ARLINGTON COUNTY WATER POLLUTION CONTROL PLANT

MARY MISS
AWPCP ART CONCEPT MASTERPLAN

A PROJECT TO TRANSFORM AN EXISTING 30-ACRE INFRASTRUCTURE SITE INTO A PUBLIC SPACE.

2003-2005

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STEVE BLAKE, JIM CONTI

THE INVISIBLE BECOMES VISIBLE

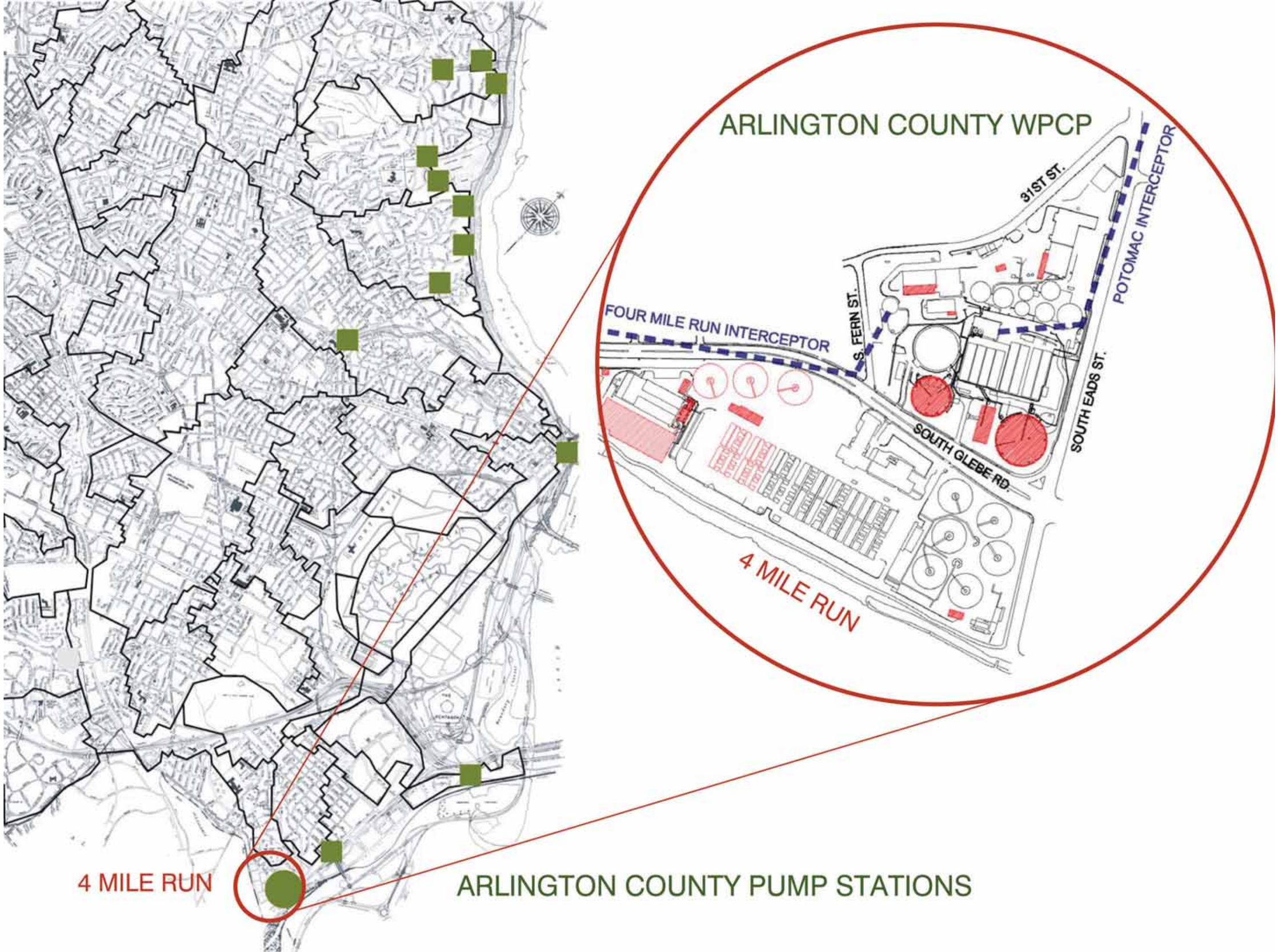
The streets of Arlington, Virginia's neighborhoods flow steadily with traffic every day. Below these streets are miles of pipes filled with water coming from our homes and moving through the sewershed towards the Chesapeake Bay. Before reaching the Bay the water is intercepted by a large treatment facility, preventing harmful pollutants from being released into this environment. The Arlington County Water Pollution Control Plant (ACWPCP) is where this vast underground system surfaces, allowing us to better understand the relationship between our community and the environment we live in. Through this Master Plan, the invisible become visible, connecting the daily lives of Arlington neighborhoods with the Chesapeake Bay.

Art Concept Master Plan

The ACWPCP acts as a gateway to Arlington, Virginia. Seen from the air or from the adjacent highway, this thirty-five acre site is a major element in the landscape of the city. This Master Plan visually and functionally transforms the plant, making apparent its pivotal role as the connector between the watershed, the county's residents and the Chesapeake Bay. It is intended that the facility become a symbol of a new bond that is being forged between the community and the environment.

Greening the WPCP: Aesthetic and Environmental Benefits
Through the implementation of the concepts outlined by Mary Miss, the WPCP will be transformed into a place of engagement, education and recreation through the treatment of the surrounding walkways, fences, neighborhood elements and the plant buildings themselves. The roofs, grounds, and roadways will be adapted to cut down on heat and odor as well as produce clean rain water runoff. A new environmental center at the north edge of the plant will be a resource for the community to learn more about the plant, recycling, and the use of native plants. The proximity of the Four Mile Run offers the opportunity to make stronger linkages between the plant and the environment beyond. Visual elements of the plant might be integrated at the edge of the river as it is restored to encourage native wildlife habitats found from Arlington to the Chesapeake Bay watershed.

Connecting the WPCP: with the Community and Environment
By creating these new experiences, meaningful relationships between the neighborhoods, the wastewater treatment facility, the river and the Chesapeake Bay watershed are established, encouraging us to consider how we affect our environment from the smallest scale to the largest. Heightening our awareness of the connections allows us the opportunity to think about our responsibilities as individuals and as a community. From this reflection, the potential to affect our future - by understanding the nature of human impact on our immediate and larger environment – becomes tangible.


ARLINGTON COUNTY WPCP
FOUR MILE RUN INTERCEPTOR
S. FERN ST.
31ST ST.
POTOMAC INTERCEPTOR
SOUTH EADS ST.
SOUTH GLEBE RD.
4 MILE RUN
4 MILE RUN
ARLINGTON COUNTY PUMP STATIONS

HOMES | STREETS | WATERSHED | ACWPCP | 4 MILE RUN | POTOMAC | CHESAPEAKE

MAKING CONNECTIONS

ARLINGTON NEIGHBORHOODS

ACWPCP

CHESAPEAKE BAY

DECODING THE WATER TREATMENT PROCESS

The primary goal of this project is to visually decode the plant, and make the processes happening inside accessible to the community.

The proposal is intended to alter the way citizens perceive the sewage treatment plant. This is to be accomplished by affecting all parts of the parts of the plant, including ground surfaces, facades, roofs and perimeter.

The public will have the opportunity to more thoroughly understand the role of the plant as the connecting point between their daily lives and the larger environment, especially the Chesapeake Bay.

PIPES

EQUIP-
MENT

SLUDGE

TANKS

BRIDGES

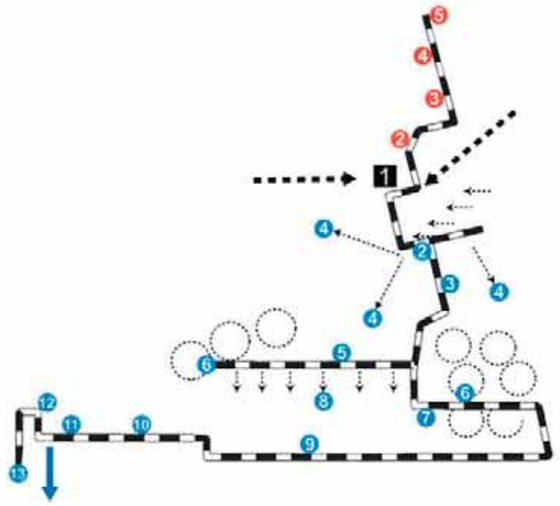
LIGHTS

BRICKS

CHAIN-
LINK

PAVE-
MENT

ARLINGTON COUNTY WATER POLLUTION CONTROL PLANT - EXISTING CONDITIONS



PROCESS DIAGRAM

The Process Diagram serves as a visual guide and reference system that invites visitors to engage with the processes going on inside the water treatment plant. As a visitor walks through the plant or along its perimeter, they will be able to learn about the plant processes through a one-to-one scale physical experience. Rather than being treated as an urban blight in the landscape, the plant will be transformed into a new kind of public space. The Process Diagram will capture the attention of Arlingtonians and make them understand that the plant is a vital part of their daily life.

LIVING SURFACES

There are many surfaces existing throughout the plant grounds - roofs, facades, pavement - all of which have potential to serve multiple functions, both visually and functionally through the use of vegetation. The idea of Living Surfaces is to achieve a maximum coverage of vegetation on the site.
While the large masses of green surfaces provide significant environmental benefits, equally important is their visual impact.
The vegetated surfaces are treated diagrammatically, as highly legible landscape treatments which call out different uses and species of native plants. Their purpose is as much educational as it is ecological.

PUBLIC NODES

The vast scale of the plant makes it a confusing and overwhelming place to visit. Public Nodes are specific places within and beyond the plant grounds that allow the site to be more accessible and identifiable to the public. Each node is different and their uses vary as meeting points, gathering spaces, viewing areas, or rest stops. Each of these spaces is integrated into the diagram concept through their visceral nature.

PROCESS DIAGRAM

1 - BANDED PIPES
2 - 3-D NUMBERS & GRAPHICS
3 - KIOSKS

LIVING SURFACES

4 - PLANT SCREENS
5 - PLANTED ROOFS
6 - ROOF TRELLISES
7 - PERIMETER TRELLISES
8 - POROUS PAVING
9 - RAIN GARDENS
10 - PHOTOVOLTAIC PANELS
11 - OUTFALL PLANTERS
12 - SEDUMS AT RIVER EDGE

PUBLIC NODES

13 - DIGESTER
14 - HAZMAT CANOPY
15 - BIOTERRACE
16 - VIEWING TOWER
17 - OUTFALL STRUCTURE
18 - PERIMETER ELEMENTS
19 - ENVIRONMENTAL CENTER
20 - PUMP STATIONS

PROCESS DIAGRAM

BANDED PIPES 1

The step-by-step process of water treatment is called out by a black and white line extending throughout the plant grounds, creating a full-scale diagram that leads visitors visually and physically from one step in the process to the next. Constructed of pipe similar to that found throughout the facility, the diagram line as a banded pipe adopts the language of the plant; existing scrubbers and pipes are also banded to become incorporated as part of the Process Diagram and create prominent visual features in this landscape.

