

Single Family Residential Development Stormwater Management Review

A report to the Board of County Commissioners

INTRODUCTION

Recent heavy rains have highlighted the stormwater management challenge faced by developers of new homes and adjacent property owners in single family neighborhoods. This is particularly apparent in older subdivisions, such as Holley by the Sea, and metes and bounds subdivisions that have minimal stormwater management infrastructure in place. New construction must be located so as to avoid structure flooding, while at the same time avoiding excess runoff onto adjacent properties.

A number of factors combine to exacerbate this challenge. Background conditions such as flat topography and elevated water table limit options for movement and storage of surface water. Florida Building Code and County Land Development Code regulations require structures to be elevated above surrounding grade, regardless of the elevation of adjacent properties. State Health Department regulations require septic drainfields to be elevated 24 inches above the ground water elevation, which in turn leads to further elevation of homes. Property owner choices such as size of home, location of fences, and landscaping also impact options for and direction of water flow. In addition, legal guidelines affect how water flow can be modified and also limit the overreach of regulatory controls.

This paper will briefly summarize each of these factors and provide recommendations for improvements.

Recommendations

The recommendations outlined at the end of this report fall into four categories: (1) Clarification of Existing Regulations; (2) Improved Implementation of Existing Regulations; (3) Expansion of Sanitary Sewer; and (4) Education and Communication.

The need for increased additional regulation is not apparent at this time; however, amending the code to clarify existing standards and their application will result in procedural and practical changes for better management of stormwater.

Regional Stormwater Management

It should be noted that this paper does not address regional, neighborhood, or area-wide stormwater management.

While new construction on individual lots plays a part in the overall volume and flow of storm water in a given area, it appears that in many cases the limited capacity for the

regional movement or storage of storm water is the main factor that creates threatening conditions in these residential areas. Individual lot development appears to mainly play a role in the non-threatening aspects of storm water management such as localized ponding and siltation.

Area-wide stormwater management looks at the big picture of where stormwater is ultimately directed and how it is conveyed, stored, and discharged. That big picture is addressed in a number of ways, including stormwater plans for platted residential development and commercial site plans, development of stormwater master plans (such as the one underway for the Holley by the Sea drainage basin), and public infrastructure projects designed and carried out by the county and the state.

FACTORS IMPACTING INDIVIDUAL LOT STORMWATER MANAGEMENT

Natural Conditions

The natural conditions of each development area change over time and affect the ability to completely and consistently manage stormwater. Depth to the water table, permeability of soils, proximity to wetlands, vegetation, and rainfall amounts are the most typical natural factors affecting stormwater management.

Increased rainfall totals may elevate the water table, thereby reducing the amount of voids in the soil available to absorb stormwater. In some cases, the water table may intersect the bottom of ponds or ditches, resulting in standing water and reduced capacity to hold additional runoff. Wetlands, which frequently serve as receivers of stormwater runoff, are similarly impacted.

The permeability of soils may be reduced by compaction, use of clay fill, and construction of impervious surfaces, thereby limiting the soil's ability to absorb water into the ground.

Vegetation slows the movement of water, allowing for increased groundwater absorption, and also take up water through their roots via capillary action. Removal of natural vegetation without re-vegetation of the site removes these benefits. With the exception of waterfront lots and work in the rights of way, the county does not regulate vegetation for single family homes.

Lot Fill

Most single family development requires soil, or fill, to be brought in to achieve the required elevation of the home and septic system. Varying amounts of fill are also required to meet the established lot elevations required by subdivision drainage plans and to achieve the yard elevation desired by the property owners.

The volume, or height of fill, is not as important to stormwater management as the location and grading of that fill. Therefore, the County does not regulate the maximum

amount of fill that may be used, but rather looks to ensure that minimum elevations are met, while at the same time ensuring that lot grading standards are followed.

Lot Grading

Lot grading, or the movement of dirt on the property so as to create the desired slope of the finished grade, directly impacts the flow of water on a lot.

The Florida Building Code requires the following with regard to lot grading:

R401.3 Drainage - Surface drainage shall be diverted **to a storm sewer conveyance or other approved point of collection** that does not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches the first 10 feet. (emphasis added)

Importantly, water is to be directed to a

- a storm sewer conveyance
- or other approved point of collection.

