be necessary at all except in cases of extreme drought.

- Weeding

Weeding will be required during the first three years of establishment and will be less frequent after the three-year period.

- Remedial Measures

Annual maintenance is not necessarily different than traditional landscaping and includes removal of dead vegetation each spring, addition of mulch, periodic inspection of soil erosion, plant health and removal of litter as needed.

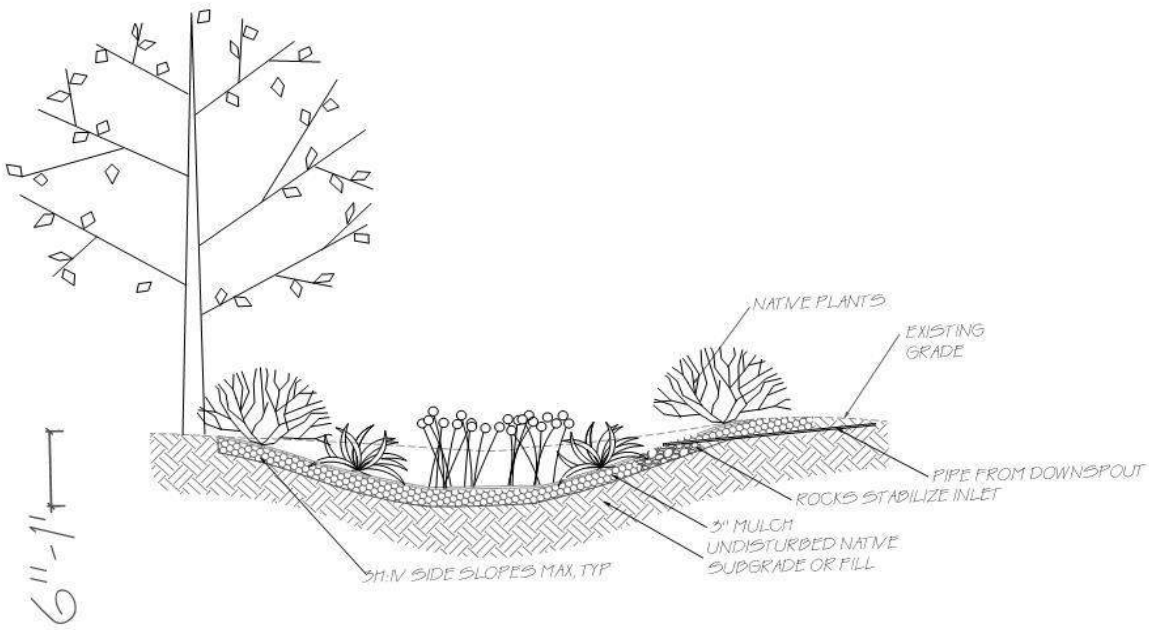
Topography: Rain gardens are easiest to install in flat areas.

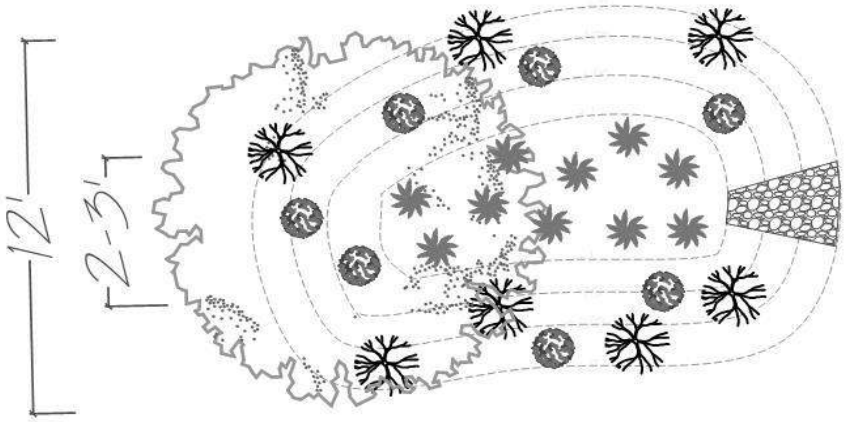
Soils: Well drained soils are best ; avoid placing rain gardens in areas with existing standing water.

Setbacks: 5' from septic systems, 5-10' ' from buildings, decks and driveways. Can be placed adjacent to property line.

Recommended minimum 12" from bottom of garden to seasonal high water table.

RESIDENTIAL STORMWATER MAGAGEMENT
252-449-4209





Flowering perennial

Tree

Grass

Shrub

*Total # of plants varies with rain garden dimension. Trees are optional, but provide more water uptake. Please see the Plant List for more recommendation on types of plants.

DRIP LINE INFILTRATION TRENCH

Dripline Infiltration trenches are excavated trenches located in the roof drip line area, filled with granular material. The voids between the aggregate materials provide the volume for temporary storage of runoff that gradually infiltrates into the surrounding soil.

