## CONCEPTUAL PLAN NARRATIVE

THE GOAL OF THIS PROJECT IS TO ANALYZE THE AREAS OF FLOODING OCCURRING AS WATER RUNS DOWN SYCAMORE STREET ONTO LINCOLN AVENUE, AND OVERTOPS THE WESTERN CURB LINE TO FLOOD PROPERTIES 1207-1113 LINCOLN AVENUE IN THE CITY OF FALLS CHURCH. THESE SUBJECT PROPERTIES ARE REPRESENTED IN PLAN VIEW WITH A PURPLE DOT. THE EXISTING STORM SEWER NETWORK IMMEDIATELY DOWNSTREAM OF THE SUBJECT AREA WAS PREVIOUSLY ANALYZED. THE MODEL DATA AND ASSUMPTIONS DEVELOPED FROM THAT PRIOR TASK ORDER WILL BE UTILIZED FOR THE DESIGN OF THIS PROJECT.

THIS CONCEPTUAL PLAN CONSIDERS NEW STORM SEWER PIPES, CURB INLETS, AND POTENTIAL UNDERGROUND DETENTION/STORAGE ON LINCOLN AVENUE. POTENTIAL GRADING AND/OR CURB MODIFICATIONS ALONG LINCOLN AVENUE WITHIN THE CITY'S RIGHT OF WAY WILL ALSO BE EXAMINED TO DETER FLOWS FROM OVERTOPPING THE WESTERN CURB LINE. THE NEW STORM SEWER SYSTEM WOULD CONNECT TO THE CITY'S EXISTING SYSTEM AT CURB INLET L1601, AT THE INTERSECTION OF LINCOLN AVENUE AND WALNUT STREET.

GKY USED XPSWMM VERSION 2019.1.1 TO MODEL THE EXISTING PIPE NETWORK USING NRCS METHODS FOR RUNOFF COMPUTATIONS AND A 1D MODEL WITH 2D COMPONENT FOR HYDRAULIC ANALYSIS. THE AREA OF CONCERN FOR THE LINCOLN AVENUE STUDY IS ALONG LINCOLN AVENUE FROM SYCAMORE STREET TO THE INTERSECTION OF WALNUT STREET. STREET, GUTTER, AND OVERLAND FLOODING IN THE STUDY AREA WAS MODELED USING A 2D GRID NETWORK LINKED TO 1D PORTIONS OF THE MODEL. THE 2D PORTION ASSIGNS A CELL ELEVATION AND MANNING'S N ROUGHNESS TO EACH 2-FT BY 2-FT SQUARE GRID CELL BASED ON INPUT DATA. GRID CELL ELEVATIONS ARE DERIVED FROM A TIN SURFACE, WHICH IS SOURCED FROM FINAL SURVEY TOPOGRAPHY DATA PROVIDED BY WALTER L. PHILLIPS INCORPORATED. MANNING'S N-VALUES WERE ASSIGNED BY ANALYSIS OF LAND COVER USING 2019 AERIAL IMAGERY.

