

Chesterfield County H&H Study Results Overview For Winburn Street Area

Town of Patrick
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STUDY RESULTS OVERVIEW

Introduction

The alternative analysis was conducted by creating existing and proposed scenarios for Winburn Street area. All scenarios were modeled for the 2-, 10-, 25-, 50- and 100-year storm events. The existing conditions were modeled to show the current system schematic and parameters, such as, inlet type, pipe type, pipe size, pipe length. Drainage areas were determined from LiDAR data and field surveying. This information directed the runoff to inflow points in the model.

The proposed conditions were developed from design improvements to try and pass the 10-year storm event. Design improvements included increasing the capacity of pipes and ditches, regrading ditches to provide a more consistent slope. Bio detention areas and infiltration areas were added to provide flow reduction and water quality improvements.

Existing and Proposed Conditions

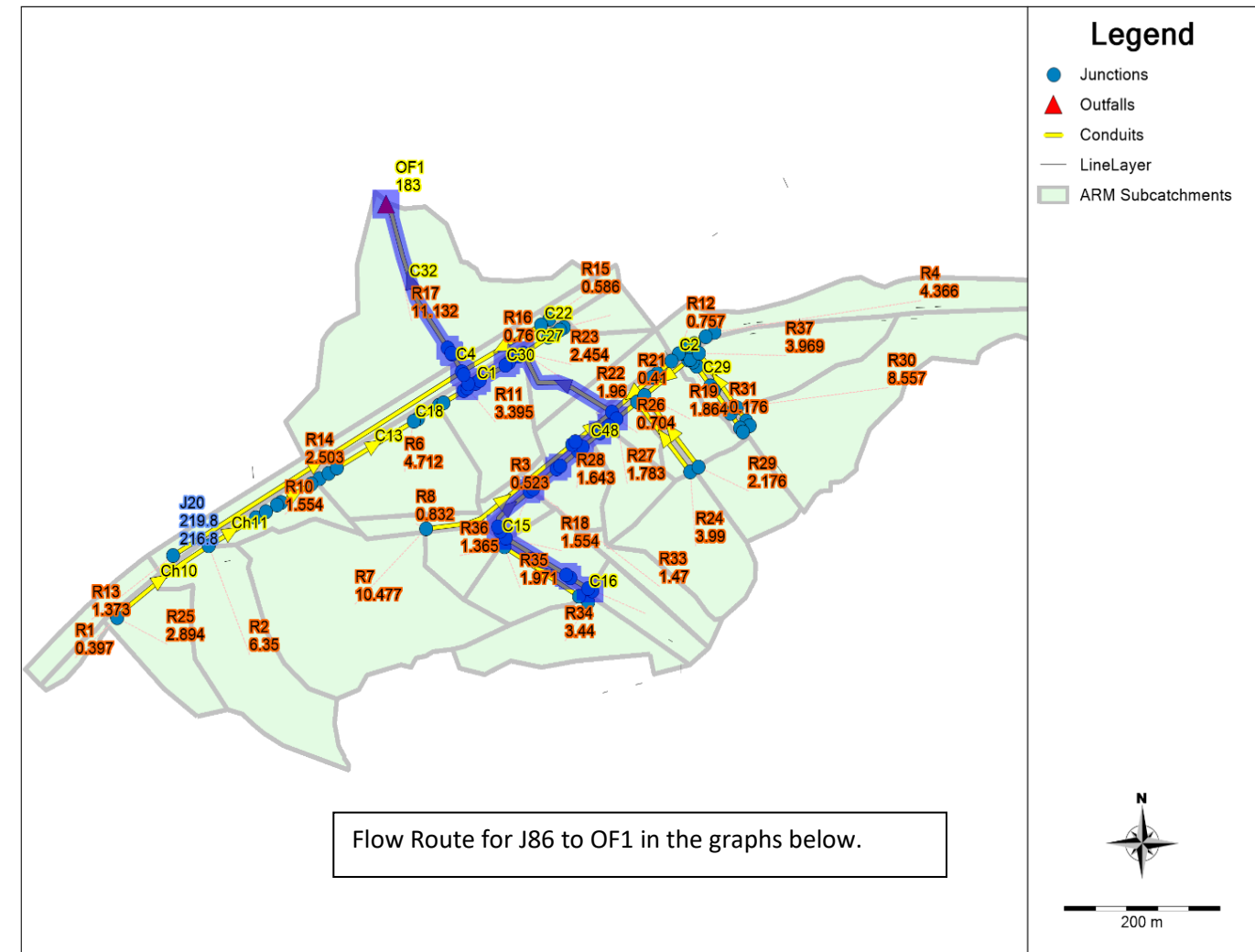
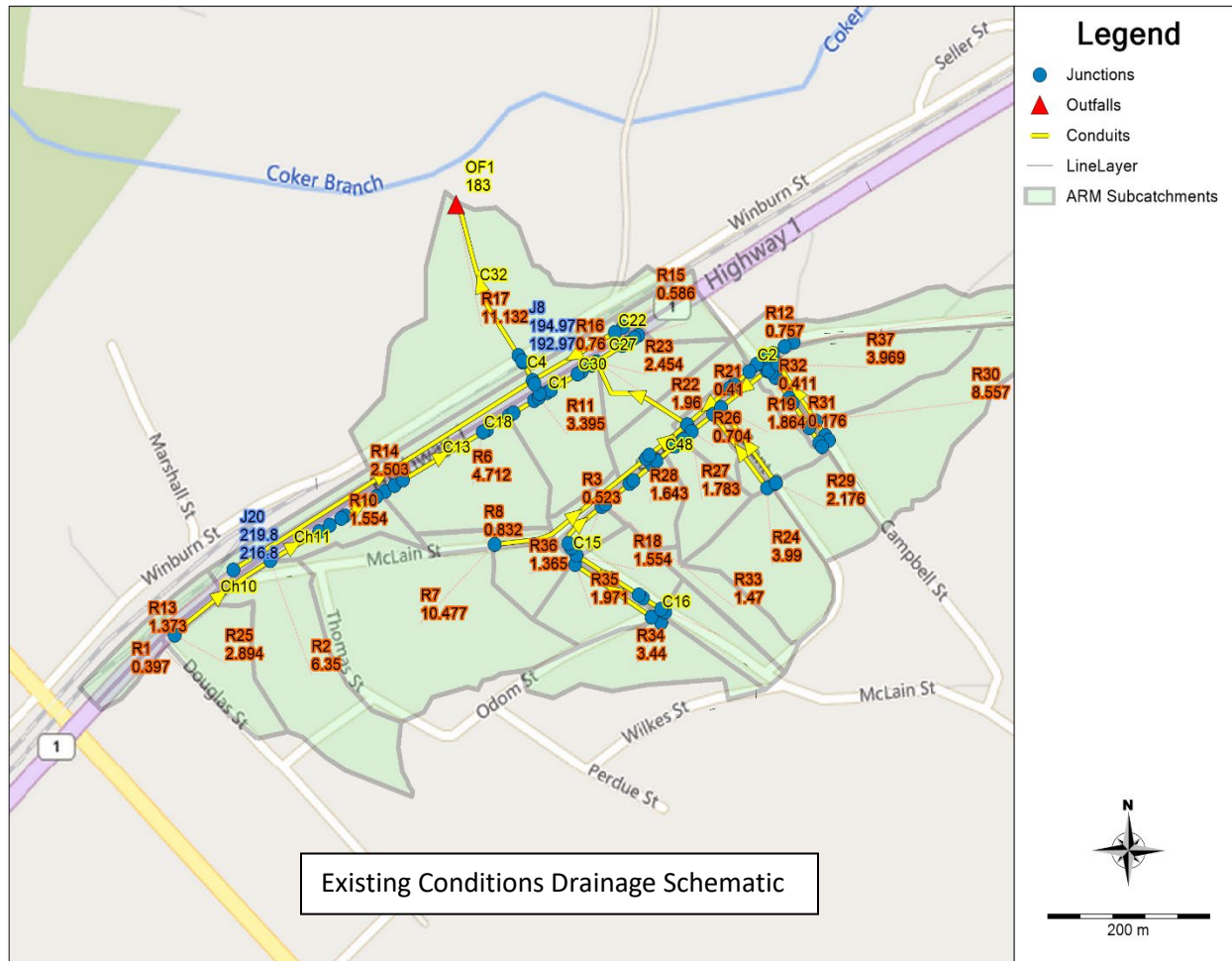
The Winburn Street Area consists of the following roads: Winburn, US Hwy 1, McLain, Griggs, Campbell, Grant and Lewis. Major flooding was reported in this area. The problem is concentrated at Winburn Street where the existing culvert is only a 15-ich CMP. The existing conditions for the drainage system show that it floods even at the 2-year storm event.

