Northeast Ohio Regional Sewer District

IN COLLABORATION WITH:

cleveland city planning commission

GREATER CLEVELAND PARTNERSHIP

OPPORTUNITY CORRIDOR DEVELOPMENT: ON-SITE STORMWATER MANAGEMENT STRATEGY

MAY 11, 2018

ch2m:

The **Opportunity Corridor Development: On-Site Stormwater Management Strategy** is a planning study led by the Northeast Ohio Regional Sewer District with input from the City of Cleveland, City Planning Commission, and the Greater Cleveland Partnership

Northeast Ohio Regional Sewer District

cleveland city planning commission

GREATER CLEVELAND PARTNERSHIP

PLANNING STUDY GOALS

1. Identify desired **future development** types within the Study Area;

2. Develop recommendations for **on-site stormwater management strategies**;

3. Provide planning-level guidance for complying with stormwater management **regulations**.

AUDIENCE

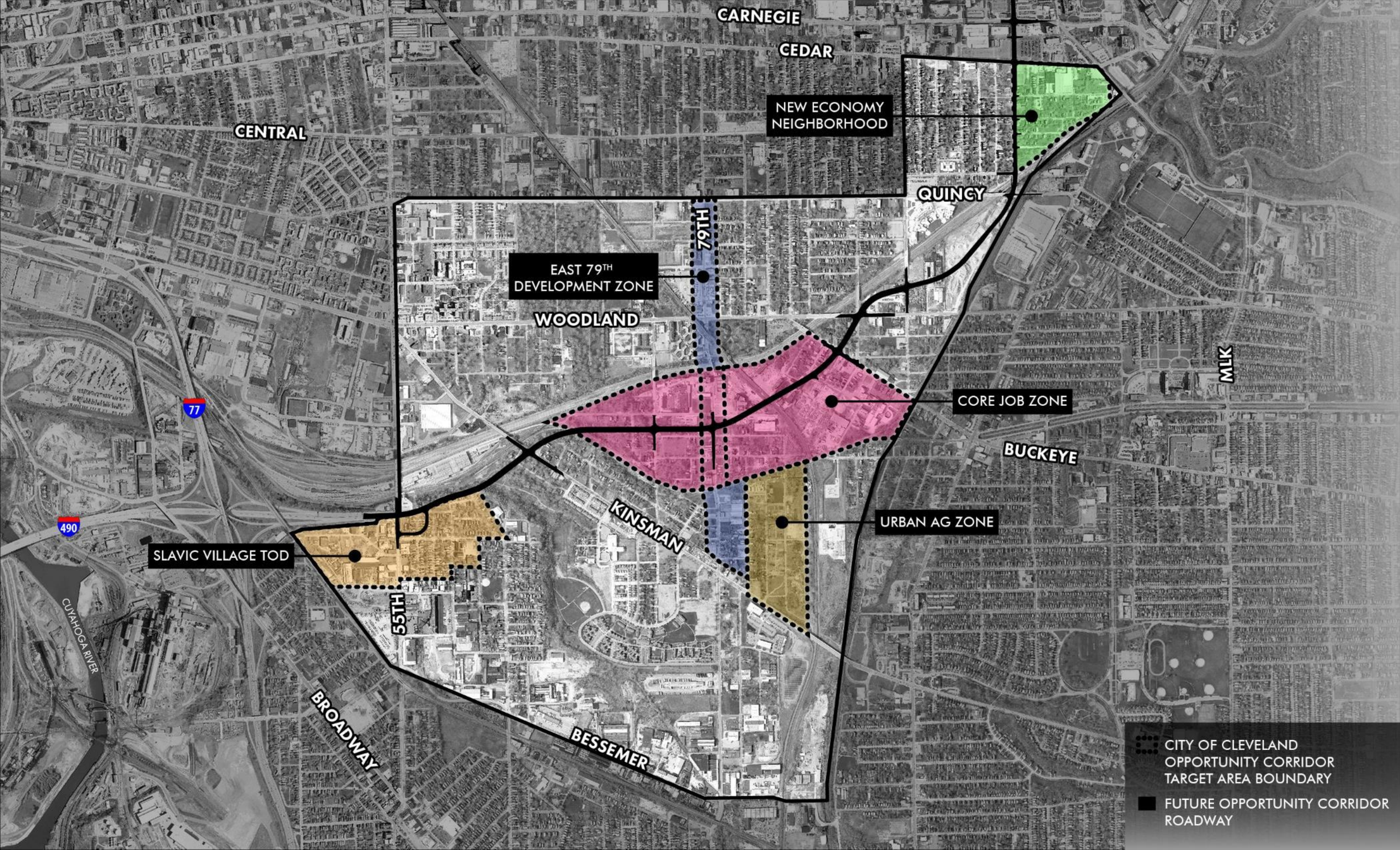
Development Community

+

City of Cleveland

+

NEORSD


CARNEGIE
CEDAR
CENTRAL
NEW ECONOMY NEIGHBORHOOD
QUINCY
79TH
EAST 79TH DEVELOPMENT ZONE
WOODLAND
MLK
CORE JOB ZONE
BUCKEYE
77
490
KINSMAN
URBAN AG ZONE
SLAVIC VILLAGE TOD
55TH
CUYAHOGA RIVER
BROADWAY
BESSEMER
CITY OF CLEVELAND OPPORTUNITY CORRIDOR TARGET AREA BOUNDARY
FUTURE OPPORTUNITY CORRIDOR ROADWAY

Woodland Village Conceptual Development Plan
Burten, Bell, Carr Development, City of Cleveland, City Architecture, BFR Partners

Friendship Village Conceptual Development Plan
Burten, Bell, Carr Development, City of Cleveland, City Architecture, BFR Partners

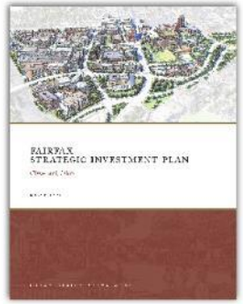
Ward 5 Forgotten Triangle Master Plan
Burten, Bell, Carr Development and the Urban Design Center of Northeast Ohio

