TECHNICAL MEMORANDUM

City of Edgewater Stormwater Review

Brett Alan Cunningham
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TO: Randy Coslow, PE; Jeff Thurman, PE; Sean Maroney

FROM: Brett Cunningham, PE, ENV SP

DATE: August 10, 2023

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY BRETT A. CUNNINGHAM, FLORIDA-REGISTERED PROFESSIONAL ENGINEER, PE46050, ON THE DATE INDICATED. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

SUBJECT: Results of Stormwater Code and Standards Review – Final
Jones Edmunds Project No. 03215-001-01

1 INTRODUCTION

Jones Edmunds reviewed the City's Stormwater Code and Standards and compared them to standards from similar communities in Florida. The review provides an opinion of the Code and Standards' appropriateness and where improvements to them could be considered. Although we reviewed all aspects, the focus was on flood protection. This Technical Memorandum summarizes our review.

2 STORMWATER STANDARDS

Our review primarily covered the City's *Comprehensive Plan* and *Code of Ordinances*. In general, the City's Stormwater Standards are very comprehensive and adequately cover all aspects related to stormwater (e.g., flood protection, water quality, water supply, and natural resources). Although we did not identify any issues that we would consider to be deficiencies, we did identify a few opportunities to make the City's Stormwater Standards even more protective. Although all the recommendations have benefits, they will typically incur additional cost to the City or developers, and in some cases the costs will be recurring. The City will need to assess the benefits and costs of each recommendation to determine whether the recommendations should be implemented and how the implementation would be scheduled.

2.1 COMPREHENSIVE PLAN

The following are potential changes to consider in the Comprehensive Plan:

- In Chapter 4 – Stormwater Sub-Element, Goal 1, Objective 1.1 – Design Storm states: "Evaluate the existing drainage system to determine future needs through the 25 year frequency, 24 hour duration storm event and implement improvements to the stormwater management system based on the design storm data." In Chapter 6 – Conservation Element, Goal 1, Objective 1.4 – 100-Year Floodplain Protection states: "Protect the natural function and values of the 100-year floodplain."

Although these two policies can coexist, the City may consider also evaluating the existing drainage system with the 100-year, 24-hour storm event for consistency and in consideration of how many properties are in a Special Flood Hazard Area (SFHA).

- In Chapter 4, Policy 1.1.2 states: "The City will require proposed new developments to provide evidence to show that LOS ratings in stormwater conveyances serving the new development will not be degraded to an LOS lower than currently exists as a result of the new development's construction and stormwater runoff contribution."

  This policy could lead to an increase in off-site flood stages if capacity in the downstream system can accommodate it without changing the LOS. Given the number of properties already in a flood hazard area, the City may want to consider changing the policy to be more consistent with the St. Johns River Water Management District (SJRWMD) rules that require no adverse off-site impacts.

2.2 Code of Ordinances

The following are potential changes to consider in the Code of Ordinances:

- Chapter 21 – Land Development Code, Section 21-42 – Flood Plains, 21-42.02 – Administration, e. Site Plans and Construction Documents, 3. Additional analyses and certifications, item (b) states: "For development activities proposed to be located in a riverine flood hazard area for which base flood elevations are included in the Flood Insurance Study or on the FIRM and floodways have not been designated, hydrologic and hydraulic analyses that demonstrate that the cumulative effect of the proposed development, when combined with all other existing and anticipated flood hazard area encroachments, will not increase the base flood elevation more than one (1) foot at any point within the community. This requirement does not apply in isolated flood hazard areas not connected to a riverine flood hazard area or in flood hazard areas identified as Zone AO or Zone AH."

  Although an allowable 1-foot rise in the floodway is common throughout the country where slope is generally much greater than it is in most of the City, the City may want to consider an allowable increase less than 1 foot – similar to other Florida communities.

- Chapter 21 – Land Development Code, Section 21-42.04 – Flood Resistant Development, c. Subdivisions, 1. Minimum requirements, item (c) states: "Adequate drainage is provided to reduce exposure to flood hazards; in Zones AH and AO, adequate drainage paths shall be provided to guide floodwaters around and away from proposed structures."

  The City may consider applying this standard more broadly.

- Chapter 21 – Land Development Code, Section 21-53 – Stormwater Management Requirements, 21-53.01 – Comprehensive Plan Reference states: "No development activity can occur without obtaining a stormwater permit from the City and/or the St. Johns River Water Management District (SJRWMD) as provided herein. It is the intent of the City to accept stormwater permits issued by the SJRWMD in lieu of a City

required permit. Development below thresholds of the SJRWMD shall require a City stormwater permit."

