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Alex Haptemariam, PE, CFM
Technical Senior Project Manager
City of Alexandria
Department of Project Implementation
301 King Street
Alexandria, VA 22314

RE: Off-Site Adverse Impact Verification for the Taylor Run Infrastructure Stabilization Project, Alexandria, Virginia

Dear Mr. Haptemariam:

The proposed project referenced in this Off-Site Adverse Impact Verification is related to the Taylor Run Infrastructure Stabilization Project, herein referenced to as the Project, for the City of Alexandria, Department of Public Works. The project has been divided into four distinct areas, each addressing specific infrastructure vulnerabilities:

1. Upstream Stormwater Outfall: Currently in disrepair, surrounding stream banks are actively eroding, and outfall discharges into an undersized plunge pool causing excessive bed scour.
2. Sanitary Sewer Crossing 1 and Stormwater Outfall: Sanitary sewer crossing is at-risk of structural damage, adjacent stormwater outfall in deteriorating, contributing to eroding stream bed and banks.
3. Exposed Sanitary Sewer Manhole: Exposed sanitary sewer manhole is exposed and vulnerable to damage from storm flows or debris.
4. Sanitary Sewer Crossing 2 and Retaining Wall: Stream bank and bed erosion has exposed an existing sanitary sewer crossing risking structural damage, and a nearby retaining wall is failing.

Proposed stabilization measures include replacement of deteriorated outfall headwalls, encasement of exposed sanitary sewer pipes, and install boulder cascades to dissipate energy through the project areas supporting long term stability and reduced project grading extents.

The proposed project area is within the Taylor Run effective 1-percent-annual-chance (100-year) floodplain and floodway. The purpose of this memo is to document the results of the flood study for the project area along Taylor Run.

The FEMA Effective one-dimensional Hydrologic Engineering Center River Analysis System (HEC-RAS) model was reviewed and updated with recent survey data. The existing conditions hydraulic analysis was performed to analyze changes in water surface elevations and shear stresses for the 10-, 25-, 50-, and 100-year storms using HEC River Analysis System (RAS) version 6.5. One-dimensional steady-state models were developed. The existing conditions model was run with a mixed flow regime.

The terrain for the proposed conditions hydraulic model was developed using a topographic surface which combined the proposed design surface with the 2019 survey, 2025 survey, and available LiDAR data. A terrain modification was incorporated between cross sections 2745 and 2777 to model the proposed flap gate on the outfall pipe from the acidic seepage wetland to the main channel. Similar Manning's n values were used for the proposed conditions model, with 0.08 applied for overbank areas, 0.03 applied for the existing channel, 0.015 for asphalt, and 0.04 applied for riprap within the channel. A Manning's n value of 0.045 was applies for section of imbricated rock. Computational parameters and cross section locations were selected similarly to existing conditions parameters, with additional cross sections being placed at

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areas of instability or abrupt grade change. The proposed conditions model was run using a mixed flow regime.

Comparison between existing and proposed conditions results in an average increase in velocity of 0.47 feet per second across the project reach for all storm events. Localized increases can be noted in the proposed boulder cascades. This is expected as the grade is much steeper than existing, however these forces are not erosive as the imbricated rock that comprises the cascade can withstand these velocities. A water surface elevation rise is noted at all storm events, with an average rise of 0.41 feet across the project reach during the 100-year storm. A maximum rise of 4.64 feet was noted at proposed cross section 3535, located within design area 2, due to the proposed grade being 5 feet higher than existing grade. This rise is located entirely on City of Alexandria property and does not affect adjoining properties. Hydraulic conditions downstream of the project area remain the same in the existing and proposed conditions.

The modeled water surface elevation increase is confined to City-owned property and does not extend to private parcels, buildings, or third-party infrastructure. Therefore, the project does not create an off-site adverse impact to another property owner. However, because FEMA/NFIP compliance is based on the mapped floodplain/floodway standard rather than ownership alone, the City should retain the supporting H&H documentation and obtain Floodplain Administrator concurrence regarding whether the modeled change is considered no-rise, within accepted model tolerance, or requires a CLOMR/LOMR.

Further discussion of model development and results comparison can be found in the enclosed HEC-RAS report.

Yours sincerely,



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Enclosures:

HEC-RAS Report