MAINTENANCE

- **Clogging**

Remove debris and inspect for sediment buildup and structural damage. Ensure the trench is dewatering between storms.

- **Cleaning**

Remove sediment adjacent to or near trench. Repair any erosion in aggregate or grassed areas.

- **Remedial Measures**

If trench has not drained within 48 hours after storm, excavate around perimeter to expose clean soil (~2 inches). Replace and reline filter fabric (if using). Clean or replace aggregate.

Recommended maximum depth: 8”

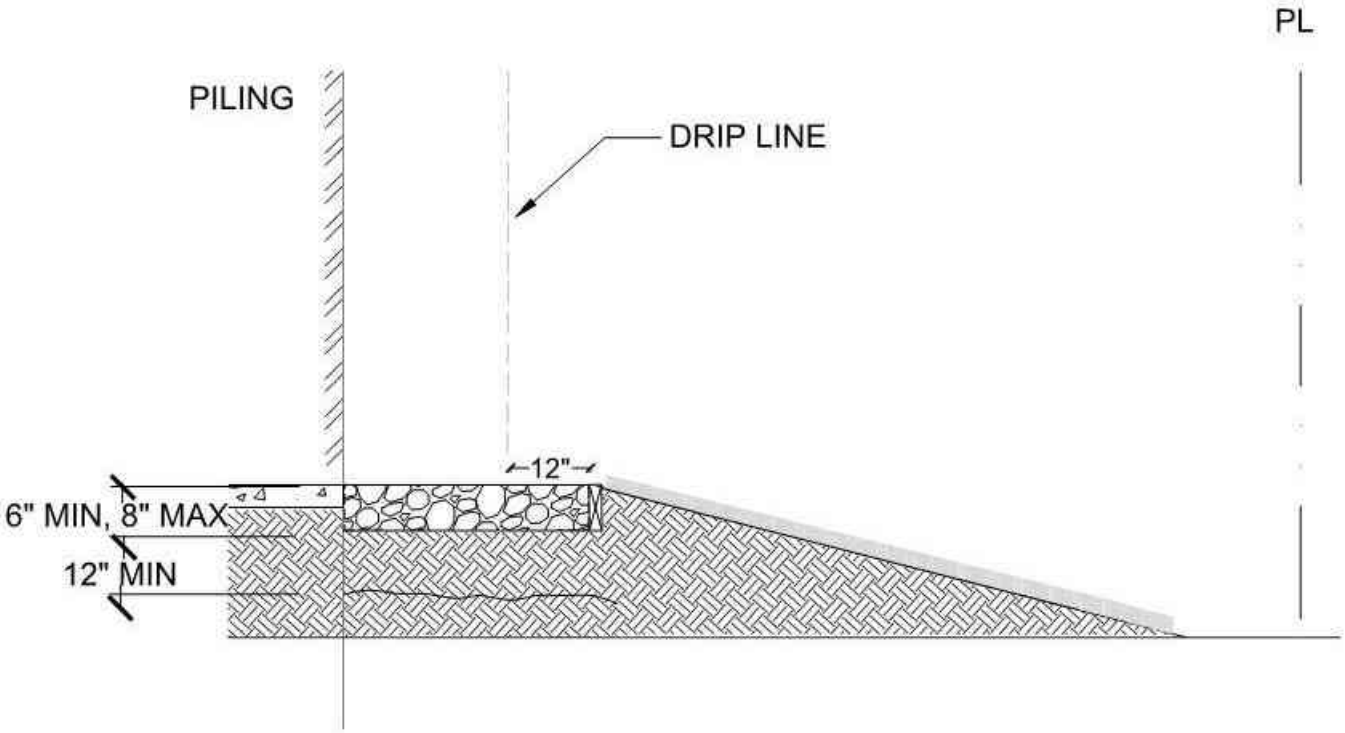
Trench bottom should be level, but the surface may slope

Setback: 5’ from septic systems

Recommended minimum 12” from bottom of garden to seasonal high water table

Minimum depth 6”, Minimum width 1’ past roof drip line

RESIDENTIAL STORMWATER MAGAGEMENT
252-449-4209


PL
PILING
DRIP LINE
12"
6" MIN, 8" MAX
12" MIN

INFILTRATION TRENCH/GRAVEL BED

Infiltration trenches, also called gravel beds, are excavated areas filled with clean granular material. The voids between the aggregate materials provide the volume for temporary storage of runoff that gradually infiltrates into the surrounding soil. A perforated pipe (french drain) may be added for additional volume storage, or to carry water to another location.

MAINTENANCE

- **Clogging**

Remove debris and inspect for sediment buildup and structural damage. Ensure the trench is dewatering between storms.

- **Cleaning**

Remove sediment adjacent to or near trench. Repair any erosion in aggregate or grassed areas.