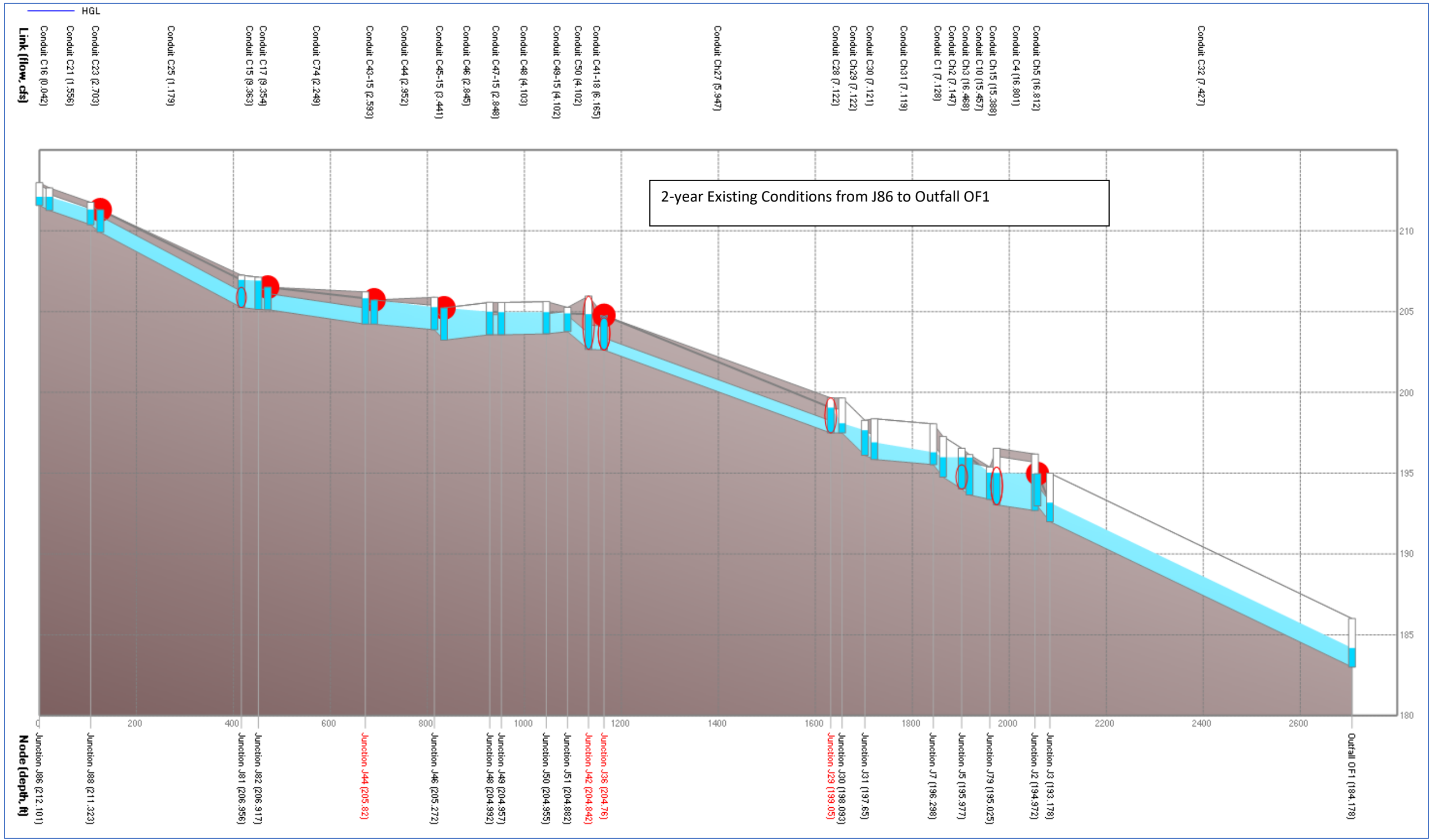
Ditches sections are located on each side of the roads and receive sheet flow from property and the roadways. The existing system has inverted slopes though pipes and some ditches are perched. The field survey and PCSWMM model confirmed the two resident locations that were noted in the questionnaire forms as flooding had driveway culverts that were below the other inverts in the drainage system. This condition not only flooded those residents but also backed up the drainage system and flooded surrounding areas.

