WATER SUPPLY STUDY: CENTRAL LEHIGH AND NORTH WHITEHALL DIVISIONS

Presented by:
Michael Brown, PE
Erin Laux

May 22, 2023

Gannett Fleming Team

Michael Brown, PE

- 25+ years experience
- Specialized experience in hydraulic modeling, planning studies and asset management
- 100+ water/wastewater system hydraulic model projects

Erin Laux

- 5+ years experience
- Provided model development, calibration, or review services on 35+ projects
- Extensive experience using WaterGEMs for modeling development and capacity assessments

GANNETT FLEMING

Executive Summary

CLD Existing Water Supply

Both CLD Lower and Upper Systems have sufficient water (and storage) under normal operations.

CLD Demand Projections

Average day demand is projected to reach 13.5 million gallons per day by 2045.

CLD Projected Supply Needs

If there any emergencies at the City of Allentown Water Filtration Plant or with CLD's City Interconnect infrastructure, CLD's supply is deficient.

CLD Risks and Vulnerabilities

The City of Allentown Water Filtration Plant and its sources are critical for the entire Region.

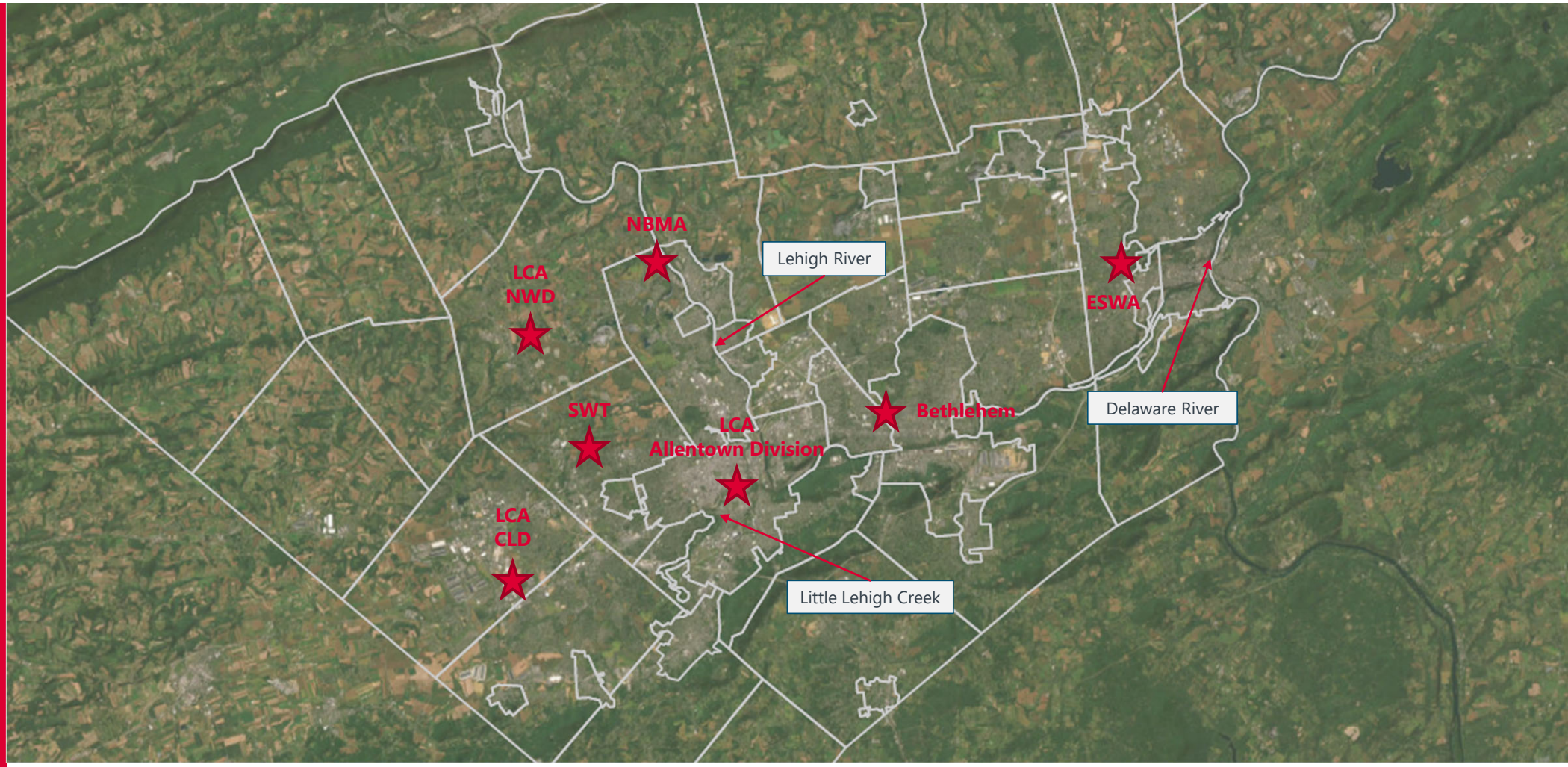
Alternatives to Address Emergency Supply Need

Various interconnections with neighboring water suppliers and temporary sources help provide redundancy in the Central Lehigh Division.

NWD Demand Projections and Supply Needs

North Whitehall Division needs an additional interconnect with NBMA.