Similarly, the Land Development Code requires the following:

4.03.06 M.1. Finished Floor Elevation – ...Finished grade shall be sloped downward from the foundation two and one half (2 ½) inches (*note: Building Code supersedes this with a 6 inch requirement*) within ten (10) feet or less including sidewalks, patios and driveways and then sloped a minimum one-sixteenth (1/16) inch per foot **to a positive drainage outfall**. (emphasis added)

Newer subdivisions have been designed with lot grading plans that are provided to builders to ensure that developed lots conform to the overall drainage plan for the subdivision. Those plans typically depict the direction of water flow on each lot using arrows, which gives guidance to builders as they grade individual lots. A more precise methodology is to established spot elevations for each lot and require builders to fill and grade each lot to meet those elevations. While more precise, this method does require the use of survey data to ensure compliance. The Engineering Department has recently begun to require the use of spot elevations on new subdivision drainage plans.

Storm Sewer Conveyance Systems

Storm sewer conveyances (ditches or pipes) are designed to carry water away from developed properties to holding ponds, wetlands, or other discharge points.

Newer subdivisions require engineered drainage systems that include specifically sized and sloped conveyance systems.

In older subdivisions, like Holley by the Sea, the storm sewer conveyance system is a series of shallow ditches connecting to wetlands. Because these systems do not conform to current design standards, they frequently do not transport water but rather serve as holding areas for stormwater. In areas further complicated by high water tables that water may not filtrate quickly into the ground resulting in water standing in ditches for long periods of time. This minimizes the volume of water that the ditches can accommodate, resulting in water backing up into yards and streets. However ineffective in moving water, these ditches are drainage systems for those subdivisions, and as such are appropriate areas for directing the flow of water from new home construction.

Approved Points of Collection

Other approved points of collection for older subdivisions and metes and bounds lots commonly include adjacent wetlands and retention swales located on the property. Creative alternatives such as rain gardens or catchment systems have been used in other jurisdictions.

Swales are typically used to convey water, but can also serve to hold water on-site to allow for infiltration. Wetlands naturally hold water and can, therefore, be useful collection points. Like with other drainage features, the capacity of swales and wetlands is not unlimited and can be overcome by frequent, heavy rains resulting in water standing in yards and roadways.

Some subdivision lots identify “drainage easements” along common property lines. These are typically not approved points of collection, but rather provide room for property owners to address drainage issues that arise along property lines.

In new subdivisions, conveyance systems are designed to move stormwater to retention or retention/detention ponds (holding ponds) that serve as an intermediate point of collection. These are designed to hold and treat a specific amount of runoff and to regulate the safe discharge of water to points down gradient (or “downhill”).

Adjacent Lots

Water flow does not stop at lot lines and some amount of flow onto adjacent properties is both natural and, in some situations, designed as part of the area-wide system. In some cases, filling of a lot between two existing homes results in a return of the natural leveling out of water flow that existed prior to development. However, increased runoff resulting from newly constructed impervious surfaces (roofs, driveways, pools) should be directed as required by the Building Code and not permitted to drain directly to adjacent properties unless part of an area-wide system.

Available Space

The grading of each lot to meet the Building Code requirement for directing water requires adequate space which is a challenge on smaller lots, particularly within side yards. Most homes on residential lots are constructed to the minimum side setback lines which are most commonly 7 feet. This leaves little room for sloping the fill needed to elevate the home and construct swales to carry water.

Structure Elevation

County wide

The Land Development Code establishes the following standards for the elevation of the finished floor of new construction:

“4.03.06 Construction Plans - Minimum Requirements:

M. Finished Floor Elevation –

1. Minimum finished habitable floor elevations (excluding basements) shall be eight (8) inches above finished grade. If no sod is installed, elevation shall be ten (10) inches above finished grade. Finished grade shall be sloped downward from the foundation two and one half (2 ½) inches (*note: Building Code supersedes this with a 6 inch requirement*) within ten (10) feet or less including sidewalks, patios and driveways and then sloped a minimum one-sixteenth (1/16) inch per foot to a positive drainage outfall.
2. In all new subdivisions a sealed professional engineer’s evaluation shall be required. The engineer’s evaluation will include design data, calculations, drawings and applicable assumptions to establish the 100 year water surface profile for the area and shall be submitted to the County Engineer. Upon review by the County Engineer, a minimum finished habitable floor elevation of fourteen inches (14”) above the expected 100 year water surface profile will be established and forwarded to the Building Inspection Department where required.
3. In areas determined by Santa Rosa County to be flood-prone with documented high water elevations, a minimum finished habitable floor elevation of eighteen inches (18”) above the high water mark will be established by the County Engineer. Finished floor elevation requirements shall be verified prior to issuance of a Certificate of Occupancy by a certified elevation letter from a registered land surveyor or registered engineer.