Ward 5 Kinsman Union Master Plan
Burten, Bell, Carr Development and the Urban Design Center of Northeast Ohio

Ward 5 Central Neighborhoods Master Plan
Burten, Bell, Carr Development and the Urban Design Center of Northeast Ohio

Connecting Cleveland 2020 Citywide Plan
City of Cleveland

Fairfax Strategic Investment Plan
Fairfax Renaissance Development Corporation, Urban Design Associates



Reclaiming Cleveland, Target Area Plans
City of Cleveland

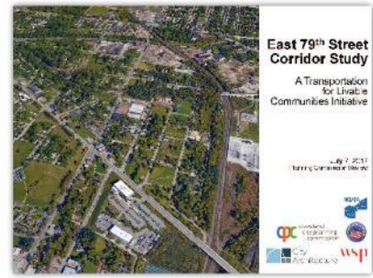
Kinsman Master Plan
Burten, Bell, Carr Development

Central Master Plan
Burten, Bell, Carr Development

Fairfax Strategic Investment Plan
Fairfax Renaissance Development Corporation, Urban Design Associates

Cleveland Central Choice Transformation Plan
Cuyahoga Metropolitan Housing Authority, City Architecture

Vibrant NEO 2040 Regional Vision, Were Should We Go Together?
Northeast Ohio Sustainable Communities Consortium Initiative



East 79th Street Corridor Study
City of Cleveland, NOACA, City Architecture, WSP

Thrive 105-93 Corridor Study
City of Cleveland, AECOM

Innovation Square Fairfax Neighborhood Plan
Fairfax Renaissance Development Corporation, City Architecture

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017

East Woodland Estates-Phase 1
City Architecture

Garden Valley Homes Estate
Cuyahoga Metropolitan Housing Authority

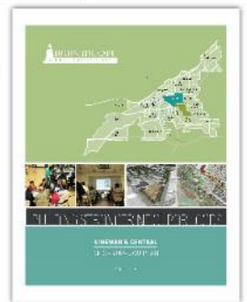
Urban Agriculture Innovation Zone
Burten, Bell, Carr Development

St. Hyacinth Transit Oriented Development Study
Slavic Village Development, McKnight Associates

Cleveland Opportunity Corridor Brownfields Area Wide Plan
City of Cleveland, US EPA, City Architecture, Partners Environmental Consulting

Cleveland Opportunity Corridor Eastern Section Expanded Plan
Greater Cleveland Partnership, City Architecture, Partners Environmental Consulting

Building Stronger Neighborhoods, Kinsman & Central Neighborhood Plan
Burten, Bell, Carr Development



COLOR CODE LEGEND:
MASTER PLAN
SITE DEVELOPMENT PLAN
STRATEGIC PLAN
COMPREHENSIVE PLAN


CARNEGIE
CEDAR
CENTRAL
79TH
FAIRHILL
WOODLAND
77
BUCKEYE
MLK
490
CUYAHOGA RIVER
BROADWAY
55TH
KINSMAN

FUTURE LAND COVER IS BASED ON INFORMATION CONTAINED IN PLANNING DOCUMENTS PRODUCED BY THE CLEVELAND CITY PLANNING COMMISSION, NEIGHBORHOOD COMMUNITY DEVELOPMENT CORPORATIONS, AND OTHER STAKEHOLDERS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LAKE ERIE
OPPORTUNITY CORRIDOR
ROADWAY ALIGNMENT
APPROXIMATE COMBINED
SEWER SERVICE AREA
CITY OF CLEVELAND BOUNDARY

On-Site Stormwater Management Regulations

CODE OF REGULATIONS OF THE
NORTHEAST OHIO REGIONAL SEWER DISTRICT

TITLE IV

COMBINED SEWER CODE

Adopted - June 3, 1993

Cleveland, OH Code of Ordinances

CHAPTER 3116 - CONSTRUCTION AND POST-CONSTRUCTION SITE STORM WATER RUNOFF CONTROL

3116.01 Definitions
3116.02 General Provisions
3116.03 Permit Required
3116.04 Plan Review, Inspections and Record Keeping; Contract Authority
3116.05 Permit Application, Fee
3116.06 Approval or Disapproval of Storm Water Pollution Prevention Plan
3116.07 Issuance of Permit; Appeal
3116.08 Periodic Inspections of Construction Activities
3116.09 Amendment of Approved Plan
3116.10 Final Inspection, Certificate of Completion of Construction Activities and Post Construction Management
3116.11
3116.12
3116.13

Statutory reference:

Construction and demo

§ 3116.01 Definitions

The definitions contained
"Authorization for Storm W
System" in effect at the tim
apply:

(a) "Construction activi
and/or filling activities that
common plan of developm

(b) "Director" means th

(c) "Ohio EPA Permit N
general permit number OH

(d) "Person" means any
commission, board, public

(Ord. No. 807-09. Passed

§ 3116.02 General Provi

(a) *Lands to Which Thi*

(b) *Discharges to Whi*

CHAPTER 541 – SEWER CONNECTIONS AND SEWER USE CODE

541.01 Definitions
541.02 Jurisdiction Over Sewer Connections
541.03 Responsibility for Installation and Maintenance of Sewer Connections
541.04 Sewer Builder's License and Bond
541.05 Sewer Connection Permits
541.06 Sewer Construction Requirements
541.07 Catch Basins
541.08 Clear Water Connections
541.09 Sewer Construction Inspection
541.10 Guarantee
541.11 Regulation of Discharges
541.12 Control of Unacceptable Discharges
541.13 Sewerage Test Tee Inspection, Installation and Snaking
541.97 Enforcement Procedures
541.98 Administration
541.99 Penalty

Charter reference:
Sewer, water and other connections, Charter § 163

Cross-reference:
Rules and regulations for sewerage system, CO 543.08
Sewerage service charges; payment, CO Ch. 543
Tampering with or possessing manhole covers, CO 625.22, 625.23

Statutory reference:
Compulsory sewer connections, RC 729.06
Interference with sewage flow, RC 4933.24
Management and control of sewerage system, RC 729.50
Power to construct sewerage system, RC 715.40, 717.01
Regulations to control house sewers and connections, RC 729.51