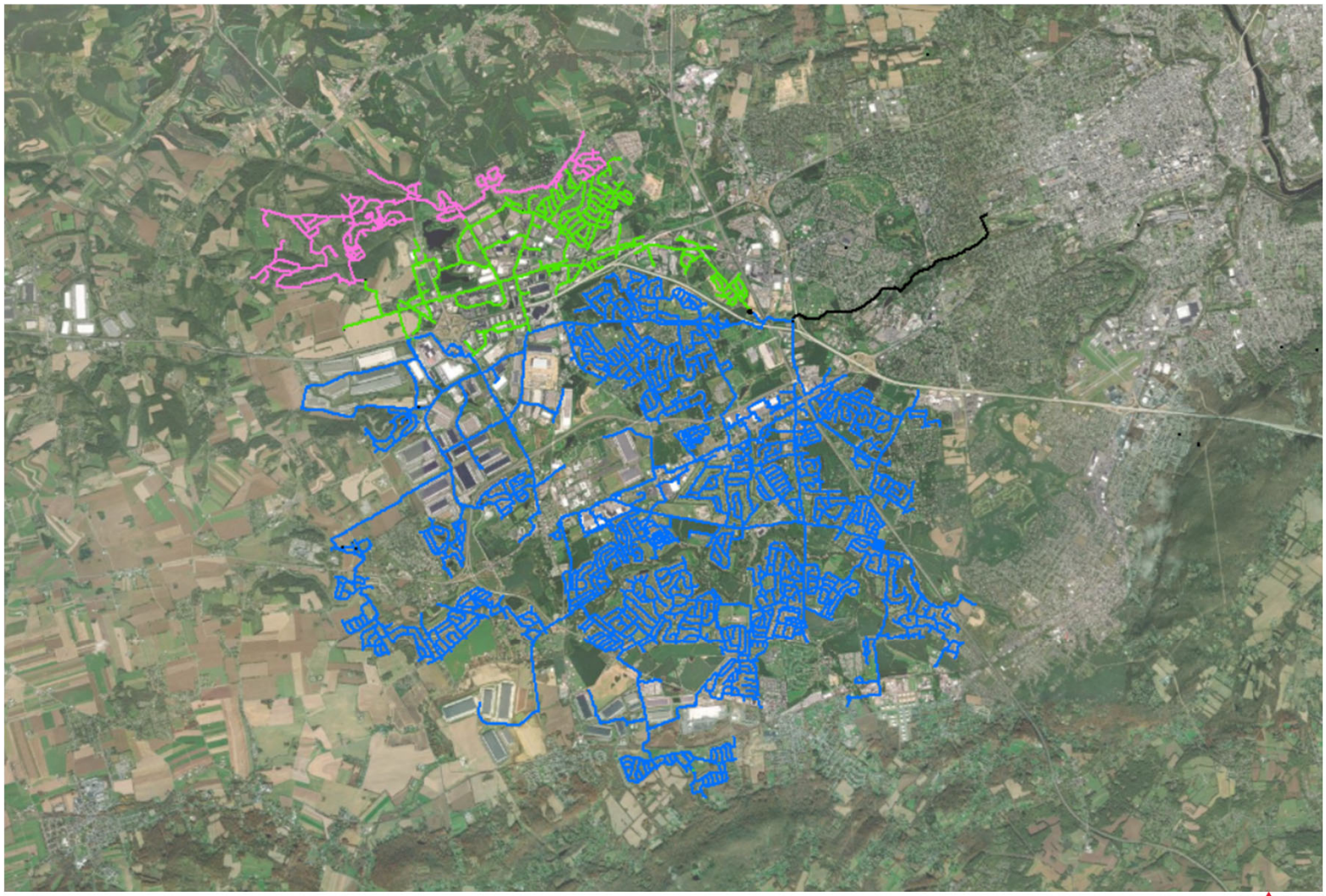
GANNETT FLEMING



GANNETT FLEMING

Central Lehigh Division

GANNETT FLEMING



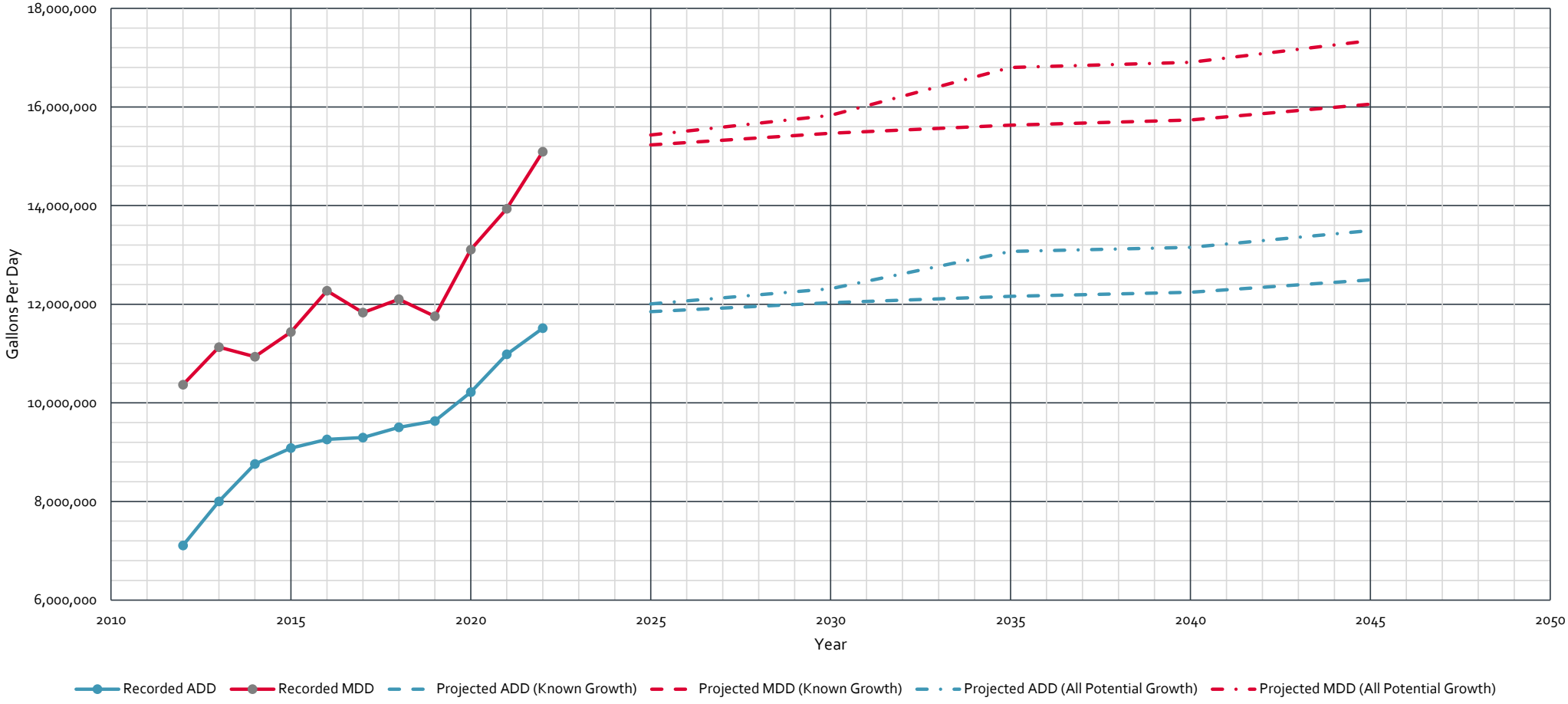
GANNETT FLEMING

CLD Well Source Capacity

Source	Current Operating Capacity (gpm)	Permitted Capacity (gpm)	Theoretical Capacity (gpm)
Well 1	499	500	1,000
Well 2	Reserve Status	250	250
Well 3	Reserve Status	1,200	1,200
Well 4	Abandoned	Abandoned	Abandoned
Well 5	1,000	1,000	1,000
Well 6	410	800	800
Well 7	Abandoned	Abandoned	Abandoned
Well 8R	1,200	1,300	1,300
Well 9	1,000	1,000	1,000
Well 10	100	100	100
Well 11	184	200	200
Well 12R	446	700	700
Well 13	318	350	350
Well 14	Reserve Status	172	172
Well 15	Reserve Status	172	172
Well 16	258	350	500
Well 17	Reserve Status	250	250
Well 20	559	600	600
Well 23	359	400	400
Well 24	321	300	300
Allentown Interconnection	5,008	7,290	7,290
SWT Interconnection	660	1,000	1,000
TOTAL	**12,322**	**17,934**	**18,584**

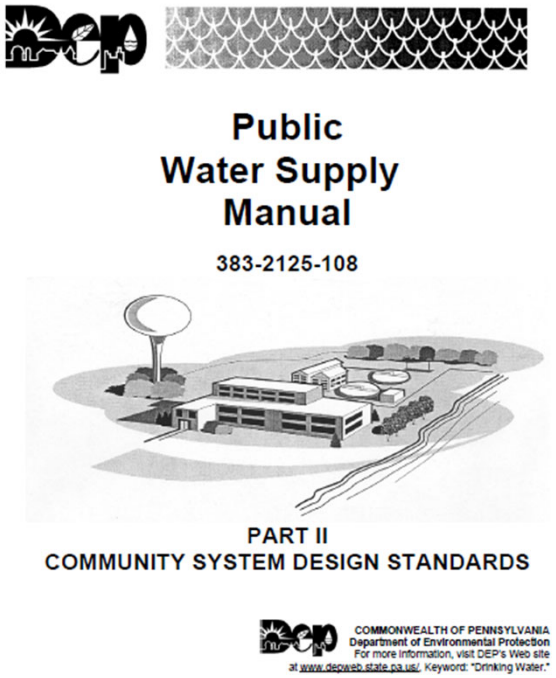
GANNETT FLEMING

CLD Demand Projections



GANNETT FLEMING

Supply Capacity Assessment



- Definitions
  - Total Supply Capacity: System capacity with all *available* sources in service.
  - Reliable Supply Capacity: Capacity with the largest source out of service. For the CLD System the largest source is the Allentown Interconnection.