- **Remedial Measures**

If trench has not drained within 48 hours after storm, drain via pumping. Excavate around perimeter to expose clean soil (~2 inches). Replace and reline filter fabric. Clean or replace aggregate.

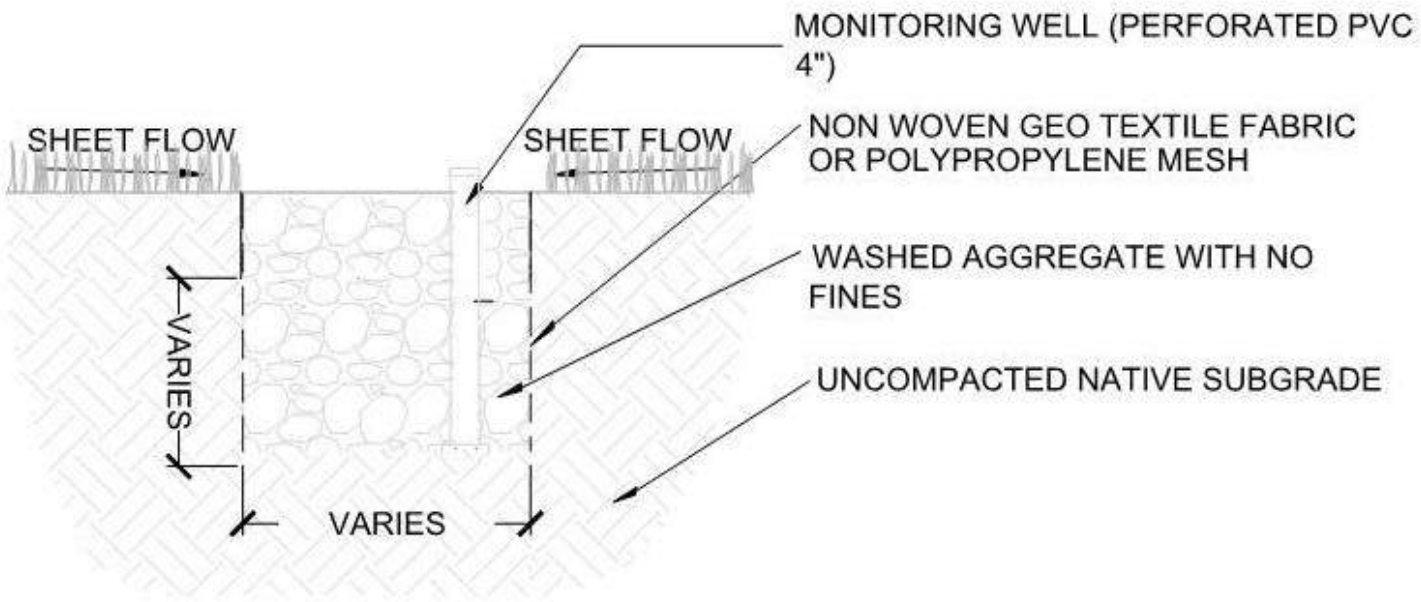
Recommended maximum depth: 3'

Trench bottom should be level, but the surface may slope

Setbacks: 5' from septic systems

Recommended minimum 12" from bottom to seasonal high water table

RESIDENTIAL STORMWATER MAGAGEMENT
252-449-4209


MONITORING WELL (PERFORATED PVC 4")
SHEET FLOW
SHEET FLOW
NON WOVEN GEO TEXTILE FABRIC OR POLYPROPYLENE MESH
WASHED AGGREGATE WITH NO FINES
UNCOMPACTED NATIVE SUBGRADE
VARIES
VARIES

CISTERN/RAIN BARREL

Rain barrels are containers used to collect a portion of the rainwater that flows from your rooftop and stores it for uses such as watering your lawn and garden.

MAINTENANCE

- Drain Rain Barrels after each significant rainfall from April to November. At a minimum, empty the rain barrel every two weeks.
- Clean the rain barrel periodically and inspect it for clogs and leaks. Remove leaves and other debris from the filter screen and ensure that it is not damaged and is securely fastened. IT is recommended to disinfect the rain barrel with bleach once a year. Unless designed for freezing temperatures, the rain barrel should be disconnected and drained for winter.
- If the Rain Barrel becomes cracked, or any of the materials become worn, replace as necessary to prevent leakages.