Ohio Environmental Protection Agency

Page 1 of 37
Ohio EPA Permit No.: OHC000004

OHIO E.P.A.
APR 11 2013
ENTERED DIRECTOR'S JOURNAL

Issuance Date: April 11, 2013
Effective Date: April 21, 2013
Expiration Date: April 20, 2018

OHIO ENVIRONMENTAL PROTECTION AGENCY

GENERAL PERMIT AUTHORIZATION FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et. seq. hereafter referred to as "the Act") and the Ohio Water Pollution Control Act [Ohio Revised Code ("ORC") Chapter 6111], dischargers of storm water from sites where construction activity is being conducted, as defined in Part I.B of this permit, are authorized by the Ohio Environmental Protection Agency, hereafter referred to as "Ohio EPA," to discharge from the outfalls at the sites and to the receiving surface waters of the state identified in their Notice of Intent ("NOI") application form on file with Ohio EPA in accordance with the conditions specified in Parts I through VII of this permit.

It has been determined that a lowering of water quality of various waters of the state associated with granting coverage under this permit is necessary to accommodate important social and economic development in the state of Ohio. In accordance with OAC 3746-1-05, this decision was reached only after examining a series of technical alternatives, reviewing social and economic issues related to the degradation, and considering all public and intergovernmental comments received concerning the proposal.

This permit is conditioned upon payment of applicable fees, submittal of a complete NOI application form and written approval of coverage from the director of Ohio EPA in accordance with Ohio Administrative Code ("OAC") Rule 3745-38-02.

Scott J. Nally
Director

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

By: _____ Date: 4-11-13

ATTACHMENT 2

Northeast Ohio Regional Sewer District

Submittal Requirements for Connections to the Combined Sewer System

Guidelines for Review and Approval

Requests for connection approval are required for all new development and redevelopment projects within the NEORSD service area seeking to connect to a combined sewer, combined sewer overflow (CSO) pipe, or separated storm sewer tributary to a combined sewer or CSO pipe.

Northeast Ohio Regional Sewer District
Protecting Your Health and Environment

Version 1.1

CITY OF CLEVELAND OHIO

Rainwater and Land Development

Ohio's Standards for Stormwater Management Land Development and Urban Stream Protection

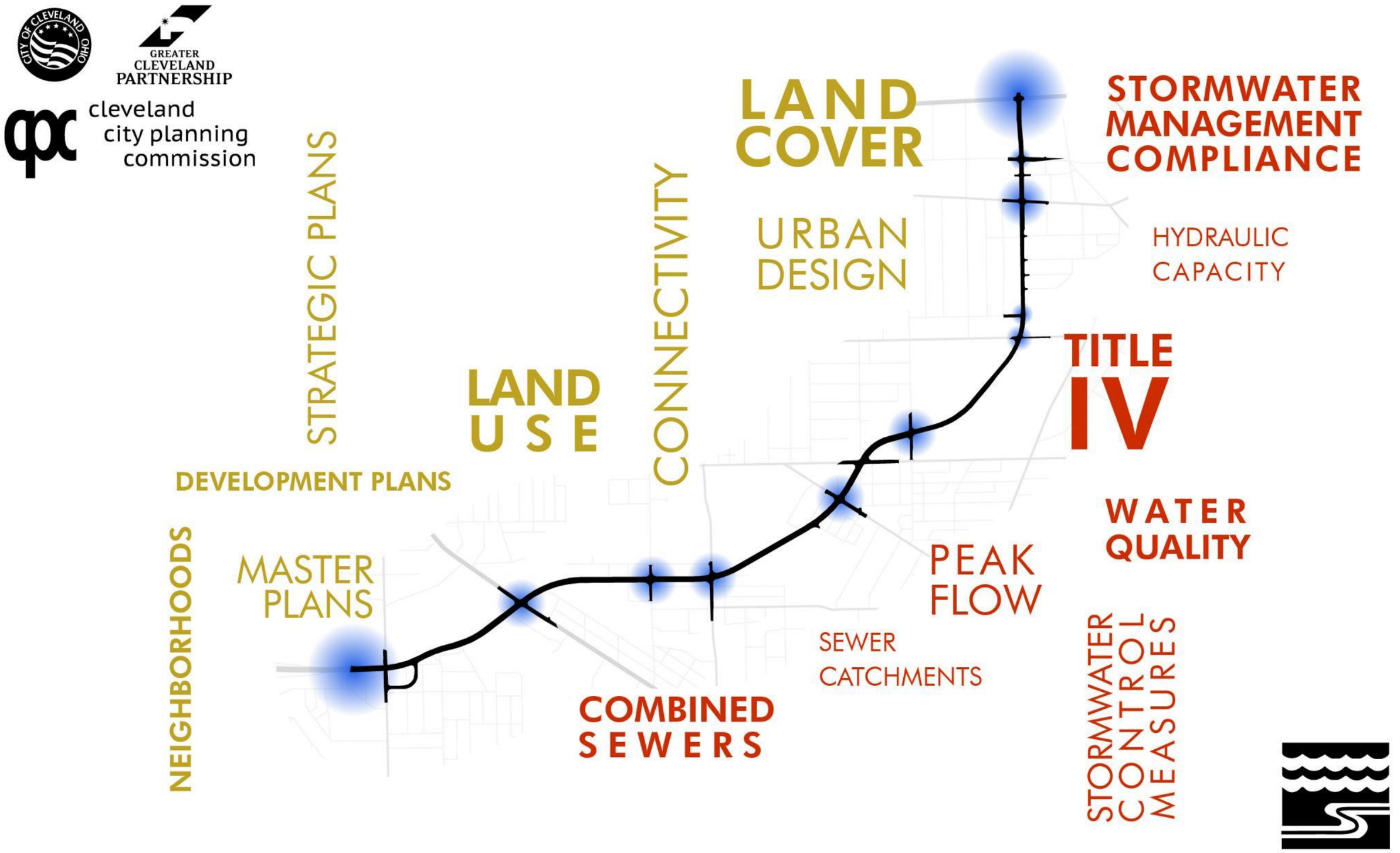
*Third Edition 2006

*Updated to include all new materials, changes and corrections as of 11-6-14.

