State of New Jersey

CHRIS CHRISTIE
GOVERNOR

KIM GUADAGNO
LT. GOVERNOR

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code 401-04Q
Division of Water Supply & Geoscience
Water System Operations Element
Bureau of Water System Engineering
401 E. State Street - P.O. Box 420
Trenton, New Jersey 08625-0420
Tel #: (609) 292-2957 - Fax #: (609) 633-1495
http://www.nj.gov/dep/watersupply/

BOB MARTIN
Commissioner

August 1, 2016

Passaic Valley Water Commission
P.O. Box 230
Clifton, NJ 07011

Dear Water Purveyor:

Enclosed is a construction permit dated August 1, 2016 issued to you pursuant to the New Jersey Safe Drinking Water Act, N.J.S.A. 58:12A, and in consideration of your application dated February 2nd, 2016 and signed by James Duprey, Director of Engineering.

Your permit is for:

- Replacement of the existing Levine uncovered finished water reservoir by two 2.5 million gallon covered pre-stressed concrete finished water storage tanks with associated water mains and a new utility building for re-chlorination system and water quality monitoring equipment through SCADA system to achieve compliance with N.J.A.C. 7:10-5.1 and 40 CFR 141.714; located in Paterson City (Reservoir Street and Grand Street, Block # 4802, Lot # 28), County of Passaic, New Jersey; and

- The distribution of water for potable purposes from said works.

Your attention is directed to both the **specific and general** conditions of the aforementioned permit. Enclosed with this permit is the Construction Completion Certification (CCC). The CCC **must** be submitted as required by the Submittal Action Requirements in the attached permit conditions. If the facility is not completed within the specified time allotment, an "Extension of Time" shall be requested at least ninety (90) days prior to the permit expiration date to allow for review and approval. No extension of time will be granted to an expired permit. Should you have any questions about this permit, please contact Syed Rizvi at (609) 292-2957. When contacting the Department regarding this permit, please reference the Permit No. and PWSID No. provided herein.

Sincerely,

Diane E. Zalaskus, P.E., Bureau Chief
for Bureau of Water System Engineering

PWSID NO.: NJ1605002
WCP160001
Enclosures
cc: Jerry P. Notte, P.E., CH2M Hill
Mayor and Council of Paterson City
Northern Bureau of Water Compliance and Enforcement
Syed Rizvi, BWSE

CHRIS CHRISTIE
GOVERNOR

KIM GUADAGNO
LT. GOVERNOR

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

BOB MARTIN
Commissioner

Mail Code 401-04Q
Division of Water Supply & Geoscience
Water System Operations Element
Bureau of Water System Engineering
401 E. State Street - P.O. Box 420
Trenton, New Jersey 08625-0420
Tel #: (609) 292-2957 - Fax #: (609) 633-1495
http://www.nj.gov/dep/watersupply/

PERMIT*

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No. WCP160001 **PWSID No.** 1605002	**Issuance Date** August 1, 2016	**Effective Date** August 1, 2016	**Expiration Date** July 31, 2021
Name and Address of Applicant Passaic Valley Water Commission P.O. Box 230 Clifton, NJ 07011		**Location of Activity/Facility:** Reservoir Street and Grand Street Block # 4802, Lot # 28 Paterson City, Passaic County	
		Type of Permit Potable Water Supply	**Statute(s):** N.J.S.A. 58:12A-1.1 et seq.

This permit grants permission to:

1. Replace the existing Levine uncovered finished water reservoir by two 2.5 million gallon covered pre-stressed concrete finished water storage tanks with associated water mains and a new utility building for re-chlorination system and water quality monitoring equipment through SCADA system to achieve compliance with N.J.A.C. 7:10-5.1 and 40 CFR 141.714;
2. Operate the facilities approved by this permit and distribute water for potable purposes from said works.

According to an Engineer's Report entitled:

	Date	Prepared By
Passaic Valley Water Commission Water Storage Improvements Phase 1 - Levine Water Tanks	02/01/2016	CH2M

According to Plans entitled:

	Date	Prepared By
Passaic Valley Water Commission Water Storage Improvements Phase 1 - Levine Water Tanks	02/01/2016	CH2M

According to Specifications entitled:

	Date	Prepared By
Passaic Valley Water Commission Water Storage Improvements Phase 1 - Levine Water Tanks	02/01/2016	CH2M

Additional information dated: July 18, 2016

This permit is subject to specific and general conditions contained in the following page(s):
Continued on Requirements Page -- 1 of 2

Approved by the authority of:

Bob Martin
Commissioner
Department of Environmental Protection

for Diane E. Zalaskus, P.E., Bureau Chief

The word permit means approval, certification, registration, etc.