3-D NUMBERS & GRAPHICS 2

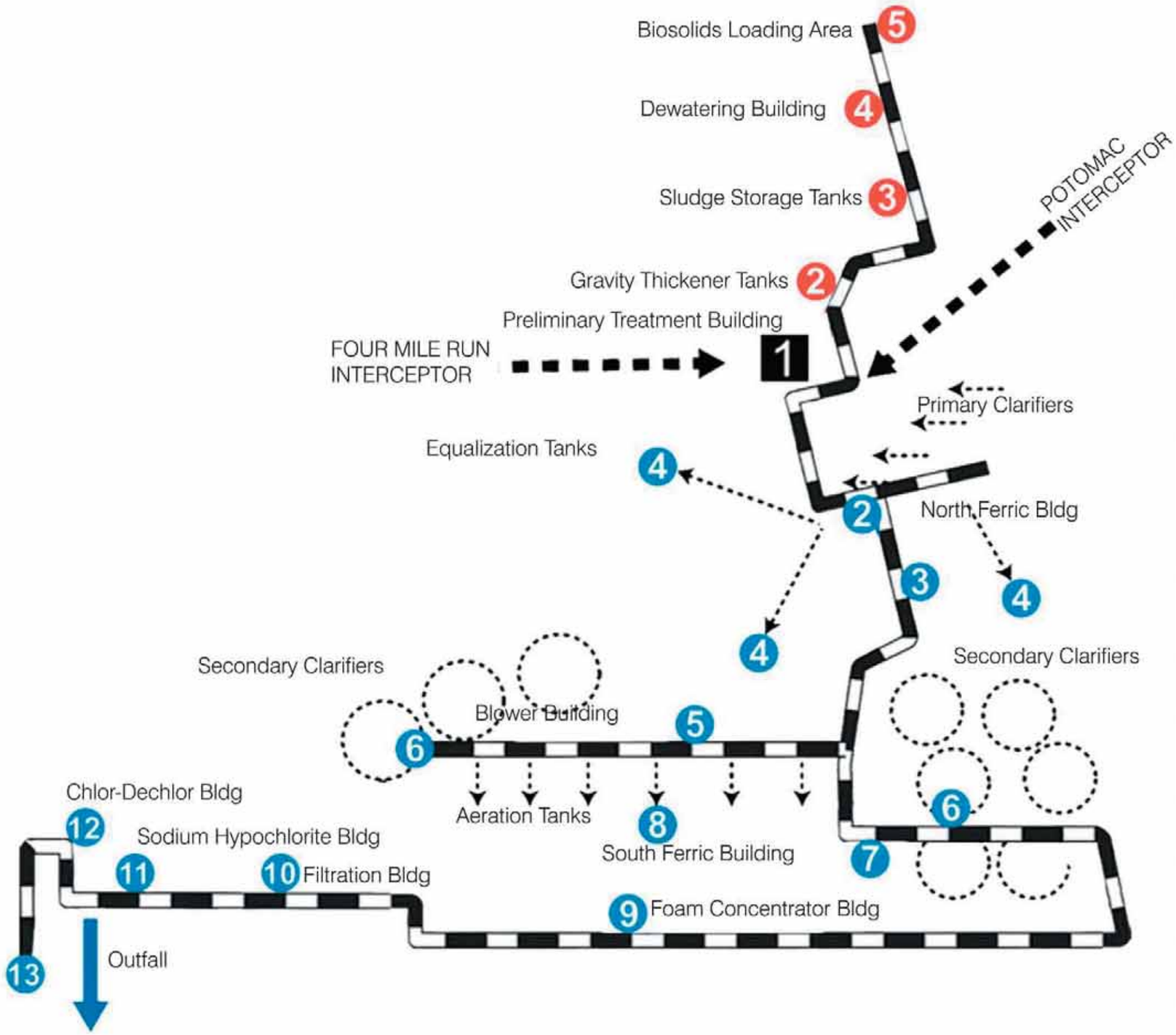
The steps in the water treatment process are marked by large numbers mounted on building facades; these relate to a series of numbers mounted on the perimeter fence, adjacent to kiosks which contain information about the process associated with the numbered building. The Process Diagram also includes 3-D graphic elements mounted to buildings and tanks to identify the processes going on at each step of the treatment.

KIOSKS 3

A series of kiosks in the perimeter fence describes the process associated with the adjacent fence-mounted number. The kiosks occur at regular intervals around the entire perimeter of the plant; from the sidewalk, visitors can move from one kiosk to the next to learn about the water treatment process. The kiosks will be visible to passing cars, so that a curious driver may be motivated to stop and look more closely. The form and size of the kiosks echoes that of the actual pipe, the Potomac interceptor, through which effluent from the neighborhood enters the plant. The important role of the plant as a connector between our daily lives and the larger environment is made visceral through images of the Chesapeake Bay framed by the kiosk structure.

MODEL OF SITE WITH PROPOSED ARTWORK ELEMENTS

THE WATER TREATMENT PROCESS
HOW DO WE MAKE PROCESSES VISCERAL?

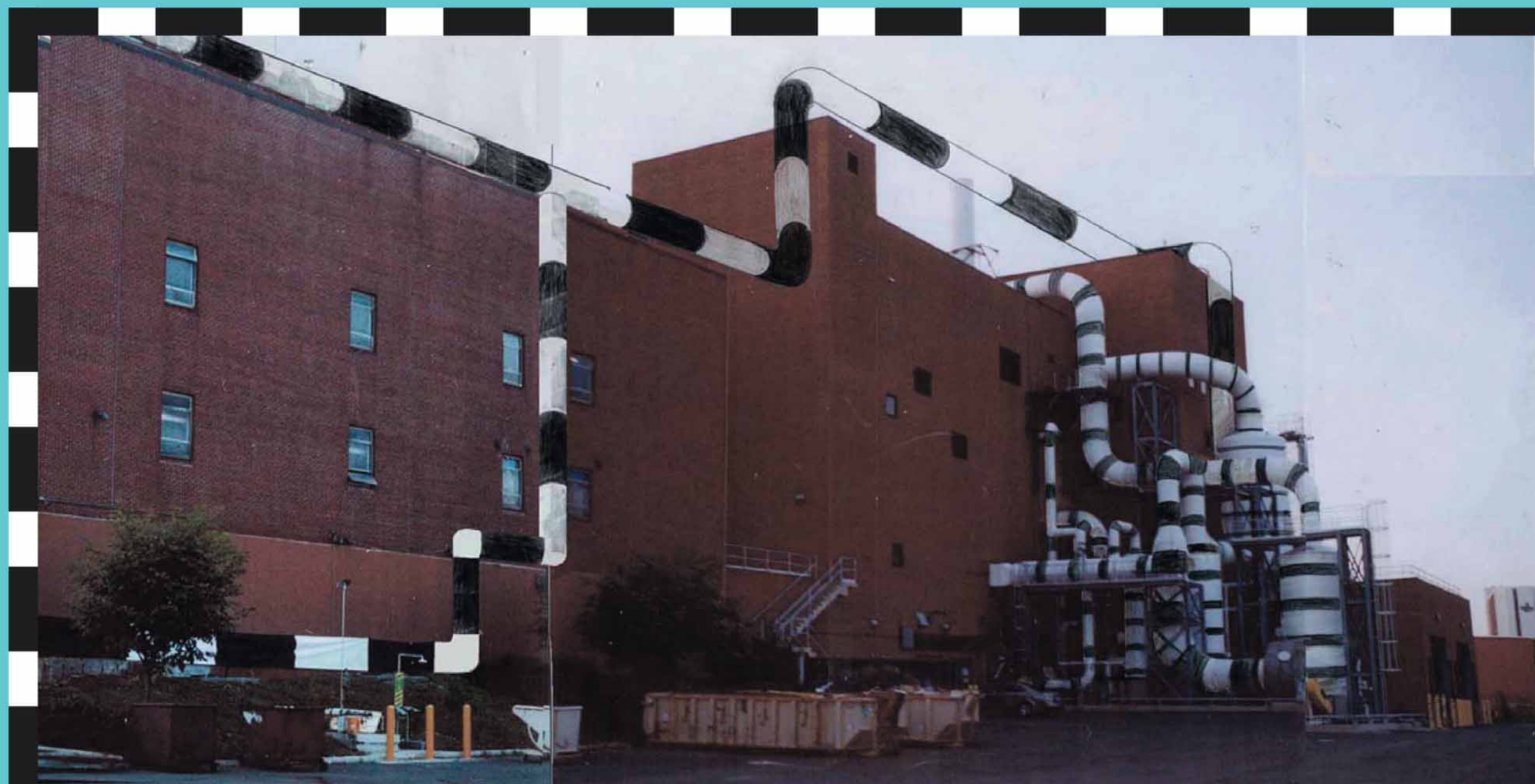


PROCESS DIAGRAM 1
Banded Pipe

2-D REPRESENTATION OF WATER TREATMENT SYSTEM AT ACWPCP. THE **PROCESS DIAGRAM** TRANSFORMS THIS 2-D ILLUSTRATION INTO A 3-D FULL SCALE *PHYSICAL DIAGRAM* DIRECTLY ON THE SITE.

PROCESS DIAGRAM 1
Banded Pipe

BANDED PIPE AND SCRUBBERS ON DEWATERING BUILDING



PROCESS DIAGRAM 1
Banded Pipe

BANDED PIPE RUNNING ALONG SOUTH SIDE OF ACWPCP IN FRONT OF AERATION TANKS

INFORMATION KIOSK INSERTED IN DOUBLE MESH FENCE
WITH NUMBER INDICATING STEP IN PROCESS
CRUSHED OYSTER SHELL CIRCLES IN SIDEWALK

KIOSK IS CONSTRUCTED USING A SEGMENT OF PIPE THE SAME SIZE AND SHAPE AS THE POTOMAC INTERCEPTOR, WHICH DELIVERS SEWAGE TO THE PLANT

PROCESS DIAGRAM

3-D Numbers 2

Kiosks 3

Banding with text explaining plant process

Eelgrass *Zostera marina* is the most abundant and persistent bay grass in high-salinity areas of Chesapeake Bay and the coastal bays; population levels are very stable. It provides a habitat for young blue crabs and sea trout.

LIVING SURFACES

PLANT SCREENS 4

Plant screens are to be applied to as many building facades as possible. Not only will these large areas of vegetation transform the plant visually, but they will also assist in cooling buildings in summer and insulating them in winter. The leaves of the climbing plants will filter out dust and other pollutants, as well as provide a more pleasant local climate due to additional water being transpired and evaporated into the air. Additionally, the plant screens will serve to reduce noise and odor.

PLANTED ROOFS 5

Planted roofs are to be installed on all new buildings proposed for the ACWCP expansion. From the neighborhoods on the hill adjacent to the facility, or from the proposed on-site viewing tower, the seasonal variations in color of these large vegetated surfaces can be observed. Functionally, the planted roofs will absorb and filter rainwater and substantially reduce the amount of runoff that would otherwise be released into the storm sewers.

ROOF TRELLISES 6

Roof trellises will serve as an alternative to planted roofs on existing buildings. These are planted trellis structures attached to the roof parapets which would provide a band of vegetation around the roof perimeter to be visible from the ground.

PERIMETER TRELLISES 7

Perimeter trellises are to be installed at regular intervals along the fence line. These planted structures will provide shade and a pleasant environment for pedestrians along the sidewalk and river edge areas surrounding the facility. Appearing as a continuous broken line around the site perimeter, these structures will be highly visible from the street both day and night; lighting is to be incorporated into trellis structure to illuminate the vines at night.

LIVING SURFACES

POROUS PAVING 8

As a stormwater management strategy, porous paving will be used to replace paved surfaces in all areas of the site where feasible. Grass crete, grass, gravel and crushed oyster shells are the types of porous materials proposed. The porous areas will be designed in specific patterns and in areas where maximum visual effect can be achieved, thus drawing attention to a stormwater feature which would otherwise be unnoticed.

RAIN GARDENS 9

Rain gardens will serve as stormwater management features to capture and clean runoff from roofs and paved surfaces throughout the plant. They have been located based on where they will be most visible and at low points on the site. The planting scheme consists of a variety of native plants.

PHOTOVOLTAIC PANELS 10

A band of vertically mounted photovoltaic panels will encircle the perimeter of each of the three Equalization Tanks. These panels will collect energy from the sun which will be used to provide supplemental power to assist with the plant's electricity needs. Their main purpose is to demonstrate the use of an alternative natural energy source.

OUTFALL PLANTERS 11

Planters are created using sections of pipe that will be inserted into the river bank surrounding the outfall (see Public Nodes). These planters will call out the various species of riparian plants found on the stream bank.

SEDUMS AT RIVER EDGE 12

Along the fence line just outside the southern edge of the ACWPCP property, patches of sedums will be planted in the ground; visitors will have a close-up view of the various types of vegetation growing on the roofs.

