REBUILD BY DESIGN
MEADOWLANDS

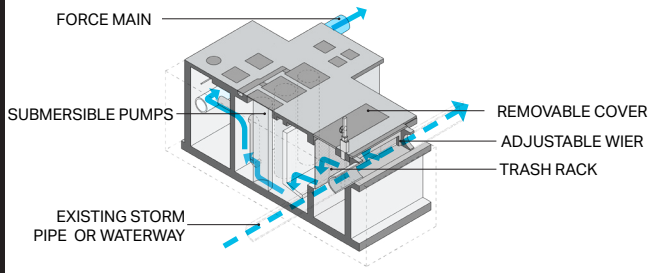
GREY INFRASTRUCTURE

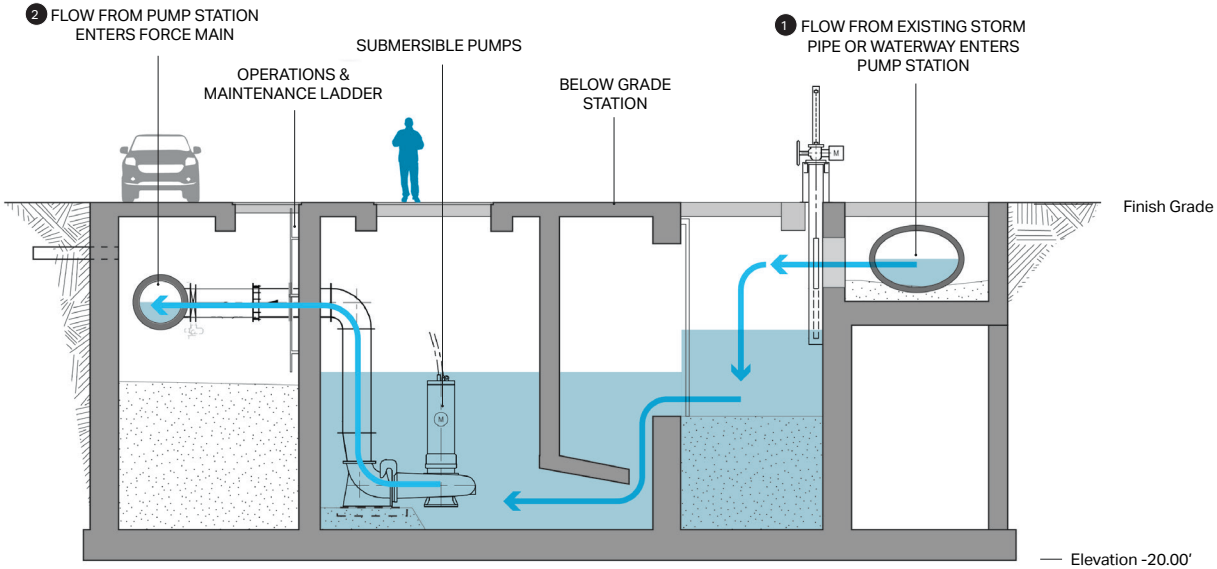
AN APPROACH TO REDUCE FLOOD-RISK

TYPICAL UNDERGROUND PUMP STATION COMPONENTS

Pump stations are constructed to move water from one location to another and vary significantly in terms of the volume of water they can move. Pump stations may be installed in locations that regularly require water to be pumped, such as flat areas where drainage is naturally difficult, in locations that accumulate large amounts of water during floods and need to be pumped on occasion, or in areas where drainage is restricted by tide gates.

HOW IT WORKS





TYPICAL CHALLENGES AND GOALS

The Meadowlands is challenged by its lack of elevation in its ability to drain stormwater. Typically powered by gravity, drainage is often slower in areas with shallow slopes. In combination with heavy rainfall events, high percentages of impervious areas and undersized stormwater infrastructure, standing water can last for days after a storm. Grey infrastructure such as pump stations and force mains can reduce flood-risk by moving water out of an area quickly. This document describes typical grey infrastructure strategies as well as those designed for the Rebuild by Design Meadowlands Losen Slote area as a case study.