PASSAIC VALLEY WATER COMMISSION
1605002

SDW Construction Permit : WCP160001

Permit Requirements

Submittal/Action Requirements

Applicable Subject Items	Submittal/Action Type	Requirement
Levine Finished Water Covered Storage Tanks (WSYG1212873)	Completed construction certification report	Within thirty days of completion of the approved facilities the permittee/engineer shall notify the Bureau of Water System Engineering of the completion date and certify that the facilities were constructed in accordance with the approved plans and specifications by returning the enclosed Construction Completion Certification. Submission shall be no later than 30 days after expiry of permit. [N.J.A.C. 7:10-11]

Text Requirements

All Phases

Levine Finished Water Covered Storage Tanks (WSYG1212873)

1. SPECIFIC CONDITIONS FOR STORAGE TANKS.
2. The permittee is advised that prior to placing the storage tank in service, the water shall be tested for volatile organic compounds (VOCs) to ensure compliance with the maximum contaminant levels (MCLs) at N.J.A.C. 7:10-5. The results shall be submitted to the Bureau of Water System Engineering with the Construction Completion Certificate. [N.J.A.C. 7:10-11]
3. The permittee is advised that the effective capacity of the proposed finished water storage tanks is 5.00 MG only. [N.J.A.C. 7:10-11]
4. This permit shall not be construed as an approval for any other future development(s) or service connections to be served by this water main extension. Separate permit applications are necessary for these development(s). [N.J.A.C. 7:10-11]
5. For this permit to remain valid, the facilities approved in this permit shall be constructed and placed into service within five years from the effective date of the permit. [N.J.A.C. 7:10-11]
6. PERMIT GENERAL CONDITIONS.
7. The permit is revocable, or subject to modification or change, at any time, when in the judgment of the New Jersey Department of Environmental Protection such revocation, modification or change shall be necessary. [N.J.A.C. 7:10-11]
8. The issuance of this permit shall not be deemed to affect in any way action by the New Jersey Department of Environmental Protection on any future application. [N.J.A.C. 7:10-11]
9. The works, facilities and/or activities shown by plans and/or other engineering data, which are this day approved, subject to the conditions herewith established, shall be constructed and/or executed in conformity with such plans and/or engineering data and said conditions. [N.J.A.C. 7:10-11]
10. No change in plans or specifications shall be made without prior written permission from the Bureau of Water System Engineering. Modification requests shall be submitted on the applicable form available at www.state.nj.us/dep/watersupply/dws_const.html. [N.J.A.C. 7:10-11]
11. The granting of this permit shall not be construed in any way to affect the title or ownership of property, and shall not make the New Jersey Department of Environmental Protection or the State a party in any suit or question of ownership of property. [N.J.A.C. 7:10-11]
12. This permit does not waive the obtaining of Federal or other State or Local Government consent when necessary. This permit is not valid and no work shall be undertaken until such time as all other required approvals and permits have been obtained. [N.J.A.C. 7:10-11]
13. A copy of this permit shall be kept at the work site, and shall be exhibited upon the request of Department personnel. [N.J.A.C. 7:10-11]

Text Requirements

All Phases

Levine Finished Water Covered Storage Tanks (WSYG1212873)

14. In the examination of plans and/or other engineering data, the New Jersey Department of Environmental Protection does not examine the structural features of the design, such as thickness of concrete or its reinforcement, the efficiency of any electrical or mechanical equipment or apparatus, and the approval herewith given does not include these features. [N.J.A.C. 7:10-11]
15. Water distribution by said works shall at all times meet the applicable standards for quality. Additional units for the derivation, treatment and for distribution of the water shall be established if and when required by the New Jersey Department of Environmental Protection. [N.J.A.C. 7:10-11]
16. The operations of the public water facility shall be under the supervision of an operator or operators who shall possess a valid license or licenses issued by the New Jersey Department of Environmental Protection, pursuant to the provisions of the Water Supply and Wastewater Operators' Licensing Act, N.J.S.A. 58:11-64 et seq. [N.J.A.C. 7:10-11]
17. The minimum required licensing classifications shall be W-4 and T-4 or equivalent in accordance with the Licensing of Water Supply and Wastewater Treatment System Operators, N.J.A.C. 7:10A-1.1 et seq. [N.J.A.C. 7:10-11]
18. The public water facilities shall be operated in such a manner so as to be in full compliance with the New Jersey Safe Drinking Water Act Rules at N.J.A.C. 7:10-1.1 et seq. and the Water Supply Allocation Rules at N.J.A.C. 7:19-1.1 et seq. [N.J.A.C. 7:10-11]
19. The public water facilities shall be operated in such a manner as to optimize the use of all available sources of water in order to achieve and maintain compliance with Water Allocation Permit No. 5099 and bulk purchase from NJDWSC. [N.J.A.C. 7:10-11]
20. As per N.J.A.C. 7:10-11.17, an applicant for a permit under this subchapter or any person, subject to the limitation on third party appeal rights set forth in P.L. 1993, c.359 (N.J.S.A. 52:4B-3.1 through 3.3), who believes himself or herself to be aggrieved with respect to any decision made by the Department regarding such permit application submitted pursuant to this subchapter, may contest the decision and request an adjudicatory hearing pursuant to the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq., and the Uniform Administrative Procedure Rules, N.J.A.C. 1:1 within 20 calendar days of the receipt of the permit decision. Filing details and the required form to be submitted are available at www.state.nj.us/dep/watersupply/dws_const.html. [N.J.A.C. 7:10-12]

State of New Jersey

CHRIS CHRISTIE
GOVERNOR

KIM GUADAGNO
LT. GOVERNOR

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code 401-04Q
Division of Water Supply & Geoscience
Water System Operations Element
Bureau of Water System Engineering
401 E. State Street - P.O. Box 420
Trenton, New Jersey 08625-0420
Tel #: (609) 292-2957 - Fax #: (609) 633-1495
http://www.nj.gov/dep/watersupply/

BOB MARTIN
Commissioner

CONSTRUCTION COMPLETION CERTIFICATION

Attention: Bureau of Water System Engineering
Engineering Northern Section

PERMIT NO.: WCP160001 **ISSUANCE DATE:** August 1, 2016

I (We) hereby certify that the following has been built and placed into service* and was completed in accordance with the approved plans, specifications, and other supporting information.