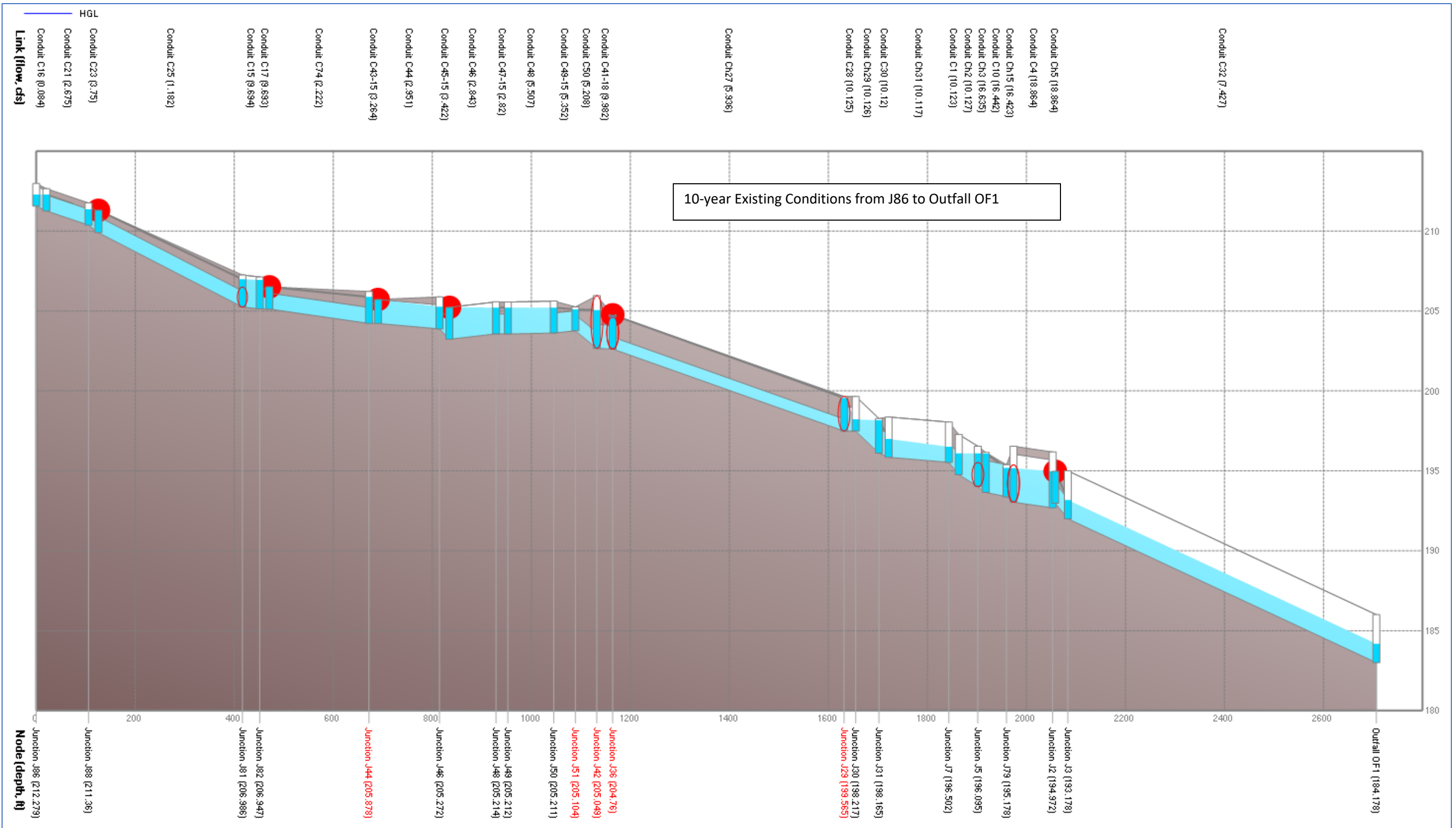
The soils in the area are Type A and B which will infiltrate runoff and permit the use of bio detention areas and other types of retention/detention. There is only one outfall for the project area. This outfall drains the area to Winburn Street where it flows into Coker Branch. Improvements to the drainage system will not have an adverse impact to Coker Branch. The figure below shows the existing conditions drainage layout.