SITE PLAN SHOWING GREEN ELEMENTS

LIVING SURFACES

Planted Roofs 5

Roof Trellises 6

Perimeter Trellises 7

Porous Paving 8

Rain Gardens 9

LIVING SURFACES
Plant Screens 4

Planted Roofs 5

Perimeter Trellises 7

Photovoltaic Panels 10

EQUALIZATION TANK WITH PLANTED ROOF, PLANT SCREENS, & PHOTOVOLTAIC PANELS /
PERIMETER TRELLISES & KIOSKS ALONG FENCE

f

PLANT SCREENS

Plant screens on Equalization Tanks

Plant screen example

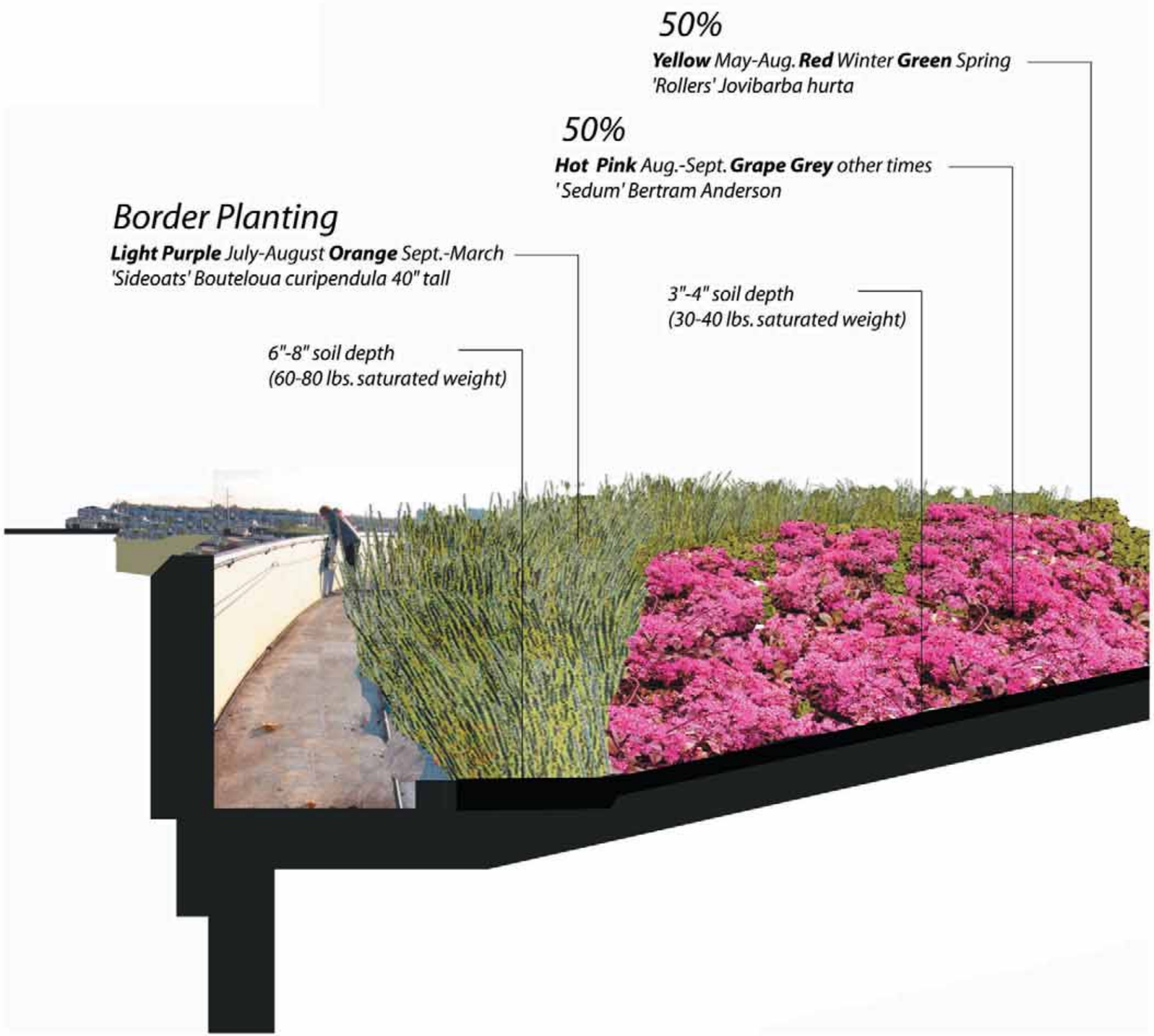
VINE SPECIES PROPOSED FOR PLANT SCREENS

Summer blooms color

Winter leaf color

Crossvine, Bignonia capreolata

A native flowering vine found growing on trees in moist woodland soils from Maryland to Florida and west to Louisiana. Crossvine is a tough, evergreen vine that produces a reliable spring display of red tubular flowers with yellow highlights. Crossvine is a vigorous climber, reaching 40 to 50 feet.



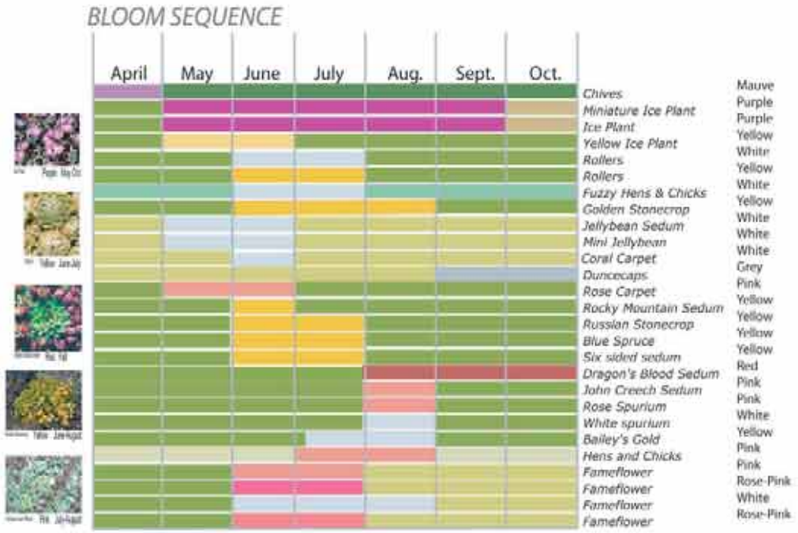
PLANTED ROOF SECTION STUDY

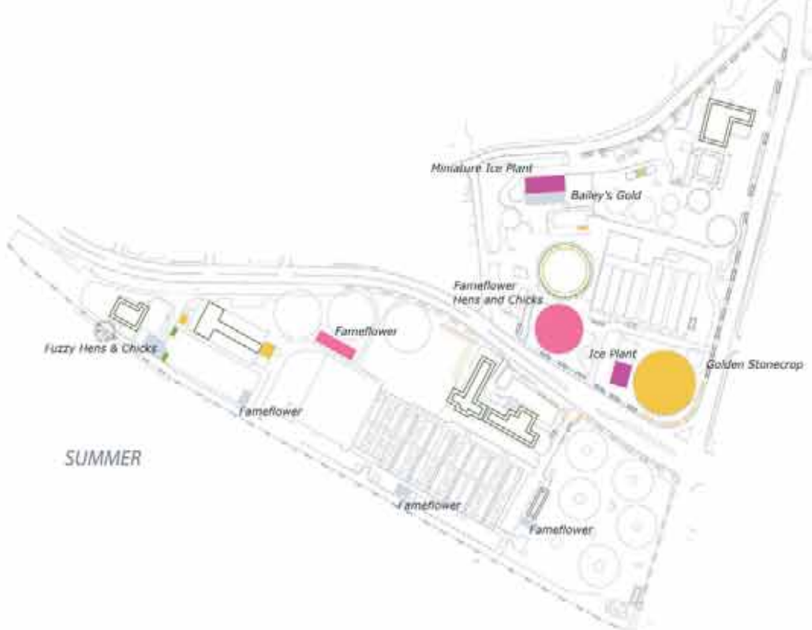
Green Roof Spring and Summer blooms

ROOFTOP PLANTINGS

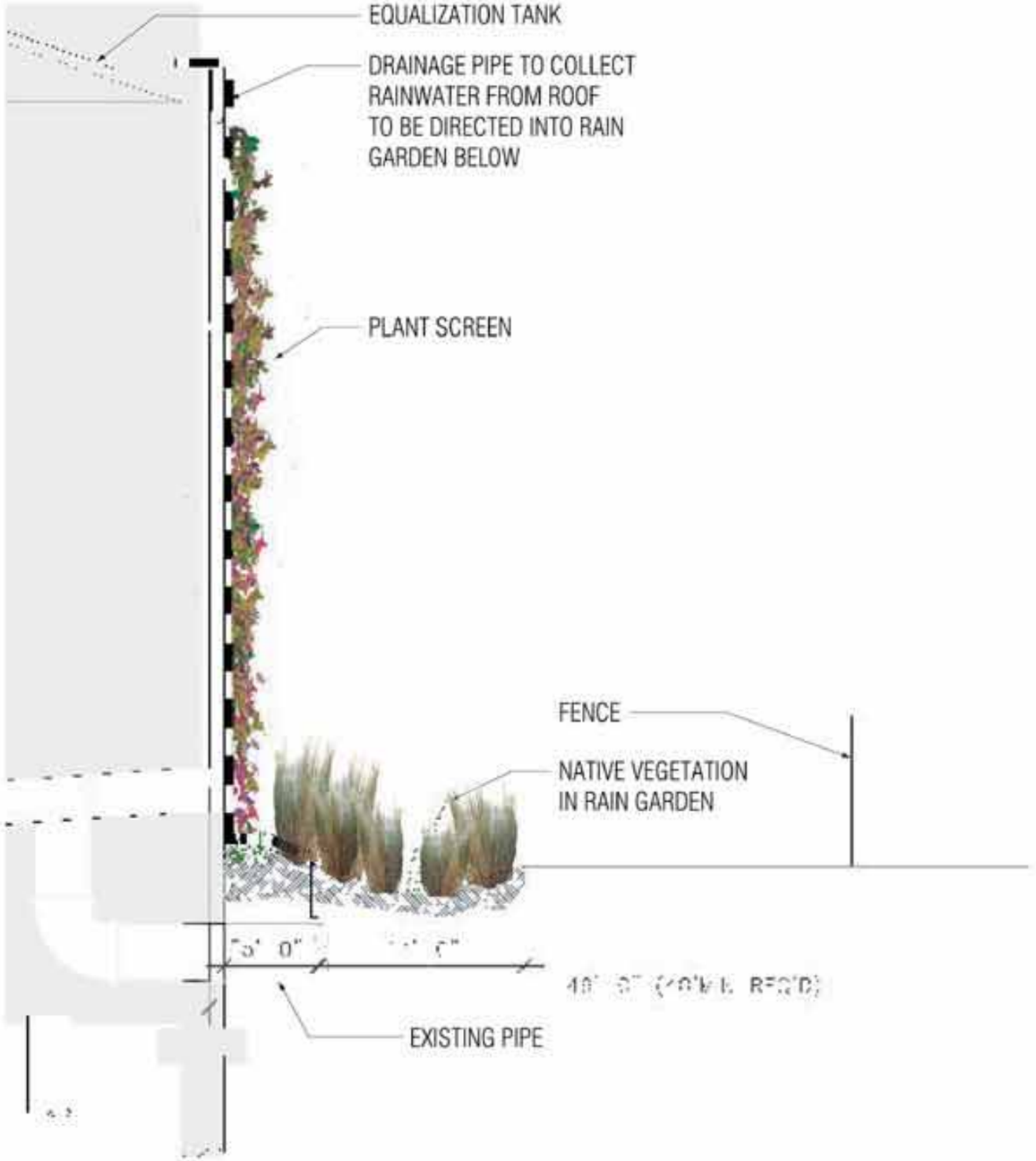
LIVING SURFACES
Planted Roofs

5





PLANTED ROOF DIAGRAMS - SEASONAL COLOR CHANGES



SECTION THRU RAIN GARDEN ADJACENT TO EQUALIZATION TANK

indiangrass

curly fox sedge

RAIN GARDEN GRASSES

LIVING SURFACES 12
Sedums at River Edge

SEDUM PATCHES PLANTED IN GROUND CALL OUT THE VARIOUS SPECIES PLANTED ON ROOFS

PUBLIC NODES

DIGESTER 13

An existing unused digester tank will be retrofitted for use as a public space. Perimeter openings in the tank invite visitors into its interior, making them aware of the vast scale of the infrastructure which supports their daily lives. Here, a wetland demonstration garden can be viewed. The digester garden creates not only a unique place for public gathering but also serves an educational function, emphasizing that water treatment infrastructure functions to mimic the way water is filtered in a natural system.

HAZMAT CANOPY 14

The hazmat (household hazardous materials) drop-off area is the place where the public can bring such items for environmentally safe disposal. The area is accessed by car and is marked by a planted canopy structure which shelters people and materials from the elements. Pausing beneath this planted canopy offers visitors a close-up experience of the type of planting occurring on rooftops throughout the site.

BIOTERRACE 15

The bioterrace feature, located on a slope near the household hazardous materials area, consists of a series of stepped trays filled with gravel and plant material which filter and slow down runoff from the adjacent paved surface. Water is captured and further filtered in a rain garden at the base of the steps. The bioterrace is an element which makes the process of cleansing hard surface runoff tangible and, as such, is intended to be one of the stops on public tour.

VIEWING TOWER 16

The viewing tower, proposed as an extension to the Biosolids building, is a place where visitor's can experience the entire site from up high and view the full extent of the diagram and planted roof system

PUBLIC NODES

OUTFALL STRUCTURE 17

The outfall is the place where clean water, as the product of the water treatment process, flows into the Four Mile Run stream. A platform above the outfall point allows visitors to look down into a pool of gushing water, making people aware of the large volume of water being treated every day. The river bank adjacent to the outfall structure is marked by sections of pipes to be used as planters which call out the various species of native plants making up a river's edge.