APPLICANT: Passaic Valley Water Commission

PWSID: NJ1605002

PROJECT DESCRIPTION: Replacement of the existing Levine uncovered finished water reservoir by two 2.5 million gallon covered pre-stressed concrete finished water storage tanks with associated water mains and a new utility building for re-chlorination system and water quality monitoring equipment through SCADA system to achieve compliance with N.J.A.C. 7:10-5.1 and 40 CFR 141.714.

MUNICIPALITY: Paterson City

COUNTY: Passaic

COMPLETION DATE: _____

DATE FACILITIES WERE PLACED INTO SERVICE *: _____

_____
Signature of Engineer & Embossed Seal

_____
Name of Engineer / New Jersey License Number

_____
Date

* Placed into service means that the water mains or other permitted infrastructure changes are actually delivering water to all consumers approved by the permit, except to the extent that the remaining number of realty improvements not being served is below the threshold for needing a permit, i.e. less than 30 realty improvements or 12,000 GPD of non-residential demand.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SYSTEM ENGINEERING
TECHNICAL REVIEWER'S REPORT

GENERAL INFORMATION

REVIEWER: Syed Rizvi — PREPARED ON: 06/02/2016

PROJECT NO.: WCP160001

APPLICANT: Passaic Valley Water Commission — PWSID NO.: NJ1605002

MUNICIPALITY: Paterson City — COUNTY: Passaic

SUBJECT: Replacement of the existing Levine uncovered finished water reservoir by two 2.5 million gallon covered pre-stressed concrete finished water storage tanks with associated water mains and a new utility building for a re-chlorination system and water quality monitoring equipment through SCADA system to achieve compliance with N.J.A.C. 7:10-5.1 and 40 CFR 141.714.

LOCATION OF WORK: Reservoir Street and Grand Street, Block # 4802, Lot # 28

DESIGN ENGINEER: Jerry Notte, P.E.
N.J.P.E. LICENSE NO.: 24GE04197100
ENGINEERING FIRM: CH2M

ESTIMATED COST: $ 16,000,000 — PERMIT FEE: $ 12000

SOURCES OF INFORMATION

APPLICATION RECEIVED: February 10, 2016
APPLICATION DATED: February 2, 2016
SIGNED BY: James Duprey, Director of Engineering

ENGINEER'S REPORT:

	Date	**Prepared By**
Passaic Valley Water Commission Water Storage Improvements Phase 1 Levine Water Tanks	02/01/2016	CH2M Hill

ENGINEER'S DRAWINGS:

	Date	**Prepared By**
Passaic Valley Water Commission Water Storage Improvements Phase 1 Levine Water Tanks	02/01/2016	CH2M Hill

ENGINEER'S SPECIFICATIONS:

	Date	**Prepared By**
Passaic Valley Water Commission Water Storage Improvements Phase 1 Levine Water Tanks	02/01/2016	CH2M Hill

ADDITIONAL INFORMATION DATED: July 18, 2016

GIS Submission

Passaic Valley Water Commission has submitted the digital GIS mapping and is under review.

PRESERVATION AREAS

Area	(Y/N)	Comments
Highlands Planning Area	N	
Highlands Preservation Area	N	
WQMP Consistent	Y	Informal Consistency Determination Letter Issued on October 17, 2014
Pinelands	N	

Assessment/Billing Information

Permit Fee/Assessment Information:

Assessment ID	Amount	Status	Date	Type
1787180	$12,000.00	Closed (Paid In Full)	02/24/16	Fee(Initial Application)

Annual Operating Fee Activity within the last 24 months:

Assessment ID	Activity Number	Amount	Status	Date	Type
1518804	WBC030012	$3,280.00	Closed (Paid In Full)	08/08/14	FEE(Annual Fee)
1696124	WBC030013	$3,280.00	Closed (Paid In Full)	07/31/15	FEE(Annual Fee)

Enforcement Information

Compliance Inspection within the last 12 months: N/A

Out of compliance issues within the last 12 months: N/A

Enforcement Actions within the last 12 months:

NJEMS No.	Lead Investigator	Status	Date	Comments
PEA150004	Oguntala, Adekunle	Effective	10/20/15	

Violation Requirements from Enforcement Actions within the last 12 months:

NJEMS No.	Requirements	Noncompliance Desc.
PEA150004	Comply with the Action Level (AL) for lead set forth in [40 CFR 141.80(c)(1)]	Failure to comply with the Action Level (AL) for lead set forth in 40 CFR 141.80(c)(1). Violation Details: LEAD ACTION LEVEL EXCEEDED for LEAD for the period 01/01/2015 to 12/31/2015 for the following sample point ID: DS DISTRIBUTION SYSTEM.