  - Emergency Condition: Reliable supply capacity vs. average day demand (ADD)
  - MDD Condition: Total supply capacity vs. maximum day demand (MDD)
- Supply is assessed as the worst case of Emergency Condition or MDD Condition.

GANNETT FLEMING

CLD System Needs Emergency Supply Source

Current Supply Capacity:	17.7 mgd	**2045 Supply Capacity:**	17.7 mgd
Current Demand:	ADD – 11.5 mgd MDD – 15.1 mgd	**2045 Demand:**	ADD – 13.5 mgd MDD – 17.3 mgd
Emergency Condition:	1.0 mgd deficit	**Emergency Condition:**	3.0 mgd deficit
MDD Condition:	2.9 mgd excess	**MDD Condition:**	0.4 mgd excess

The CLD System's supply need is in the event of a loss of an existing large source…
There is not a supply need for everyday use.

GANNETT FLEMING

Potential Vulnerabilities to the CLD Water System

- Combined CLD-Allentown Emergency
- Loss of power at WFP
- Water quality issue in the Little Lehigh Creek
- Break on the Allentown Interconnection transmission main
- Loss of power at Schantz Spring Pump Station
- Loss of one (1) pump at the Schantz Spring Pump Station
- New (unplanned) large user in the Upper System
- CLD Auxiliary Pump Station power outage
- Applewood Pump Station power outage
- CLD finished storage taken out of service
- Upper System transmission main break
- Lower System transmission main break