PERIMETER ELEMENTS 18

Perimeter Elements refer to the features adjacent to the sidewalk. These include the fence running around the entire ACWPCP site, a series of information kiosks, planted trellis structures occurring at regular intervals along the fence line, and a pattern of circular crushed oyster shell paving embedded in the sidewalk.

ENVIRONMENTAL CENTER 19

The Environmental Center is a place where visitors can learn more about the plant process, the functioning of watersheds, green roofs, rain gardens and other environmental issues and practices. It is a resource center, a place for environmental demonstrations, classrooms, a plant nursery etc. The building itself could be constructed using sustainable building materials and demonstrate ways in which people can integrate smart environmental practices into their own homes or neighborhoods. The proposed building would be located just north of the site in the vacant area across from 31st Street.

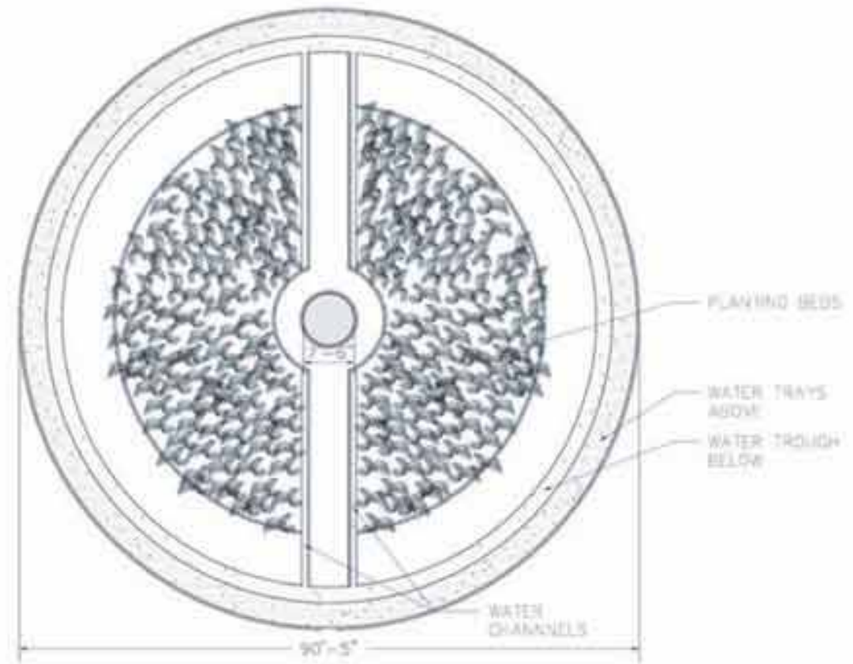
PUMP STATIONS 20

The pump stations located at low points throughout the neighborhood represent points where the plant infrastructure beneath the city streets surfaces. These buildings will be treated with vegetation features similar to those at the plant such as plant screens and rain gardens. In addition, a small opening in each building facade will be created to allow visitors a glimpse of the pump station interiors.

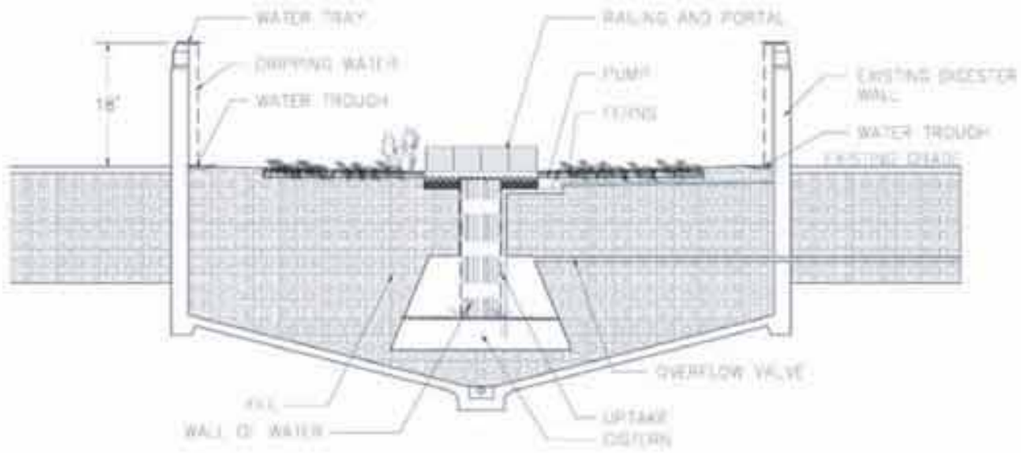
DIGESTER INTERIOR

DIGESTER SECTION WITH GARDEN

PUBLIC NODES
Digester
13

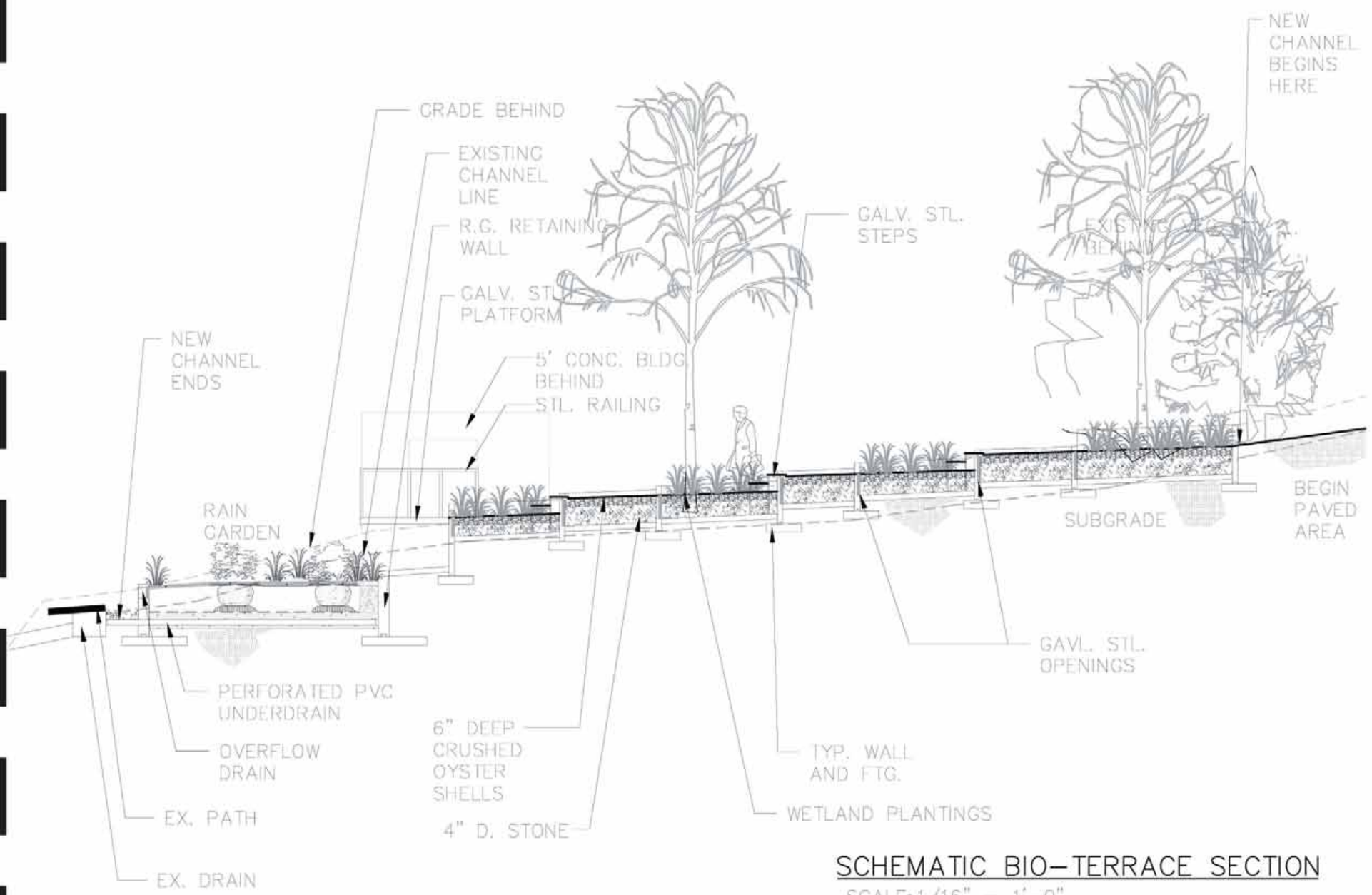


DIGESTER OPTION B PLAN
SCALE:1/16" = 1'-0"



DIGESTER OPTION B SECTION
SCALE:1/16" = 1'-0"

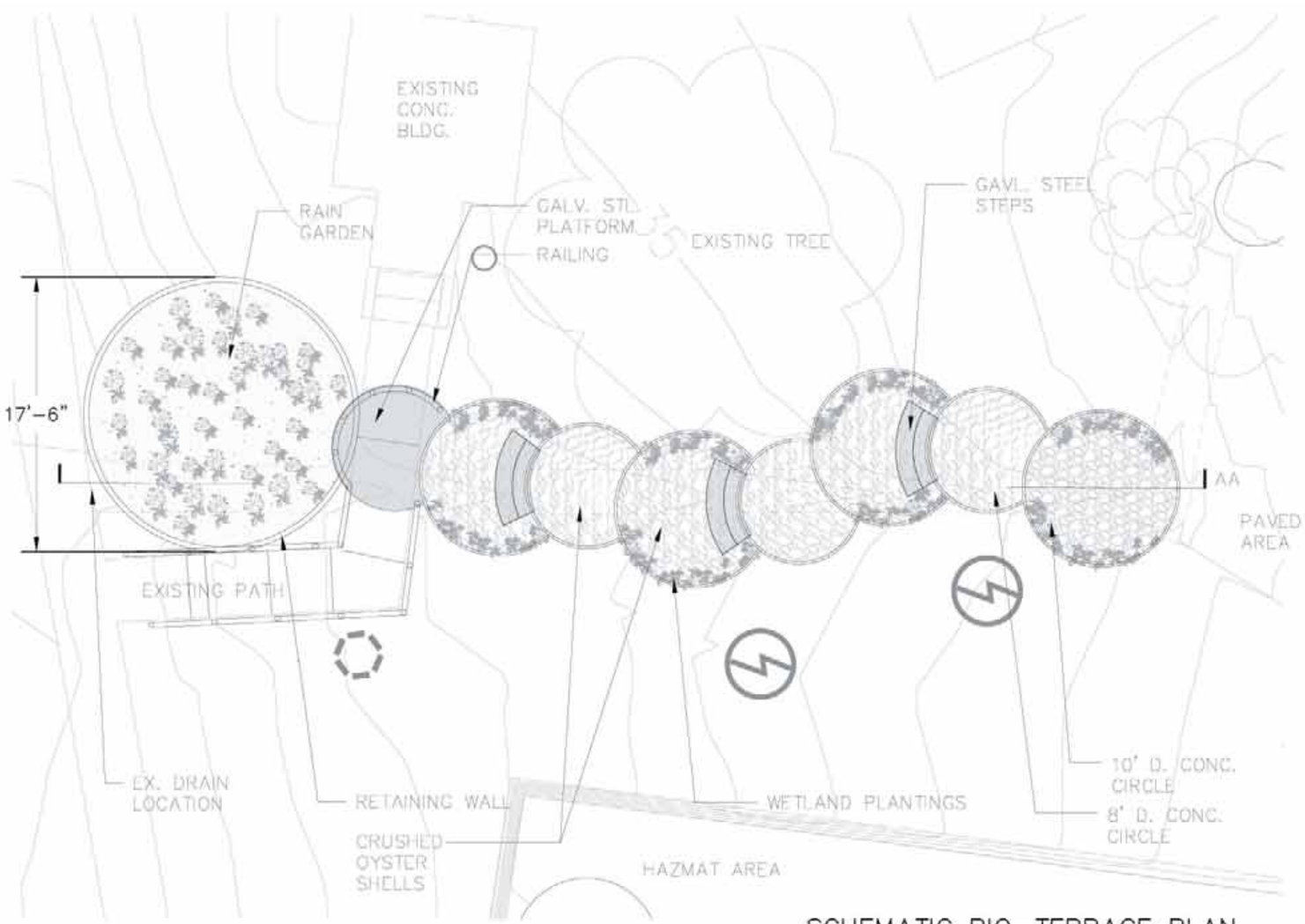
DIGESTER DETAILS



SCHEMATIC BIO–TERRACE SECTION
SCALE: 1/16" = 1'–0"