Construction Completion Certification (CCC)

Expired permits and permits to expire within the next 6 months missing CCCs: N/A

Master Permit Applicability Determination

Number of permit applications for water main extension and/or replacements and/or transmission mains in each of the preceding three years.

Year	2012	2013	2014	2015
Number of Permits	2	1	0	1
	Total number of permits over the preceding three years =			4
	Ave number over the preceding three years = (Total/3 years =) If number in 2015 > 2012 then use 2015 in calculation			<4

Since over the three preceding years an average of four or more permit applications per year for water main extension and/or replacements and/or transmission mains have been received permit conditions have been added to require the Water System to submit a Master Permit application within six months. N.J.A.C. 7:10-11.10(a)3.

General Description of Project

This permit is for replacement of the existing Levine uncovered finished water reservoir by two 2.5 million gallon covered pre-stressed concrete finished water storage tanks with associated water mains and a new utility building for re-chlorination system and water quality monitoring equipment through SCADA system to achieve compliance with N.J.A.C. 7:10-5.1 and 40 CFR 141.714. The project is located at the intersection of Reservoir Street and Grand Street, Block # 4802, Lot # 28 in the City of Paterson, Passaic County, New Jersey.

Background

The U.S. Environmental Protection Agency has mandated that the Passaic Valley Water Commission (PVWC) to find safer way to store already treated drinking water that has for decades been held in the Levine uncovered reservoir. Treated or finished water is vulnerable to fecal contamination from wildlife and runoff when stored in open-air reservoir.

The Passaic Valley Water Commission (PVWC) owns and operates the existing Levine uncovered finished water reservoir to supply water in the Cities of Paterson, Passaic and Clifton, and the Borough of Prospect Park, Passaic County, New Jersey. The New Jersey Safe Drinking Water Act regulations adopted the most current National Primary Drinking Water Regulations (NPDWR) at 40 CFR 141. Subpart W of the National Primary Drinking Water Regulations, Enhanced Treatment for Cryptosporidium, 40 CFR 141.714, requires that systems must meet the conditions of paragraph (c)(1) or (c)(2) of this section for each uncovered finished water storage facility or be in compliance with a State approved schedule to meet these conditions no later than April 1, 2009. 40 CFR 141.714(c)(1) requires that systems must cover any uncovered finished water storage facility and 40 CFR 141.714(c)(2) requires that the systems must treat the discharge from the uncovered finished water storage facility to the distribution system to achieve inactivation and/or removal of at least 4-log virus, 3-log Giardia Lambia, and 2-log Cryptosporidium using a protocol approved by the State, such as a combination of ultraviolet disinfection and chlorination. PVWC could not meet the requirement of 40 CFR 141.714(c)(1) and (c)(2) on or before April 1, 2009 and therefore executed an Administrative Consent Order (ACO) with the Department on March 30, 2009 in order to be in compliance with a State approved schedule to meet the conditions of paragraph (c)(1) or (c)(2) of 40 CFR 141.714 for each uncovered finished water storage facility within the water distribution system.

The executed ACO required PVWC to submit feasibility study reports conducted by a private contractor to the Department identifying options to either eliminate the uncovered finished water reservoirs or replace it with covered storage tanks. After several back and forth submittals and reviews, the Department conditionally approved final report on August 24, 2012. This permit application is submitted by the PVWC to comply with the approved final report and proposing to install two 2.5 million gallon covered pre-stressed concrete storage tanks at Levine Reservoir.

History of Levine Uncover Reservoir

The Levine uncovered finished water reservoir was built in 1885 that sits on the edge of the Paterson-Great Fall National Historic Park. The National Parks Service considers Levine reservoir to be a "contributing asset" and it cannot be disturbed without permission from federal government. The reservoir is currently undergoing review by Section 106 of the National Historic Preservation Act to determine how much if any of the reservoir property can be disturbed.