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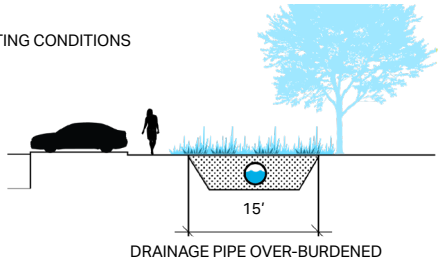
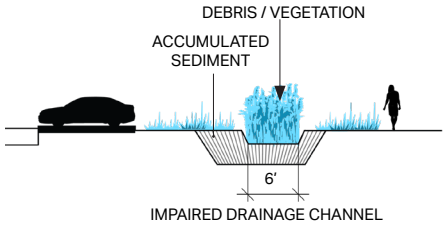
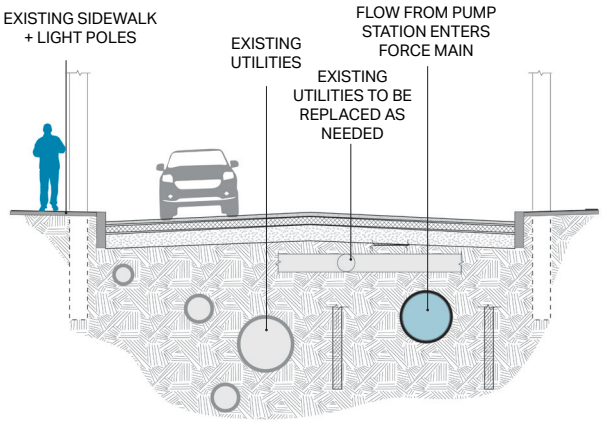




TYPICAL FORCE MAIN FUNCTION

A force main is a pressurized stormwater pipe. Stormwater pipes most often operate with the force of gravity to keep the stormwater flowing. However, in some cases, stormwater pipes must be installed at a nearly flat angle, or go uphill. In these situations, pumps or compressors can be used to pressurize the sewers to keep the stormwater flowing. Backflow preventers are flap gates, valves, or other devices used to prevent water from flowing backwards through the stormwater drainage infrastructure, such as when stormwater outfalls are submerged during floods.



For more information please visit:
https://www.nj.gov/dep/floodresilience/rbd-meadowlands.htm

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

LOSEN SLOTE CASE STUDY

LIBERTY STREET PUMP STATION + FORCE MAIN

IMPROVED CONVEYANCE

VOLUME CONTROL

EXISTING CHALLENGES

The Losen Slote waterway is approximately 2.3 miles long flowing from its headwaters into the Hackensack River in Bergen County, NJ. Its drainage watershed covers approximately 770 acres. As part of the Rebuild by Design Meadowlands project, a new pump station was designed near Lorena St. and Liberty St. including a new force main starting at Liberty St., running under Eckel Rd. and outflowing into Losen Slote near Birch St. in Little Ferry. The Losen Slote watershed drainage was challenged by several conditions such as a drainage bottleneck and limited capacity in the existing channel and pipe network. Additionally, the area is densely developed with minimal pervious surface. These conditions contributed to the frequent flooding experienced in the community.