Although SJRWMD has a robust review process, erroneous analyses can make it through their review process. At a minimum, the City may want to reserve the right to review stormwater calculations – particularly if a proposed development is of concern.

- Chapter 21 – Land Development Code, Section 21-53 – Stormwater Management Requirements, 21-53.03 – Exemptions to Permit Requirements, item f. states: "Construction of any new structure that consumes less than 1,000 square feet of impervious surface per parcel. The total impervious surface per parcel shall not exceed 1,000 square feet to qualify for this exemption."

  Exemptions for small amounts of imperviousness are common and are usually unlikely to significantly increase downstream stages. However, an exception can occur at the lot level if grading or fill substantially changes flow patterns. This can be a problem for infill development/redevelopment. The City may consider adding language in the exemptions preventing this problem from occurring (e.g., reference 21-53.06 – Positive Outfall Standards).

- Chapter 21 – Land Development Code, 21-53.04 – General Design Standards, item a. states: "In general, the latest revision of the U.S. Department of Agriculture, Soil Conservation Service's Technical Release No. 55 entitled A Urban Hydrology for Small Watersheds shall be used in the stormwater designs described herein. However, the City Engineer may authorize the use of alternative methodology if similar results are produced."

  Watershed modeling throughout Florida has shown that the Curve Number methodology in Technical Release (TR55) tends to significantly overpredict runoff in sandy soils with deep groundwater tables. Although these may not be prevalent in the City, the City may want to consider other infiltration models such as Green-Ampt or Horton that are implemented in commonly used models such as Streamline Technologies, Inc.'s Interconnected Channel and Pond Routing Version 4 (ICPR4) or US Environmental Protection Agency's Storm Water Management Model (SWMM) for these areas.

- Chapter 21 – Land Development Code, 21-53.04 – General Design Standards, items d. through g. relate to on-site pollution abatement. Items e. and h. appear to have contradictory language in that item e. states that "detention with filtration shall be used" where 100 percent retention is not possible, but item h. states that "The use of filtration systems is not permitted."

  The City may need to re-evaluate items d. through h. when the updated Stormwater Rules required by the 2020 Clean Waterways Act are expected to be ratified. Also, the Comprehensive Plan supports the use of low-impact development (LID). Even though retention covers the main pollutant removal mechanism for many LID practices, the City may want to consider a specific mention of the use of LID practices in this part of the Code of Ordinances to tie back to the Comprehensive Plan.

- Chapter 21 – Land Development Code, 21-53.04 – General Design Standards, item k. states: "The post-development discharge rate and volumes shall not exceed the pre-development rates in a 100 year/3 day storm event for land-locked basins and 25 year/24 hour storm event for a positive outfall basin."

  Given the number of properties within the City that are within an SFHA and the objective from the Comprehensive Plan to control the 100-year floodplain, the City may want to consider using the 100-year/24-hour storm event for positive-outfall basins.

- Chapter 21 – Land Development Code, 21-53.04 – General Design Standards, item l. states: "All rainfall amounts shall be interpolated from the hydrograph contour in the latest version of TR-55 for the particular area of the City."

  The National Oceanic and Atmospheric Administration (NOAA) Atlas 14 is based on a larger and more recent dataset of rainfall and is becoming the more commonly used rainfall reference in Florida. The City may want to consider switching to the data from that reference. However, we do not recommend using the rainfall distributions from Atlas 14 since they are generally considered to under-represent the peak intensities experienced historically in Florida. The NRCS TR55 distributions may be more reflective of the high intensities experienced in Florida. The City may want to consider specifying the rainfall distributions to be used for design. The City may also want to consider projected increases in future rainfall for consideration of setting finished floor elevations.

- Chapter 21 – Land Development Code, 21-53.04 – General Design Standards, item m. states: "The peak discharge rate from a developed or redeveloped site shall not exceed the peak discharge rate prior to development or redevelopment."

  Although this has been a commonly used criterion in the past, studies have shown that maintaining pre-development peak flows does not always maintain pre-development off-site peak stages because of the cumulative effect of discharging near-peak-flow conditions from multiple areas over a longer period under post-development conditions. Two methods that address this issue are requiring the post-development peak flow to be 90 percent of the pre-development runoff or requiring the use of a watershed model to demonstrate no adverse off-site impacts. The latter method is usually predicated on the regulating entity having a maintained watershed model, modeling standards for use of the watershed model, and the capacity to adequately review the results.

- Chapter 21 – Land Development Code, in multiple locations the latest Flood Insurance Study (FIS) or Flood Insurance Rate Map (FIRM) for Volusia County is used as the basis for establishing the Flood Hazard Area, where available. Provisions exist for establishing the base flood elevation when the FIS, FIRM, or similar studies do not provide it. Although the data in the FIS and FIRM are generally valid, FISs and FIRMs often do not provide the level of detail needed to identify all flood-prone areas and are not forward-looking in terms of future changes in rare storm event volumes. The City may consider appending the FIS and FIRM data with the results from its upcoming Stormwater Master Plan Update and Vulnerability Assessment to address those two issues. The latter would be particularly true for establishing finished floor elevations.

3 RECOMMENDATIONS

This Section summarizes our general recommendations for the City's consideration for improvements to its overall stormwater management program. The recommendations are not listed in order of benefit or expense:

- **Improve the City's Community Rating System (CRS) Class**: Communities that participate in the CRS earn a rating from 1 to 9, with 1 being the best possible rating. The City currently maintains a Class 7 rating, which provides a 15-percent discount for National Flood Insurance Policy (NFIP) in SFHAs. A CRS rating of 5 or 6 is a typical value for coastal communities in Florida although some have higher ratings and others have lower. A push is occurring in Florida to try to get more communities to a 4. Achieving the next best (i.e., lower) rating is often incrementally more difficult because fewer – and often more expensive – ways are available for achieving the greater number of points required to attain the next best rating. Recent CRS documentation showed 718 NFIPs are in the City covering approximately $211,000,000 in assets. Achieving a CRS rating of 4 would equate to another 15-percent discount on NFIP policies in SFHAs. Although the additional discounts are important for determining whether the City should pursue a better CRS rating, the activities associated with an improved CRS rating provide other resiliency benefits. An audit of the current CRS activities and those needed to achieve an improved rating is a suggested action for the City.

- **Stormwater Master Plan Update (SMPU)**: The City is currently considering an SMPU, which will have multiple benefits:

  - Several years have elapsed since the last update was completed; therefore, an update would be make the analysis more accurate to current conditions.
  - Using the latest light detection and ranging (LiDAR) and other geographic information system (GIS) data means that a more detailed analysis can be performed.
  - Typically, a significant number of CRS points are available from performing SMPU-related activities.
  - An SMPU can help identify projects that are most likely to be grant-fundable and establish priorities for funding and implementation.
  - The City can use an updated stormwater model to assess if proposed new developments will cause adverse off-site impacts using demonstrative criteria.

- **Demonstrative Criteria**: The City's Stormwater Standards should generally protect existing properties from adverse impacts of new development and redevelopment using the presumptive criteria in the City's Stormwater Standards. However, an alternative approach is to require demonstrative criteria when the development is above a certain threshold. Demonstrative criteria typically require using an existing watershed model maintained by the City that the developer's engineer must use to build into the proposed development and demonstrate that no adverse off-site increases in flood stages occur. The model is normally accompanied by a manual or set of standards that demonstrate how the system can be acceptably modeled. This approach may be more feasible for the City if an SMPU is developed. This approach is generally considered to be preferable to presumptive criteria, but an initial investment in the model and associated documentation is required together with an ongoing investment to maintain the model

using City or consultant staff to review the submittals using the models. Examples of communities using this approach are Sarasota County, St. Johns County, and Hillsborough County.

- **Drainage easement mapping and acquisition**: We recommend that the City complete its GIS layer of existing drainage easements and evaluate its existing easements versus critical stormwater infrastructure that needs to be maintained. The evaluation should include a prioritization of drainage easements to acquire and a description of ditches and their responsible maintenance entity. It is important to note that potentially incomplete easements have not prevented the City from performing their mission of protecting property and protecting the environment as they have been able to amicably work with each property owner so that the maintenance activities are not restricted.

- **City Ditch Maintenance**: The City currently inspects its ditches and canals and maintains them as needed at least annually and often more frequently than annually. The City also inspects and maintains "storm routes" in advance of a Tropical or know severe weather event. Those practices are more frequent than some industry recommendations and should provide a high level of service for maintenance. For example, the American Society of Civil Engineers (ASCE) published recommendations for stormwater inspection frequencies in its *Standard Guidelines for the Design, Installation, and Operation and Maintenance of Urban Stormwater Systems* (ASCE 45-16/46-16/47-16). Inspection frequencies vary by system component type, but the publication suggests a spot-check every 3 years and a full inspection every 6 years for ditches/waterways. A Computerized Maintenance Management System is recommended for scheduling the inspections and recording the maintenance work performed. Over time, the results can be used to refine maintenance schedules in different parts of the system.