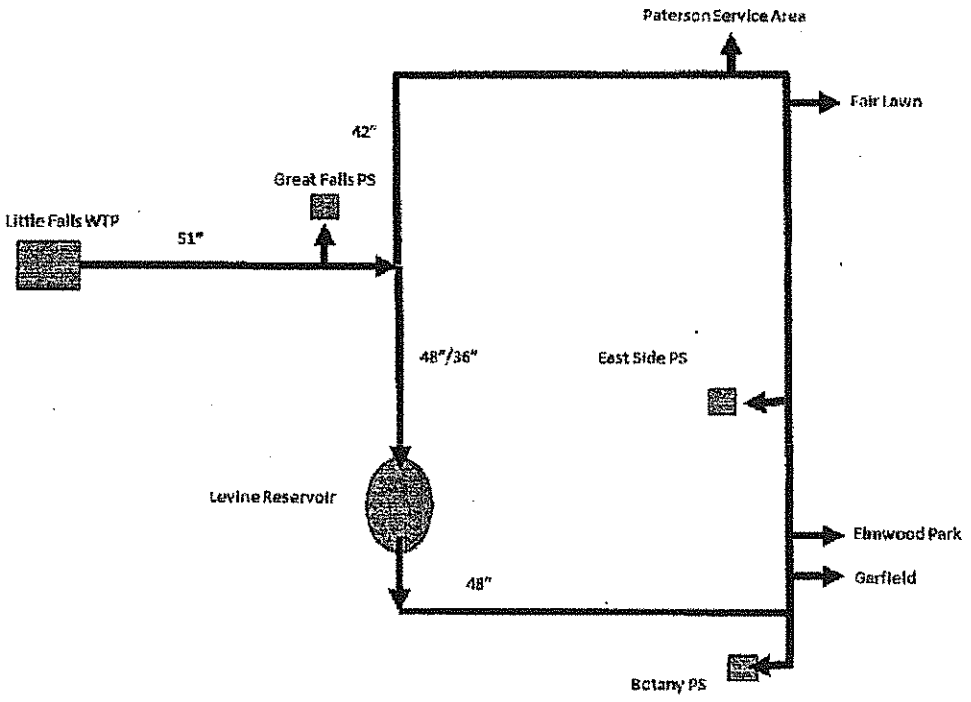
Existing Mode of Operation at the Levine Reservoir

The Levine reservoir has a current high water level (HWL) of elevation 180 feet (NGVD 29). The reservoir is connected to the "industrial gradient known as HGL 180 of the PVWC distribution system. The industrial gradient is supplied by the existing high lift pumps at the Little Falls Water Treatment Plant via a 51 inch transmission main. In the vicinity of the Great Falls in Paterson, the 51 inch transmission main splits into a 42 inch and 36 inch mains. The 36 inch main leads to the Levine reservoir that increases to 48 inch after some distance. The 42 inch main also bypassing the reservoir that runs toward the North end of the City of Paterson. The system's hydraulics has been evaluated in 2003 using hydraulic model of the system. Average water demand of the Industrial Gradient HGL 180, as reflected in the hydraulic model is 24 MGD. Historic peak demand of the Industrial Gradient is approximately 30 MGD. The model indicates that approximately 40% (12 MGD) of the total Industrial flow passes through the Levine Reservoir and the remaining 28% (18 MGD) bypasses the reservoir.

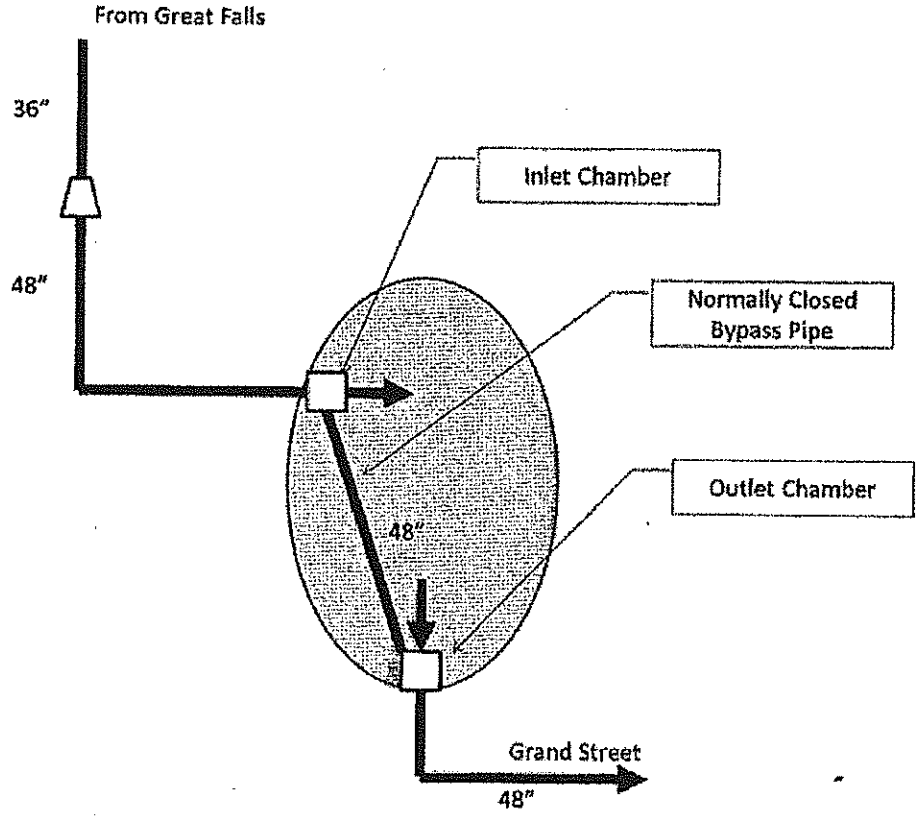
There is an inlet chamber on the west side of the reservoir and an outlet chamber on the south side of the reservoir. Under normal conditions, water enters the reservoir from a 48 inch pipeline at the inlet chamber, and exits the reservoir into a 48 inch pipeline at the outlet chamber. The reservoir can be isolated from the transmission system and flow can be diverted through a 48 inch bypass pipeline laid on the bed of the reservoir, running between the inlet and the outlet chambers.