Barrels need to be installed on level surface

Rain barrels work where occupants intend to use the captured water

Multiple rain barrels can be connected together

Mosquito control is important and can be abated by using a screen or mosquito tablets

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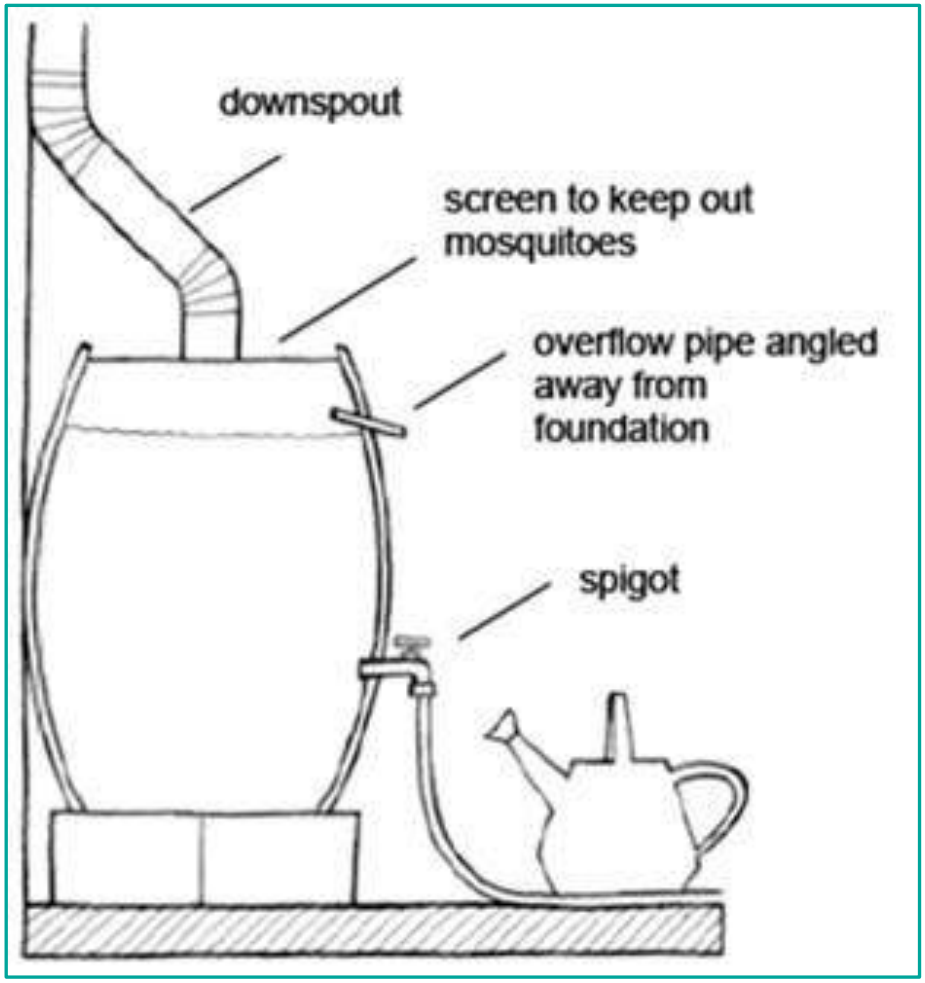
downspout
screen to keep out mosquitoes
overflow pipe angled away from foundation
spigot

PLANT LIST

DESCRIPTION

Plants used in stormwater control measures should be carefully considered depending on several factors: water requirements or tolerance, sun exposure, tolerance for drought, sandy soil adaptability, and salt tolerance.

- **Benefits**
  1. Additional water uptake through evapotranspiration.
  2. Filtering of environmental contaminants.
  3. Aesthetically pleasing additional to the landscape.
  4. Once established, minimal maintenance required weeding.
- **Design Considerations**
  1. Choose plants depending on the estimated amount of water they will receive.
  2. The use of native plants is suggested to reduce maintenance as they are better adapted to soils and environmental conditions.
  3. Choose a variety of plants instead of just one or two species.

Go Native! Ask local nurseries to stock native plants.

Keep existing native plants on your property whenever possible.

Use your smartphone camera to scan the QR code below for more native plant resources!