GANNETT FLEMING

Alternatives to Address Emergency Supply Need

SWT Interconnections

Schantz Spring Booster

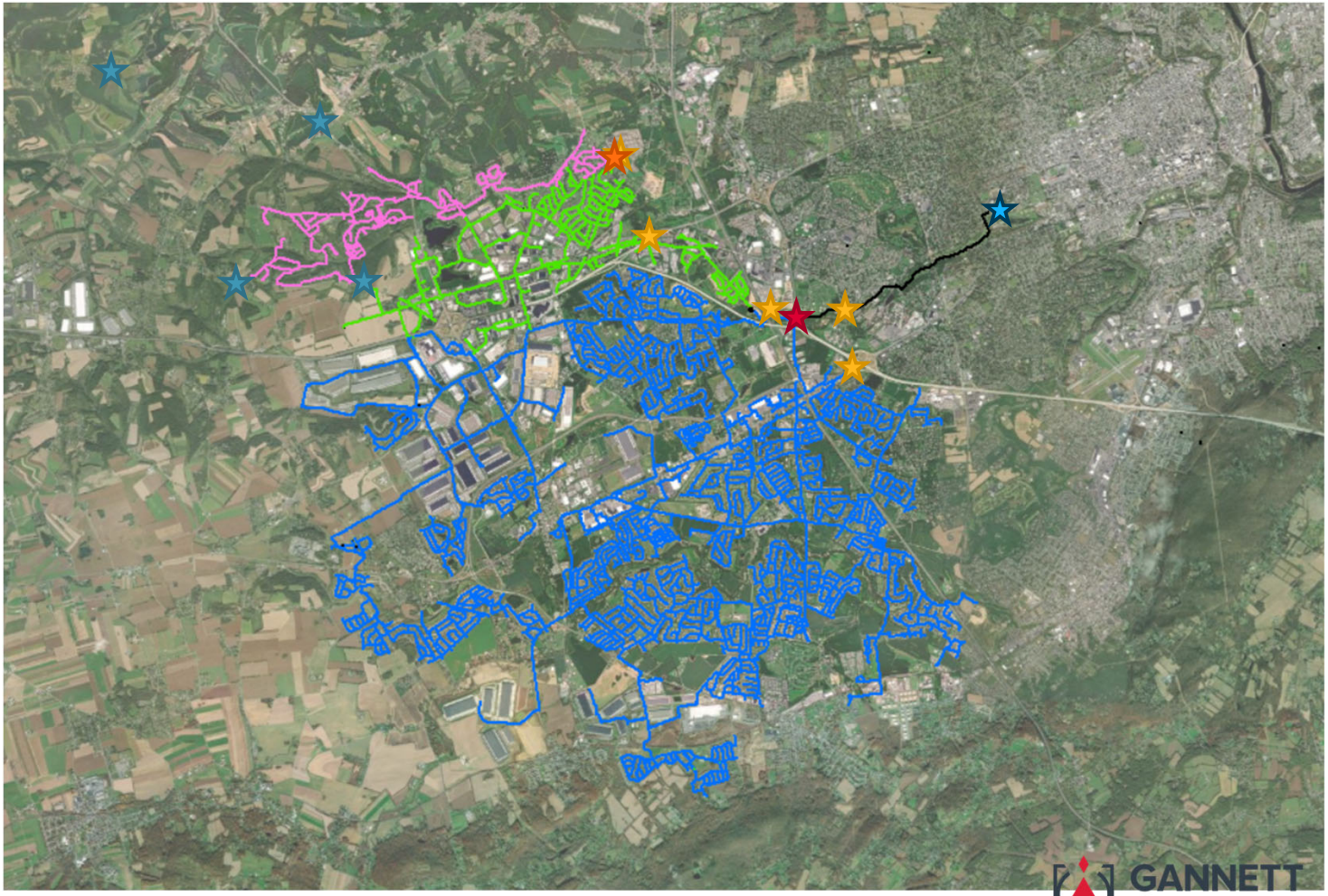
Additional Storage

Increase Allentown Supply

Well 17 Booster

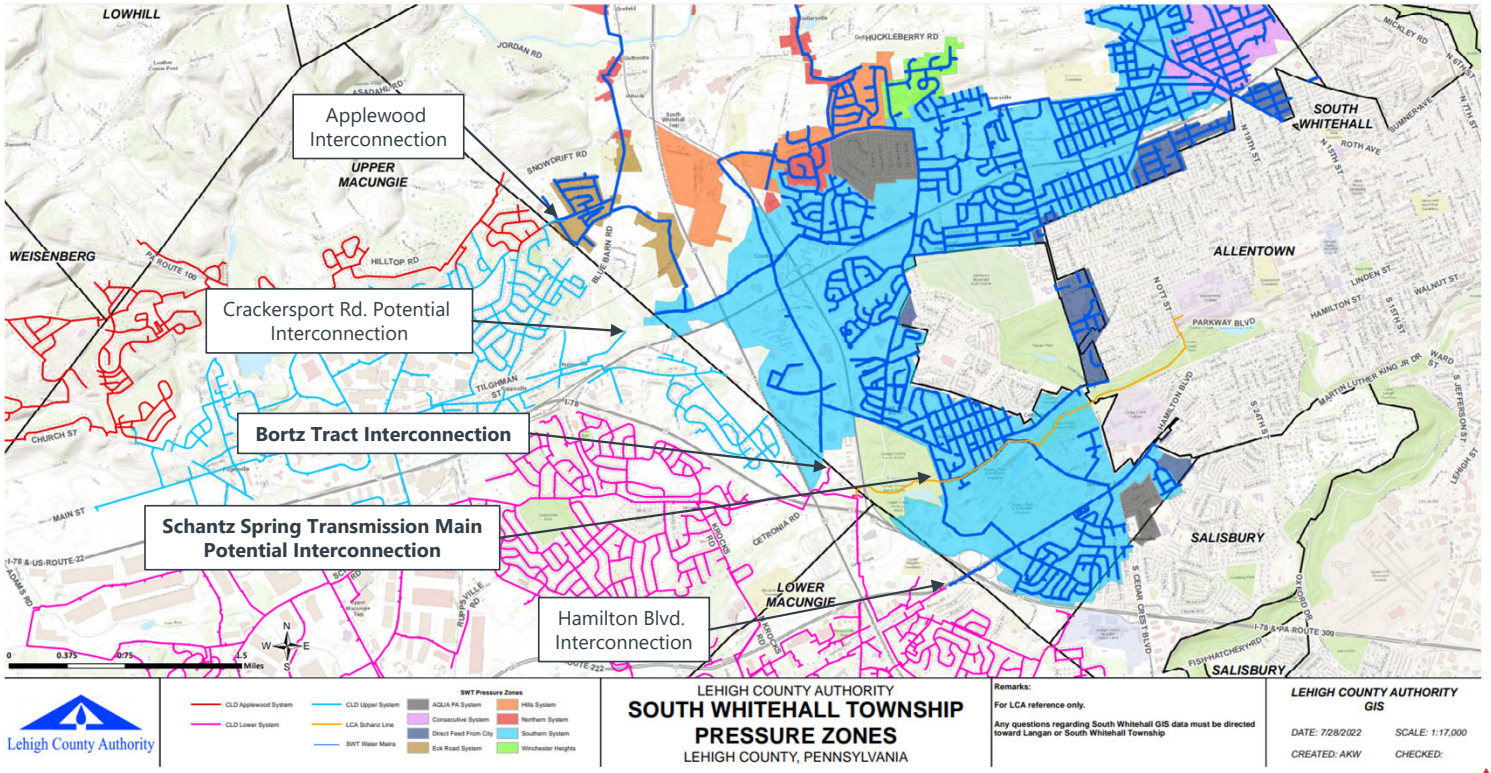
Optimize Existing Wells Various Locations