Figure below illustrates the reservoir inlet, outlet, and bypass piping and structures. There is also a connection from the HG 300 gradient (not shown in the figure) to the reservoir which can be used additional flow through the reservoir to the HGL 180 gradient if needed.

Industrial Gradient Transmission Schematic



Levine Reservoir Piping Schematic



Proposed Temporary Earthen Berm:

The primary objective of this project is to avoid outage of water storage in the industrial zone of the water system; and control the timing and minimize the duration of outage. From the geotechnical data completed during November 2013, it was understood that the temporary earthen berm will be constructed on rock formation classified as fine to medium grain orange mountain basalt. For that purpose a dividing earthen berm is proposed to partition the reservoir into northern and southern sections. The southern section of the berm would allow part of the existing reservoir to remain in service and provide a reduced capacity of storage during construction of the tanks and utility/chemical feed building in the un-watered northern section of the reservoir. A planned shutdown of 4 weeks is expected for the construction of the temporary berm.

Proposed Hydraulic Design for New Tanks:

Elevation:

Pursuant to the Conceptual Design Report, the proposed tanks will have a HWL (overflow) elevation of 193' (NGVD 29) which is 13 feet higher than the existing reservoir HWL of 180. Tank floor elevation will be at 175' (NGDV 29) providing a maximum water depth of 18 feet in the tanks. Hydraulic modeling indicates that the increase in HWL by 13 feet will not have a significant negative impact on the capacity of the existing Industrial High Lift Pumps at the Little Falls WTP.

Flow Rates and Residence Time:

Flow rates through the site are not expected to change as a result of the reservoir being replaced by tanks. With all flow through the site being directed through the two tanks, operating in parallel, the flow rate and associated residence time of water in each tank will be as follows:

Both Tanks in Service		
	Flow Rate Through Each Tank MGD	Residence Time in Each Tank Hours
Average Day Flow (10 MGD)	5	12
Peak Day Flow (12 MGD)	6	10
One Tank in Service, One Tank Off-line		
Average Day Flow (10 MGD)	10	6
Peak Day Flow (12 MGD)	12	5

Overflow Rate and Venting Capacity:

The tanks will be equipped with high water level alarm system to minimize the risk of overflow. However, provisions have been made in the tank for overflow once water exceeds the design HWL of 193 feet. Considering the hydraulic analysis modeling and discussion with PVWC, the maximum potential overflow at peak capacity, and a water main break incidence will result in 20 MGD or 13,900 GPM of excess system inflow until the pumping rate at the Little Falls WTP is reduced. Each tank are therefore designed with an overflow capacity of 20 MGD for 15 minutes (13,900 GPM x 15 min. = 208,500 gallons) for operator to recognize and react the incident. The tank overflow pipes will drain to catch basins connected to the site existing storm sewer system. An air gap is provided between the drain pipe and the storm sewer drain as required by the SDW regulations. Because there is no retention or detention basin for the overflow therefore the system can accommodate longer than 15 minutes of overflow incidence. The storage tanks venting capacity is designed considering worst-case drawdown scenario of 30 MGD.

The tanks will also be equipped with low level alarm system. The SCADA system will generate high and low level alarms based on the measured tank levels from the transmitters. The study report shows that a minimum water level would be required to maintain in the tanks at all times to avoid any uplifting slab of the tanks due to high water table in the surroundings. The top of the reservoir base slab is at elevation 175'. Based on 100 year and 500 year storm events, the maximum water surface elevation in the detention ponds will be at 175.2 feet. As a conservative approach, in the event that the outlets from the detention ponds were plugged, the maximum water surface elevation in the detention ponds for 100 year and 500 year storm events is at 176 feet. PVWC has directed CH2M to design the reservoir to resist buoyant uplift for the following conditions:

Reservoir Empty

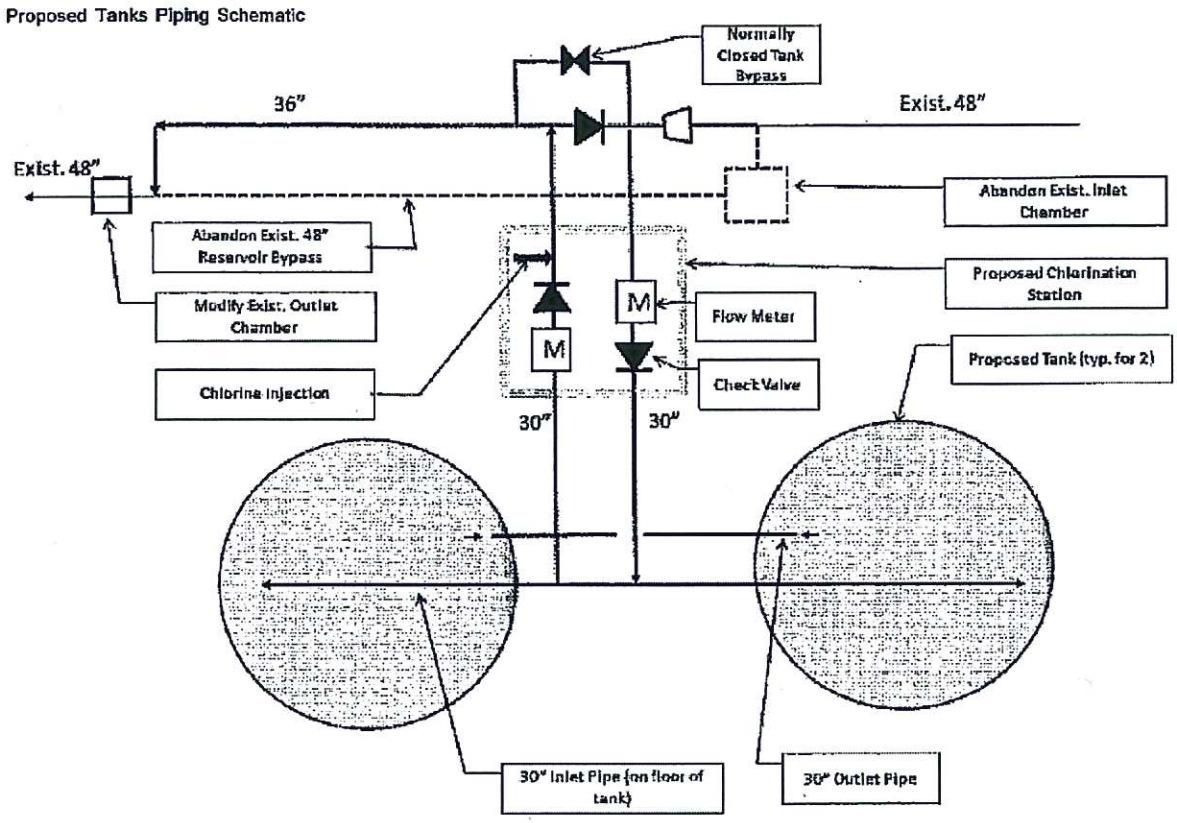
Groundwater Elevation = 179.0' with Factor of Safety = 1.1

Groundwater Elevation = 180.0' with Factor of Safety = 1.0

Proposed Tank Operations:

The basic parameters of the project include construction of two 2.5 million gallon pre-stressed concrete tanks with floor elevation at 175 feet and overflow elevation at 193 feet having inside diameter of 156 feet. The tanks are to be built within the area presently occupied by the existing uncovered reservoir and therefore critical issue is implementing maintenance of water system operation during construction. Conceptual design report proposes a dividing wall would allow part of the existing reservoir to remain in service during construction of the tanks. The tanks are proposed to be constructed partially on bedrock. Much of the site that will not be occupied by the two new tanks was to be devoted to the two proposed storm water detention basins. Perforated pipe perimeter drains will be provided around the foundation of each tank to direct storm water away from the tank foundation. The perimeter drains will discharge to the tank overflow catch basins. Additional perimeter drains will be provided closer to the ground elevation to direct runoff from the tank roofs to the storm water drain. Access to the site will be provided with a new paved driveway connecting to Reservoir Street. The driveway will run past the chemical feed/utility building and will fully encircle both proposed tanks.

The proposed tanks will perform the same basic function as the existing Levine reservoir and therefore the system operational parameters will not change. Under normal conditions, both tanks will be in service and operate in parallel with equal water level. Inflow to the Industrial Gradient 180 will continue to be the high lift pumps at the LFWTP. Pumping rate will be adjusted to maintain the desired water level in the tanks. All water passing through the site will normally be routed through the tanks. The ability to bypass both tanks will be provided. Each tank will have separate inlet and outlet pipes to minimize stagnation of water. Flow meters will be provided to measure inflow to and outflow from the tanks. There will be single inflow meter common to both tanks, and a single outflow meter common to both tanks. The piping required to achieve the functionality is described above is shown schematically below:



Because of the age of the existing 48 inch bypass piping between the existing inlet and outlet chambers and the unknown depth beneath final grade, it is decided to abandon in-place and replaced with 36 inch piping. At a design peak day flow of 12 MGD, the velocity in a 36 inch pipe will be 2.6 feet/sec and at 20 MGD will be 4.38 feet/sec. The tanks inlet and outlet are sized at 30 inch diameter. Velocities will be 5.9 feet/sec and 6.31 feet/sec at flow 12 MGD and 20 MGD respectively.

Chemical Feed System

Water discharged from the Levine open reservoir is currently dosed with sodium hypochlorite to provide free residual chlorine in the distribution system. This is needed because the chlorine residual from the Little Falls Water Treatment Plant (LFWTP) degrades during detention in the open Levine finished water reservoir. Water discharged from the reservoir is currently dosed with sodium hypochlorite from the existing utility/chemical building to provide a free chlorine residual within the 180 HGL distribution system.