PUBLIC NODES 15

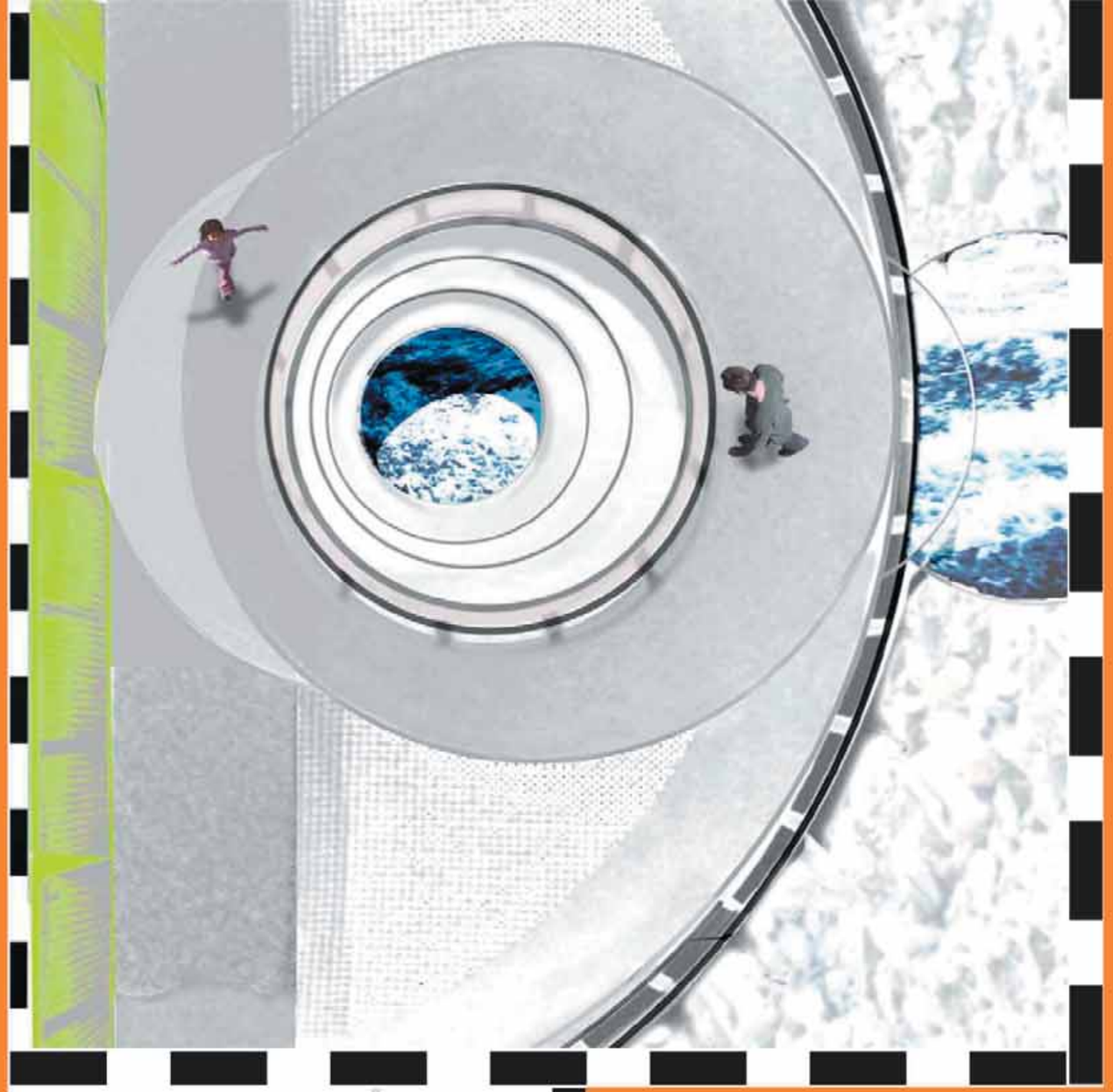
Bioterrace



BIOTERRACE PLAN

BIOTERRACE RAIN GARDEN AND STEPS

PUBLIC NODES
Outfall Structure
17

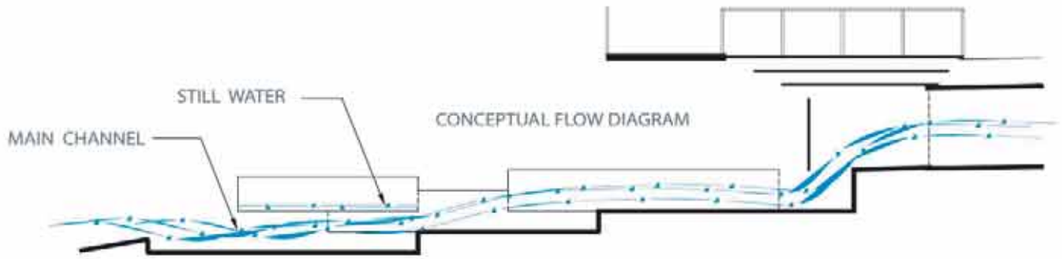


TOP VIEW OF OUTFALL STRUCTURE

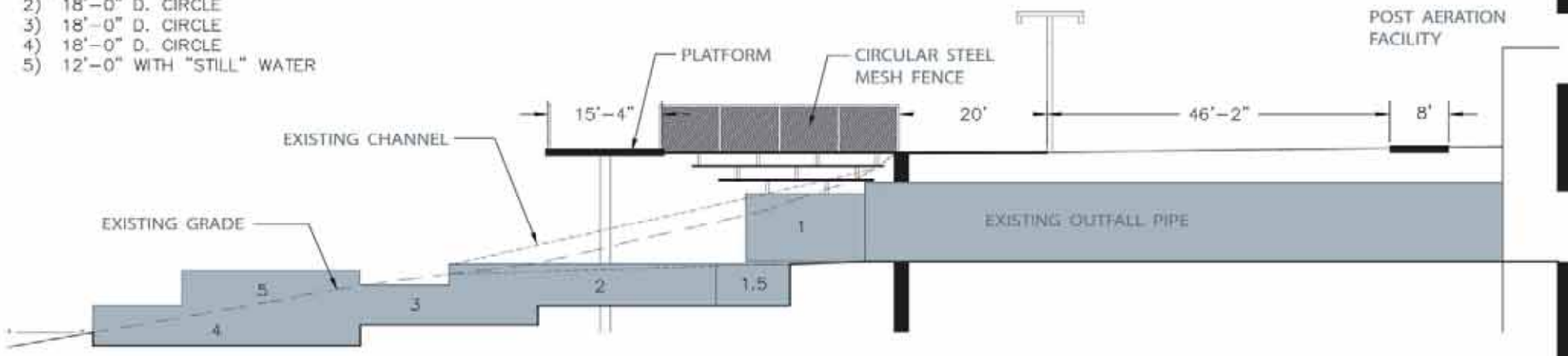
VIEW OF OUTFALL STRUCTURE FROM FOUR MILE RUN

PUBLIC NODES
Outfall Structure

17

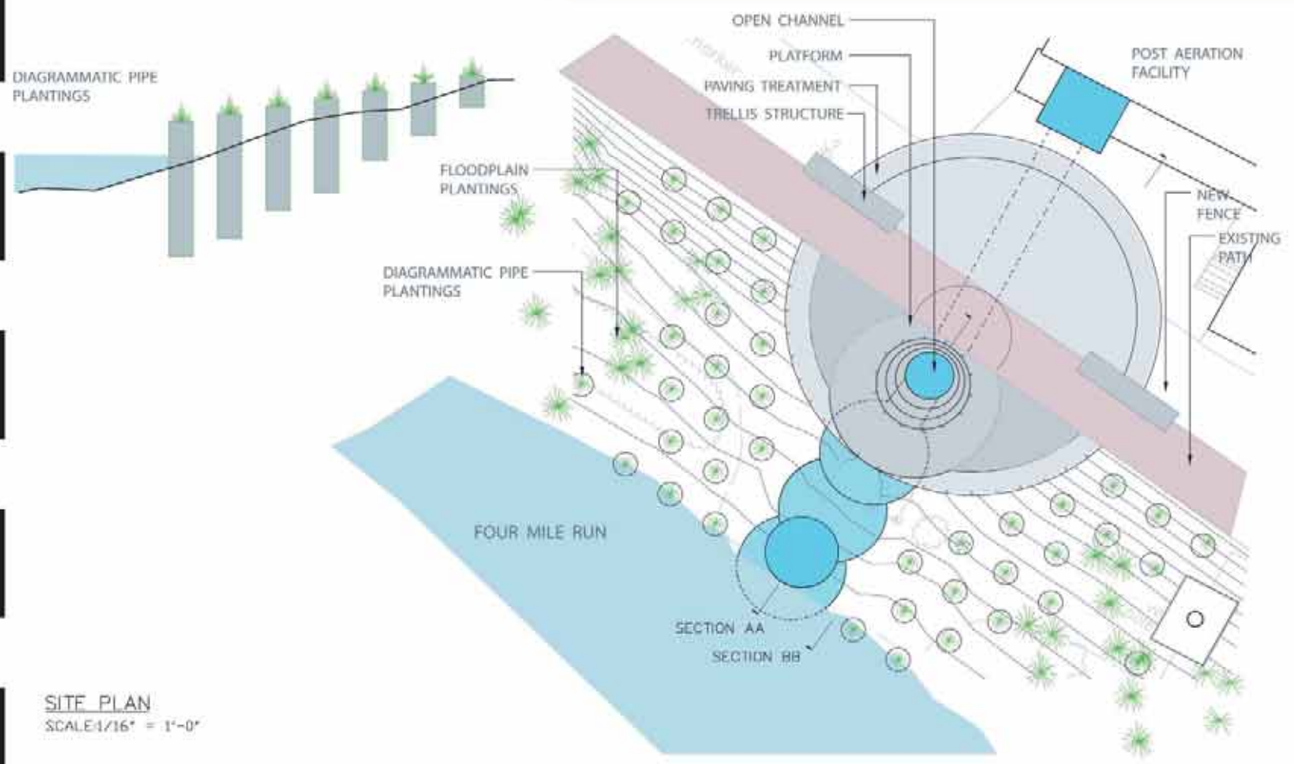


1) 8'-0" D. PIPE
1.5) TRANSITION AREA
2) 18'-0" D. CIRCLE
3) 18'-0" D. CIRCLE
4) 18'-0" D. CIRCLE
5) 12'-0" WITH "STILL" WATER



SECTION / WATER FLOW DIAGRAM

TOP VIEW OF OUTFALL STRUCTURE WITH PIPES IN RIVERBANK CALLING OUT NATIVE PLANTS



SITE PLAN
SCALE:1/16" = 1'-0"

PUBLIC NODES

Perimeter Elements

18

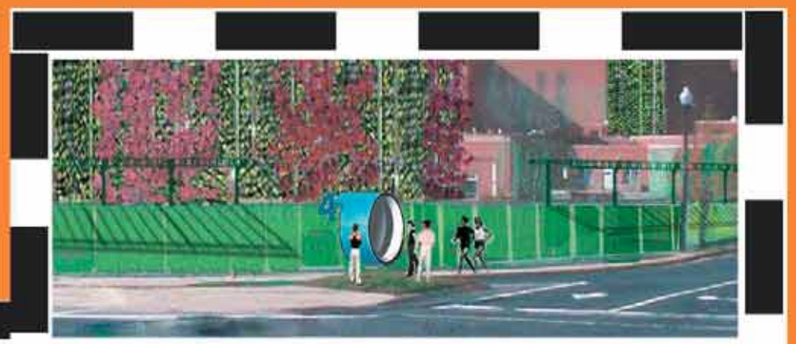
INFORMATION KIOSKS PROVIDE VISUAL ACCESS POINTS TO THE PLANT FOR PASSING VEHICLES AND STOPPING PLACES FOR PEDESTRIANS