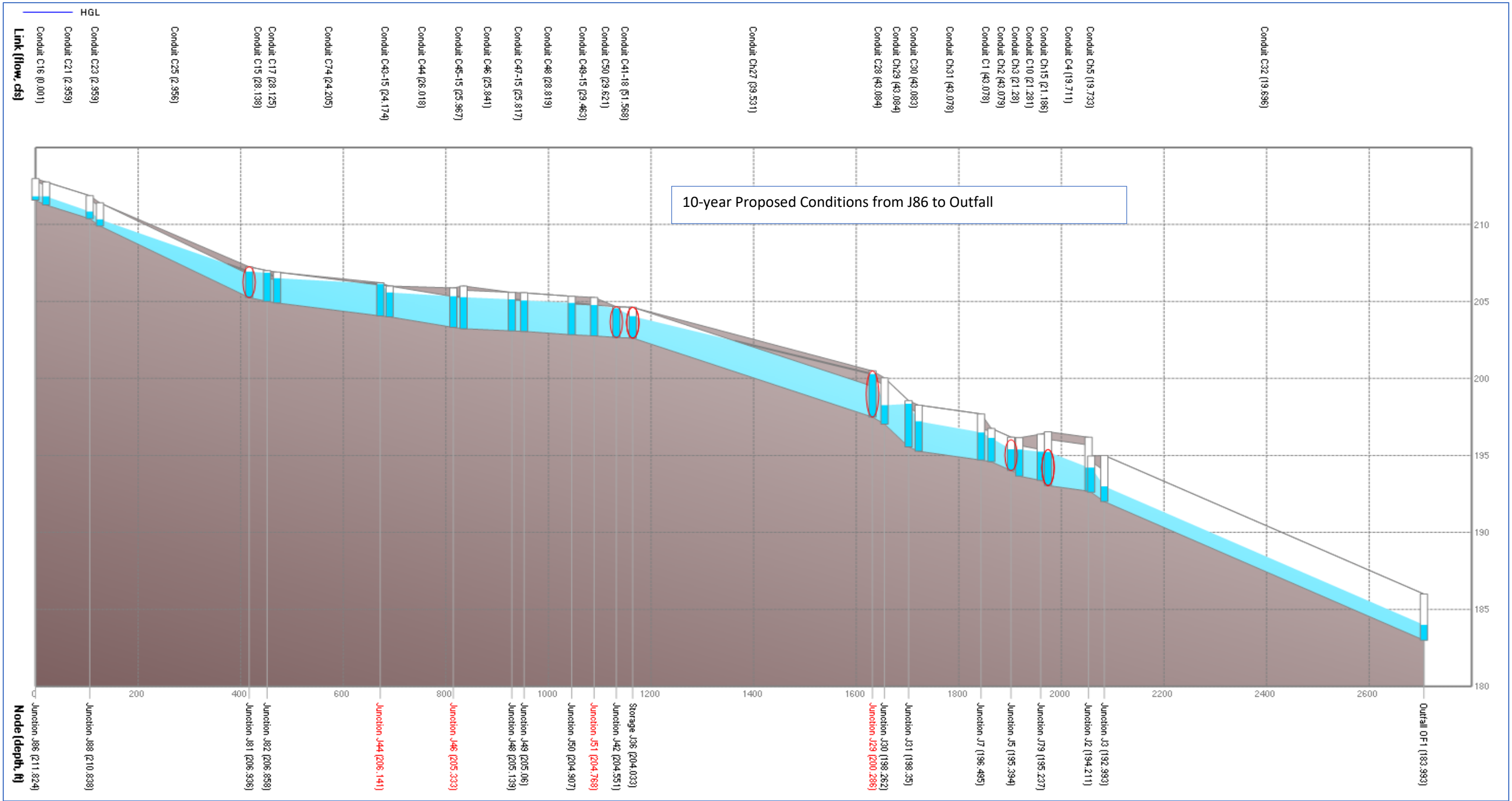
The 2-year existing conditions drainage line from Junction J86 to Outfall OF1 is shown Below the second figure profile shows the flooding (red circles) along that line.