Ohio Department of Natural Resources
Division of Soil and Water Conservation

2045 Morse Road, Building B-3
Columbus, Ohio 43229-6605
(614) 265-6610

This publication was funded in part by the Ohio Water Development Authority through a research and development grant.


CITY OF CLEVELAND OHIO
GREATER CLEVELAND PARTNERSHIP
cleveland city planning commission
STRATEGIC PLANS
CONNECTIVITY
LAND COVER
URBAN DESIGN
STORMWATER MANAGEMENT COMPLIANCE
HYDRAULIC CAPACITY
TITLE IV
LAND USE
DEVELOPMENT PLANS
NEIGHBORHOODS
MASTER PLANS
WATER QUALITY
PEAK FLOW
SEWER CATCHMENTS
STORMWATER CONTROL MEASURES
COMBINED SEWERS

Summary Report Overview

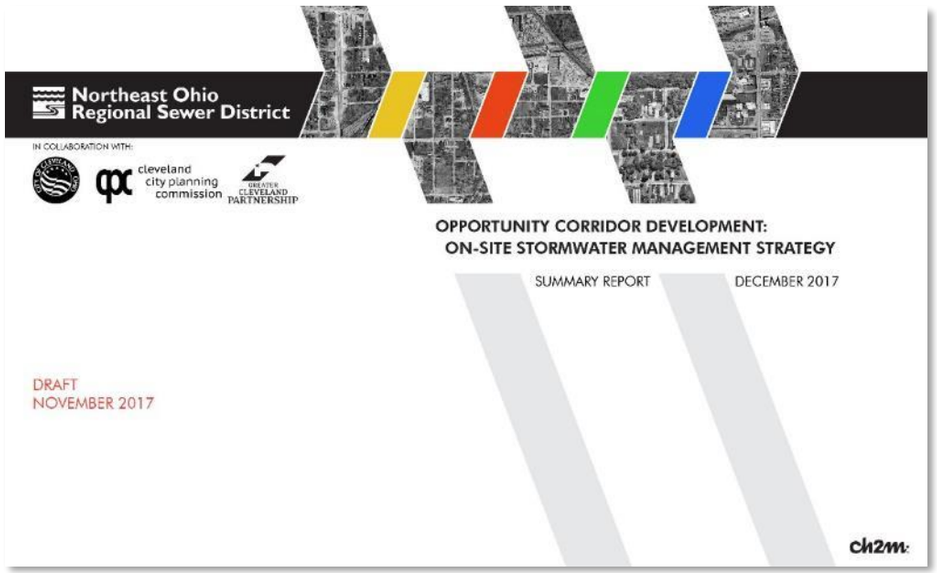
SEP 2015 — JUN 2016 — AUG 2016 — MAR 2017 — APR 2017 — OCT 2017 — NOV 2017