These regulations are adopted to attempt to reduce flooding to habitable areas of single family residences. It is recognized that no regulation will guarantee that such flooding will not occur.”

Flood Zones

For properties located within certain FEMA flood zones, the minimum finished floor elevation is established on the flood maps. Santa Rosa County has adopted an additional 3 foot elevation requirement for residential structures located in special flood hazard areas.

Septic Tanks and Drain Fields

Properties with elevated septic drain fields typically have homes elevated above the drain field so as to achieve gravity flow from the home into the septic tank and drain field. The alternative to elevating the home is the use of a grinder pump to pump wastewater up into the drain field. While this method requires less fill for the home, it can result in costly maintenance expenses and it creates a less attractive “buried elephant” look in the yard.

Holley by the Sea is an example of a subdivision that is partially served by sanitary sewer provided by the Holley-Navarre Water System and partially served by individual septic tanks. In those parts of the subdivision not served by sewer, the high water table in that area necessitates bringing in fill to elevate septic drain fields such that the bottom of the drainfield is 24 inches above the water table.

In all areas of the county, new development is required to connect when sanitary sewer systems are available. For subdivision development purposes, sewer is considered “available” when it is located within one half mile of the development. For individual lots, sewer is “available” when it is located within the right-of-way adjacent to the lot.

Property Owner / Builder Preference

Property owner, or builder, preference is a fourth factor impacting the elevation of homes. While many homeowners desire to keep costs down by limiting the amount of lot fill used in construction, others prefer to further increase the elevation of their home to avoid future flooding problems or for aesthetic purposes.

Methods for Elevating Structures

The foundation chosen for residential structures affects the amount of fill required for the lot.

Stemwall Foundations

For structures with stem wall foundations, the minimum finished floor elevation is achieved by bringing in fill to the lot and by adjusting the height of the stem wall.

Monolithic Slab Foundations

Monolithic slab on grade foundations rely solely on filling of the lot with dirt to elevate the structure to the appropriate height.

Piling Foundations

For structures with piling foundations, the elevation of the home is dictated by the height of the pilings. These are typically used in shoreline areas where floodplain regulations require them. They can be used in other areas to limit the amount of fill required to elevate a home; however, water must still be directed away from the home to avoid standing water under the structure.

Pier Foundations

Pier foundations can also raise the elevation of the structure with limited requirements for lot filling; however, those are not permitted in this region of Florida due to the wind load requirements of the Florida Building Code. (Note: piers can be used when surrounded by a stem wall.)

Erosion Control

Uncontrolled erosion and sedimentation impact stormwater management through the deposition of sediment into ditches, storm drains, and ponds. The Land Development Code requires the following:

Section 4.04.03.J - Single Family Dwelling and Duplex Development Storm Water Control

1. All single family dwelling and duplex development activities, shall maintain erosion control measures so as to prevent sediment or debris from leaving the development parcel. Any sediment or debris that leaves the development site shall be properly recovered by the building permit holder.

Failure to comply with this requirement shall constitute a violation of this ordinance and shall be cause for suspension of a building permit or development order.

Anecdotal evidence indicates that while the code requires erosion control, there are gaps with regard to installation and maintenance of functioning systems.

Legal Guidance

In general, new development is responsible for managing the increase in stormwater runoff resulting from the development. The natural stormwater runoff from a vacant lot is affected by permeability of soils, elevation and grade of the lot, and presence of vegetation. Changing those factors and adding impervious surfaces such as roof tops, driveways, and pools serve to increase the amount of water that runs off of the property.

The increased volume of water resulting from development should be managed as discussed above.

This does not mean that the increased water runoff from new development can never flow onto adjacent properties. The phrase "reasonable man rule" has developed over time as a result of case law related to stormwater impacts. This rule says that a property owner can take "reasonable" action to protect their home and property. An example related to new development would be when a home is constructed on a lot that sits lower than the adjacent properties and, prior to development, held the water coming off of the neighboring lots. In that case it is "reasonable" for the new development to fill the lot so that the new home is elevated consistent with neighboring homes, resulting in a return of the natural flow of water over the adjacent lots.