Develop New Wells Various Locations



GANNETT FLEMING

South Whitehall Township Interconnections



GANNETT FLEMING

Risks Addressed by South Whitehall Township Interconnections

- Combined CLD-Allentown Emergency
- Loss of power at WFP
- Water quality issue in the Little Lehigh Creek
- Break on the Allentown Interconnection transmission main
- Loss of power at Schantz Spring Pump Station
- Loss of one (1) pump at the Schantz Spring Pump Station
- New (unplanned) large user in the Upper System
- CLD Auxiliary Pump Station power outage
- CLD finished storage taken out of service
- Upper System transmission main break
- Lower System transmission main break

GANNETT FLEMING

5.2 MGD POTENTIALLY AVAILABLE VIA EXISTING WELL OPTIMIZATION

PADEP STATUS CHANGE

- Reserve Status Wells
  - Well 2
  - Well 3
  - Well 14
  - Well 15
  - Well 17
- Thorough permit application process required to change well status back to "active."
- Treatment upgrades needed for Wells 2, 3, and 17.
- Adds approximately 2.9 mgd of source water.

WELL CAPACITY UPGRADES

- Wells that are good candidates for "upgrades"
  - Well 2
  - Well 12R
  - Well 16
- Potential increases in yield for Wells 2 and 16.
- Well 12R is operated at lower capacity to avoid high turbidity.
- Adds approximately 1.4 mgd of source water.
- If Operations maximized well output, approximately 2.3 mgd of source water would be added.

GANNETT FLEMING

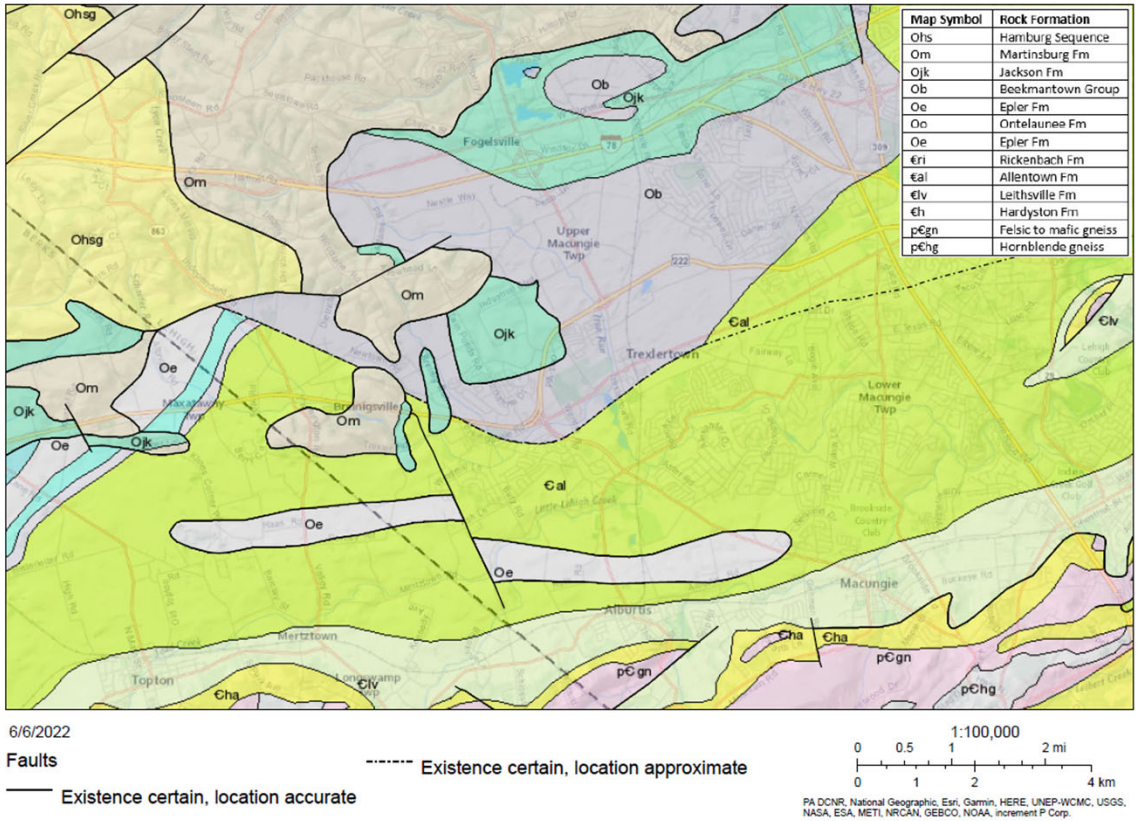
Risks Addressed by Optimizing Wells

- Combined CLD-Allentown Emergency
- Loss of power at WFP
- Water quality issue in the Little Lehigh Creek
- Break on the Allentown Interconnection transmission main
- Loss of power at Schantz Spring Pump Station
- Loss of one (1) pump at the Schantz Spring Pump Station
- New (unplanned) large user in the Upper System
- CLD Auxiliary Pump Station power outage
- CLD finished storage taken out of service
- Upper System transmission main break
- Lower System transmission main break

GANNETT FLEMING

Key Findings from Preliminary Hydrogeologic Assessment

Figure 1. Geologic Map



The CLD service area is underlain by carbonate rock formations that can **sustain higher yielding water supply wells.**

Undeveloped properties in the **southern and western areas** could be secured to **conduct test well drilling.**

Groundwater availability estimates indicate Little Lehigh Creek subbasins in the southern service area could **support additional groundwater withdrawals.**

Current pumping rates in the Little Lehigh Creek and Swabia Subbasins are at withdrawal rates that are less than 10 percent of their respective minimum groundwater recharge rates.