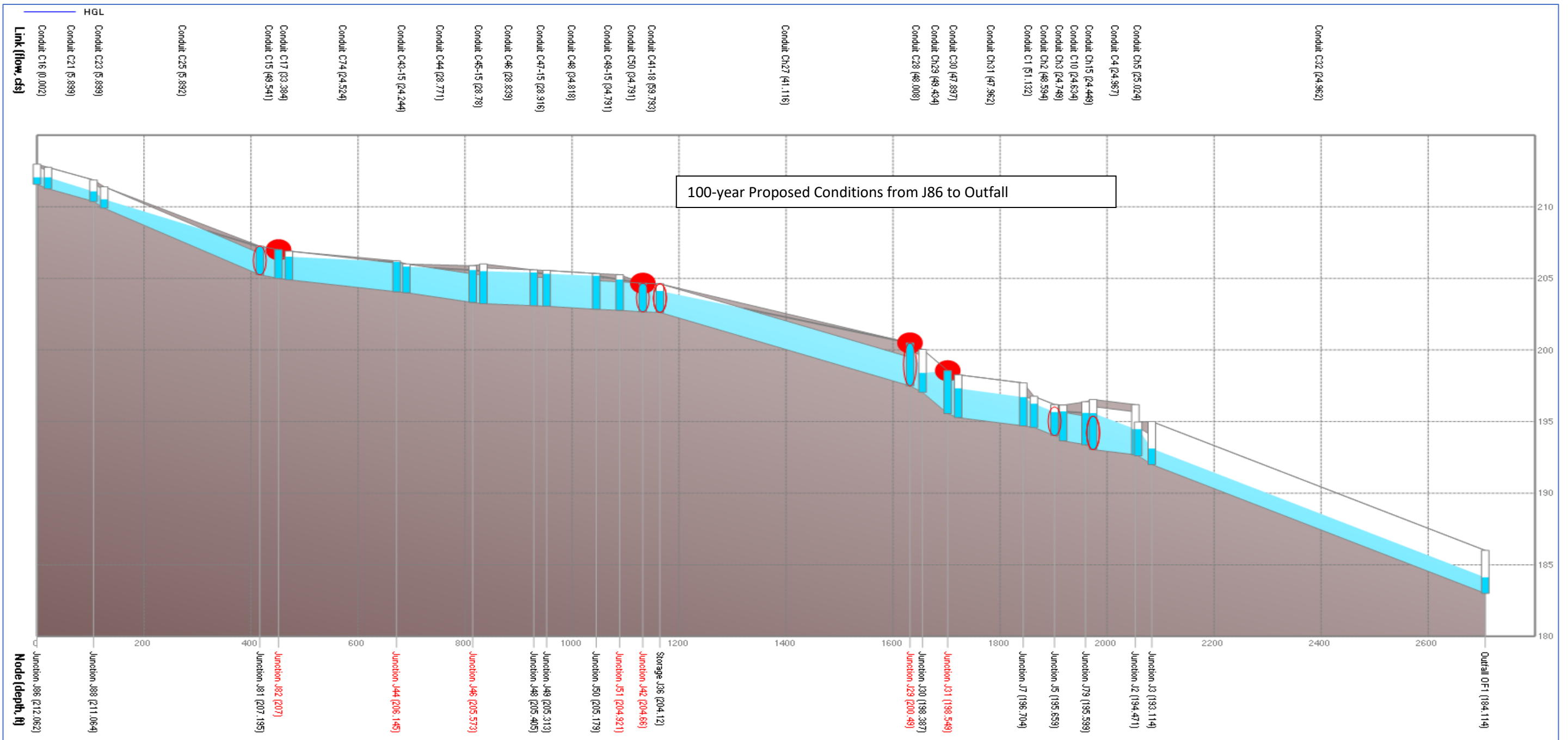
The 10-year existing and proposed profiles from Junction J86 to Outfall OF1 shows no flooding for the proposed design. This meets the 10-year Level of Service.











