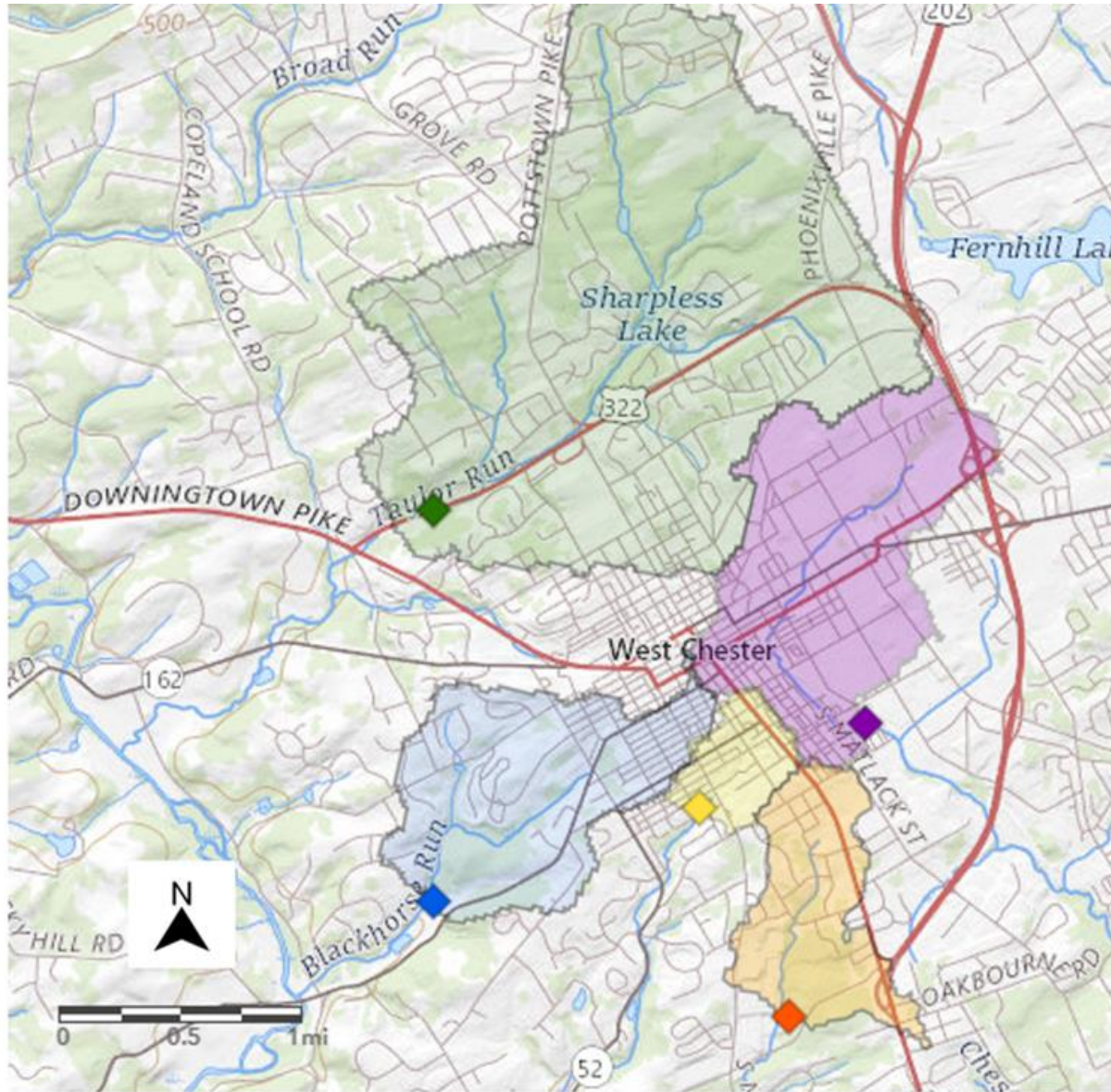




PART I

INVESTIGATING STREAM RESPONSE TO ROAD DE-ICING AGENTS

A CLOSER LOOK AT 5 STREAMS
IN WEST CHESTER,
PENNSYLVANIA



PRWB Watershed Boundary



GC Watershed Boundary



BR Watershed Boundary



TR Watershed Boundary



Plum Run East Branch



PREB SL281

Plum Run West Branch



PRWB SL282

Goose Creek



GC SL283

Blackhorse Run



BR SL284

Taylor Run



TR SL285

STUDY AREA

METHODS / LAND COVER

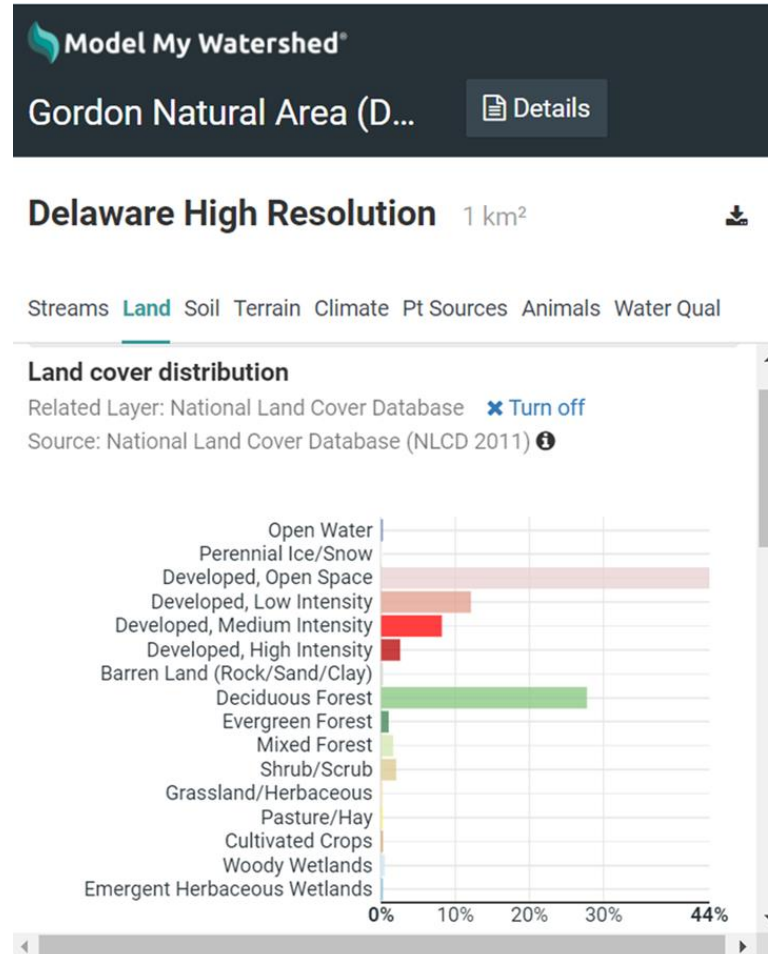
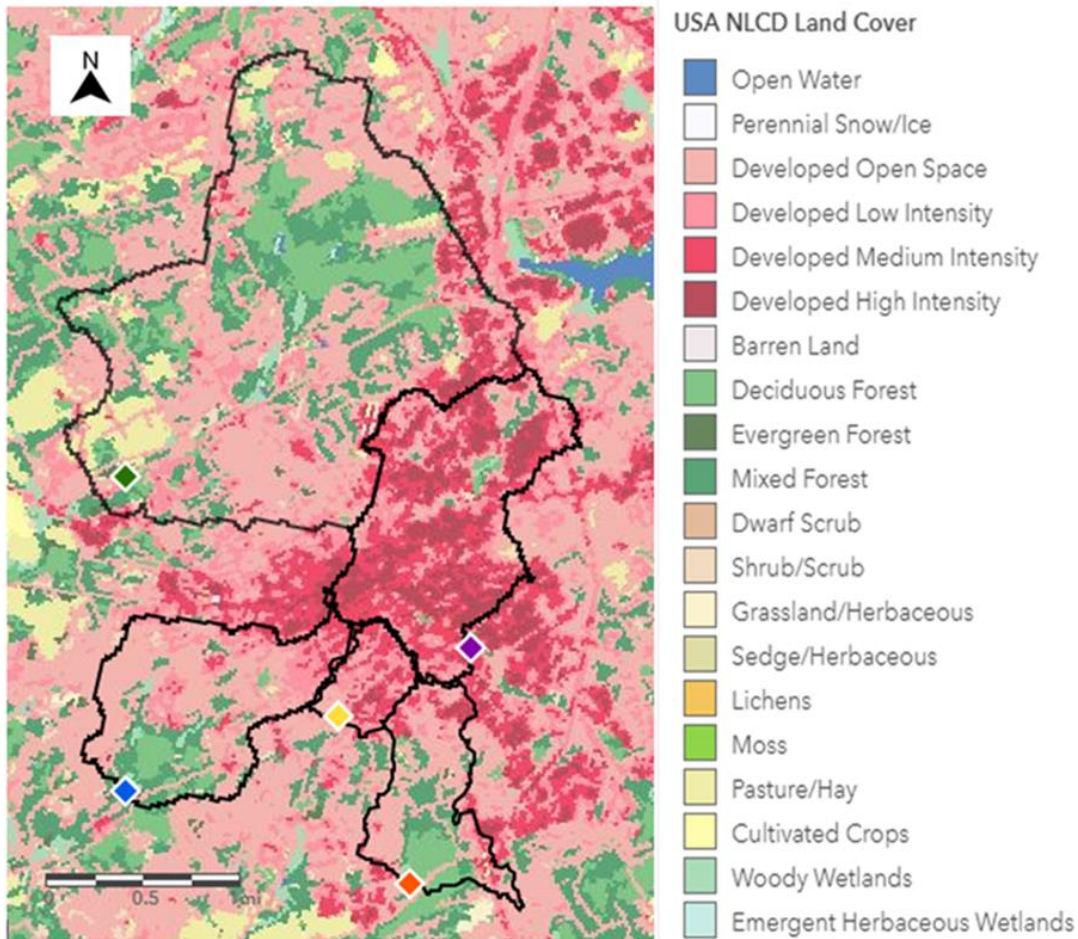