A new utility building is proposed to construct next to the two 2.5 MG finished water tanks at Levine reservoir. A new sodium hypochlorite feed system will be utilized to the effluent of the Levine reservoir storage tanks via pipe injection to maintain a free residual within the 180 HGL distribution system. Sodium hypochlorite will be fed in a 12.5% solution. Two 875 gallon chemical tanks will be provided inside the utility building. The sodium hypochlorite storage and chemical feed system will be located inside the new utility building. Sodium hypochlorite solution will be delivered to two (2) high density crosslink polyethylene (HDXLPE) storage tanks from a truck off-loading station adjacent to the outside wall of the utility building. Spill containment pit and alarm system will be provided at the unloading area. Three (3) metering peristaltic chemical

feed pumps, manufactured by Watson Marlow/Bredel, Model 520 DuN/R2 are proposed to installed with a maximum pumping capacity of 7.6 gallon per minute (182 GPD) to maintain residual chlorine level between 0.3 and 1.5 mg/liter within the distribution system. Each chemical feed pump's turndown ratio will be 12.5:1. Two chemical feed pumps will be in service while one chemical pump will be available as standby. The chemical feed pumps will pump 12.5% sodium hypochlorite solution from the chemical storage tanks to an application point at the effluent piping manifold of the Levine water storage tanks. Double containment polyvinyl chloride (PVC) piping will be provided from the tanks outlet to the injection point. Leak detection system will be provided throughout the double containment piping. An electrical actuated valve will be provided at each tank outlet so that the tank can be isolated automatically when not in service. Emergency shower and eyewash will be provided inside the utility building. Chlorine analyzer/controller will be electronically paced and will be linked to the finished water flow meter.

$$\text{Pounds/day required} = 1.5\,ppm * 30.0\,MGD * 8.34\frac{lb}{gallon} / 0.125 = 3{,}002.4\frac{pounds}{day}$$

$$\text{Gallons/day required} = \frac{3{,}002.4\frac{lb}{day}}{1.21 * 8.34\frac{lb}{gallon}} = 297.5\frac{gallons}{day}$$

As shown above a 297.5 GPD of 12.5% sodium hypochlorite feed system will be required at a maximum historic peak day demand of 30 MGD. PVWC is proposing three positive displacement pumps of capacities 182.4 GPD. Two pumps will be sufficient to handle the historic peak day demand.

At an average day demand of 12 MGD, 119 gallon/day will be required. PVWC is required to maintain to maintain approximately 3,570 gallons of 12.5% hypochlorite solution. PVWC is proposing 1,750 gallons total storage in two 875 gallon tanks, which will be sufficient for 15 day. As the product is locally available, this amount is acceptable as storage.

Chlorination Details

Specific Chemical Used	12.5% Sodium Hypochlorite
Number of Pumps	3 Pumps (2 primary/1 back-up)
Chemical Pump Make	Watson Marlow/Bredel,
Chemical Pump Model	520 DuN/R2
Type of Pump	Positive Displacement
Pump Capacity	7.6 gallons/hour (182.4 GPD)
Chemical Dosage (pounds/day)	3,002.4 pounds/day
Chemical Dosage (gal/day)	297.5 gallons/day
Final Concentration (ppm)	1.5 ppm
Method of Pump Control	Flow Paced
Purpose of Treatment	Re-Chlorination

Note

PVWC is not proposing onsite emergency generator. Upon enquiry, It was stated that emergency generators are being installed at the Little Falls WTP where continuous chlorine feed system is provided. The chlorine feed station at Levine will only be used to give PVWC the flexibility to boost the chlorine levels if needed, and therefore the chemical feed system will not be used for primary disinfection. However provisions are provided with quick connections for portable generator at the facility so that if there is a power outage the residual chlorine levels could be maintained.

PVWC is not providing any extra space inside the chemical/utility building for future corrosion control feed system installation. This is due to the reason that adding corrosion control chemical feed at Levine before the New Street open finished water reservoir is replace with cover tanks would allow water to be pumped from Levine 180HGL gradient through the Great Falls pumping station and into the 300 HGL gradient where it could get into New Street open reservoir will cause algal blooms. Corrosion control for the 18o HGL gradient will be provided after the Levine tanks that are completed but the injection point will be provided after the Levine tanks downstream of the Great falls pumping station.

Levine reservoir currently discharges to the existing on-site storm water drainage facilities which have been designed to meet the requirements of N.J.A.C. 7:8. In future there will be a reduction in peak discharge from the site therefore directing the site drainage to the existing drain line is consistent with the historic site drainage. Because this project produces a net reduction of peak flows and thus a benefit to the existing drain line hydraulics, PVWC has not performed any evaluation of the drainage capacity as there is no potential for adverse impacts resulting from this project.

Conclusions

This project as designed is in accordance with the regulations, therefore it is recommended for approval at this time.

Recommendations

Check One:

[**X**] Examination of the engineering data submitted indicated that the project, as designed, complies substantially with our rules and regulations.

It is therefore recommended that the project be APPROVED and permit issued for construction, derivation, distribution, subject to the usual conditions.

[ ] Examination of the engineering data submitted indicates that the project, as designed, does not comply with our rules and regulations.

It is therefore recommended that the project be DISAPPROVED.

[ ] The project has remained technically deficient beyond the due date specified by the Department for providing additional information.

It is therefore recommended that the project be RETURNED.

RECOMMENDED PROVISOS

Check One:

[ ] Specific conditions to approval

[ ] Reasons for disapproval

[ ] Reasons for return

[**X**] None required

Syed Rizvi 7/21/2016

Syed Rizvi
Bureau of Water System Engineering

SJP

Reviewed By

SJR

Section Chief Approval

Date: 7/25/16