STORMWATER MANAGEMENT COMPONENTS

2900 linear feet of force main

50 cubic feet per second pump capacity

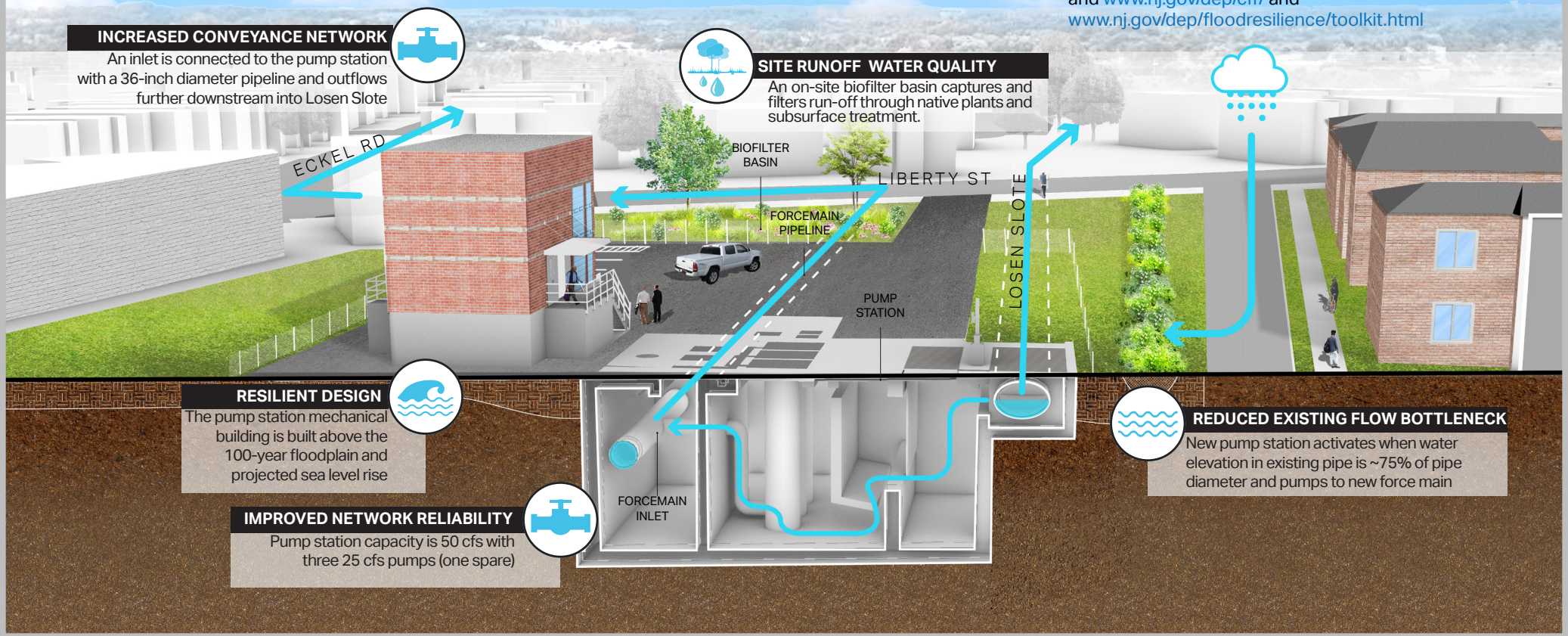
3 pumps total

HOW TO REDUCE FLOOD RISK?

Through hydraulic modeling, numerous potential approaches to reduce flood risk in the Losen Slote watershed were assessed. The final design includes a new pump station at Liberty Street that pulls water out of the existing Losen Slote conveyance pipe, through the pump station and into a new force main that then discharges downstream. The pump station turns on to supplement the existing pipe network where capacity is limited and the new force main provides additional drainage capacity. An on-site biofilter basin filters parking lot runoff with native plants. Additionally, an existing abandoned tide gate is being removed from the downstream channel to improve the flow of Losen Slote. These improvements would reduce both the depths and extent of flooding in the drainage basin for storms ranging in frequency from 2 to 100 years.

ADDITIONAL INFORMATION

This project is one component of the efforts the NJDEP is facilitating to assist communities in building resilience. For more information, check out these resources: www.nj.gov/dep/floodresilience/rbd-meadowlands.htm and www.nj.gov/dep/cfr/ and www.nj.gov/dep/floodresilience/toolkit.html



INCREASED CONVEYANCE NETWORK
An inlet is connected to the pump station with a 36-inch diameter pipeline and outflows further downstream into Losen Slote

SITE RUNOFF WATER QUALITY
An on-site biofilter basin captures and filters run-off through native plants and subsurface treatment.

RESILIENT DESIGN
The pump station mechanical building is built above the 100-year floodplain and projected sea level rise

IMPROVED NETWORK RELIABILITY
Pump station capacity is 50 cfs with three 25 cfs pumps (one spare)

REDUCED EXISTING FLOW BOTTLENECK
New pump station activates when water elevation in existing pipe is ~75% of pipe diameter and pumps to new force main