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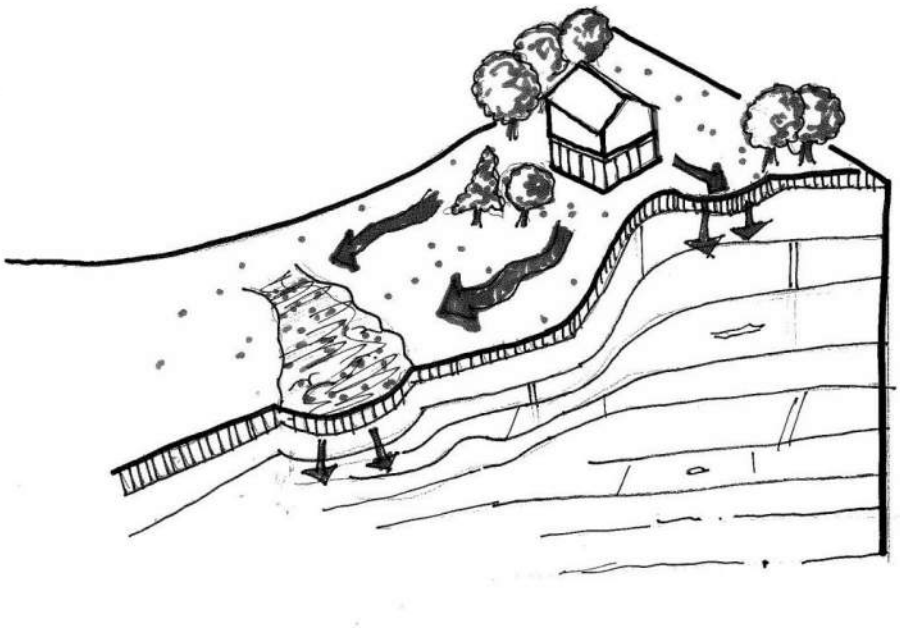
Plant	Type	Water	Sun	Height	BLOOM PERIOD										
					J	F	M	A	M	J	J	A	S	O	N
Swamp Magnolia	Tree			36-72’											
Persimmon	Tree			15-20’											
Cherry Laurel	Tree			12-36’											
Yaupon Holly *(Ilex vomitoria)*	Tree/Shrub			12-36’											
Inkberry *(Ilex glabra)*	Shrub			6-12’											
Sweet Pepperbush *(Clethra alnifolia)*	Shrub			3-6’											
Yucca *(Yucca filamentosa)*	Shrub			2-3’											
Blanket Flower *(Gaillardia pulchella)*	Flowering perennial			1-2’											
Coreopsis *(Coreopsis lanceolata)*	Flowering perennial			2-3’											
Milkweed (*Asclepias*)	Flowering perennial			1-3’											
Coneflower (Echinacea purpurea)	Flowering perennial			2-5’											
Muhly grass *(Muhlenbergia)*	Grass			3-4’											
Switchgrass *(Panicum Virgatum)*	Grass			2-3’											
Little blue stem (*Schizachyrium Scoparium)*	Grass			2-3’											
River oats *(Chasmanthium latifolium)*	Grass			3-4’											
Indian grass *(Sorghastrum Nutans)*	Grass			2-3’ 6’ w/bloom											

LOT DEPRESSIONS



Naturally occurring low areas on a site may be utilized for stormwater capture. These areas should receive water from impervious areas by way of a downspout pipe extension, swale, or other mechanism to transport water to the low area.

MAINTENANCE

- Keep any buried pipes and associated downspouts and gutters free of debris and flowing.
- Check gutters, downspouts and pipes for clogs or cracks and replace as needed.
- Make sure the area is not overflowing onto a neighbors property or the rights of way or road.
- Recommended to plant vegetation if none exists for additional water uptake.

Areas should be at least 5' away from structures.