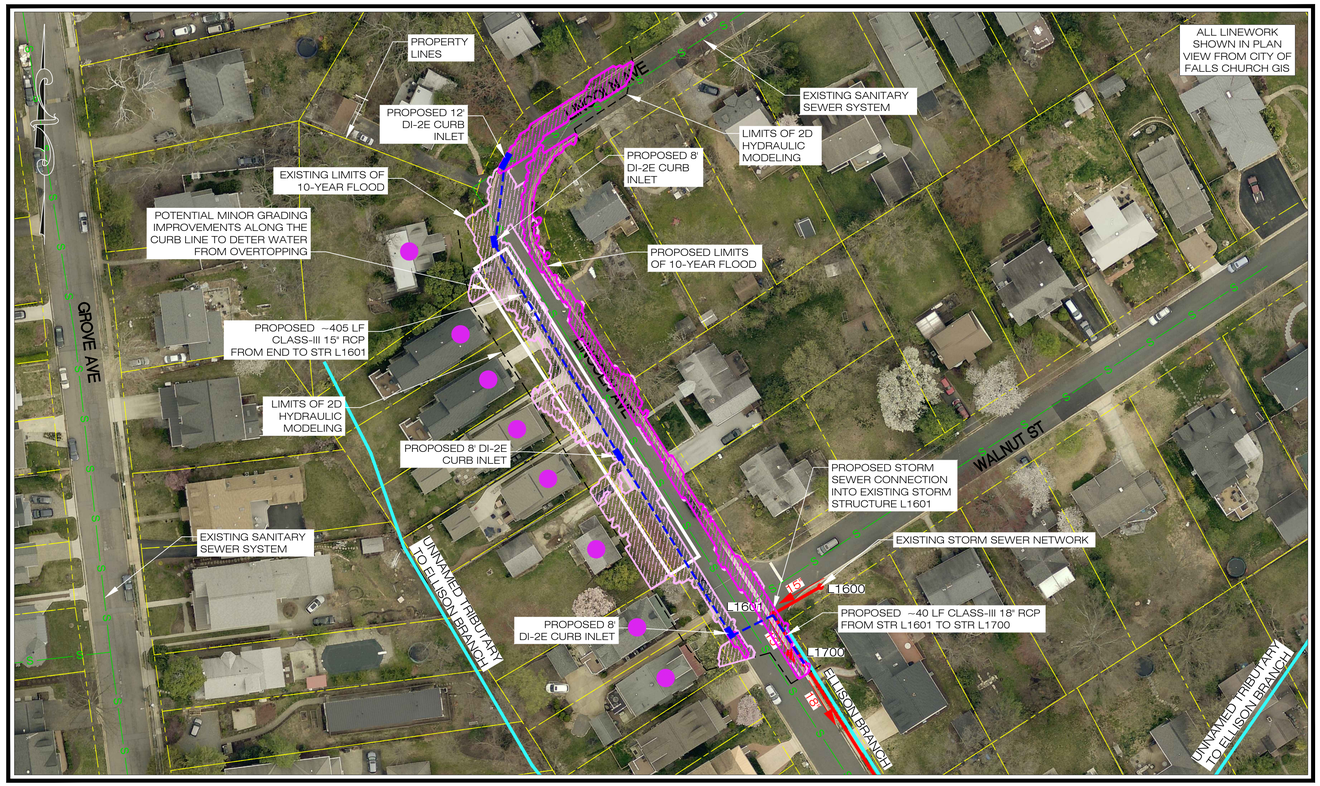
FOR THE 10-YEAR AND 100-YEAR STORM EVENTS, AN SCS TYPE-II, 24-HOUR RAINFALL DISTRIBUTION WAS USED, WITH TOTAL RAINFALL AMOUNTS OF 4.9 AND 8.47 INCHES, RESPECTIVELY (NOAA ATLAS 14). THE PROPOSED DESIGN IS INTENDED TO REDUCE FLOODING DURING THE 10-YEAR DESIGN STORM ONLY. DOWNSTREAM TAILWATER CONDITION AT THE MODEL OUTFALL (EXISTING STORM STRUCTURE L1800) USES A STAGE PLOT OF THE HGL AT L1800 GENERATED FROM AN ESTABLISHED XPSWMM MODEL OF THE ELLISON BRANCH WATERSHED, SUBMITTED BY GKY TO THE CITY OF FALLS CHURCH IN 2019.

TO MODEL STREET FLOODING, GKY INTRODUCED RUNOFF FLOWS FROM UPSTREAM DRAINAGE AREAS INTO THE 2D MODELING GRID AT LOCATIONS ON BOTH SIDES OF SYCAMORE STREET AND ALLOWED THE WATER TO FLOW DOWNHILL TOWARD THE REPORTED FLOODING LOCATIONS. THE EXISTING CONDITION MODEL SHOWS RUNOFF IN THE GUTTER/ROADWAY ALONG LINCOLN AVE OVERTOPPING THE CURB IN MULTIPLE LOCATIONS AND FLOWING OVERLAND TOWARD SEVERAL RESIDENCES. THE EXISTING CONDITION MODEL RESULTS ARE CONSISTENT WITH HOMEOWNER FLOODING REPORTS. THE FLOODING IS OCCURRING DUE TO A LACK OF CURB INLET STRUCTURES AND STORM SEWER INFRASTRUCTURE ALONG LINCOLN AVENUE UPHILL FROM THE WALNUT STREET INTERSECTION. YARDS THAT SLOPE DOWNHILL TOWARD RESIDENCES FROM THE BACK OF THE CURB CONTRIBUTE TO THE FLOODING OF PROPERTIES ALONG LINCOLN AVENUE.

GKY EVALUATED BOTH PIPE AND INLET CAPACITY TO DEVELOP A PROPOSED CONDITION MODEL. BASED ON MODELING RESULTS, GKY PROPOSES INSTALLING A PIPE RUN ALONG THE WEST SIDE OF LINCOLN AVENUE WITH FOUR CURB INLET STRUCTURES TO CAPTURE STREET RUNOFF AS FAR UPHILL AS SYCAMORE STREET. PROPOSED PIPE WILL TIE IN WITH THE EXISTING STORM NETWORK AT STRUCTURE L1601. ADDITIONALLY, GKY PROPOSES REPLACING THE EXISTING 15-INCH PIPE BETWEEN L1601 AND L1700 WITH AN 18-INCH PIPE. THE PIPE DOWNSTREAM OF L1700 IS 18 INCHES IN DIAMETER AND PROPOSED UPSTREAM PIPES CANNOT EXCEED THIS SIZE.