4 Stakeholder Meetings

1 City of Cleveland Meeting

1 NEORSD External Advisory Committee Meeting

1 East Design Review Committee Meeting



PLANNING OVERVIEW

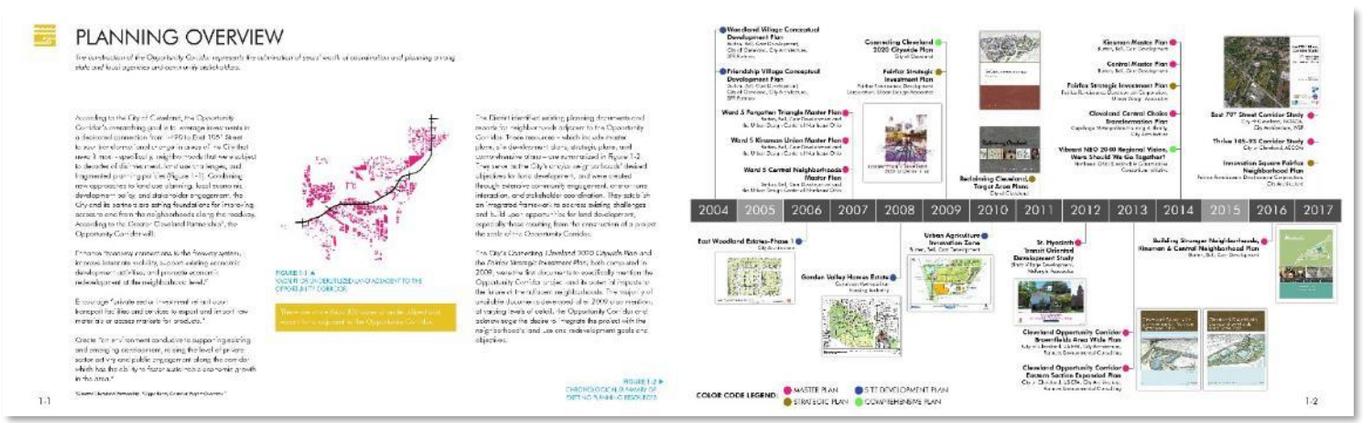
REGULATORY CONTEXT

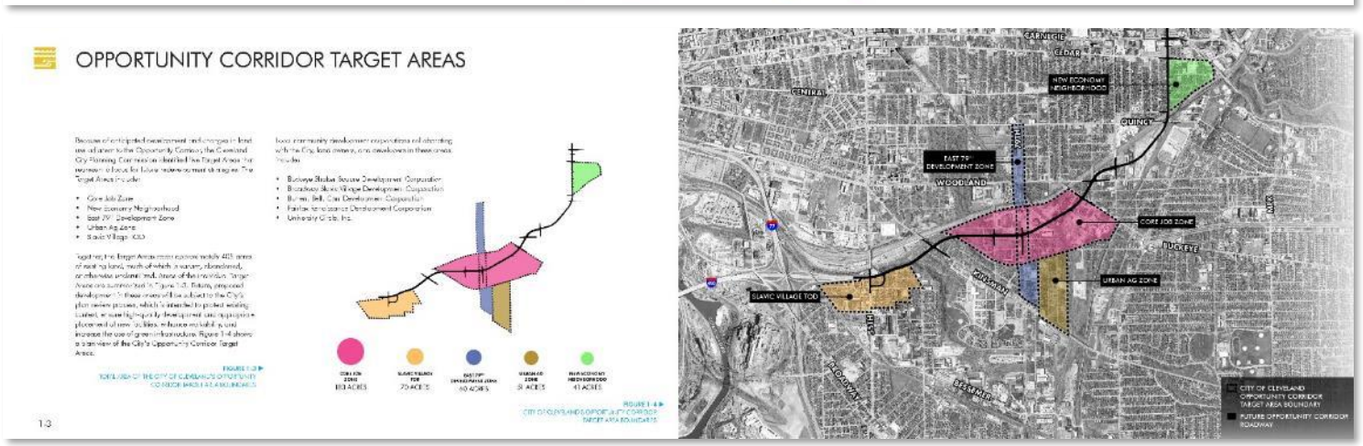
STORMWATER CONTROL MEASURES

IMPLEMENTATION

PLANNING OVERVIEW

- Planning Overview
- City of Cleveland's Opportunity Corridor Target Areas
- Study Area Overview