May only be utilized where natural grades have resulted in a depression

Water should be contained on your property

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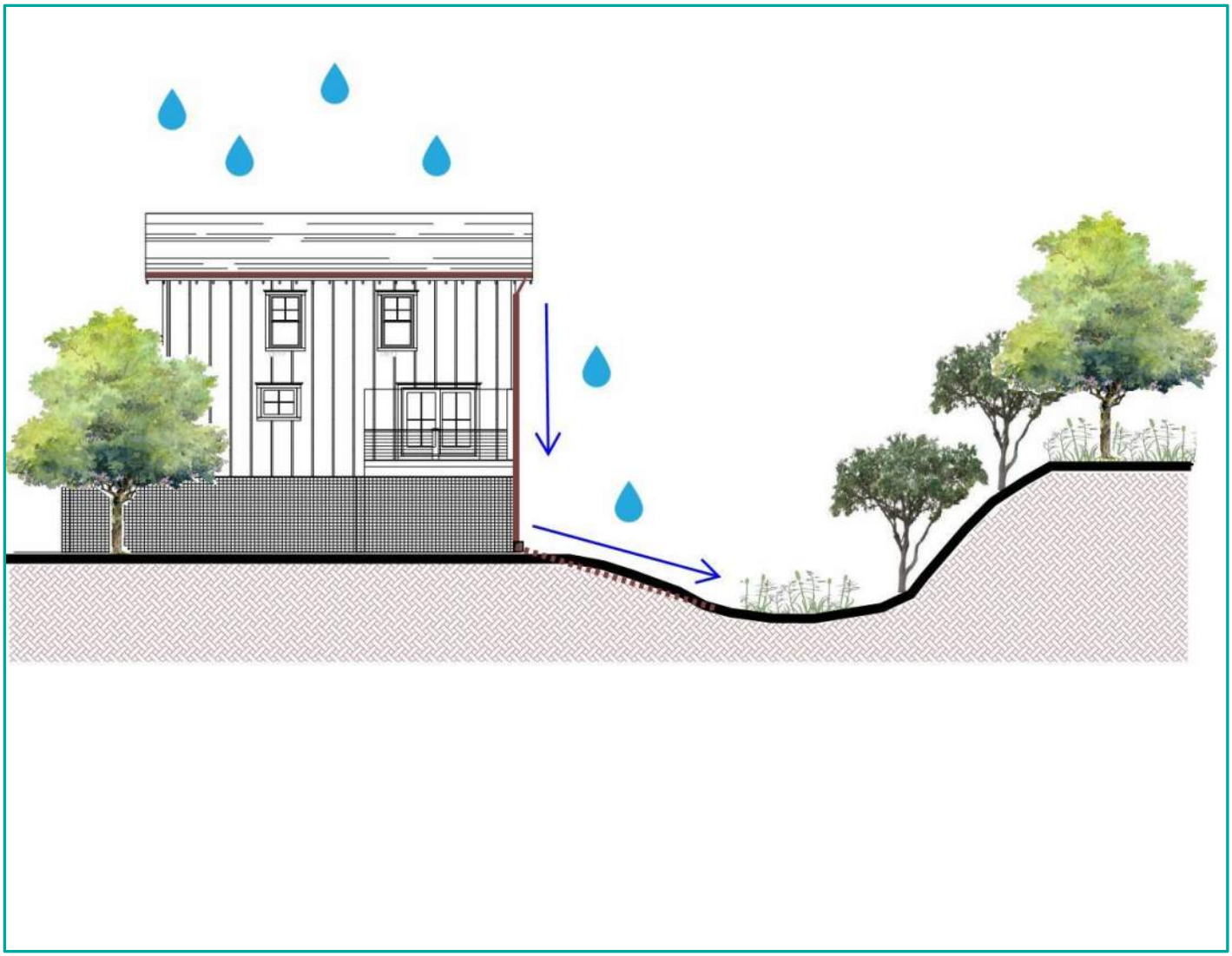
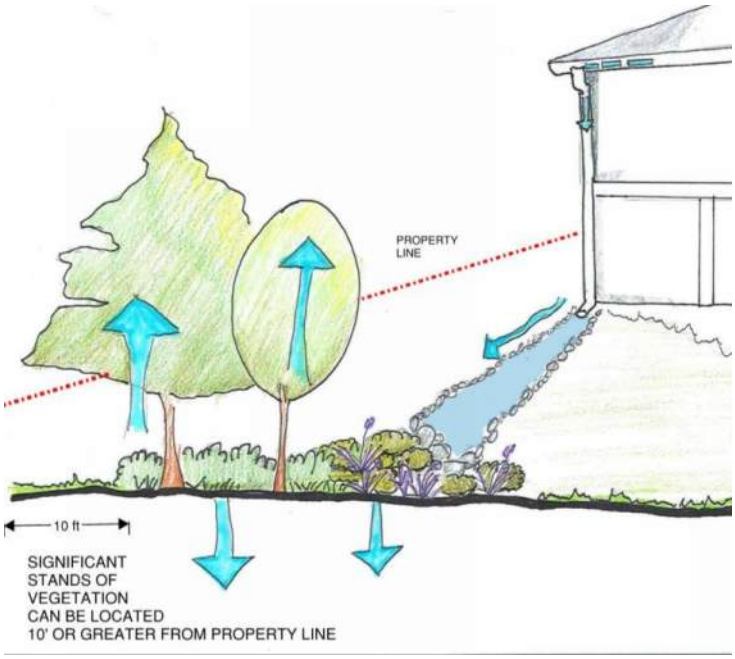


VEGETATED AREAS



Existing mature vegetation on a site may be utilized for stormwater capture and infiltration. These areas should receive water from impervious areas by way of a downspout pipe extension, swale, or other mechanism to transport water to the vegetation.

MAINTENANCE

- Keep any buried pipes and associated downspouts and gutters free of debris and flowing.
- Check gutters, downspouts and pipes for clogs or cracks and replace as needed.
- Make sure the area is not overflowing onto a neighbors property or the rights of way or road.
- Plant vegetation if none exists. That will soak up more water.

Areas should be at least 5' away from structures.

Vegetation should be mature

Water should be contained on your property

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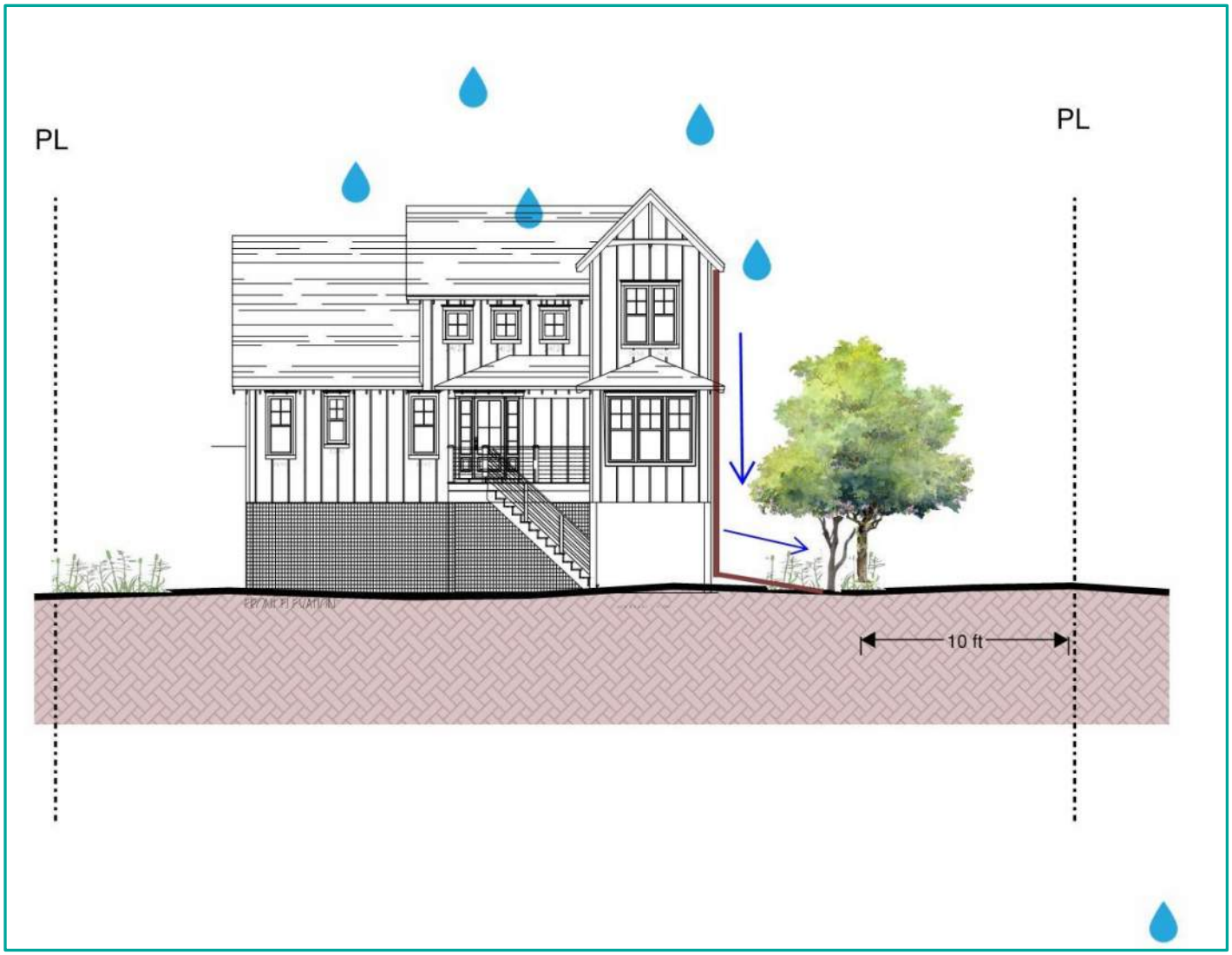
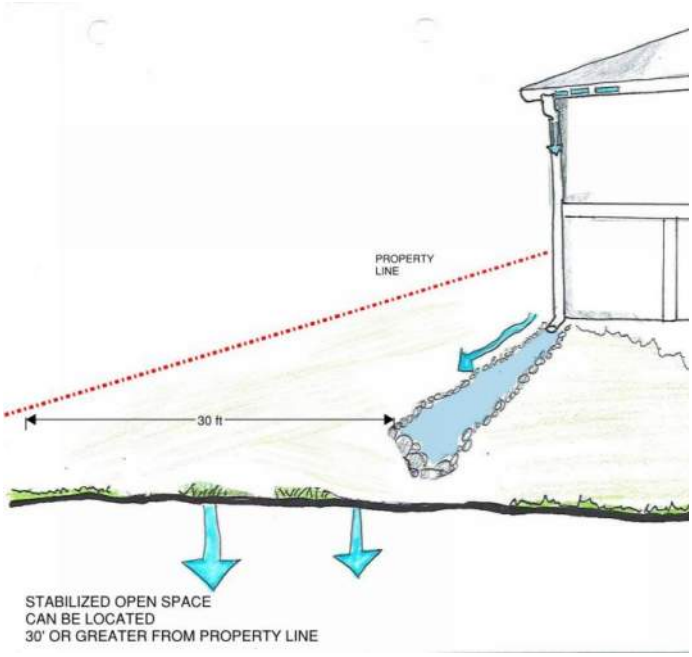

PL
PL
10 ft

STABILIZED OPEN SPACE AREAS



Existing open space areas not associated with on site septic systems, may be utilized for stormwater capture and infiltration. These areas must be at least 30 feet from a property line, and should receive water from impervious areas by way of a downspout pipe extension, swale, or other mechanism to transport water to the area.