GANNETT FLEMING

Risks Addressed by Developing New Wells

- Combined CLD-Allentown Emergency
- Loss of power at WFP
- Water quality issue in the Little Lehigh Creek
- Break on the Allentown Interconnection transmission main
- Loss of power at Schantz Spring Pump Station
- Loss of one (1) pump at the Schantz Spring Pump Station
- CLD finished storage taken out of service
- Lower System transmission main break

GANNETT FLEMING

2 MGD AVAILABLE VIA SCHANTZ SPRING BOOSTER STATION

Water Supply Agreement, Section 3b
c. Termination of Interim Water Supply. The Interim Water Supply shall immediately terminate on the earlier of **(i)** the Long-Term Operation Date or (**ii**) the two year anniversary of the Interim Operation Date. Thereafter, Schantz spring may only be used by LCA as an emergency supply source only subject to the 2.0 MGD limit and subject to the City's prior approval for such emergency use. If the City agrees to an emergency supply of water from Schantz Spring to LCA, the City shall be responsible for controlling such supply via the Schantz Spring Valve. LCA understands and agrees that the Schantz Spring Valve shall be owned by and under the exclusive control of the City.

Station is in great condition. Operations do a visual inspection once a month.

The station has not been operated since the permanent station was put online.

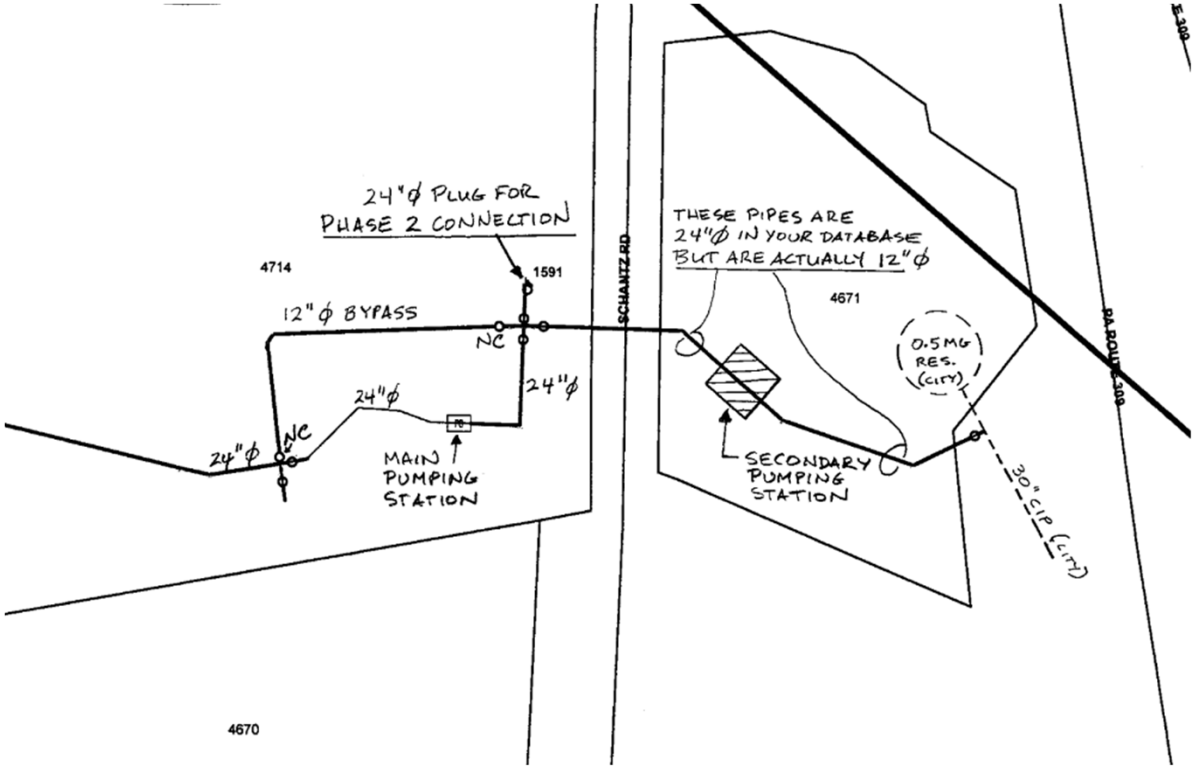
The station is tied into SCADA for at least monitoring.

A second Cl feed was added to the station post-construction. Adequate detention time is provided from an oversized pipe on the discharge of the station.

GANNETT FLEMING

Risks Addressed by Utilizing the Schantz Spring Booster Station

- Combined CLD-Allentown Emergency
- Loss of power at WFP
- Water quality issue in the Little Lehigh Creek
- Break on the Allentown Interconnection transmission main
- Loss of power at Schantz Spring Pump Station
- Loss of one (1) pump at the Schantz Spring Pump Station



GANNETT FLEMING

Additional Alternatives to Help Mitigate System Vulnerabilities

Additional Storage in the Upper System

- Applewood Zone
- Risks addressed:
  - New (unplanned) large user in the Upper System
  - CLD Auxiliary Pump Station power outage
  - Applewood Pump Station power outage
  - CLD finished storage taken out of service
  - Upper System transmission main break

Increase in Allentown Supply

- Currently purchase 7 mgd, Schantz Spring Pump Station maximum capacity is 10.5 mgd.
- Risks addressed:
  - New (unplanned) large user in the Upper System
  - CLD finished storage taken out of service
  - Upper System transmission main break
  - Lower System transmission main break

Well 17 Booster Pumps

- Used to supplement the Applewood Pump Station
- Risks addressed:
  - Applewood Pump Station power outage
  - CLD finished storage taken out of service
  - Upper System transmission main break