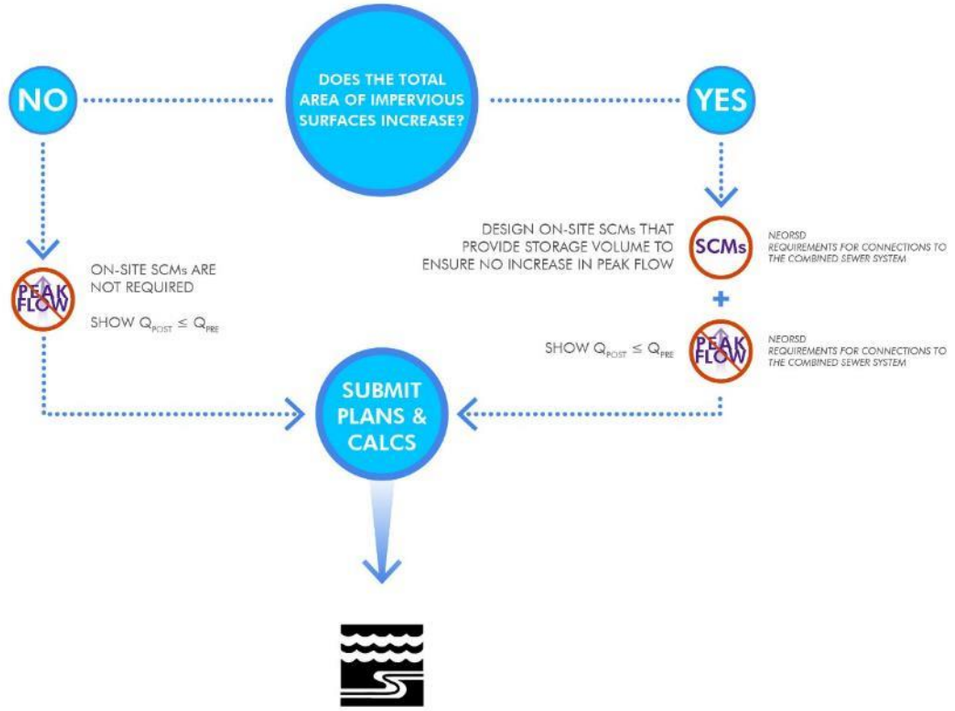


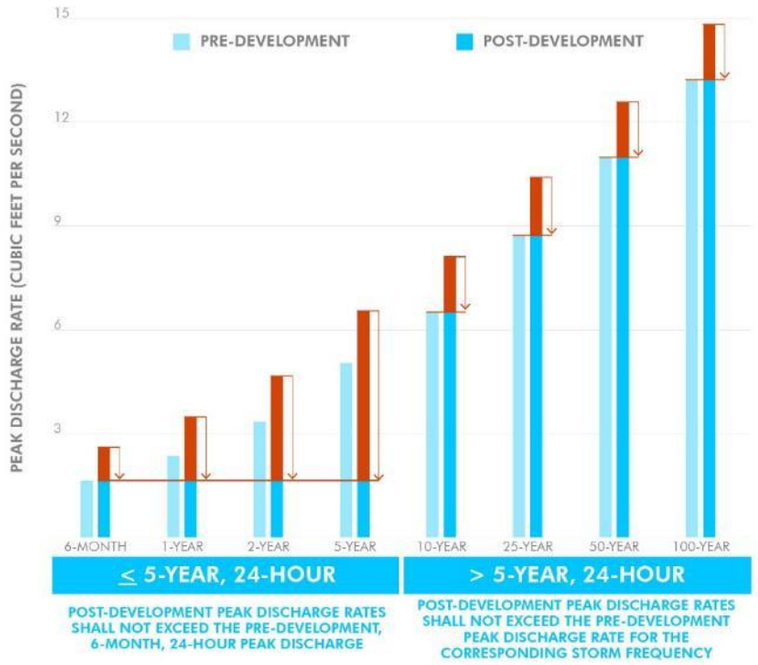


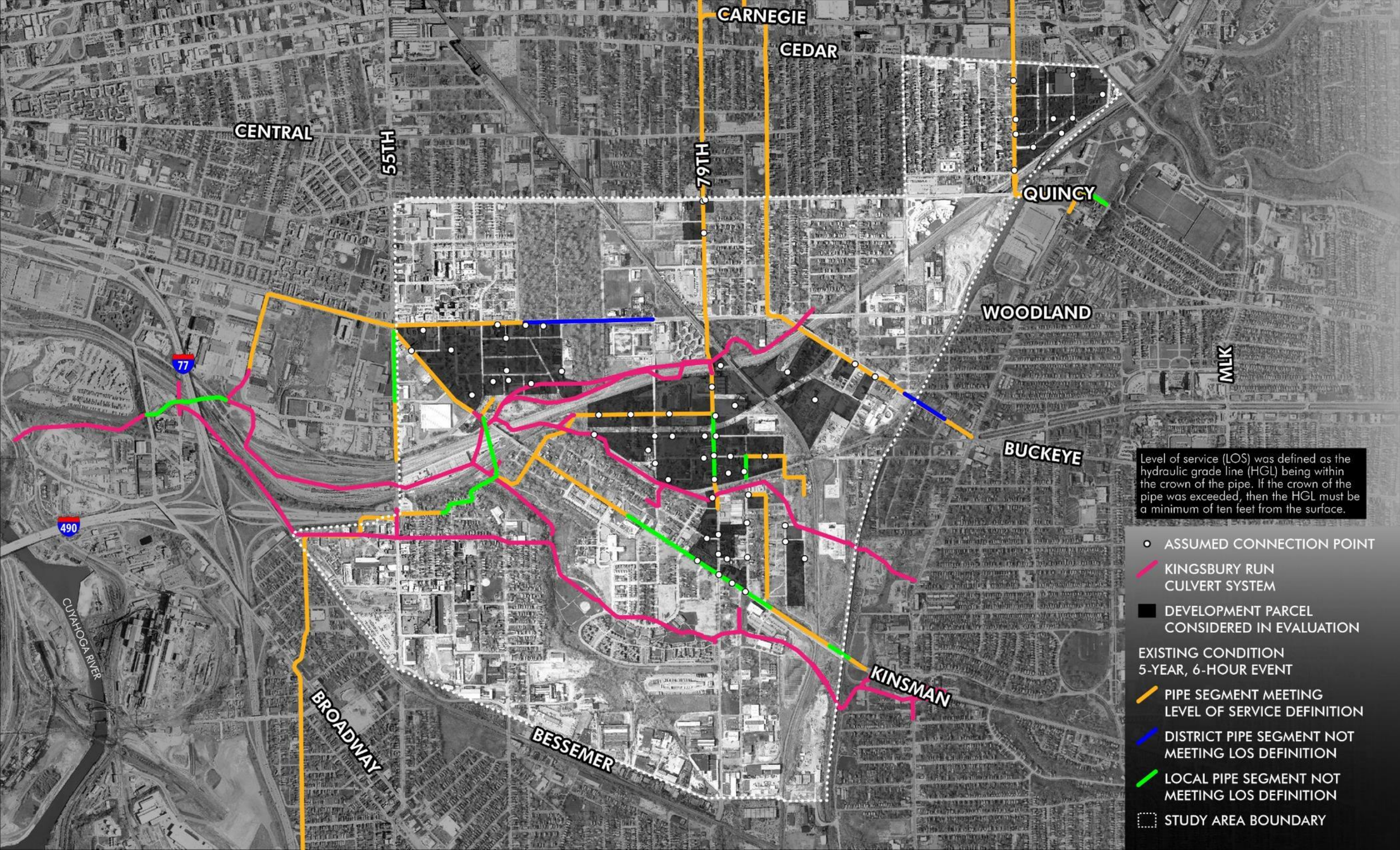
REGULATORY CONTEXT

- NEORSD Regulations (Title IV)
- City of Cleveland Regulations (§ 514)
- City of Cleveland Regulations (§ 3116)
- Compliance Flowcharts
- Stormwater Fee Credits

Regulatory Context






CARNEGIE
CEDAR
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QUINCY
WOODLAND
MLK
BUCKEYE
77
490
CUYAHOGA RIVER
BROADWAY
BESSEMER
KINSMAN
Level of service (LOS) was defined as the hydraulic grade line (HGL) being within the crown of the pipe. If the crown of the pipe was exceeded, then the HGL must be a minimum of ten feet from the surface.
ASSUMED CONNECTION POINT
KINGSBURY RUN CULVERT SYSTEM
DEVELOPMENT PARCEL CONSIDERED IN EVALUATION
EXISTING CONDITION
5-YEAR, 6-HOUR EVENT
PIPE SEGMENT MEETING LEVEL OF SERVICE DEFINITION
DISTRICT PIPE SEGMENT NOT MEETING LOS DEFINITION
LOCAL PIPE SEGMENT NOT MEETING LOS DEFINITION
STUDY AREA BOUNDARY

STORMWATER CONTROL MEASURES

- Surface, Subsurface, and Above-ground Management Strategies
- Construction Cost Resources
- Maintenance Requirements Resources

SURFACE MANAGEMENT

BIORETENTION

DRY EXTENDED DETENTION BASIN

WET EXTENDED DETENTION BASIN

TREE PLANTERS

SUBSURFACE MANAGEMENT

PERVIOUS PAVEMENT

INFILTRATION

UNDERGROUND STORAGE

ABOVE-GROUND MANAGEMENT

RAINWATER HARVESTING

GREEN ROOF

BIORETENTION

Bioretention refers to a surface depression with engineered soil, stone layers, and specialized plants. While maintenance requirements are often higher than traditional extended detention, bioretention provides greater water quality benefits and improved aesthetics. Bioretention can range in size from large detention basins to small planters integrated within parking lots.

Bioretention is a method for managing stormwater runoff on the surface. Bioretention delays and reduces the volume of stormwater runoff through native soil infiltration and adsorption from plants and within soil (i.e., evapotranspiration). Water quality is improved by promoting settling, microbial breakdown, and nutrient assimilation by plants.

QUANTITY CREDIT

When sized to comply with Title IV regulations, which is often achieved with enhanced designs (e.g., oversizing), bioretention may be eligible for a 15% Peak Flow Credit. A 25% credit may be available with higher levels of control.

A 25% or 50% Runoff Volume Credit may also be available depending on the level of reduction in post-development runoff volume. Significant infiltration is required to obtain this credit.

QUALITY CREDIT

When properly designed, installed, and maintained, bioretention may be eligible for a 25% Stormwater Quality Credit, which is the typical credit for this type of control measure.

The application of stormwater credits assumes review and approval of on-site stormwater control measures by the Northeast Ohio Regional Sewer District. See the *NEORSD Stormwater Fee Credit Policy Manual* for additional information.

SYSTEM COMPONENTS

Components of bioretention (Figure 3-2) include native plants, bioretention soil, and filter and aggregate layers. Typical depths of the soil, filter, and aggregate storage layers are 24 inches, 6 inches, and 12 inches, respectively; however, depths of the filter and aggregate storage layer can vary depending on storage needs and/or site constraints.