INLET CAPACITY RATING CURVES WERE DEVELOPED USING FHWA HYDRAULIC TOOLBOX CALCULATIONS AND MODELED IN XPSWMM USING THE 2D INFLOW CAPTURE FEATURE. THIS IS A CONSERVATIVE APPROACH VALID FOR THE CONCEPTUAL LEVEL PLAN ONLY. PROPOSED INLETS ARE THREE 8-FOOT LONG CURB INLETS AND ONE 12-FOOT LONG CURB INLET AT THE FAR UPSTREAM END OF THE PROPOSED PIPE RUN. INLET SIZING WILL BE EVALUATED USING VDOT METHODOLOGY AT FINAL DESIGN, AND PROPOSED SIZES MAY DECREASE.

GKY RECOMMENDS CONSIDERING RAISING CURB, YARD, AND/OR DRIVEWAY APRON ELEVATIONS AT FLOODING LOCATIONS AS PART OF THE FINAL DESIGN SOLUTION. WATER OVERTOPPING DEPTHS ARE LESS THAN SIX INCHES AND MODEST GRADING ALTERATIONS IN SELECT LOCATIONS MAY CONTAIN RUNOFF TO THE GUTTER AND STREET. THE PROPOSED INLETS AND PIPES WILL STILL BE NECESSARY TO MANAGE THE STREET FLOODING. DUE TO KNOWN PIPE CAPACITY ISSUES DOWNSTREAM FROM L1601, THE PROPOSED DESIGN IS UNABLE TO COMPLETELY CONTAIN THE 10-YEAR FLOWS IN THE STORM SEWER, BUT IT WILL ELIMINATE THE CURRENT OVERLAND FLOODING PROBLEMS FOR A 10-YEAR DESIGN STORM SITUATION.

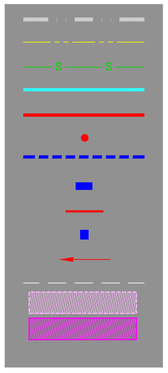



1/5 ELLISON BRANCH & LINCOLN AVENUE PROJECT CONCEPTUAL LAYOUT

1" = 50'

GRAPHIC SCALE
50 0 25 50 100
( IN FEET )
1 inch = 50 ft.

## CONCEPTUAL PLAN LEGEND




ALL INFORMATION HEREON, INCLUDING THE PLAN AND COST ESTIMATE, IS IN DRAFT FORM AT A CONCEPTUAL LEVEL OF DESIGN, PRODUCED AS AN INTERIM PRODUCT. INFORMATION WILL CHANGE AS SUBSEQUENT LEVELS OF DESIGN ARE COMPLETED.

## CONCEPTUAL PLAN CONSTRAINTS

| No. | Constraint | Cost | Schedule | Constructability | Comments |
|---|---|---|---|---|---|
| 1 | Overhead utility lines are present along the west side of Lincoln Avenue. | | 🟢 | | Easement language will need to be examined. If necessary permissions would need to be obtained from easement-holders. |
| 2 | Waterlines exist along Lincoln Avenue (not shown) that could impact potential improvements of the proposed storm sewer system along the street. | 🟡 | | 🟢 | Pending final design and test pits, proposed pipe horizontal and vertical alignment will be located to minimimize conflicts with waterline; however, care must be taken in construction to protect existing pipe and avoid damage during excavation. If waterline is found to be in conflict, waterline may be relocated. |
| 3 | Sanitary sewer lines exist along Lincoln Avenue that could impact potential storm sewer network and grading improvements between homes and along the project extents. | | 🟢 | | Pending final design and test pits, proposed pipe horizontal and vertical alignment will be located to minimimize conflicts with sanitary sewer; however, care must be taken in construction to protect existing pipe and avoid damage during excavation. |
| 4 | There may be other unknown utilities in the area of proposed work that could cause a potential conflict. | 🟡 | 🟡 | 🟡 | Pending final design and test pits, proposed pipe horizontal and vertical alignment will be located to minimimize conflicts with utilities; however, care must be taken in construction to protect existing utilities and avoid damage during excavation. |
| 5 | Improvements may be required for the storm sewer network and site grading on private property. | 🟢 | 🟡 | 🟢 | Permissions will need to be obtained. |
| 6 | Light poles, power poles, fire hydrants, etc. may be impacted by any construction along the west side of Lincoln Avenue. | 🟡 | 🟢 | 🟡 | Permissions will need to be obtained and coordination with homeowners and utilities will be required. Fire hydrant lead lines and water service lines may need to be relocated. |

**Legend**

| | |
|---|---|
| 🟢 | Minimal Impact |
| 🟡 | Moderate Impact |
| 🔴 | Significant Impact |

**Project: City of Falls Church Watershed Master Plan: Ellison Branch & Lincoln Avenue Project**
**Design Assumptions: New Storm Sewer System and Grading Relief**
**Estimate Type: Conceptual Construction Cost Estimate**
**Prepared by: GKY & Associates, Inc.**
**Date: April 20, 2020**

| # | ITEM | QUANTITY | UNIT | UNIT COST | COST |
|---|---|---|---|---|---|
| 1 | **EROSION & SEDIMENT CONTROL** | | | | |
| 2 | Erosion and Sediment Controls | 1 | LS | $30,000 / LS | $30,000 |
| 3 | | | | **EROSION & SEDIMENT CONTROL SUB TOTAL:** | **$30,000** |
| 4 | **PROPOSED IMPROVEMENTS** | | | | |
| 5 | 15" RCP CL III Pipe | 405 | LF | $300 / LF | $121,500 |
| 6 | 18" RCP CL III Pipe | 40 | LF | $350 / LF | $14,000 |
| 7 | DI-3 Curb Inlet for 15" Pipe | 4 | EA | $25,000 / EA | $100,000 |
| 8 | 15-18" Connection to Existing Structure | 3 | EA | $2,500 / EA | $7,500 |
| 9 | Remove Existing 15" Pipe, Full Haul Off | 40 | LF | $120 / LF | $4,800 |
| 10 | Grading Improvements | 1 | LS | $40,000 / LS | $40,000 |
| 11 | Pavement Restoration | 1 | LS | $75,000 / LS | $75,000 |
| 12 | | | | **PROPOSED IMPROVEMENTS SUB TOTAL:** | **$362,800** |
| 13 | **MISCELLANEOUS** | | | | |
| 14 | Mobilization | 1 | EA | $25,000 / EA | $25,000 |
| 15 | Maintenance of Traffic | 1 | LS | $40,000 / LS | $40,000 |
| 16 | Utility Coordination and/or Relocation | 1 | LS | $75,000 / LS | $75,000 |
| 17 | Construction Design, Survey, and Stakeout | 1 | LS | $40,000 / LS | $40,000 |
| 18 | | | | **MISCELLANEOUS SUB TOTAL:** | **$180,000** |
| 19 | | | | | |
| 20 | | | | **PROJECT SUB TOTAL:** | **$572,800** |
| 21 | | | | **CONTINGENCY (45% of PROJECT SUB TOTAL):** | **$257,760** |
| 22 | | | | **PROJECT TOTAL:** | **$830,560** |

3/5 ELLISON BRANCH & LINCOLN AVENUE PROJECT CONCEPTUAL COST ESTIMATE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ELLISON BRANCH & LINCOLN AVENUE PROJECT
CONCEPTUAL PLAN (1 OF 2)

WATERSHED MANAGEMENT PLAN PROJECTS
CITY OF FALLS CHURCH, VIRGINIA

NOT FOR CONSTRUCTION

| DATE | DESCRIPTION |
|---|---|
| . | . |

H SCALE: 1" = 50'
H DATUM: NAD83
V SCALE: N/A
V DATUM: NGVD29

DESIGNED: SM/CA
DRAFTED: SM/AJ
CHECKED: BK

PROJECT#: 2016-006
CONTRACT#: TO#30

1207 LINCOLN AVENUE LOOKING
WEST FROM SYCAMORE STREET
(IMAGE FROM GOOGLE STREET VIEW
JULY 2014)

INTERSECTION OF LINCOLN AVENUE AND
WALNUT STREET

1201 LINCOLN AVENUE

1113 LINCOLN AVENUE LOOKING
SOUTHWEST FROM WALNUT STREET
(IMAGE FROM GOOGLE STREET VIEW
JULY 2014)

2
5A

EXISTING CONDITIONS PHOTOS

NOT TO SCALE

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2
5A

EXISTING CONDITIONS 10-YEAR FLOOD DEPTHS

1" = 100'

3
5A

PROPOSED CONDITIONS 10-YEAR FLOOD DEPTHS

1" = 100'


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ELLISON BRANCH & LINCOLN AVENUE PROJECT
CONCEPTUAL PLAN (2 OF 2)

WATERSHED MANAGEMENT PLAN PROJECTS
CITY OF FALLS CHURCH, VIRGINIA

NOT FOR CONSTRUCTION

| DATE | DESCRIPTION |
|---|---|
| - | - |

| | |
|---|---|
| H SCALE: | 1" = 50' |
| H DATUM: | NAD83 |
| V SCALE: | N/A |
| V DATUM: | NGVD29 |
| DESIGNED: | SM/CA |
| DRAFTED: | SM/AJ |
| CHECKED: | BK |
| PROJECT#: | 2016-006 |
| CONTRACT#: | TO#30 |
| SHEET: | 5A OF 9 |