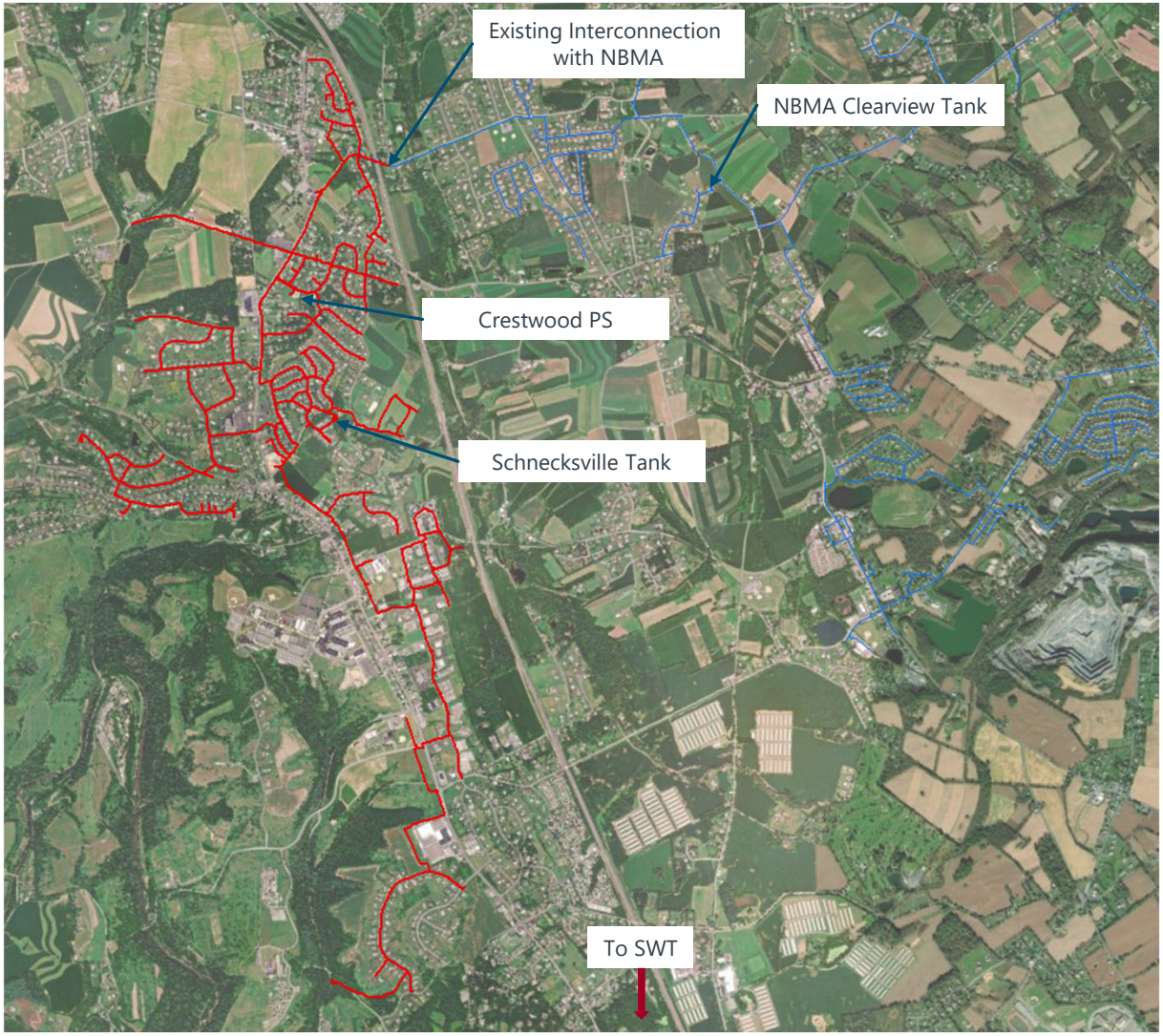
Generators at WFP and Various Pump Stations

- Risks addressed:
  - Loss of power at WFP
  - Loss of power at Schantz Spring Pump Station
  - CLD Auxiliary Pump Station power outage
  - Applewood Pump Station power outage