An overflow structure regulates flows from the bioretention system to downstream sewer systems. A subsurface underdrain system, with clean-outs, is typically connected to the overflow structure when infiltration into native soils is not feasible. Edge restraints – for example, a concrete curb flush with the ground surface – can be included to separate bioretention areas from the adjacent landscape.

SPATIAL CONSIDERATIONS

Bioretention can take the form of a bioretention basin or a bioswale. Basins are most suitable within open space, lawn areas, or integrated within or adjacent to large parking areas. Bioswales are linear strips of bioretention systems with minimum slope. They are most suitable adjacent to roadways or small parking areas, or downstream of building downspouts. Figures 3-3 through 3-7 show examples of bioretention.

SURFACE MANAGEMENT

The geometry of bioretention is flexible and usually depends on the unique set of site constraints: for example, existing topography, proximity to buildings or roadways, or existing utilities. Incorporate appropriate setbacks from building foundations and property lines, and avoid conflicts with the groundwater table.

DESIGN CONSIDERATIONS

Stormwater runoff is conveyed to bioretention via overland flow, through curb cuts near adjacent pavement, or through a headwall connected to upstream storm sewer infrastructure. In all scenarios, sufficient erosion protection, energy dissipation, and flow spreading measures are required.

The typical ratio of bioretention surface area to tributary drainage area is 1:15 (i.e., one square foot of bioretention system would manage the stormwater runoff from 15 square feet of drainage area), although ratios can range between 1:10 and 1:20 depending on spatial constraints and the land cover characteristics of the upstream drainage area. At a minimum, bioretention systems should be sized to fully capture and treat the Ohio EPA's water quality volume, which is the stormwater runoff generated during the 0.75-inch rain event.

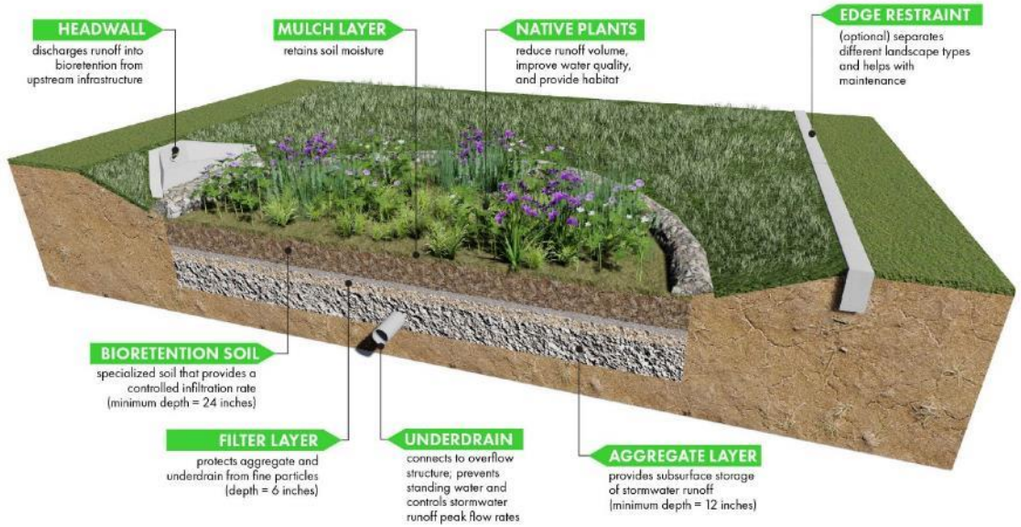


FIGURE 3-2 ▶
CONCEPTUAL CROSS SECTION OF BIORETENTION

For additional design considerations and technical guidance, consult Section 2.10 of the Ohio Department of Natural Resource's *Rainwater and Land Development Manual*.

The design of the overflow structure should be based on meeting local requirements for maximum post-development peak flow rates and volume attenuation. The bioretention system, including the underdrain(s) and overflow structure, should be fully drained within 48 hours. Surface ponding should draw down within 24 hours.

Plant species should be non-invasive and native to Northeast Ohio. Species should be able to withstand variable moisture and temperature conditions, as well as periodic inundation and saturated soil conditions. Trees are typically not planted within the bottom of bioretention, but can be planted on side slopes so long as roots will not negatively impact sewer infrastructure.

CONSTRUCTION CONSIDERATIONS

Sediment control measures must be incorporated and maintained at all times during construction. These measures prevent construction site runoff and sediment from entering and clogging the bioretention system. In the case that sediment enters a bioretention feature during construction, sediment should be immediately removed and properly disposed.

Construction should be suspended during periods of rainfall to limit compaction of bioretention layers and clogging of the bioretention system. Inspect and maintain all sediment control measures following periods of rainfall.

Installation of vegetation should coincide with industry-accepted planting windows for specific vegetation types. After plants are installed, weekly maintenance is recommended during the first two to three years to ensure proper establishment.

Verify that all vegetation meets American Standard for Nursery Stock, and verify post-construction warranty periods for all vegetation, including seed, plants, and trees.

MAINTENANCE CONSIDERATIONS

Routine inspection and maintenance will ensure that bioretention systems function as intended over the long-term. During the first year after construction, inspections of the vegetation, underdrain system, and overflow structure should occur weekly and following rain events. After the first year, inspections should occur monthly and following rain events.

The minimum vegetation maintenance activities include weeding, watering, seasonal mulching, seasonal pruning, and restoration/replacement of plants, when needed.

Adequate watering is critical during the first three years of establishment and during dry periods within the active growing season. Fertilizing should only be performed if plant health requires it or if over time soil becomes deficient of nutrients. An organic, slow-release fertilizer is recommended in these situations.