MAINTENANCE

- Keep any buried pipes and associated downspouts and gutters free of debris and flowing.
- Check gutters, downspouts and pipes for clogs or cracks and replace as needed.
- Make sure the area is not overflowing onto a neighbors property or the rights of way or road.

Areas should be at least 5' away from structures.

Open space areas must be stabilized, at a minimum with sod, grass or other ground cover.

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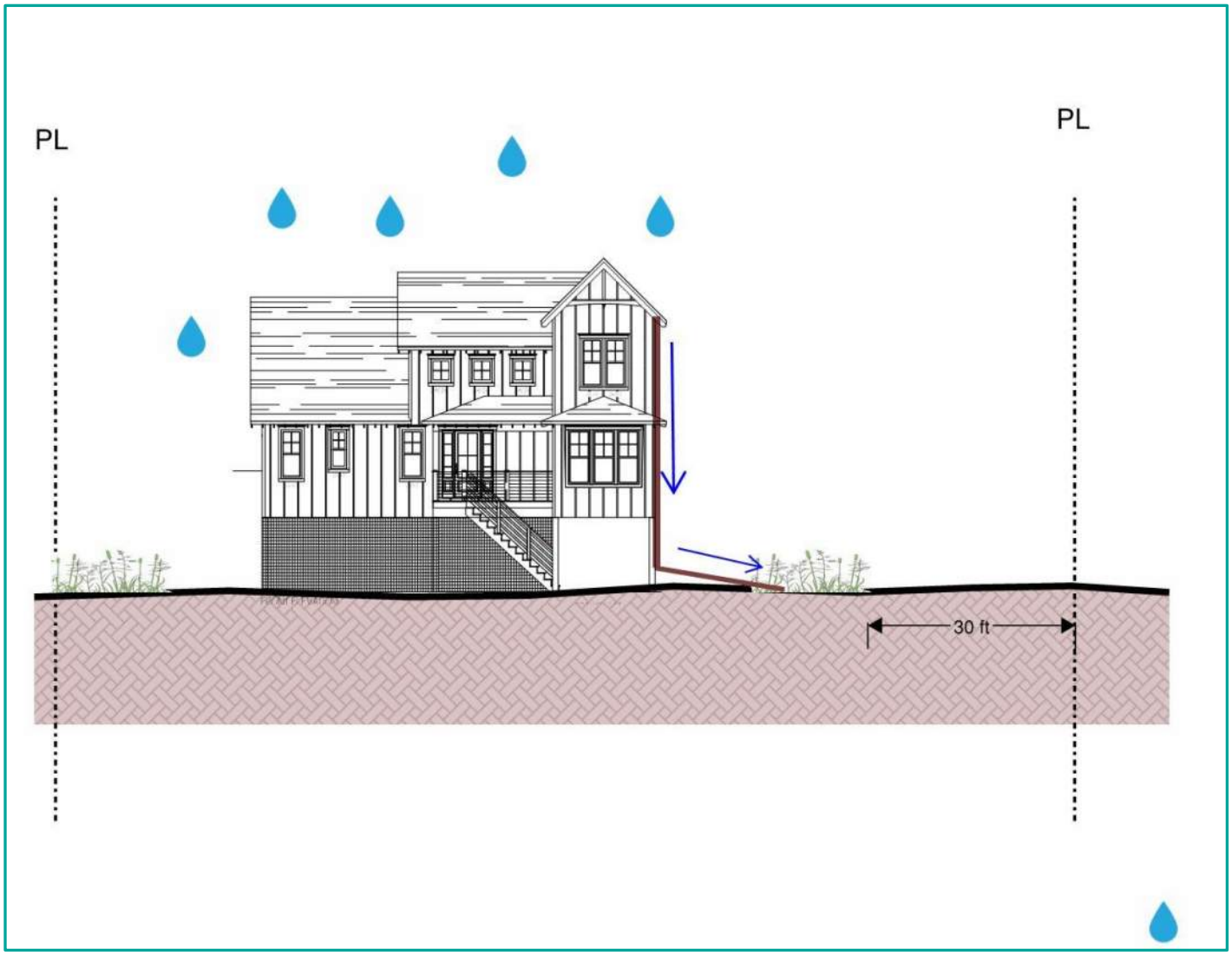
PL
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30 ft

WETLANDS

Existing wetlands should be kept as able to maintain infiltration patterns. These areas should receive water indirectly from impervious areas by way of a downspout pipe extension, swale, or other mechanism to transport water to the wetland. Make sure the water is discharged to a vegetated area or stormwater improvement before reaching the wetland.

MAINTENANCE

- Keep any buried pipes and associated downspouts and gutters free of debris and flowing.
- Check gutters, downspouts and pipes for clogs or cracks and replace as needed.
- Make sure the area is not overflowing onto a neighbors property or the rights of way or road.

Areas should be at least 5' away from structures.

May be utilized on lots where wetlands have been identified by ACOE

Water may sheet flow if the majority of wetlands outside built areas are retained.

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