FENCE MORIĖ PATTERN

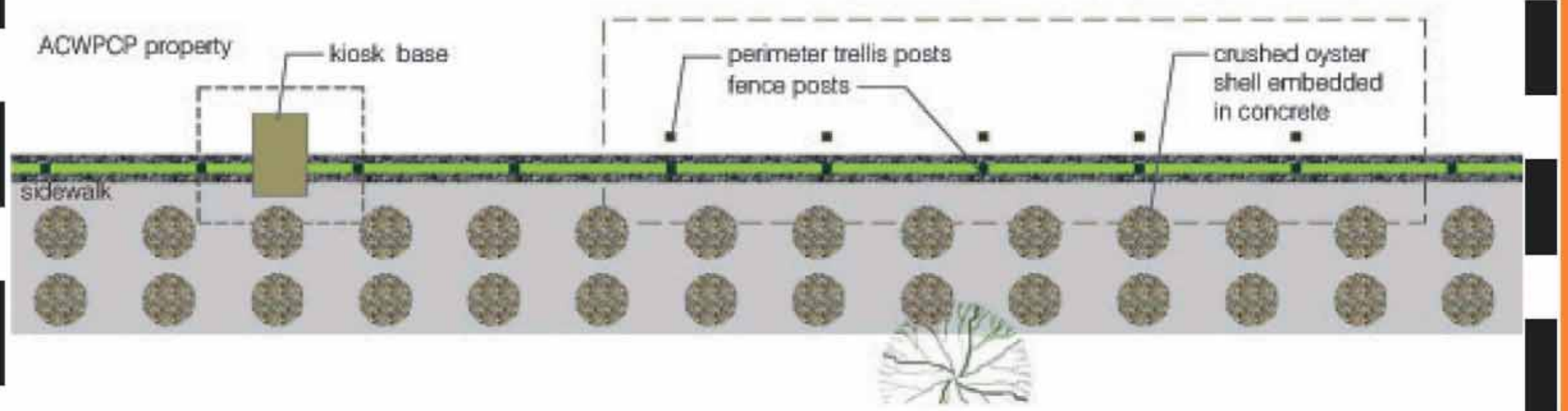
PUBLIC NODES 18

Perimeter Elements

PERIMETER TRELLISES AT REGULAR INTERVALS ALONG SIDEWALK PROVIDE SHADE



PLAN OF FENCE & SIDEWALK WITH PERIMETER ELEMENTS



PUBLIC NODES
Environmental Center
19

PLANT NURSERY

A PLACE FOR GATHERING AND LEARNING

SITE FOR PROPOSED ENVIRONMENTAL CENTER ON 31ST STREET, NORTH OF ACWPCP SITE

PUBLIC NODES
Environmental Center
19

PLANT NURSERY

A PLACE FOR GATHERING AND LEARNING

SITE FOR PROPOSED ENVIRONMENTAL CENTER ON 31ST STREET, NORTH OF ACWPCP SITE

Sewershed Boundaries Map

Pump Stations in Communities


gulf run pump station


donaldson run pump station


dover run pump station


windy run pump station


kirkwood run pump station


palisades pump station

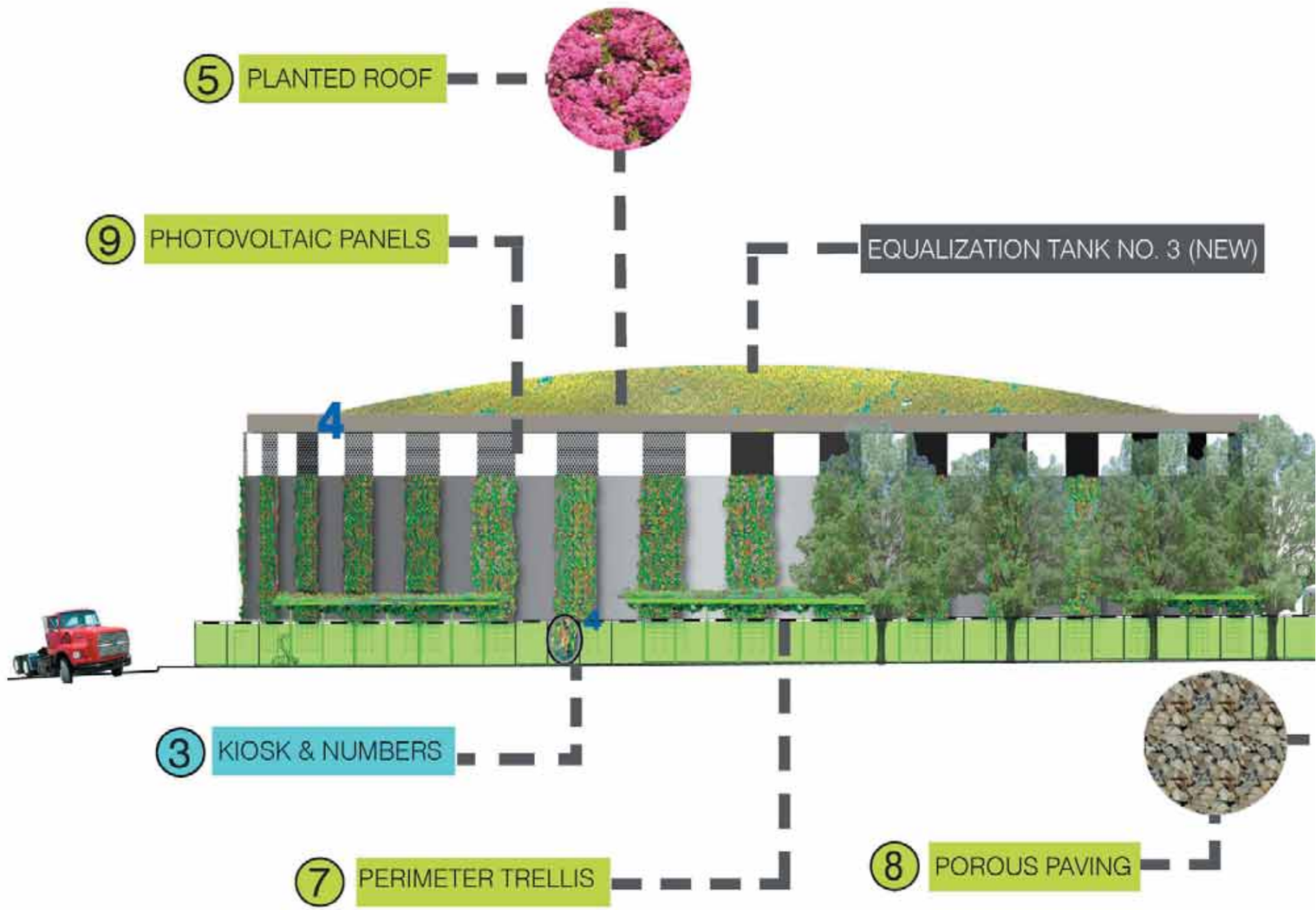

roaches run pump station

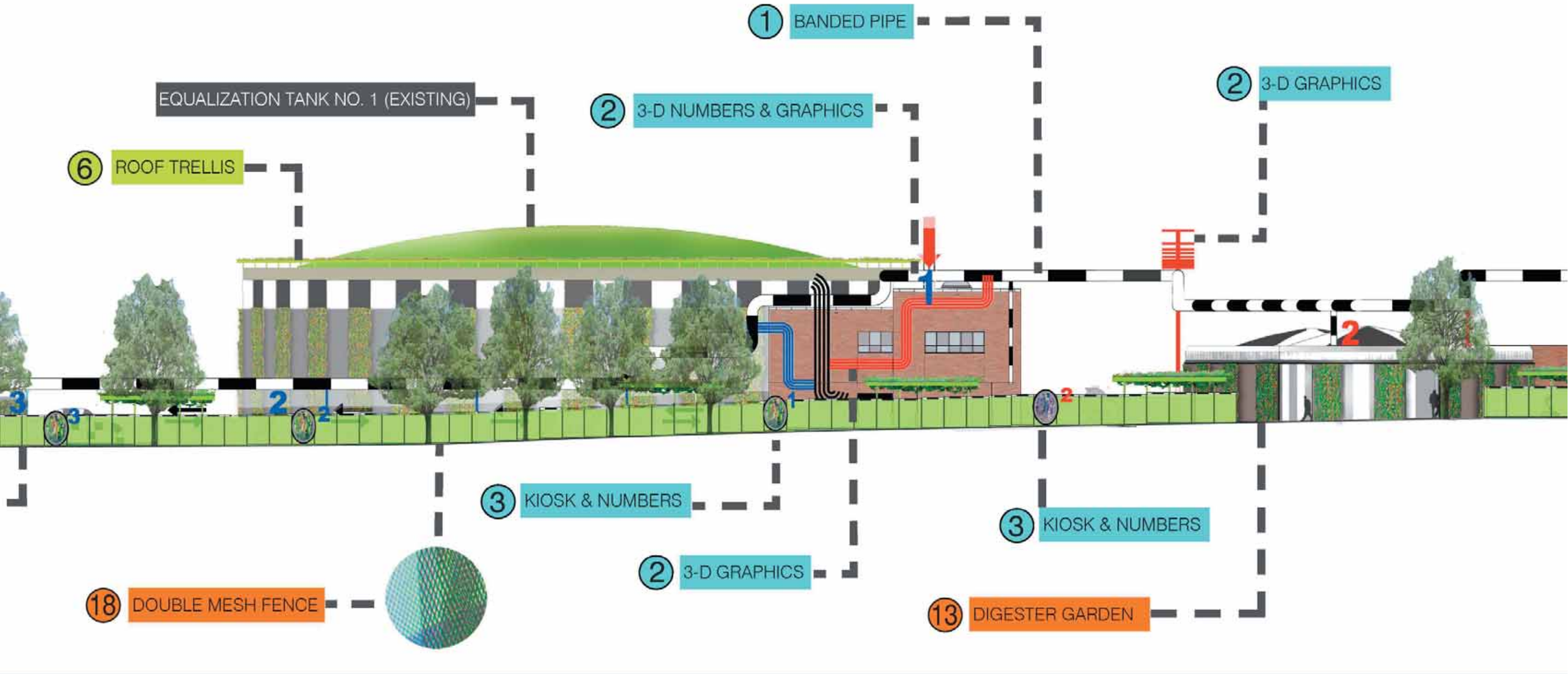
ARLINGTON COUNTY
NEIGHBORHOOD PUMP
STATIONS AS EXTENSIONS OF
THE SEWAGE TREATMENT PLANT

PUBLIC NODES 20

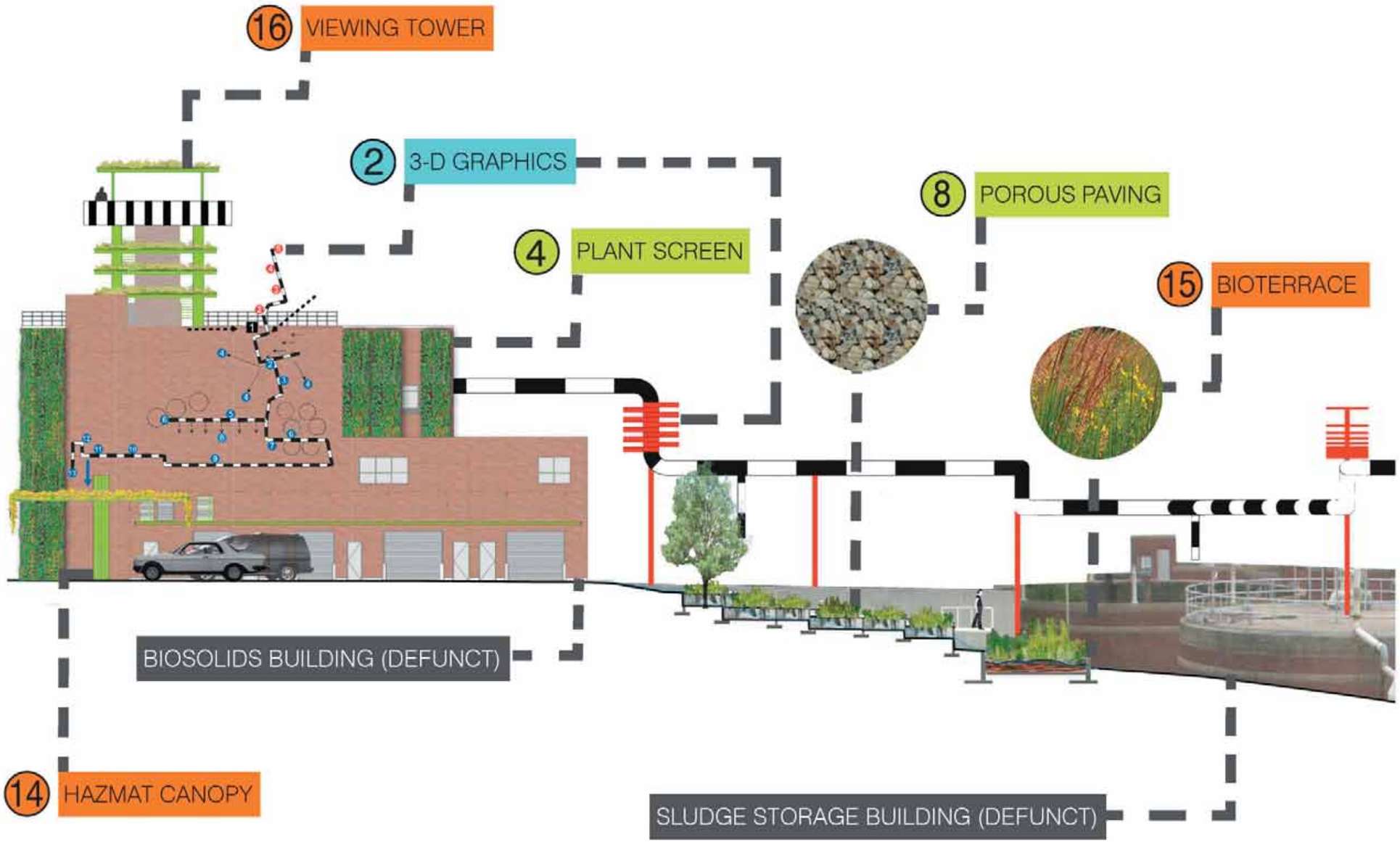
Pump Stations

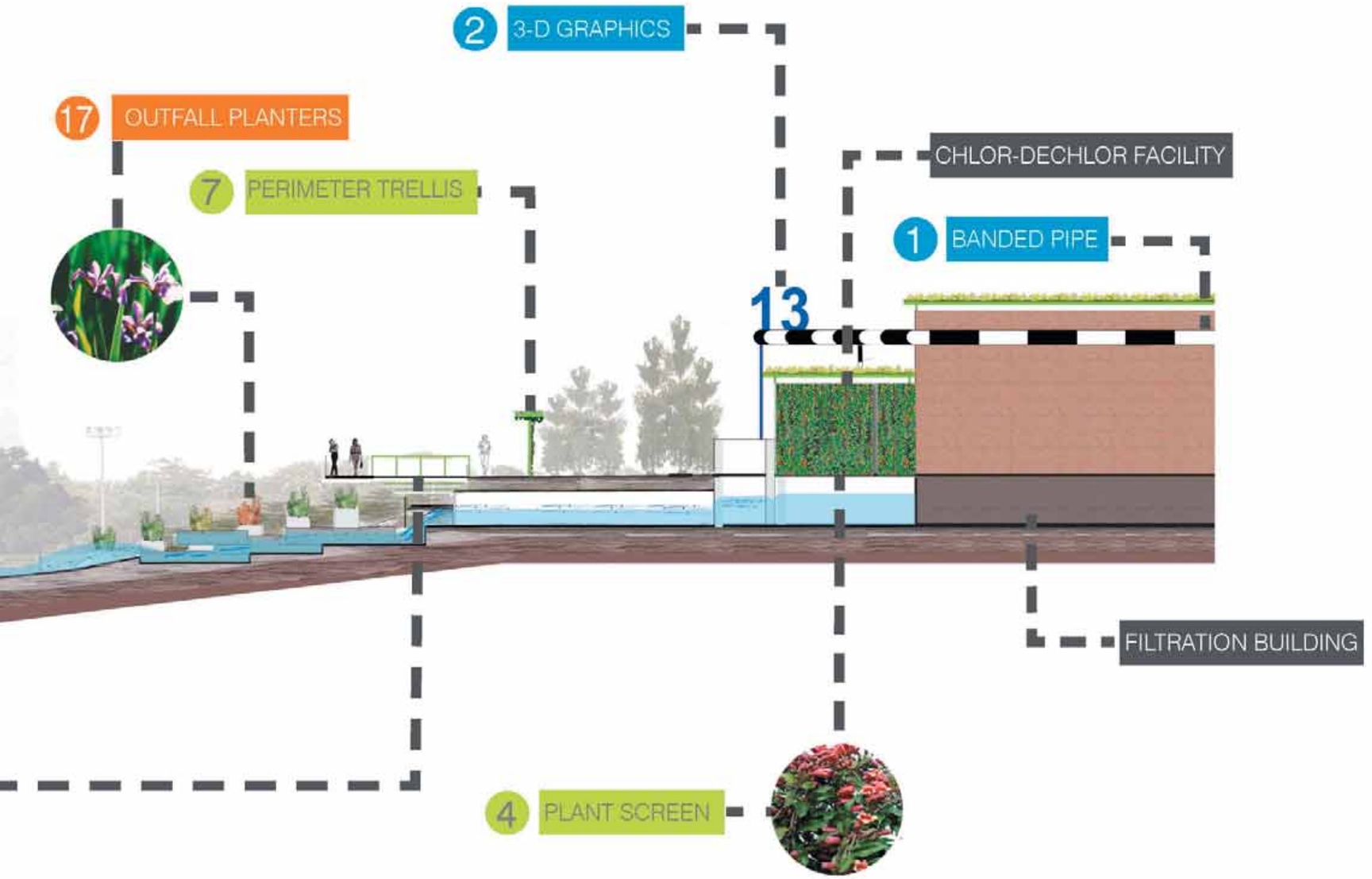
PUMP STATION WITH PLANT SCREEN, RAIN GARDEN, AND FACADE OPENING


5 PLANTED ROOF
9 PHOTOVOLTAIC PANELS
EQUALIZATION TANK NO. 3 (NEW)
4
4
3 KIOSK & NUMBERS
7 PERIMETER TRELLIS
8 POROUS PAVING


1 BANDED PIPE
2 3-D GRAPHICS
EQUALIZATION TANK NO. 1 (EXISTING)
2 3-D NUMBERS & GRAPHICS
6 ROOF TRELLIS
3 KIOSK & NUMBERS
2 3-D GRAPHICS
3 KIOSK & NUMBERS
18 DOUBLE MESH FENCE
13 DIGESTER GARDEN


15 VIEWING TOWER
2 3-D GRAPHICS
6 ROOF TRELLIS
2 3-D GRAPHICS
DEWATERING BUILDING
4
3
5
3
4
5
BIOSOLIDS BUILDING (DEFUNCT)
3 KIOSK & NUMBERS
7 PERIMETER TRELLIS
1 BANDED PIPE
4 PLANT SCREEN


16 VIEWING TOWER
2 3-D GRAPHICS
4 PLANT SCREEN
8 POROUS PAVING
15 BIOTERRACE
BIOSOLIDS BUILDING (DEFUNCT)
14 HAZMAT CANOPY
SLUDGE STORAGE BUILDING (DEFUNCT)


2 3-D GRAPHICS
17 OUTFALL PLANTERS
7 PERIMETER TRELLIS
CHLOR-DECHLOR FACILITY
1 BANDED PIPE
13
FILTRATION BUILDING
4 PLANT SCREEN


PUBLIC PARK
FOUR MILE RUN STREAM
17
OUTFALL PLATFORM

new equalization tank 3 **BEFORE**

new equalization tank 3 **AFTER**

new filtration building, bike path, and river edge **BEFORE**

new filtration building, bike path, and river edge **AFTER**

EXISTING SITE WITH EXPANSION
(expansion to be completed in 2008)