FIGURE 3-3 ▲
BIORETENTION WITHIN OPEN SPACE

FIGURE 3-4 ▲
BIORETENTION INTEGRATED BETWEEN PARKING STALLS

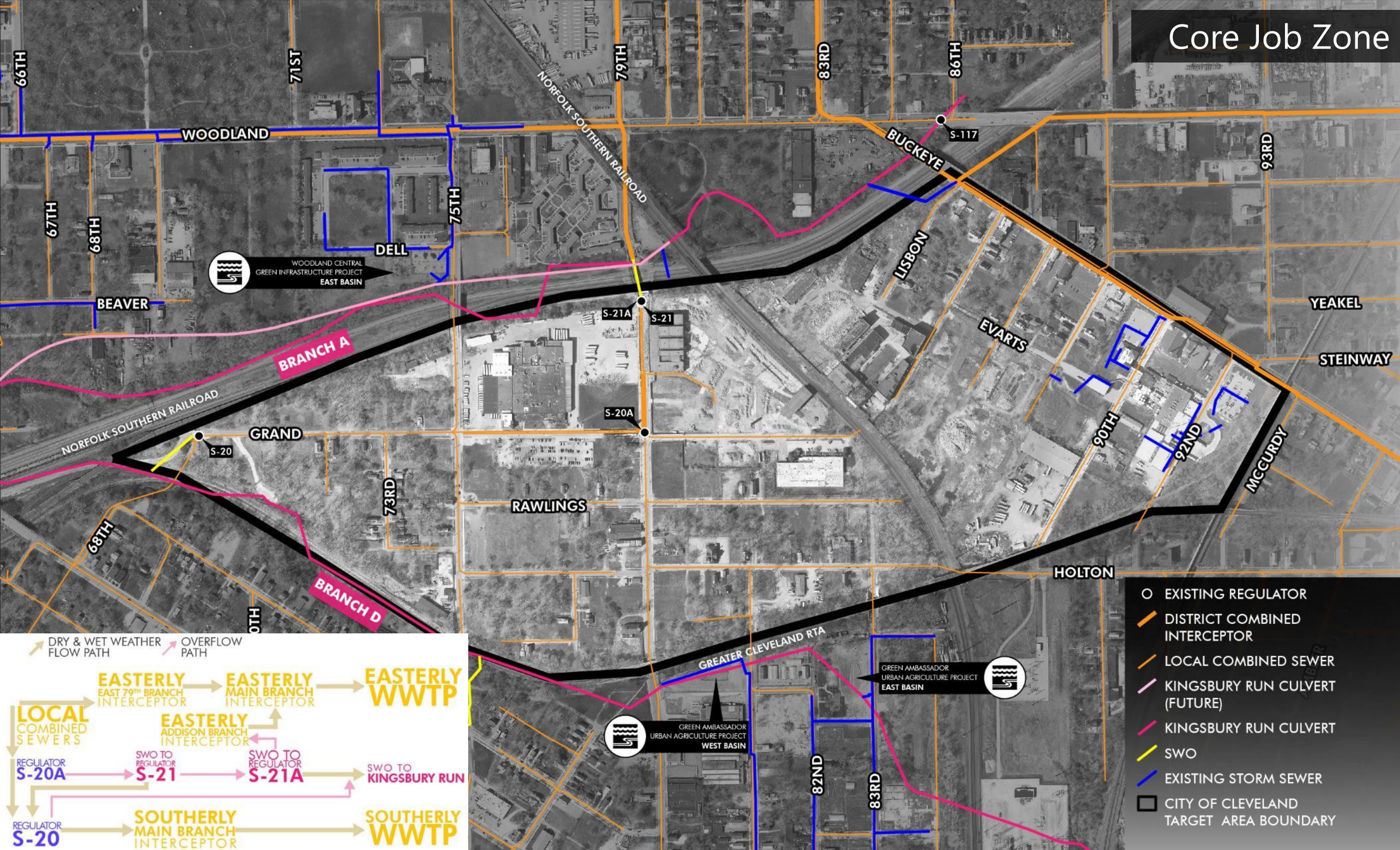
FIGURE 3-5 ▲
BIORETENTION BASIN WITHIN A SURFACE PARKING LOT.

FIGURE 3-6 ▲
BIORETENTION BASIN WITHIN OPEN SPACE

FIGURE 3-7 ▲
NEWLY-INSTALLED BIOSWALE WITH RIGHT-OF-WAY

IMPLEMENTATION

- Planning Recommendations
- Inventory of Existing Drainage Facilities and Collections Systems
- Examples for Integration of On-Site Stormwater Management


Core Job Zone
66TH
71ST
79TH
83RD
86TH
93RD
WOODLAND
NORFOLK SOUTHERN RAILROAD
BUCKEYE
S-117
67TH
68TH
75TH
DELL
WOODLAND CENTRAL
GREEN INFRASTRUCTURE PROJECT
EAST BASIN
BEAVER
LISBON
YEAKEL
S-21A
S-21
EVARTS
STEINWAY
BRANCH A
NORFOLK SOUTHERN RAILROAD
S-20A
GRAND
S-20
90TH
92ND
MCCURDY
73RD
RAWLINGS
68TH
HOLTON
BRANCH D
GREATER CLEVELAND RTA
GREEN AMBASSADOR
URBAN AGRICULTURE PROJECT
EAST BASIN
GREEN AMBASSADOR
URBAN AGRICULTURE PROJECT
WEST BASIN
82ND
83RD
EXISTING REGULATOR
DISTRICT COMBINED INTERCEPTOR
LOCAL COMBINED SEWER
KINGSBURY RUN CULVERT (FUTURE)
KINGSBURY RUN CULVERT
SWO
EXISTING STORM SEWER
CITY OF CLEVELAND TARGET AREA BOUNDARY
DRY & WET WEATHER FLOW PATH
OVERFLOW PATH
EASTERLY EAST 79TH BRANCH INTERCEPTOR
EASTERLY MAIN BRANCH INTERCEPTOR
EASTERLY WWTP
LOCAL COMBINED SEWERS
EASTERLY ADDISON BRANCH INTERCEPTOR
REGULATOR S-20A
SWO TO REGULATOR S-21
SWO TO REGULATOR S-21A
SWO TO KINGSBURY RUN
REGULATOR S-20
SOUTHERLY MAIN BRANCH INTERCEPTOR
SOUTHERLY WWTP

Core Job Zone

FUTURE LAND COVER IS BASED ON INFORMATION CONTAINED IN PLANNING DOCUMENTS PRODUCED BY THE CLEVELAND CITY PLANNING COMMISSION, NEIGHBORHOOD COMMUNITY DEVELOPMENT CORPORATIONS, AND OTHER STAKEHOLDERS

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New Economy Neighborhood

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MAY 11, 2018

ch2m: