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MEMORANDUM

DATE: September 10, 2019

TO: Mayor Donna Holaday

FROM: Diane Gagnon, Assistant Engineer

COPY: Matt Coogan
Tony Furnari

SUBJECT: Phillips Drive Neighborhood Drainage and Flooding Problems
Project Update and Recommended Next Steps

The purpose of this memo is to give a project update and provide recommendations to continue to alleviate the drainage and flooding problems that exist in the Phillips Drive neighborhood, which includes, Phillips Drive, Drew Street, Sullivan Drive, and Ryan Road.

Summer/Fall 2017:

1. We received the neighborhood's report titled *Phillips Drive Neighborhood-Water Drainage Issues, Report to Mayor Donna Holaday, June 2017* and was asked to provide responses.
2. We researched record Plans, deeds, approved Subdivision documents, from City files and Registry of Deeds. Field-located drainage inlets and outlets and identified watersheds, soil types, ground surface types, and boundaries. Setup hydrologic model.
3. The City has met with residents on multiple occasions, held a public meeting 9-27-17, and collected comments and feedback.
4. We inspected the conditions of the roads, drainage pipes and structures and performed some limited field survey.
5. DPS has cleared debris from stream that runs from the end of Ryan Road through the Phillips Drive culvert and up to the Hoyt's Lane culvert.

6. Engineering staff with assistance of a CCTV-contractor inspected approximately 80% of the existing drainage pipes in the neighborhood with a tire-mounted camera and cleaned pipes of any obstructions.
7. Engineering Department began a hydrologic and hydraulic analysis of both Phillips Drive and Cherry Hill neighborhoods to determine if there are areas that are exacerbating the groundwater problems or to see where any problems may exist.

Year 2018:

1. We came up with the most logical solutions to mitigate the damage being caused by said flooding. This proposal was laid out in the report titled *Phillips Drive Neighborhood Drainage and Flooding Problems Evaluation Report and Recommended Solutions, Prepared by: Jon-Eric White, PE, City Engineer and Diane Gagnon, Assistant Engineer, January 2018*. This report provides four possible solutions to alleviate the drainage and flooding problems, as follows:
 - **Solution No. 1: Complete New Roadway Construction**
Construct new roadways with curbing, drainage systems, swales, and culverts. Curbing is recommended to ensure that the runoff in the roadways remain in the roadways. Any solution less than this, such as installing a new drainage system only, would only be partially effective and will not solve all the problems. The problems stem from both an insufficient drainage system and the lack of curbing and fixing one without the other is not advisable. Therefore, a complete roadway improvement project with curbing is recommended.
 - **Solution No. 2: Cleanout Cherry Hill's detention pond outlets**
Unclog the outlet pipes from Cherry Hill's detention ponds.
 - **Solution No. 3: Install Subdrain to Eliminate Icing on Phillips Drive**
Install perforated pipe subdrains under Phillips Drive from 19 Phillips down to the stream.
 - **Solution No. 4: Increase sizes of outlet pipes from Cherry Hill's detention ponds**
The theory is to send more runoff downstream during storm events in order to reduce the amount of flow being infiltrated into the ground. The pipes will need to be sized so that they do not send more runoff downstream than the amount of runoff that used to come from the previous tree farm. (Solution 4 should be not be implemented until it has

been proven or it is clear that Solutions 1-3 have not met expectations.)

In order to accomplish these improvements, the following construction phasing was recommended:

- **Phase I – Test Pits, Solution 2, and Solution 3:**
 1. Excavate or drill to determine soil type and depth to ledge. High ledge will impact drainage and roadway design and construction.
 2. Clean out outlet pipes (Solution 2).
 3. Install subdrain (Solution 3).
 - **Phase II – Detailed Topographic Survey:**

A detailed topographic survey is needed to assist in the design, regardless of which roadway and drainage improvements will be implemented.
 - **Phase III – Design:**

The capital improvement projects resulting from this effort will need to be designed by a professional civil engineer.
 - **Phase IV – Construction:**