The proposed conditions consisted of additional inlets and correcting inverted slopes for each drainage line. Pipe sizes were increased to pass the 2- and 10-year events. The results of these improvements can be seen in the Appendix. The 2- and 10-year profiles for the existing and conditions profiles are shown to compare improvements in the hydraulic grade lines. The pipes/culverts were enlarged and many consisted of dual pipes to carry the 10-year event. The existing ditches were very shallow V-ditch sections that were changed to 2-ft flat bottom trapezoidal ditch at 2:1 side slopes at varying depths.

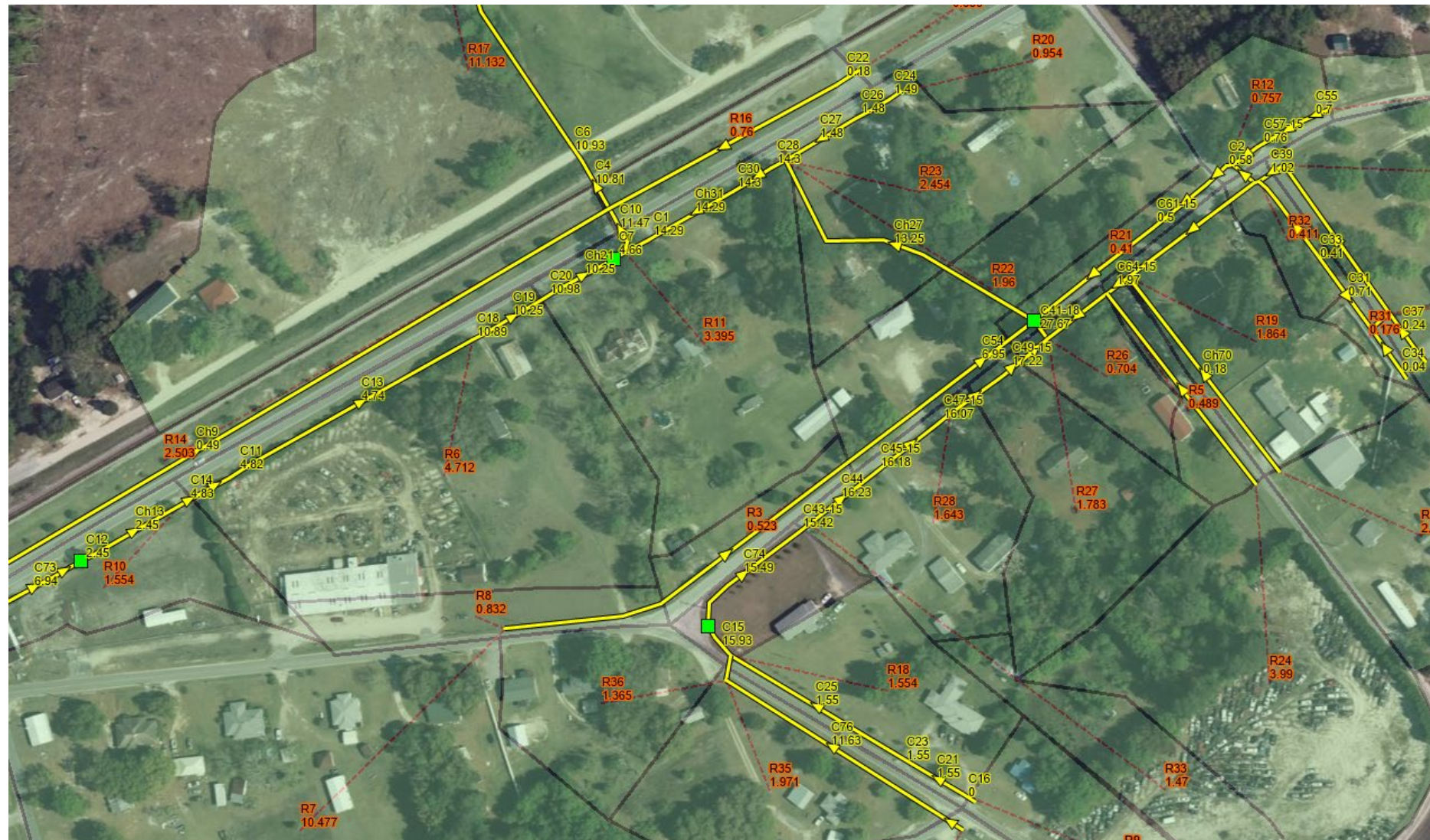
Bio-retention areas were developed along Chestnut Street to reduce flooding and allow stormwater to pond and infiltrate. Detention areas were also used to reduce peak flows downstream. These facilities were located near the outfalls.

Dual pipes were designed along Griggs St and US Hwy 1. The Griggs St cross culvert was increased to a dual 24-inch RCP where it discharges into a bio -detention facility. From there it is piped to US Hwy 1 and ties into improved ditch and onto the railroad culvert.

SECTION 4. RESULTS

The PCSWMM output shows the 10-year design criteria can be met. The 10-year Level of Service target was the goal of the study. The SCDOT criteria for secondary roads is the 10-year event.

This meet the objective of the study and SCOR, several green infrastructure improvements were incorporated in the design. Most of the existing ditches were improved but not piped to allow for infiltration and ease of maintenance. Also, culverts placed in flat-slope areas tend to clog if there is not enough scour velocity to clean them. The proposed, potential locations of the green bio-retention/detention areas are shown in green squares in the map.



Survey Data with Aerial and LiDAR Contours

