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**MEMORANDUM**

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**TO:** TOWN OF ARLINGTON ZONING BOARD OF APPEALS – **SENT VIA EMAIL**

**FROM:** JOHN HESSION, PE

**SUBJECT:** THORNDIKE PLACE – FLOODING MITIGATION MEASURES

**DATE:** OCTOBER 4, 2021

**CC:** [ZBA@TOWN.ARLINGTON.MA.US](mailto:ZBA@TOWN.ARLINGTON.MA.US)  
CHRISTIAN KLEIN, CHAIR  
PATRICK HANLON  
PAUL HAVERTY, BLATMAN, BOBROWSKI & HAVERTY, LLC  
GWEN NOYES AND ARTHUR KLIPFEL, ARLINGTON LAND REALTY  
STEPHANIE KIEFER, SMOLAK & VAUGHAN

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During the September 9, 2021 public hearing, Patrick Hanlon requested that the Applicant provide a summary of evidence that the Thorndike Place project, as currently proposed, will not increase flooding on adjacent or downstream properties. Three types of potential flooding have been discussed and addressed during the design, review, and public hearing process: localized flooding, stream flooding and groundwater flooding which are discussed further below.

**Localized Flooding**

Localized flooding refers to smaller scale flooding that can occur anywhere in a community. This can include shallow flooding that occurs in low-lying areas after a heavy rain, flooding in small watersheds, ponding, and localized stormwater and drainage problems. The street flooding experienced on Dorothy Road and Littlejohn Street after an intense rainfall event is considered localized flooding. The intersection of Dorothy and Littlejohn is a low point in the neighborhood with two catch basins at the Dorothy/Littlejohn intersection and two catch basins in the vicinity of 56 and 57 Dorothy Road. These catch basins discharge through a municipal 12" storm drain across the Thorndike Place property to the southeast at Route 2. In existing conditions, only a very small area (0.16 acres) of the undeveloped site discharges to Dorothy Road/Littlejohn Street. With the proposed development, the portion of the project site contributing stormwater runoff at Dorothy Road/Littlejohn Street has been reduced and the peak rate of runoff and volume of runoff is reduced when compared to existing conditions.

The proposed project is not contributing any new runoff to the existing low area at the Dorothy Road/Littlejohn Street intersection and is, therefore, not increasing the localized flooding. This has been confirmed by the Town's Peer review consultant, BETA Group, in their September 8, 2021 Comprehensive Permit Civil / Wetland Peer Review #5.

The project's stormwater management system has been designed to meet and exceed the Massachusetts Stormwater Standards. In particular, the proposed stormwater runoff rates are equal to or less than existing runoff rates for the 2 through 100-year storm events using NOAA 14+ precipitation data, which data exceeds both: a) the Natural Resources Conservation Service (NRCS) precipitation data (required by the Massachusetts Stormwater Standards) and b) the Cornell precipitation data (required by the Arlington Wetlands Protection Regulations).

In reviewing the localized flooding concerns noted by neighbors, it appears that there may be capacity issues in the Town's existing 12" storm drain that discharges across the Thorndike Place property. Based on the size and slope of the Town's existing storm drain, the full flow capacity is less than 4 cubic feet per second (cfs). Likewise, it appears that the Town has not sought to maintain its storm drain easement, which is overgrown, and it is possible that roots may also be impacting the capacity. The Town's capacity is likely not sufficient given the increasing intensity and frequency of rainfall events. Additionally, there is no emergency overflow or relief for this low area. When the capacity of the existing municipal storm drain system is exceeded, stormwater ponds in the street and overflows onto private property; in particular the duplexes (#'s 61 – 85 constructed primarily between 2014 and 2017) on the north side of Dorothy Road with garages under the buildings.

The construction of Thorndike Place may provide an opportunity for the Town to clear its existing easement of vegetation and increase the capacity of the municipal system to minimize the likelihood of localized flooding in the future. Based on the date of the easement, the existing storm drain outfall was constructed in the 1950's. Typically, in the 1950's the design for stormwater system pipes and inlet grates was based on a 10-year storm intensity. The current Town of Arlington Stormwater Management Standards requires a 25-year storm intensity for design.

### **Stream Flooding**

The current FEMA 100-year flood elevation (el = 6.8). represents the stream flooding associated with Alewife Brook. FEMA completed an update of the Flood Insurance Study (FIS) in 2016. The FIS is a compilation and presentation of flood hazard areas along rivers, streams, coasts, and lakes within a community.

The Massachusetts Wetlands Protection Act (WPA) and the Arlington Wetlands Protection Regulations regulate work within Bordering Land Subject to Flooding (BLSF). The boundary of BLSF is defined as the extent of the FEMA 100-year floodplain. Under the WPA, compensatory storage shall be provided for all flood storage volume that will

be lost as the result of a proposed project within Bordering Land Subject to Flooding. Compensatory storage shall mean a volume not previously used for flood storage and shall be incrementally equal (1:1 ratio) to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, displaced by the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. The Arlington Wetlands Protection Regulations compensatory flood storage at a 2:1 ratio for all flood storage volume that will be lost at each elevation.

The Thorndike Place project does propose filling within BLSF but also meets the more stringent Arlington Wetlands Protection Regulations 2:1 compensatory storage volume and unrestricted hydraulic connection requirements. By meeting the performance standard, the proposed project will not contribute to increased flooding on adjacent or downstream properties. This has been confirmed by the Town's Peer review consultant, BETA Group, in their September 8, 2021 Comprehensive Permit Civil / Wetland Peer Review #5.

### **Groundwater Flooding**

Based on the test pits conducted on November 25, 2020, groundwater on the site is estimated to be at elevation 3.0. The Applicant has agreed to conduct additional groundwater testing to confirm the seasonal maximum high groundwater elevations on the site. With the available data, the project was redesigned to raise the senior living building's garage to elevation 6.0 and the duplex basements to elevation 3.0, both at or above the existing groundwater elevation. Additionally, Ambrose Donovan, PE, LSP of McPhail Associates presented at the June 10, 2021 ZBA public hearing that the proposed development, including the projection of building foundations below groundwater, would have no impact on the groundwater table in the vicinity of the project.

The proposed stormwater infiltration system has been designed based on the observed groundwater elevation. Since there is less than 4 feet of proposed separation between the bottom of the infiltration system and the groundwater, the Massachusetts Stormwater Standards require a groundwater mounding analysis. The groundwater mounding analysis is included in Section 6.05 of the Stormwater Report revised August 2021. Per BETA Group's June 25, 2021 Comprehensive Permit Civil / Wetland Peer Review #3, the analysis indicates that the lateral extent of the ground water mound will extend to the foundations of four townhouse units as well as the foundation of the senior living building. The mounding is a localized effect and should not impact overall groundwater elevations in the area. However, it should be considered in the design of the building foundations. The infiltration system impacts will be considered, and appropriate waterproofing will be incorporated in the foundation design of the townhouses, garages/carports and the senior living building.

## **Conclusion**

Thorndike Place, as designed, will not contribute to increased localized flooding, stream flooding or groundwater flooding on adjacent or downstream properties. Additionally, it is important to note that the Thorndike Place design considers climate change and resiliency by incorporating NOAA 14+ precipitation data, which exceeds current regulatory requirements, in the design of the stormwater management system and that the proposed building first floors are located above the projected 2070 Sea Level Rise/Storm Surge (SLR/SS) 100-year flood elevation projecting future residents from the potential of increased flooding.