Complete roadway and drainage system construction per Phase III Design.
2. March 2018, we chaired a public meeting to provide the City and residents of Phillips Drive Neighborhood the highlights from the Engineering Report.
 3. October 2018: DPS installed a catchbasin and a perforated pipe subdrain in Phillips Drive from 19 Phillips down to the stream next to eliminate icing on the road Solution 3 above. The Water Department determined it was caused by a leaky service connection and repaired the service. **(Phase 1, Task 3/Solution 3 Complete)**
 4. November 2018: In an effort to resolve/redirect ground water at the Goulet Residence at 25 Philips Drive, Ted Norton Contracting installed a perforated drain pipe from under foundation on house and connected to City's drainage system per plan titled Proposed Drain Line, 25 Phillips Drive, dated June 8, 2019 by the City of Newburyport Engineering Division. The home owner incurred half of the project cost.
 5. November 2018: Melissa Welch of 6 Drew Street contacted DPS in regards to water actively flowing between the 6 & 8 Drew Street homes, and ends up in their backyards. On November 28, the City of Newburyport's Water Department investigated to determine if the water was a main break or groundwater. The water in question was tested for fluoride and it was determined that the levels were too low of residual to be city water. The water department continued their investigation and

found water seeping from landscape timbers at 7 Drew Street (7 Drew Street has had water turned off for a period of time). Sullivan Street was investigated to ensure there was no evidence of a leak in the waterline (Conducted in December by outside contractor, Carl Supper). The Water Department determined that this water in question is groundwater. This problem reinforced the fact that the roadway in this location needs to be reconstructed to keep roadway runoff in the road.

Year 2019:

1. A complete topographic survey of the Philips Neighborhood was completed in the in fall/winter 2018 and was submitted to the Engineering Division on January 29, 2019. **(Phase II Complete)**
2. May/June 2019: DPS, with the assistance of a private pipe cleaning company, cleaned all of the catch basins in the neighborhood. DPS inspected all of the structures and pipes throughout the neighborhood. They reported that the drainage pipes and structures were free of debris and were flowing freely. It was also reported that the ground water was high.
3. As part of DPS Water Division's bi-annual water pipe leakage testing, Phillips drive was tested in 2019 and no leaks were detected. (We are not sure exactly when they performed the lead tests.)
4. In July, the resident at 24 Phillips contacted the Water Division to investigate what sounded like a leak in her water pipes in her basement. The Water Division closed the valve to her house and the noise stopped so they felt it was a leak after the valve, which is owned by the homeowner, so the homeowner was told that she needs to contact a contractor. This leak ended up in her basement so her sump pump was constantly flowing and sending the discharge to the ground surface in her backyard, thereby partially flooding the backyard of 22 Phillips. A contractor fixed the leak in August and the sump pump was eventually turned off. Problem resolved and not attributed to upstream groundwater or overall neighborhood drainage issues as suggested by the owner at 22 Phillips.
5. General feedback from a few residents in the neighborhood is that they have not had any groundwater problems like they have had in the past. We concluded that cleaning out the drainage pipes was all that was needed. We went up to the outlet of the detention pond just downstream of the Cherry Hill Estates project – Daniel Lucy Drive neighborhood – and it was still clogged but the pond was dry. We suspect that this pond is not the cause of past flooding problems but that we'll observe it during the next forecasted heavy rain event – i.e. 10-year or greater storm event or around 5-inches of rain in a 24-hour period.

Next Steps

1. Observe neighborhood's drainage system and the detention pond just downstream of Daniel Lucy during the next heavy rainfall event. Make recommendations as necessary.

2. Design new roadways with new catch basins, larger pipe diameters to handle the climate's more intense storms, construct swales to handle the heaviest of rains. Curbing should only be needed on roads with gutter grades greater than 5% to prevent erosion of the soil at the pavement's edge. Otherwise, curbing is not necessary. Sidewalks are not recommended from our perspective because of the lack of sidewalk use for the sidewalks that currently exist.

3. Construct in Phases, or as funding allows.