GANNETT FLEMING

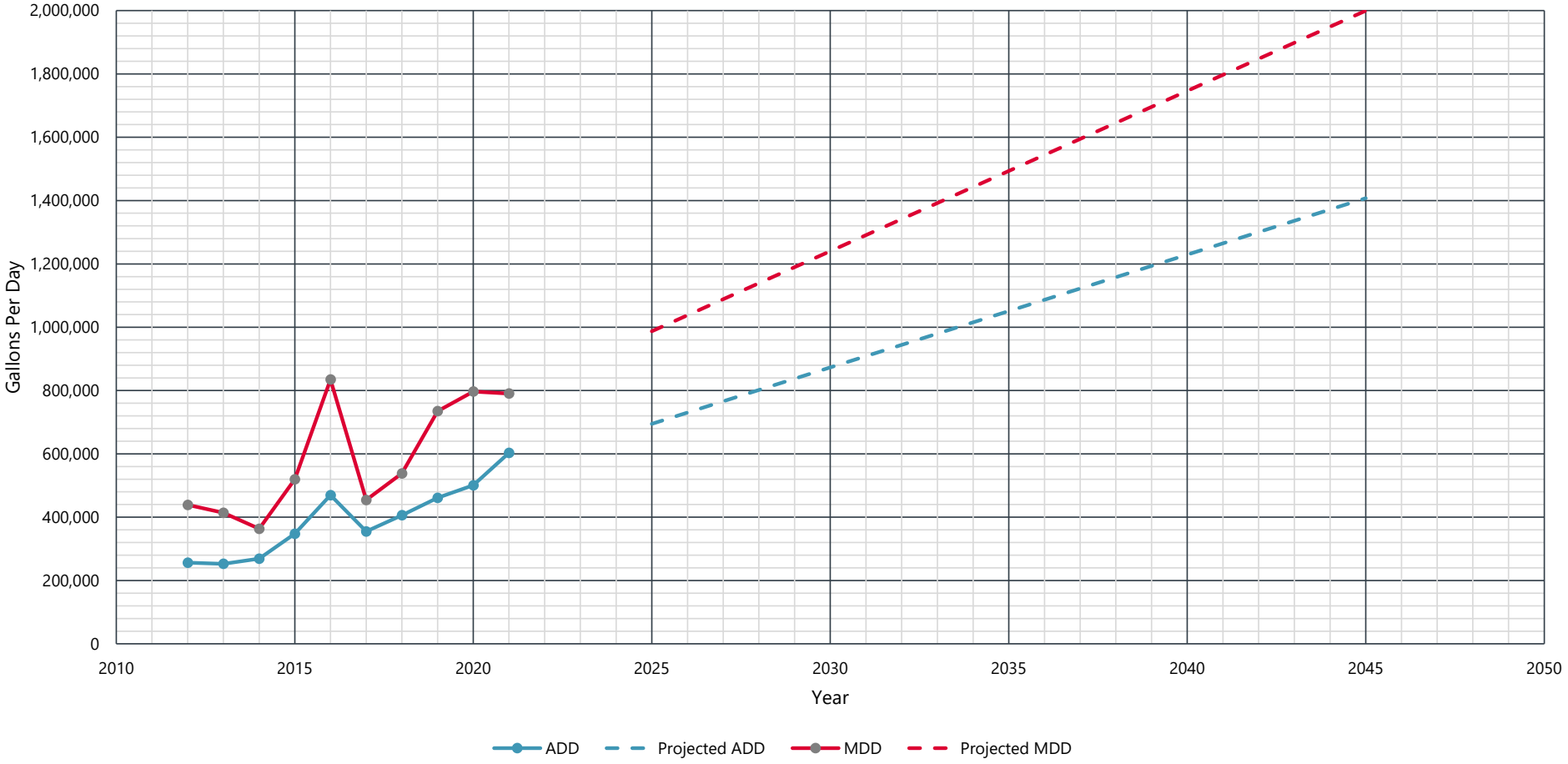
North Whitehall Division

GANNETT FLEMING

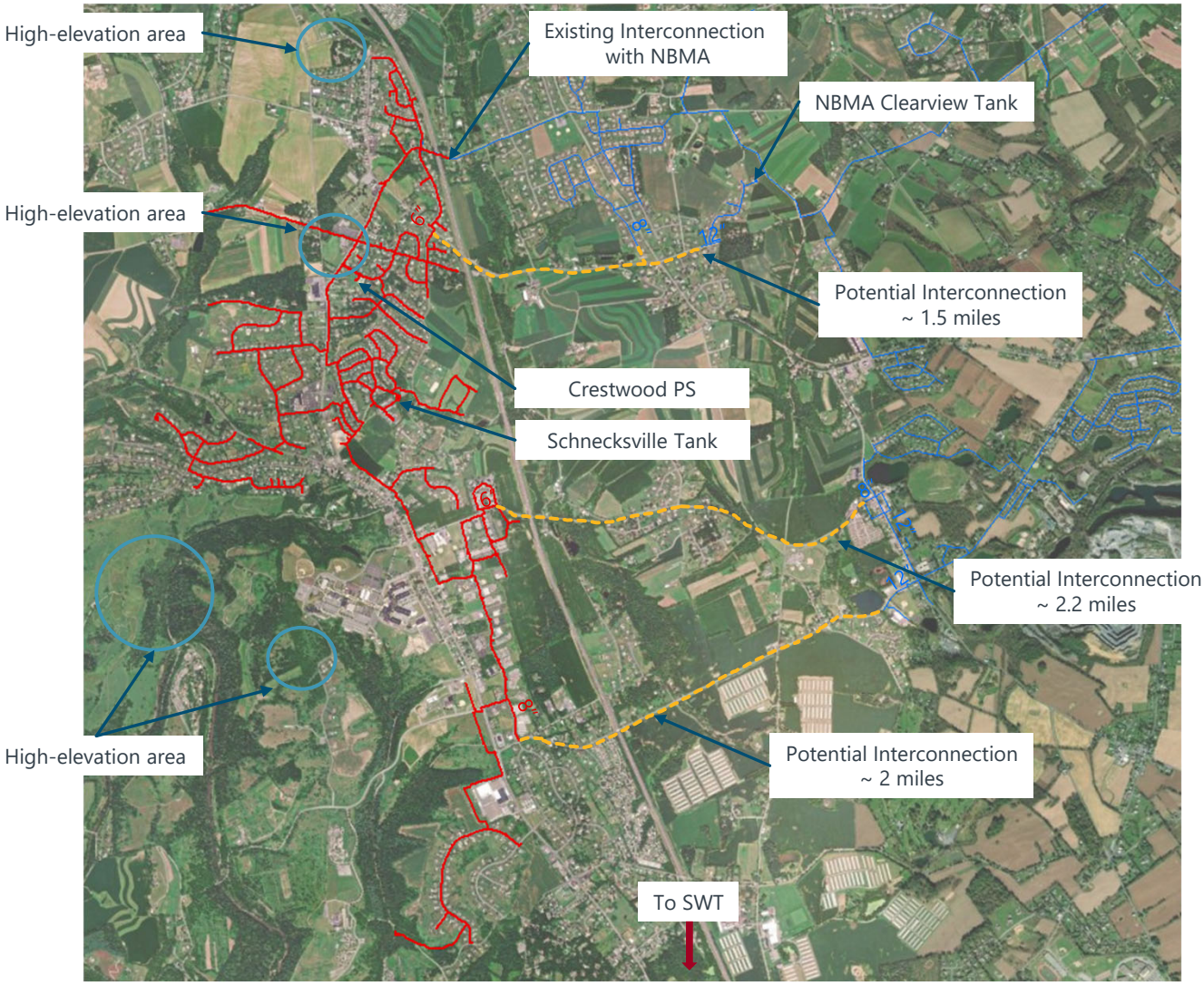


GANNETT FLEMING

NWD Demand Projections



GANNETT FLEMING



GANNETT FLEMING

Next Steps…

- CLD and NWD Water Supply Alternatives Analysis and Selection
  - Detailed evaluation of feasible, identifiable alternatives
  - Cost feasible alternatives
  - Weight cost vs. risk
  - Prioritize and plan implementation
- Basis of Design studies
- Continuation of Master Plan
  - Pipeline Capacity Assessment (focus on distribution and transmission)
    - Fire flow
    - Unaccounted for water
  - Comprehensive Storage Assessment

GANNETT FLEMING

Any Questions?

Mike Brown
mtbrown@gfnet.com

Erin Laux
elaux@gfnet.com

GANNETT FLEMING

GANNETT FLEMING

THANK YOU!