Another important piece of legal guidance related to stormwater controls is the concept of a "regulatory taking." In Florida, if regulations are adopted that result in a property owner losing all reasonable use of his property, that is considered a taking and the property owner must be compensated for the value of his property. For example, a regulation could be adopted that prohibits the use of elevated septic drain fields on residential lots to minimize the amount of fill used. However, if sanitary sewer was not available or planned for expansion to a lot proposed for development, that regulatory action would result in the inability to develop the lot (absent extreme measures such as the use of portable toilets), which could constitute a taking.

Property Owner Modifications

Many property owners are unaware of how modifications to their property affect the flow of water on their lot, between lots, and within stormwater conveyance systems.

Some of the more commonly seen obstructions include:

- Fences that do not permit water to flow under or through them;
- Landscaping features;
- Pools and other structures;
- Ditches filled to avoid standing water and to make yard maintenance easier; and
- Soil and sod added by a homeowner or sub-contractor following construction of the home.

RECOMMENDATIONS

Recommendations for improvements fall into four general categories:

- (1) Clarification of Existing Regulations;
- (2) Improved Implementation of Existing Regulations;
- (3) Expansion of Sanitary Sewer; and
- (4) Education and Communication.

(1) Clarification of Existing Regulations

While new regulations are not proposed at this time, there is a need to clarify existing regulations to improve compliance and effectiveness.

- Land Development Code provisions related to stormwater management and erosion control for single family development should be co-located for clarification and ease of use.

(2) Improved Implementation of Existing Regulations

Revise the permitting and inspection procedures to increase the emphasis placed on correct lot grading and erosion control measures early in the development process. Current procedures place the first inspection after construction has commenced and after lots have been filled and graded. Also, increased emphasis on maintenance of existing stormwater conveyance systems and installation of new systems as warranted.

- Require more detailed information be provided with a permit application.
 - o Identify on the development plan the location of the storm sewer conveyance or other approved point of collection toward which stormwater will be directed.
- Initiate a pre-development site inspection.
 - o Designate a site inspector who will be responsible for all site inspections.
 - o Train site inspector as needed.
 - o Task site inspector to conduct pre-development inspection with the project contractor to ensure agreement on actions required to meet code standards.
 - o Task site inspector to coordinate regularly with the Public Works Department and the Engineering Department as needed to ensure code compliance, evaluate unique situations, and develop solutions to identified problems.
 - o Establish a goal of performing site inspections within 24 hours of request.
 - o Require the use of survey data when lot grading elevations cannot be visually confirmed or when spot elevations are included in the engineered drainage plan design.
- Provide training for inspectors and contractors on installation and maintenance of erosion control measures.
- Allocate resources to the Road and Bridge Department to increase regular maintenance of county-owned stormwater systems, including periodic survey of homeowner placed obstructions in dedicated storm water features.
- Implement the recommendations from the pending Holley by the Sea stormwater master plan as funding becomes available to improve stormwater conveyance systems, thereby minimizing the need for further action related to individual lots.

(3) Expansion of Sanitary Sewer

The expansion of sanitary sewer will not only minimize the number of elevated septic drain fields in stormwater problem areas, but will also avoid health issues resulting from flooded septic systems and serve to protect environmental resources in areas near waterbodies, wetlands, and areas with high water tables.

- Meet individually with sanitary sewer providers to discuss stormwater concerns, their plans for service expansions, and means for continued coordination during the development process.
- Coordinate with sewer providers and the health department to make GIS mapping information available to the permitting agencies.

(4) Education and Communication

Education of and communication with county staff, contractors, and the public can be accomplished in a number of ways that will serve to improve compliance with county code and empower property owners to effectively manage stormwater on their property.

- Provide training for inspectors and contractors on lot grading and erosion control.
- Mail out notices to targeted subcontractor groups advising of county code related to lot grading, lot fill (i.e. red clay limitations), and erosion control.
- Utilize the county website, county publications, standard media, and social media to educate property owners on stormwater topics and to provide them with useful ideas they can employ such as permeable pavement, rain gardens, rain barrels, and catchment systems.