EXISTING SITE WITH EXPANSION + PROPOSED ARTWORK

ground trellises & kiosks

neighborhood pumping stations

observation tower

public gathering space

roads & sidewalks

environmental center

outflow

diagram elements

pervious surfaces

river edge

green roofs

rain gardens

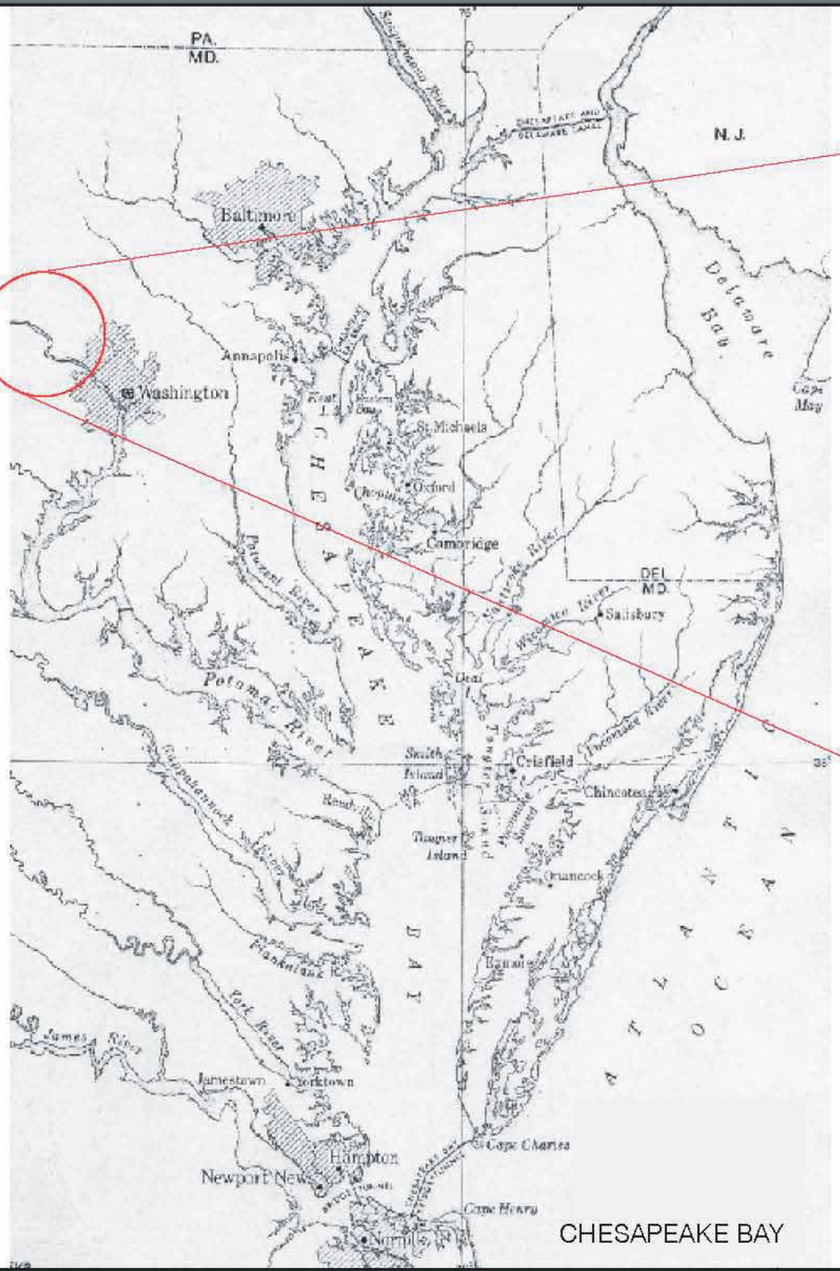
plant screens

Construction Dates

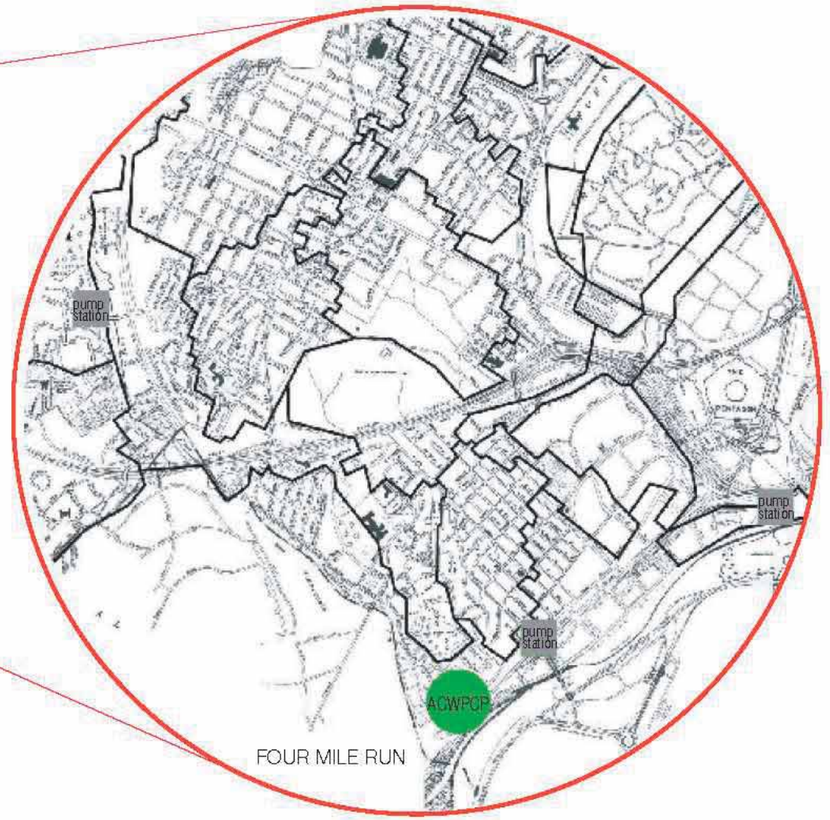
DP-1 10/04 to 7/07

DP-2 5/05 to10/08

aerial view of renovated WPCP with **MASTERPLAN**

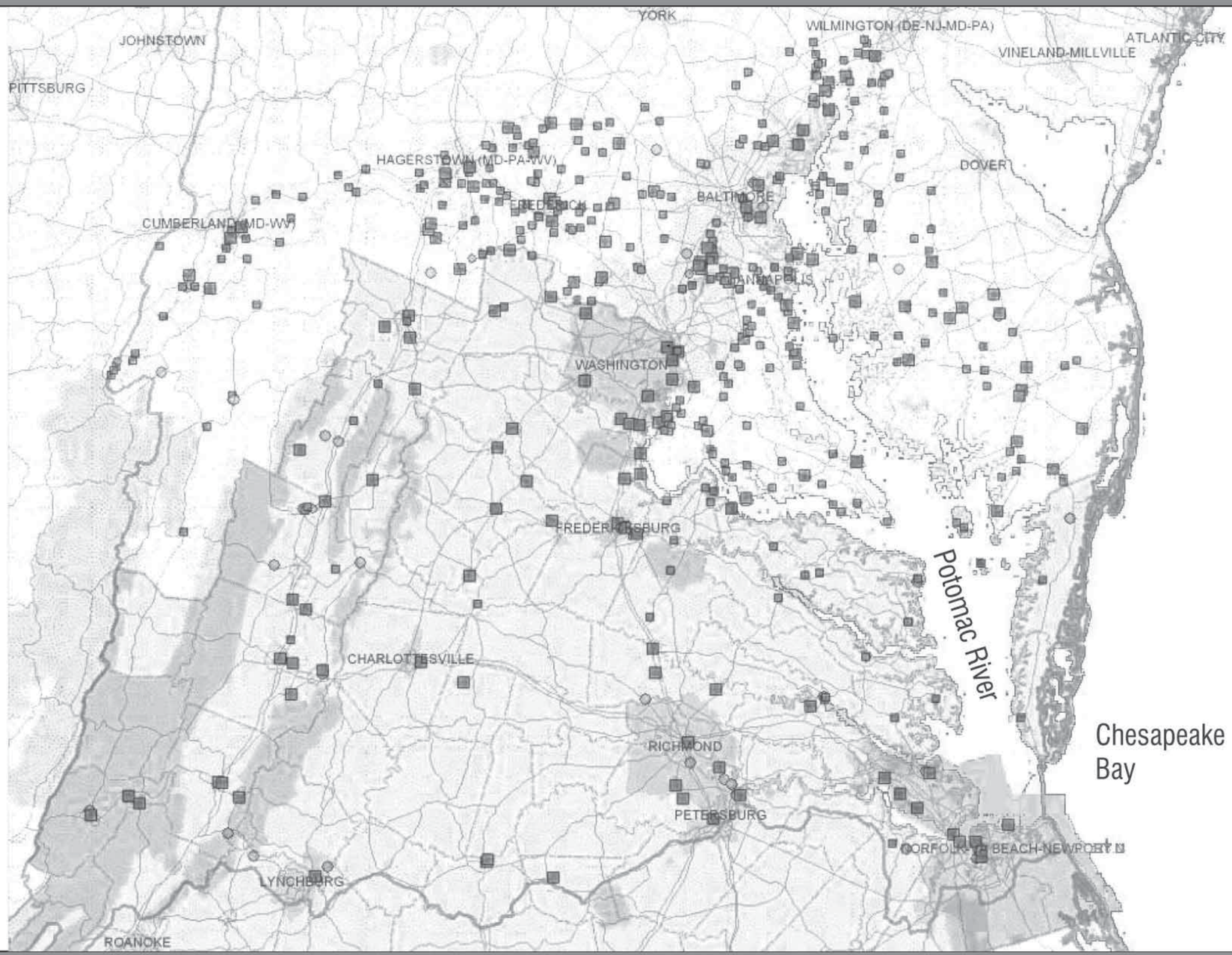


FOUR MILE RUN

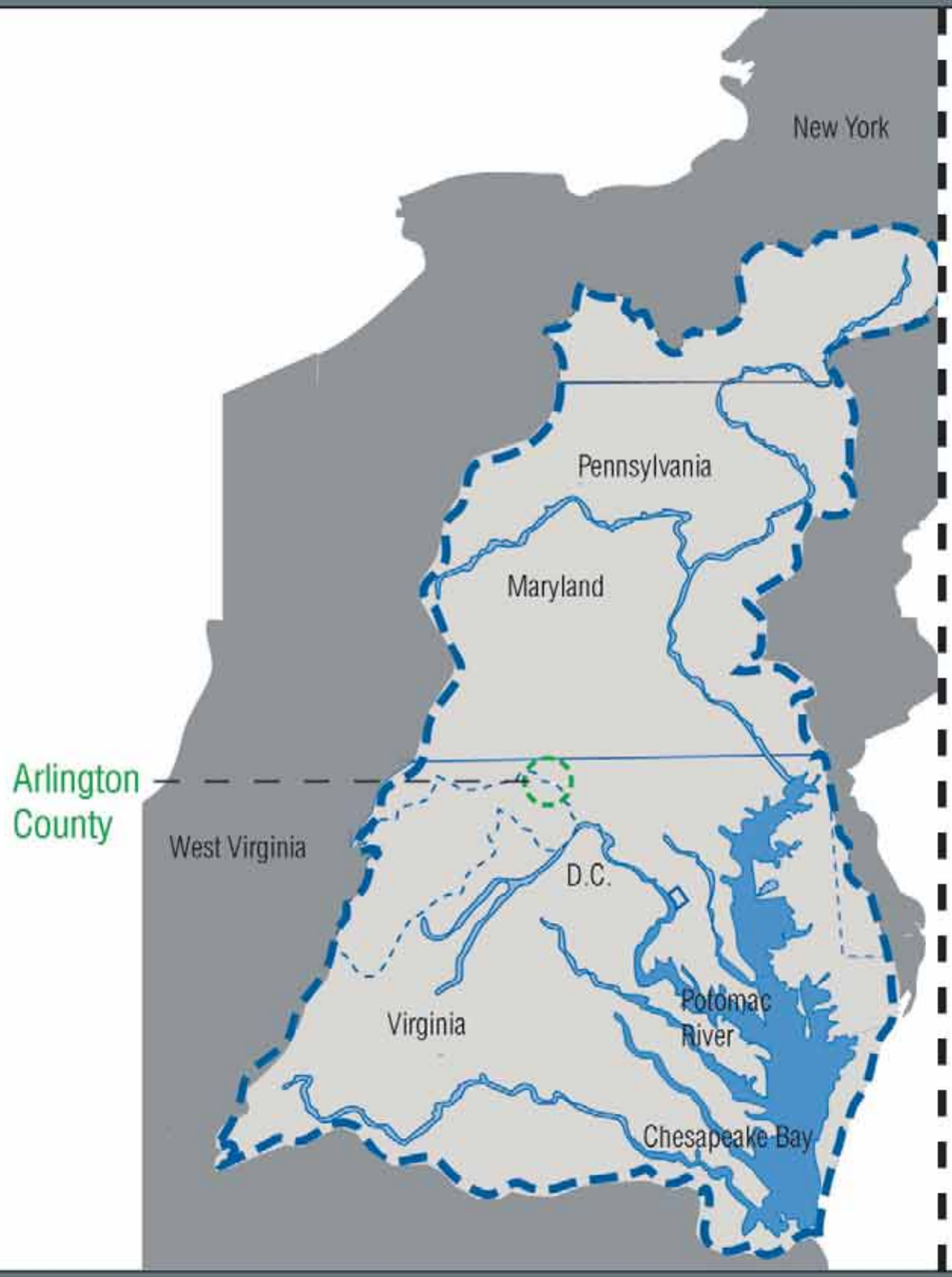


ARLINGTON COUNTY

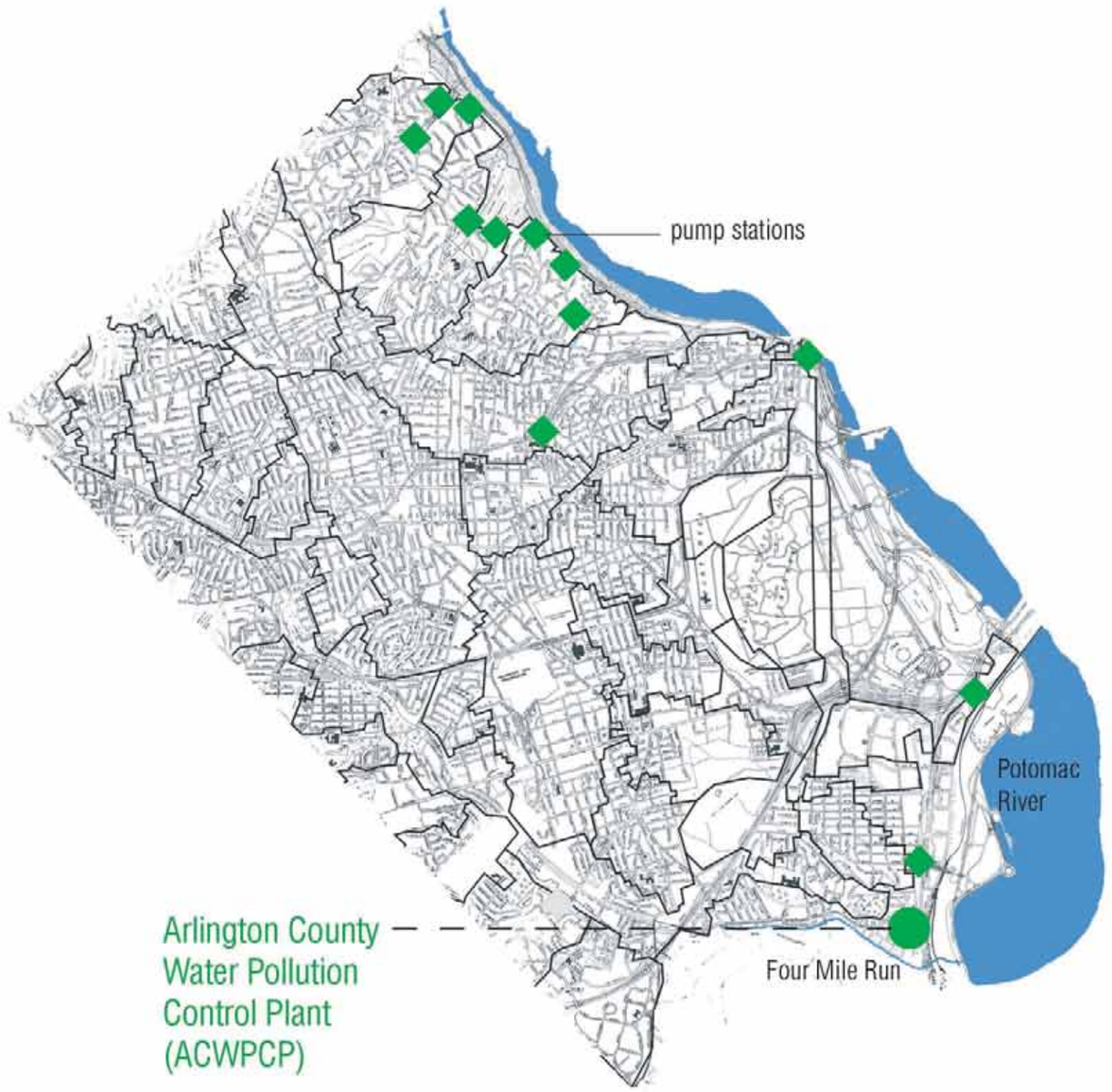
ACWPCP Regional Context



Virginia Municipal Discharges



Potomac Watershed



Arlington County Sewersheds

TREATMENT CAPACITY million gallons per day (mgd)

10 20 30 40

COST

public art plant infrastructure

2005

public art is introduced to plant expansion process for the first time

$12,000,000

visual access & education

$250,000,000

1981

tertiary level(or advanced) treatment - chemical addition and filtration processes for solids and phosphorus removal

$84,000,000

1963

removal of 85-90% of pollution to Four Mile Run Stream using activated sludge process

$5,500,000

1950

enlarged plant designed to remove approx. 60% of suspended solids & 30% of biochemical oxygen demand

$3,000,000

1933

primary treatment plant - screening, grit removal, two-hour sedimentation and chorination
100 miles of sanitary sewers

$255,000