Image of Model My Watershed. Adapted from Model My Watershed, by SWRC, 2020, retrieved from <https://modelmywatershed.org/project/31761/scenario/54611>

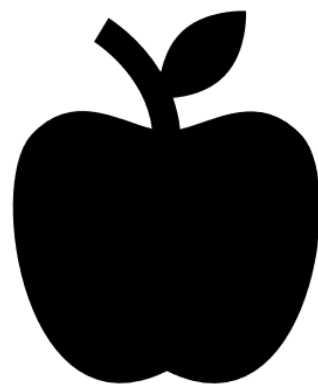


METHODS / MONITORING STATION INSTALLATION

Left: David Bressler and Rachel Johnson

Right: Rachel Johnson, Shannon Hicks, and David Bressler





Neutral Buoyant Object (NBO)

$$Q(h) = ah^2 + bh + c, \text{ where } h = \text{sensor depth}$$

Equation used for research project.

METHODS

DISCHARGE MEASUREMENTS

METHODS / PRECIPITATION DATA

USGS 01480870 East Branch Brandywine Creek below Downingtown, PA PROVISIONAL DATA SUBJECT TO REVISION

Available data for this site

Time-series: Current/Historical Observations ▾

GO

⊖ Click to hide station-specific text

Funding for this site is provided by:



Chester County Water
Resources Authority



USGS - Federal Priority
Streamgages



USGS - Cooperative Matching
Funds

Image of National Water Information Systems: Web Interface, by USGS. Retrieved from https://nwis.waterdata.usgs.gov/pa/nwis/uv/?cb_00045=on&format=gif_default&site_no=01480870&period=&begin_date=2019-12-09&end_date=2019-12-10



METHODS

CHLORIDE

RESULTS / EVENT #1

NO SALT

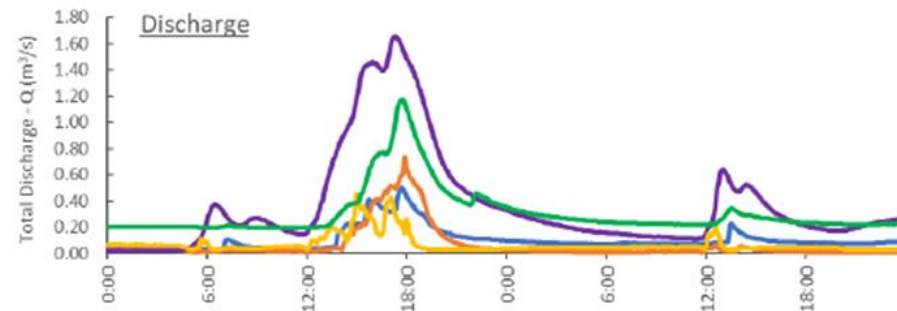
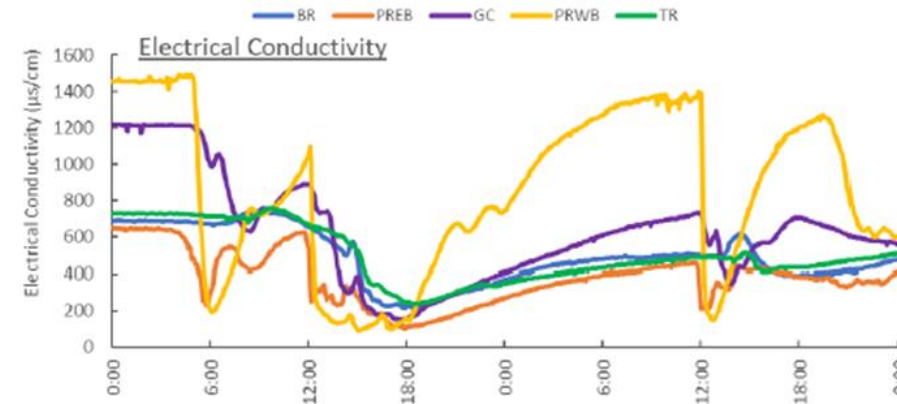
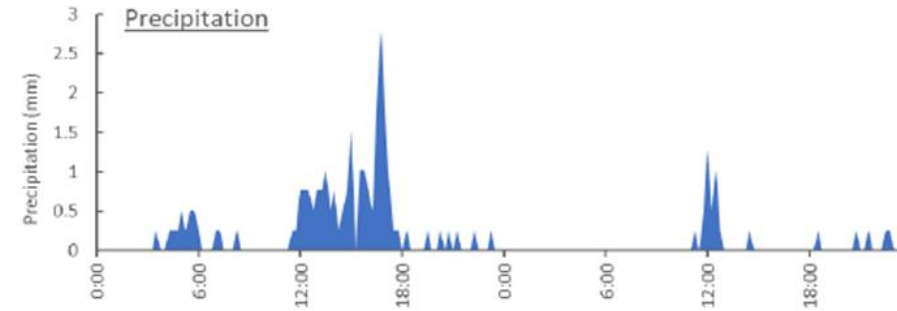
December 8 & 9, 2020

Precipitation

- 32 mm

Electrical Conductivity / Drop

Stream	From $\mu\text{S/cm}$	To $\mu\text{S/cm}$
PREB	604	230
PRVVB	1449	194
GC	1208	631
TR	727	238
BR	468	219



RESULTS / EVENT #2

SALT RESPONSE

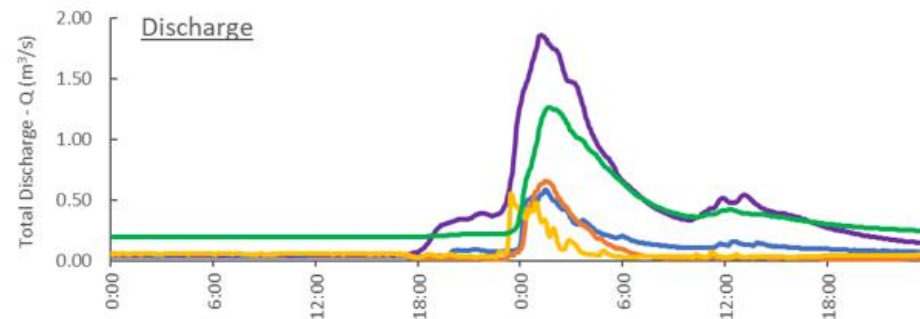
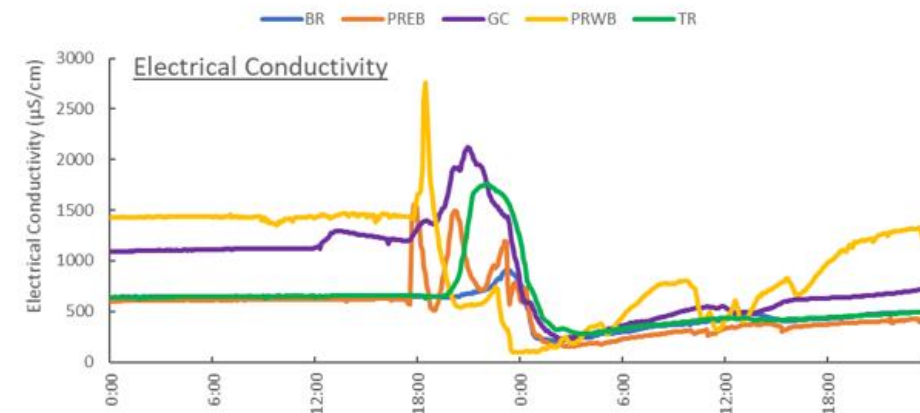
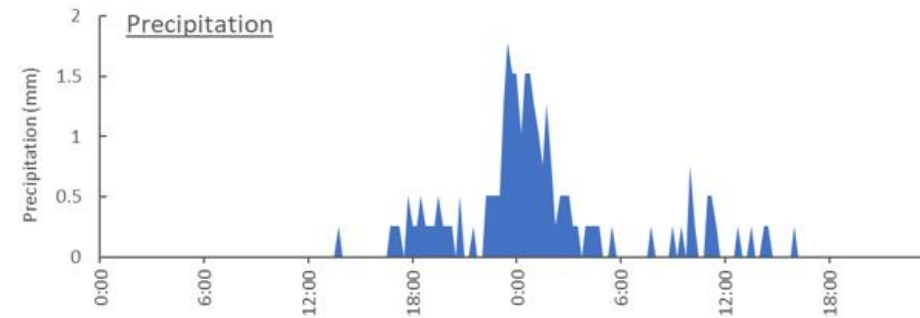
December 16 & 17, 2020

Precipitation

■ 31 mm

Electrical Conductivity / Spike

Stream	From $\mu\text{S/cm}$	To $\mu\text{S/cm}$
PREB	605	1551
PRWB	1428	2764
PREB	605	1482
GC	1092	2126
TR	638	1755
PREB	605	1195
BR	639	907



RESULTS / EVENT #3

RESIDUAL SALT RESPONSE (?)

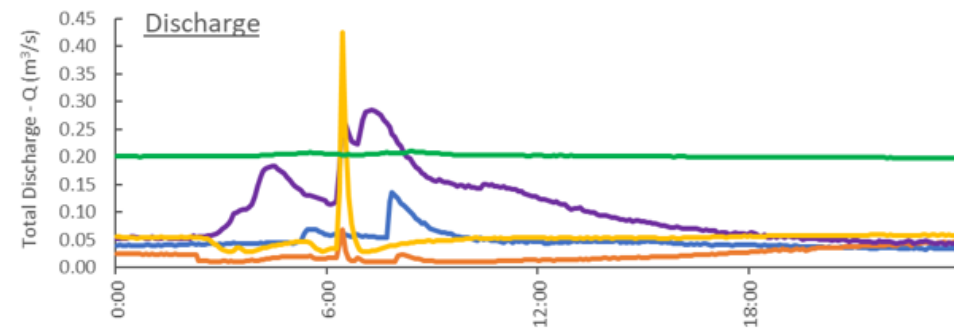
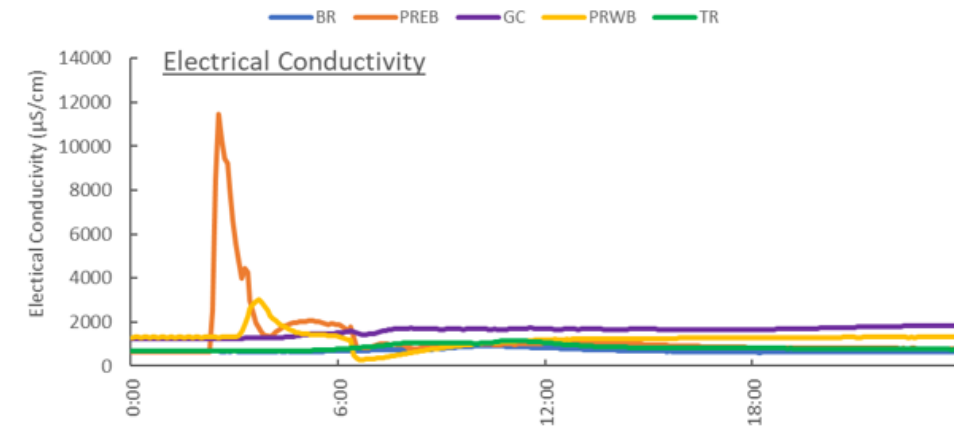
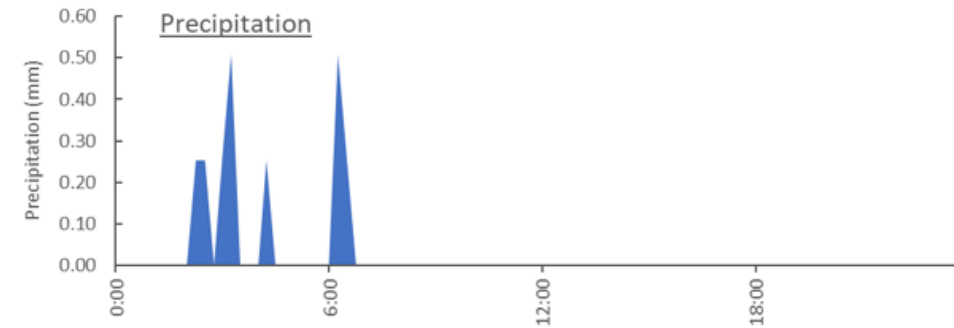
January 12, 2020

Precipitation

■ 2.3 mm

Electrical Conductivity / Spike

<u>Stream</u>	<u>From</u> <u>μS/cm</u>	<u>To</u> <u>μS/cm</u>
PREB	641	11444
PRWB	1279	3012
GC	1225	1859
TR	689	1148
BR	665	910



RESULTS / EVENT #4

SALT RESPONSE

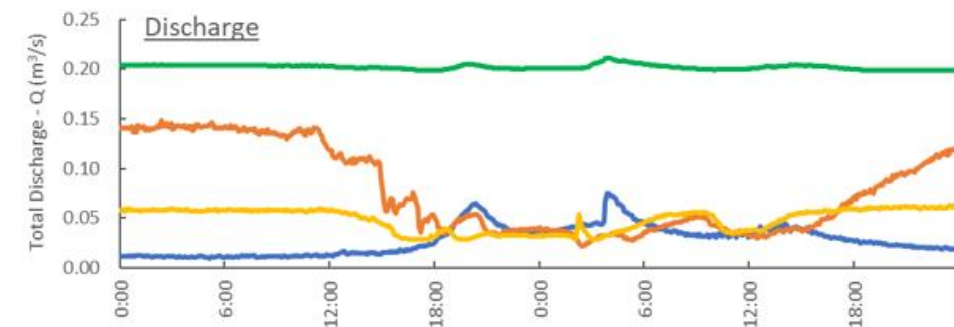
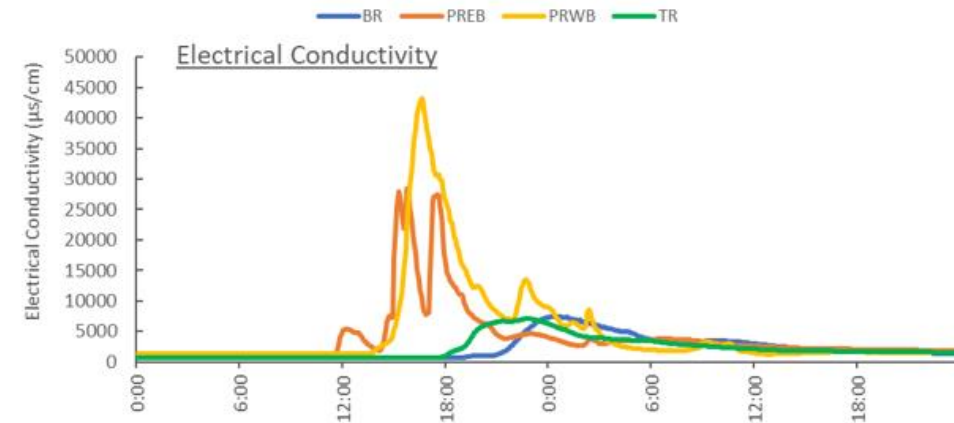
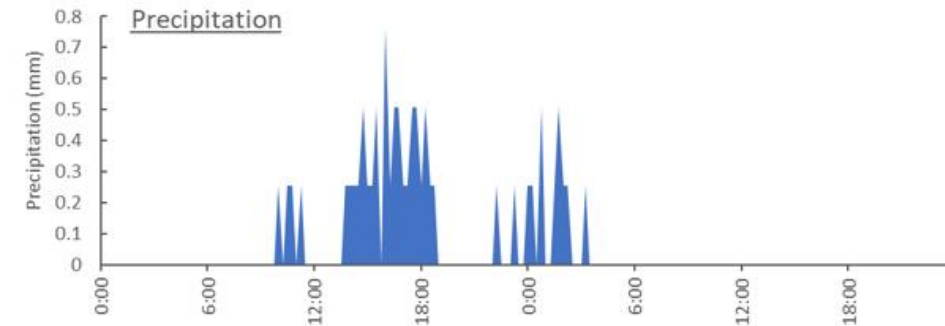
January 18 & 19, 2020

Precipitation

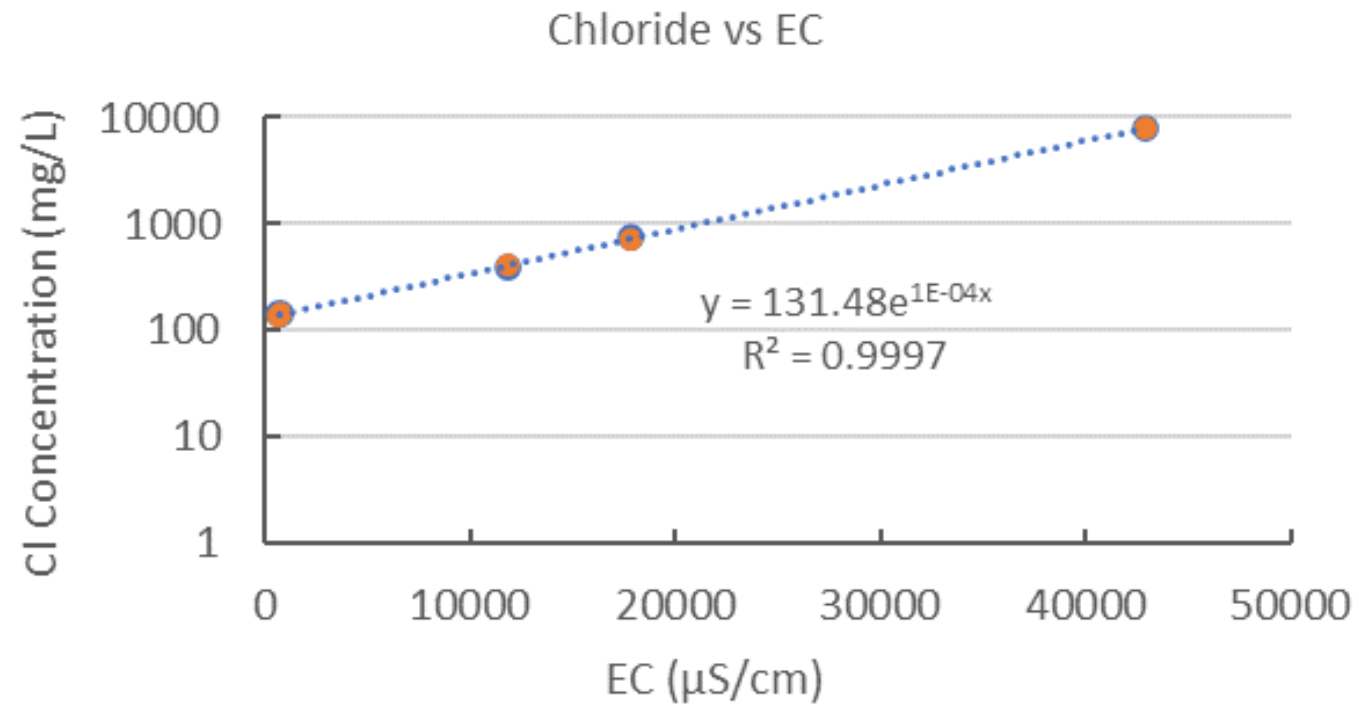
■ 11 mm

Electrical Conductivity / Spike

Stream	From $\mu\text{S/cm}$	To $\mu\text{S/cm}$
PREB	695	5381
PREB	695	27990
PRWB	1320	43287
PREB	696	28430
PREB	695	27473
PRWB	1320	8559
PRWB	1320	13437
TR	740	7083
BR	694	7476

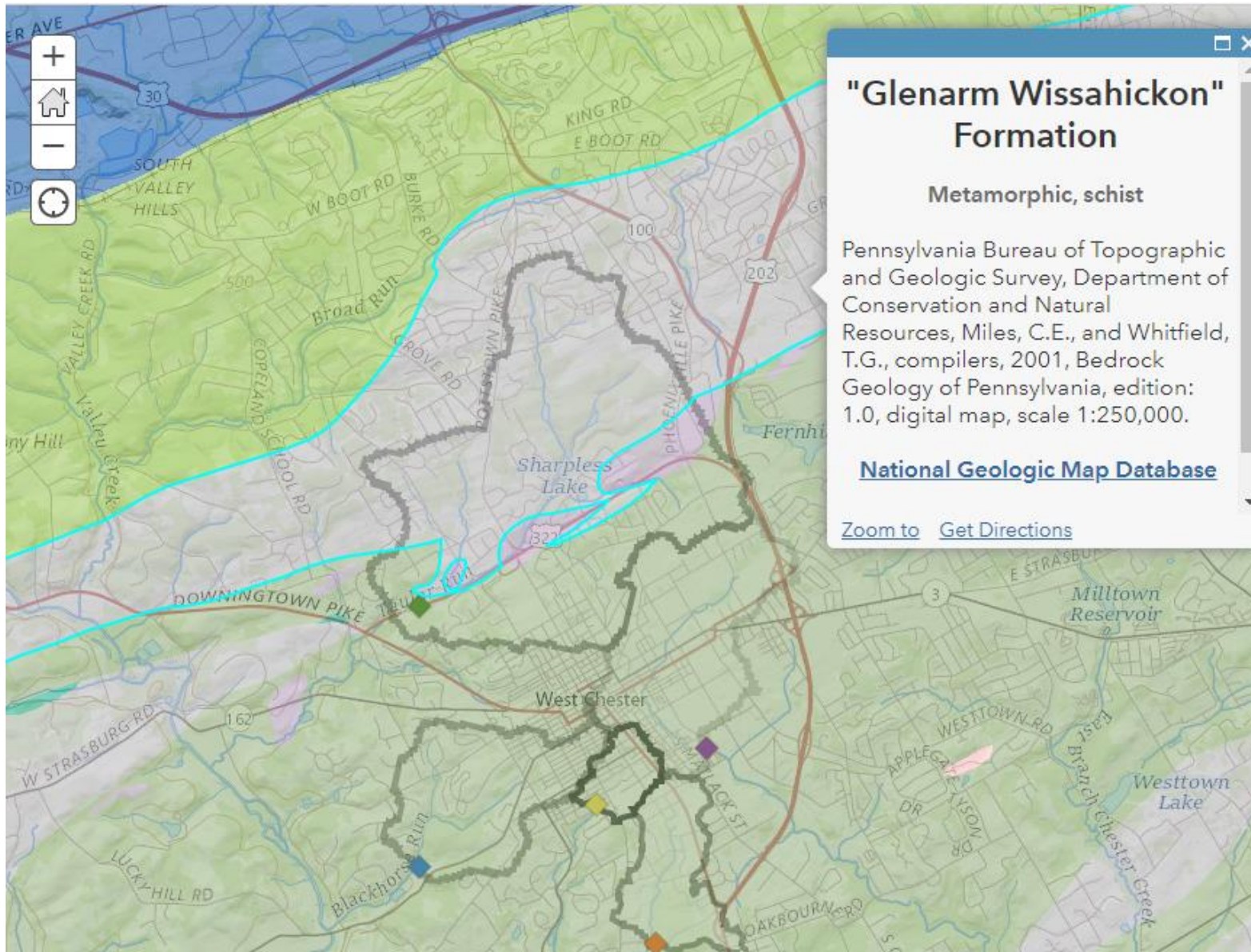


RESULTS / CHLORIDE



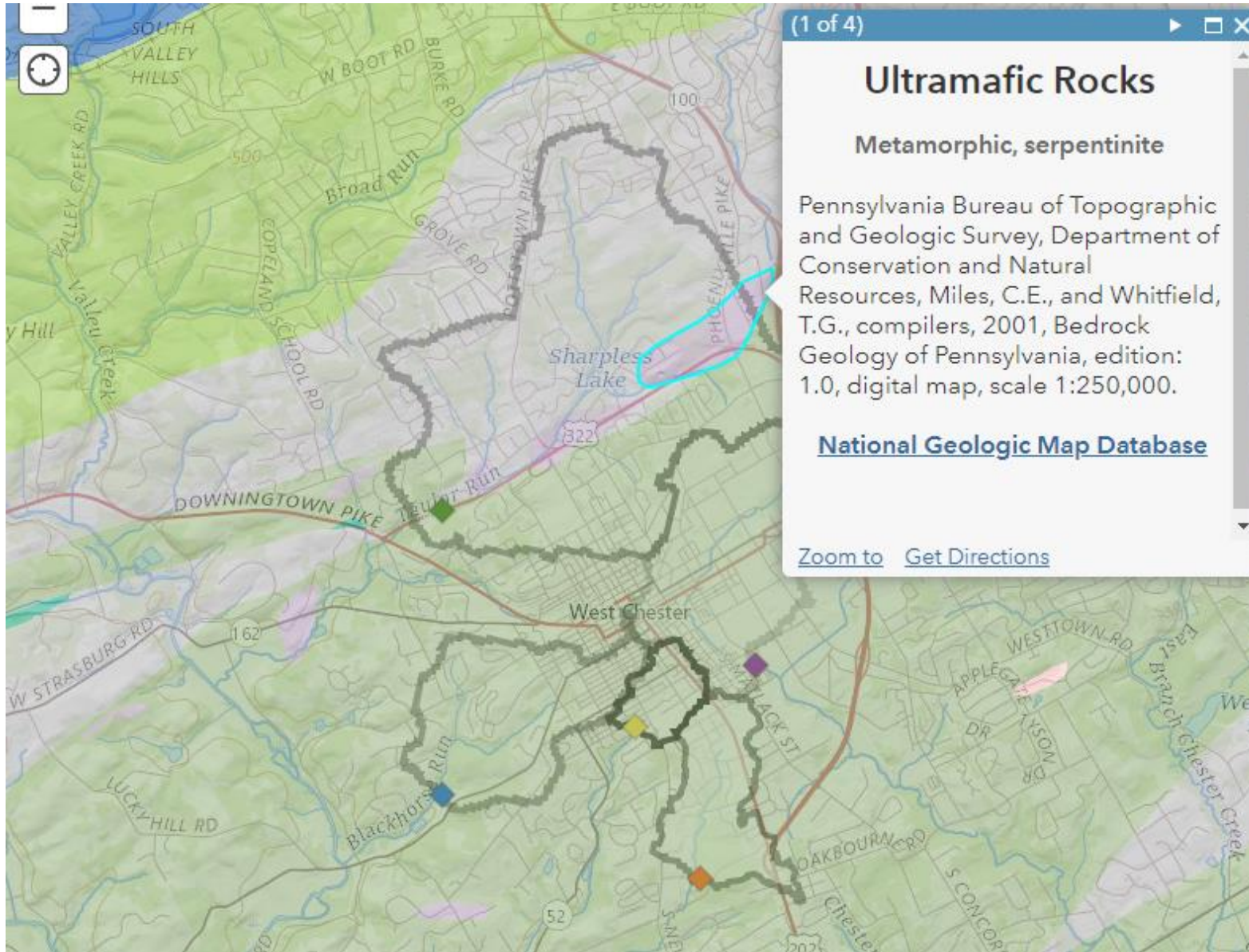
CONCLUSION

- Stream responses to de-icing agents were identified as a result of observing baseline data for this study.
 - PREB and PRWB are the first two streams to respond to de-icing agents observed as spikes in EC.
 - GC is typically the third stream to reach peak EC. GC experiences a slower steadier rise.
 - TR and BR are the fourth and fifth streams to reach peak EC, respectively. These streams also experience a slow steady rise, reaching peak EC several hours after the first responses of PREB and PRWB.
- De-icing agents may have significant impacts on aquatic life and the potability of water. Long term research will be necessary to identify specific effects and develop mitigating measures to assure the future health of these freshwater sources.



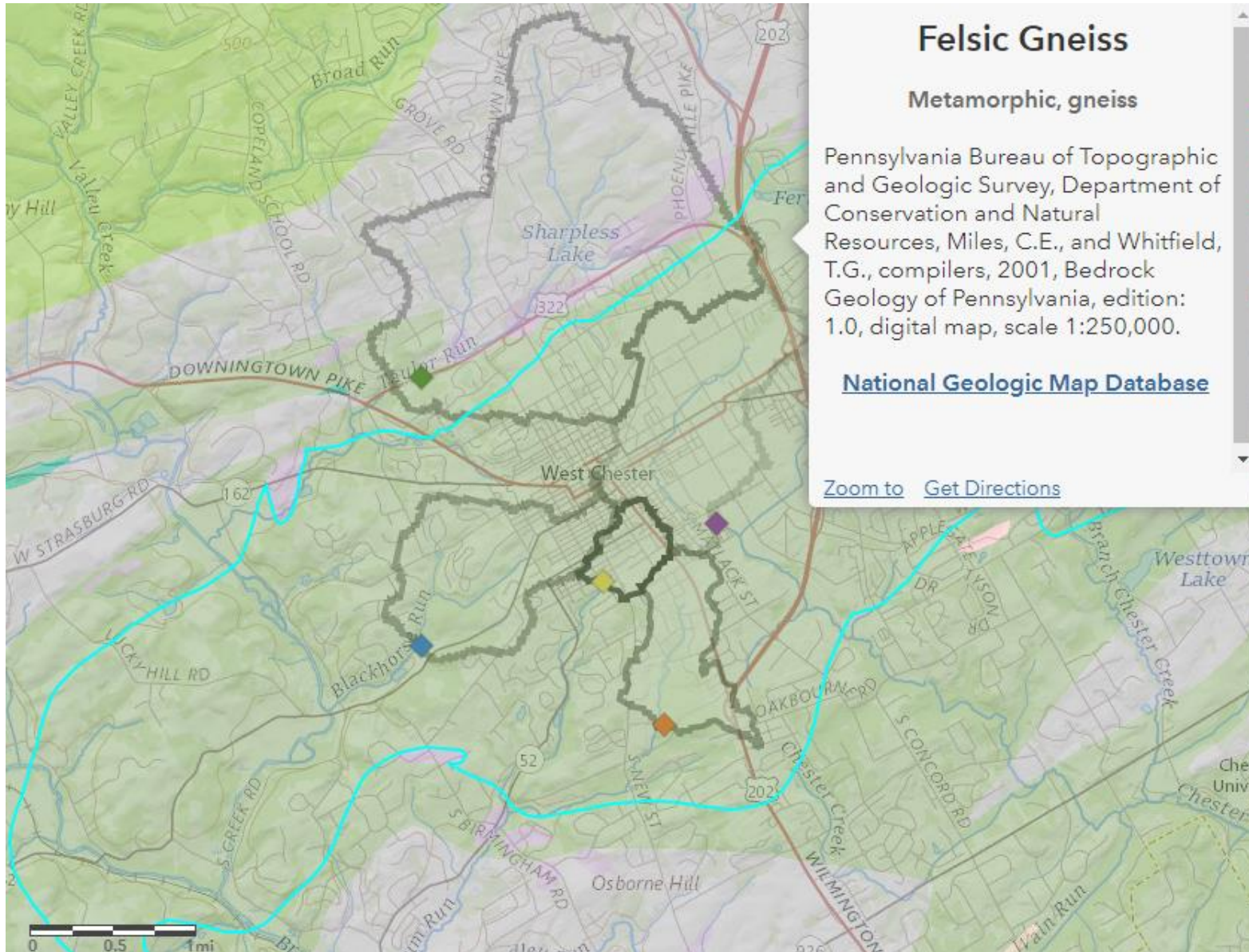
STUDY AREA

UNDERLYING GEOLOGY



STUDY AREA

UNDERLYING GEOLOGY



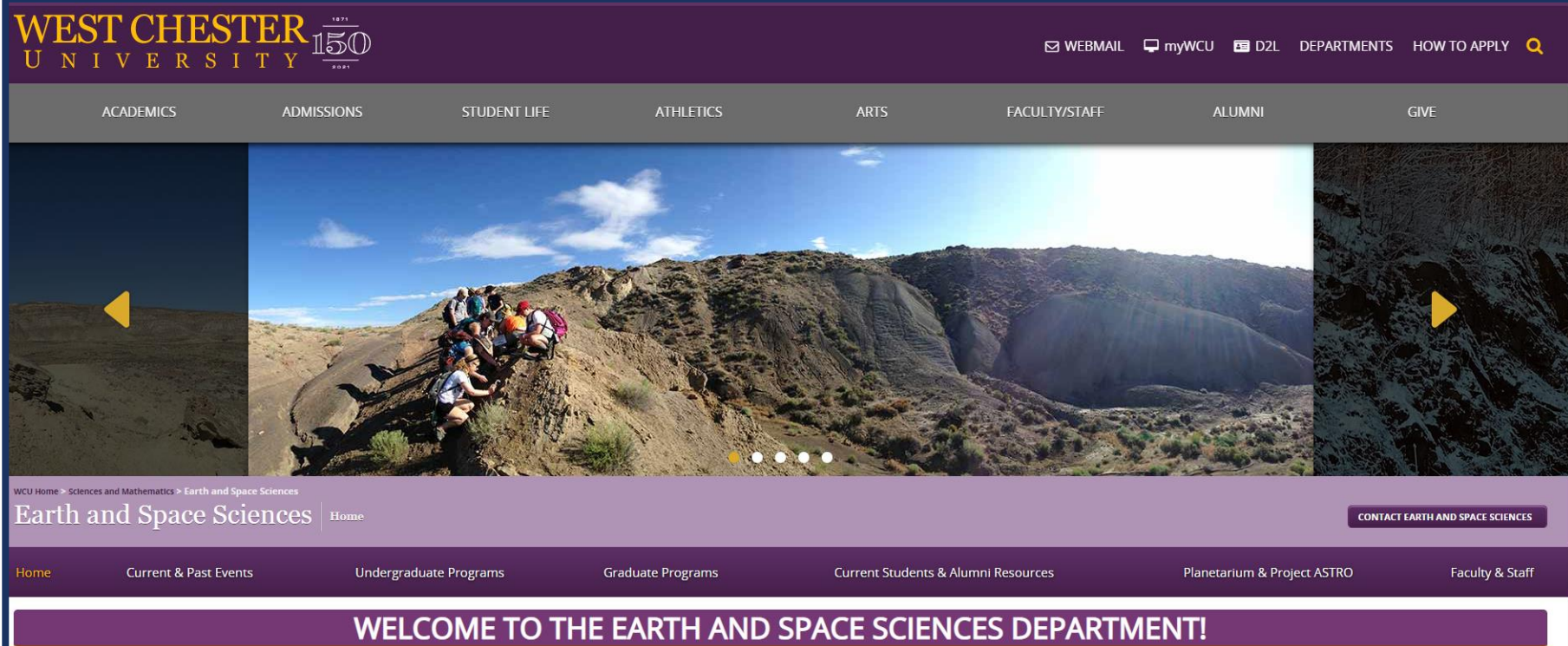
STUDY AREA

UNDERLYING GEOLOGY



PART 2

ENVIRO DIY / CITIZEN SCIENCE LOGISTICS



WEST CHESTER UNIVERSITY

GRADUATE STUDENT • EARTH AND SPACE SCIENCES DEPARTMENT

IMAGE RETRIEVED FROM WCUPA.EDU



PENN STATE EXTENSION

MASTER WATERSHED STEWARD

IMAGE RETRIEVED FROM
BENARILAW.COM



STROUD WATER RESEARCH CENTER

ENVIRO DIY
VOLUNTEER

SWRC IMAGE RETRIEVED FROM
YOUTUBE



Create an Account - Increase your productivity, customize your experience, and engage in information you care about.

COVID-19

GOVERNMENT

SERVICES

RESIDENTS

Administration

Finance & Revenue / Tax Information

Building, Housing & Code Enforcement

Fire Department

Information Technology Services

Parking Services

Parks & Recreation

Police Department

Public Works

Waste Water Department

[You Are Here: Government > Departments > Waste Water Department](#)

WASTE WATER DEPARTMENT

ABOUT THE DEPARTMENT

The department is comprised of 2 treatment plants and 4 pumping stations is owned and operated by the Borough of West Chester. The department has an annual, total budget of approximately \$4.5 million dollars. The Borough of West Chester owns over \$30 million worth of physical structures and mechanical equipment that make up the Waste Water Department.

The primary responsibility of the staff is to serve the residents of West Chester and East Bradford Township through effective operating techniques and to insure that the stringent parameters and permits are met or exceeded.

The department employs 18 personnel pursuing many different specialized jobs at the 2 plants. The system is monitored and maintained by:

- A compliance officer
- Certified operators
- Lab technicians
- Maintenance crews
- Supervisors

ABOUT THE PLANTS

The infrastructure is divided into 2 collection basins served by the Goose Creek and Taylor Run treatment plants. The breakdown of sewage is biologically accomplished by different methods at each plant, but the processes are ultimately very efficient and benign to the receiving streams. After passing through the several biological and oxidation processes at the 2 plants, the disinfected, "polished" effluent is dechlorinated by chemical means before discharge to the streams.

[Contact Us](#)

Waste Water
Department

Mailing Address

Borough of West Chester
401 E. Gay St.
West Chester, PA 19380

Taylor Run Plant

Email Michael Findley
Wastewater
Superintendent
795 Downingtown Pike
West Chester, PA 19380
Ph: 610-436-1369

Goose Creek Plant

Email Sean Mitchell
Wasterwater
Superintendent
351 Snyder Ave.
West Chester, PA 19382
Ph: 610-696-2320

Hours

9 a.m. - 3 p.m.

[Staff Directory](#)

**BOROUGH OF WEST
CHESTER**

PERMISSION FOR INSTALLATION

WASTER WATER SUPERINTENDANTS (2) VIA PHONE AND EMAIL

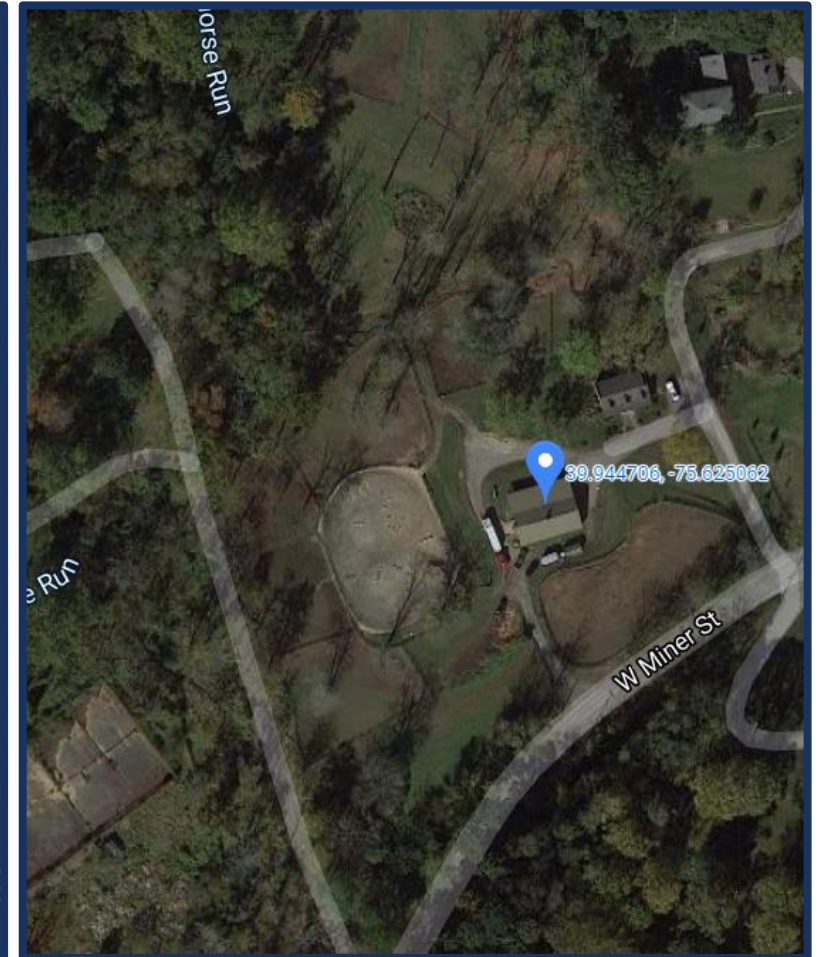
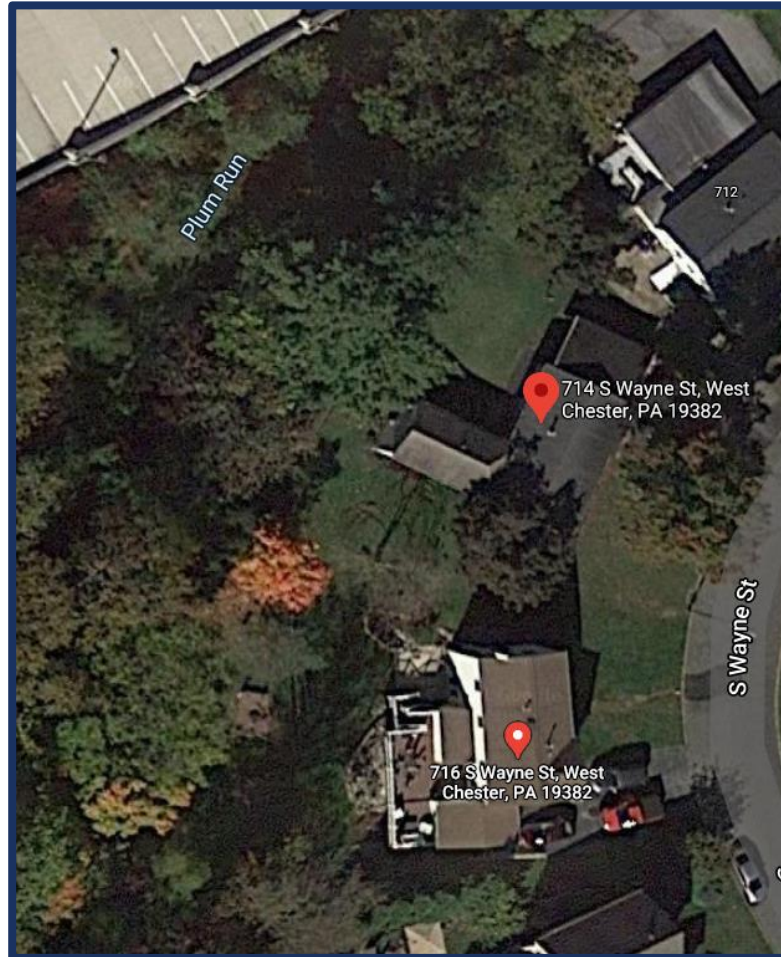
IMAGE RETRIEVED FROM WEST-
CHESTER.COM

RESIDENTS

PROPERTY ACCESS / KNOCKING ON THE DOOR

MAP OF SOUTH WAYNE
STREET RETRIVED FROM
GOOGLE MAPS

MAP NEAR WEST MINOR
STREET RETRIEVED FROM
GOOGLE MAPS



STEWARDSHIP MANAGER OF THE GORDON NATURAL AREA

STREAM ACCESS NEXT TO THE PUMP HOUSE / EMAIL COMMUNICATION

[IMAGE RETRIEVED FROM WCUPA.EDU](http://WCUPA.EDU)

Gordon Natural Area



WEST CHESTER UNIVERSITY – MANAGER OF GROUNDS MAINTENANCE

CAMPUS SALTING PRACTICES: IN PERSON INFORMATIONAL INTERVIEW

[IMAGE RETRIEVED FROM WCUPA.EDU](https://wcupa.edu)

WEST CHESTER
UNIVERSITY

1871
150
2021

[WEBMAIL](#) [myWCU](#) [D2L](#) [DEPARTMENTS](#) [HOW TO APPLY](#) [Q](#)

[ACADEMICS](#) [ADMISSIONS](#) [STUDENT LIFE](#) [ATHLETICS](#) [ARTS](#) [FACULTY/STAFF](#) [ALUMNI](#) [GIVE](#)

[Home](#) > [Finance & Administration](#) > [Facilities](#) > [Snow Walks](#)
Facilities | [Snow Walks](#) [CONTACT FACILITIES](#)

[Home](#) [Students](#) [Faculty/Staff](#) [Energy and Sustainability](#) [Policies and Procedures](#)

Snow Walks

Snow Removal Information

To Report Hazardous Conditions:

- Help Facilities maintain a safe campus by alerting us to potential ice hazards that you observe or are reported to you.
- Call Work Control at x2444 (8:00 am to 4:30 pm, Monday through Friday).
- After hours: report emergencies to Public Safety at x3311.

Snow Walks Plan

In order to keep the campus operational during snow removal, a network of priority sidewalks (Snow Walks) has been selected. The Snow Walks shall be the first walks cleared during a snow event and every attempt shall be made to keep them open while the snow is still falling. Building entrances shall be cleared on a prioritized basis with the highest priority going to entrances that lead to Snow Walks.

The Snow Walk network will allow a person to get from any location on North Campus to any other location on North Campus. During a snow event, the university encourages the use of Snow Walks and avoiding unplowed paths. The Snow Walks will be safer, drier and less slippery than untouched walks.

ADA access was a major factor in determining the Snow Walk network. The University endeavors to provide equal mobility access. Of necessity, stairs and routes with stairs have a lower priority than Snow Walk routes.

The Snow Walk arrangement in South Campus is designed to get people either to bus stops or parking lots. The Snow Walk system in the more remote South Campus assumes that people will rely on private or public transportation to reach other campus buildings. Owing to the design of the SC Apartments, stairways shall be integrated into the Snow Walk net. Within the apartment complex, the Snow Walk system will operate in a similar manner to North Campus.

Campus Zones

BOROUGH OF WEST CHESTER
PUBLIC WORKS DEPARTMENT

BOROUGH SALTING
PRACTICES

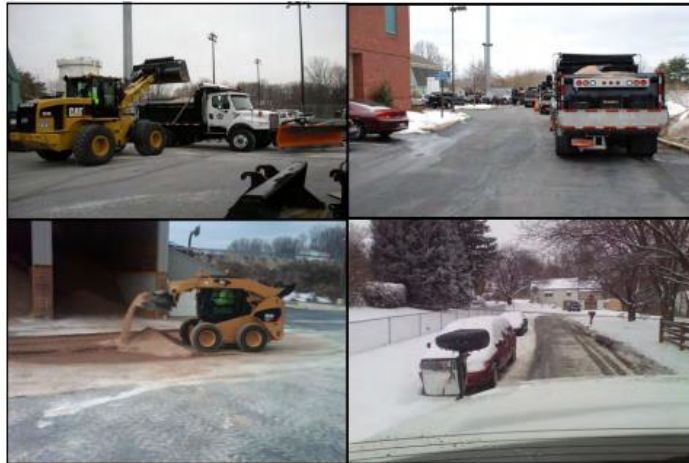
ADMINISTRATIVE ASSISTANT
VIA EMAIL

IMAGE RETRIEVED FROM GOOGLE MAPS





West Goshen Township
Streets Department



Winter Operational Procedures, Snow & Ice Control
and General Information

WEST GOSHEN
TOWNSHIP

TOWNSHIP SALING
PRACTICES

POSTED ONLINE

IMAGE RETRIEVED FROM
WGOSHEN.ORG

Township Priority Roads Winter Storm Maintenance

Call the Township at (610) 436-5108 x201
or email rbehmke@eastbradford.org
for issues on these roads.

- Allerton Road
- Blue Rock Road
- Bradford Avenue
(only Hillsdale Rd to W. Miner St.)
- Brandywine Road
- Conner Road (winter maintenance only)
- Copeland School Road
(Rt. 322 to Guthrie Rd.; winter maintenance only)
- Frank Road
- Guthrie Road
- Harmony Hill Road
- Highland Road (Rt. 322 to Hillsdale Rd.)
- Hillsdale Road
- Lucky Hill Road
- Mansion House Drive
- North Creek Road (Rt. 322 to Rt. 162)
- North Creek Road (Rt. 162 to Rt. 842)
- Price Street
- Scanneltown Road
- St. Finegan Drive
- Shenton Road
- Skelp Level Road
- South New Street
- Sunset Hollow Road
- Tree Lane
- Valley Creek Road
- West Market Street

PennDOT Priority Roads

Call PennDOT at (484) 340-3200 for issues
on these roads.

FALL
2020

Winter Road Maintenance



Each winter, the Township Public Works Department is responsible for clearing and plowing approximately 57 miles of Township roads—this equates to 114 lane miles. The roads are divided into seven plow routes—one for each plow operator.

For the purposes of winter storm operations, the Township further divides this road network into three service categories:

1. Primary roads are those with higher traffic volume and/or that serve as through roads (see list in sidebar to the left). Winter maintenance starts on priority roads (and may focus solely on these roads during an intense storm) to ensure these primary routes remain open and passable.
2. Secondary roads are all other subdivision roads.
3. Tertiary roads are cul-de-sacs, which although lower priority, may be cleared and/or treated along with secondary roads, as weather conditions

curtails the snow from freezing to the road surface so it can be plowed later. Road salt works best when there is traffic to work the brine over the surface. During freezing rain and sleet events, anti-skid operations continue until precipitation stops.

Snow plowing operations start usually after 2-3 inches of snow have accumulated on road surfaces. If the precipitation is light, the Township will keep the entire road network clear, traversing all three types of roads listed above.

If the storm intensifies the trucks will focus on priority roads. Cul-de-sac streets and minor roads will not be done unless the priority roads can be kept open. If a storm intensity reaches a level that makes it difficult to maintain, the trucks will only focus on the priority roads.

After the precipitation stops and all Township roads have been plowed to establish a minimum passable lane, cartway lanes are opened wider to the paved edge. Intersections and cul-de-sacs are cleared last.

The responsibility for providing winter maintenance on private roads is the responsibility of the property owners (or the developer in a new development). East Bradford Township does not perform winter maintenance on state roads either (see list in sidebar to the left). For winter maintenance problems with these roads,

EAST BRADFORD TOWNSHIP
TOWNSHIP SALTING PRACTICES
DIRECTOR OF PUBLIC WORKS
VIA EMAIL

[IMAGE RETRIEVED FROM EASTBRADFORD.ORG](http://EASTBRADFORD.ORG)

CERTIFICATE HOLDER

TAYLORS

Taylors Run and Stroud Water
Research Center
401 E. Gay St.
West Chester, PA 19380



4HCHE15

OP ID: ES

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

02/18/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

TAYLOR RUN WASTE WATER TREATMENT PLANT

LIABILITY - MVS LIABILITY INSURANCE THROUGH PENN STATE EXTENSION

LOCAL LABS

COSTS FOR FULL SUITE ANALYSIS / CALLED LABS / LABS SENT COST ESTIMATE SHEETS

[WATER SAMPLE COSTS RETRIEVED FROM ENR.GOV](#)

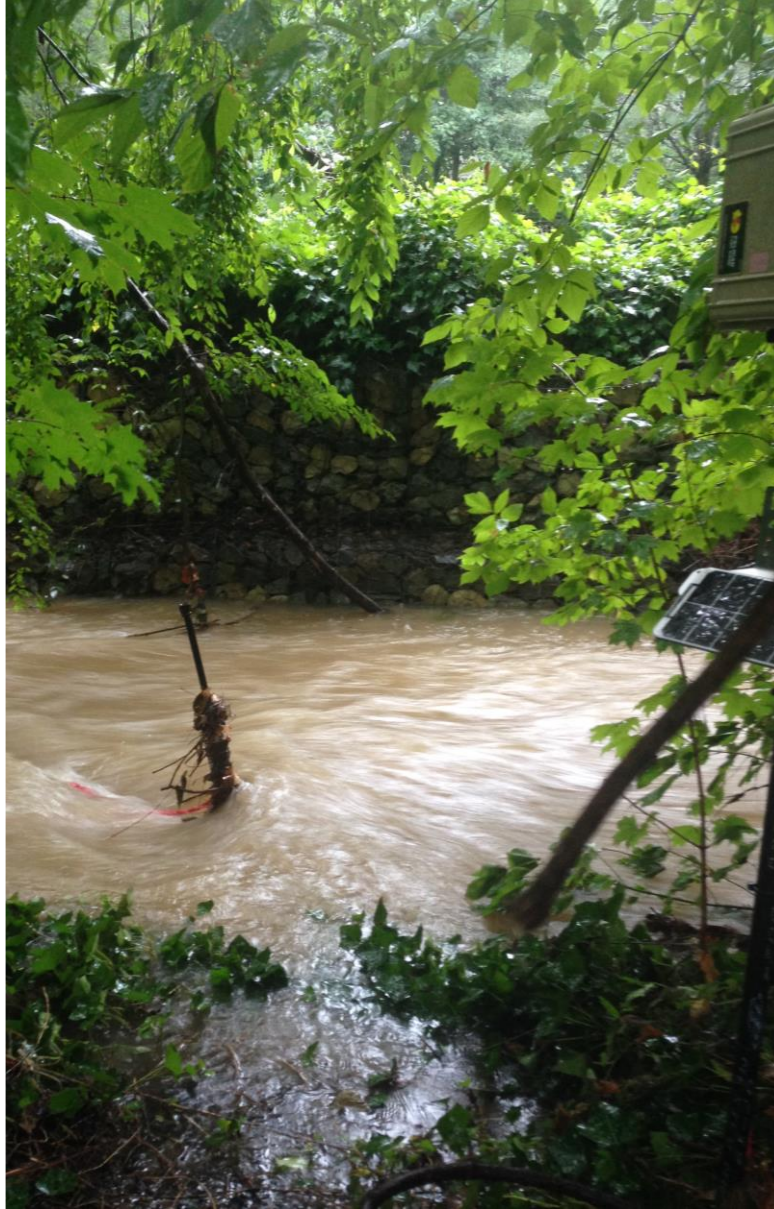
Water Analysis – Individual Parameters

1) Physical Parameters (per sample)

• Alkalinity, Carbonates (Alkal)	\$15.00
• Colour, Apparent	\$10.00
• Colour, Tru	\$13.00
• Solids, Total Dissolved (TDS)	\$20.00
• Solids, Total Suspended (TSS)	\$20.00
• pH	\$10.00
• Conductivity, Specific (25 °C) (Cond)	\$10.00
• Turbidity (Turb)	\$10.00
• Residual Chlorine (Cl ₂)	\$10.00
• Total Chlorine	\$6.00
• Oil and Grease (visible) (O&G (vis))	

3) Major Ions (per sample)

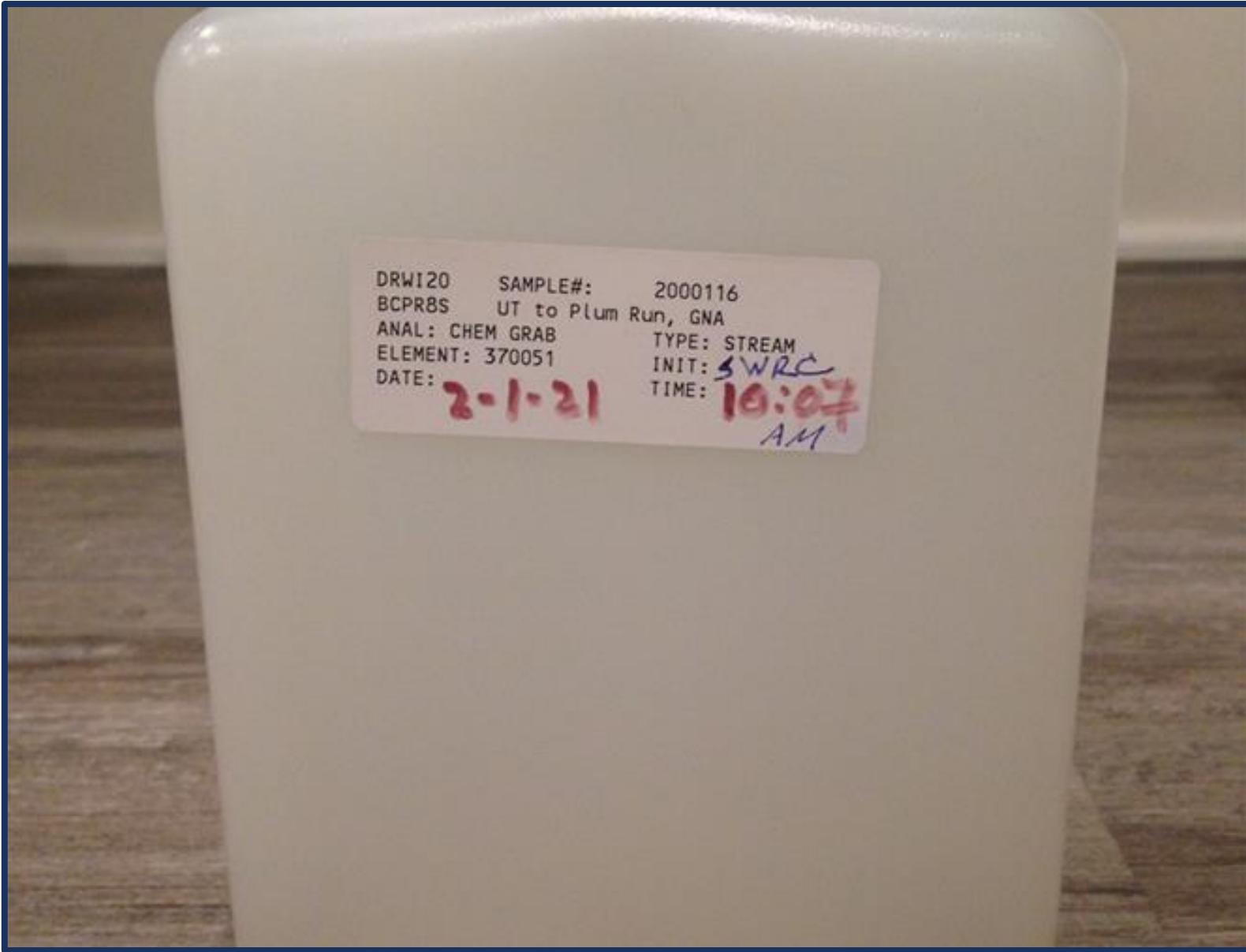
• Cation suite by IC Scan (includes Ca, Mg, K, Na, hardness)	\$33.00
• Calcium (Ca)	\$7.00
• Potassium (K)	\$7.00
• Magnesium (Mg)	\$7.00
• Sodium (Na)	\$20.00
• Hardness as CaCO ₃ (Hard)(Hardness requires Calcium and Magnesium analysis)	\$7.00
• Fluoride (F)	\$7.00
• Chloride (Cl)	\$7.00
• Sulphate (SO ₄)	\$7.00
• Nitrite (as N) (NO ₂ -N)	\$20.00
• Nitrate (as N) (NO ₃ -N)	\$18.00
• Nitrates + Nitrites (as N) (NO ₃ +NO ₂ -N) (NO ₃ +NO ₂ -N requires NO ₃ -N and NO ₂ -N analysis)	
• Reactive Silica (SiO ₂)	



PENN STATE
MASTER WATERSHED
STEWARDS

DISCHARGE MEASUREMENTS

CALLS / EMAILS / TEXTS



PENN STATE
MASTER WATERSHED
STEWARDS

WINTER GRAB SAMPLING

CALLS / EMAILS / TEXTS



PENN STATE
MASTER WATERSHED STEWARDS

AND


STROUD WATER RESEARCH
CENTER


GRAB SAMPLE
PICK-UP AND DROP OFF

CALLS / EMAILS / TEXTS

WEST CHESTER UNIVERSITY - ENVIRONMENTAL HEALTH PROGRAM

ESTABLISHING NEW STATION OWNERS / CALLS / EMAILS / ZOOM / IN-PERSON TRAINING



[WEBMAIL](#) [myWCU](#) [D2L](#) [DEPARTMENTS](#) [HOW TO APPLY](#) 

[ACADEMICS](#) [ADMISSIONS](#) [STUDENT LIFE](#) [ATHLETICS](#) [ARTS](#) [FACULTY/STAFF](#) [ALUMNI](#) [GIVE](#)

[WCU Home](#) > [College of Health Sciences](#) > [Department of Health](#) > [The Environmental Health Program](#)

The Environmental Health Program

[Home](#)

[CONTACT THE ENVIRONMENTAL HEALTH PROGRAM](#)

[Home](#) [BS in Environmental Health](#) [Minor in Environmental Health](#) [Master of Public Education](#)

The Environmental Health Program

The *Environmental Health Program* at West Chester University prepares talented students for the technical and professional demands of careers dedicated to the protection of human health and the environment. At all levels, the program embraces the broad environmental ethic of sustainability through human cooperation with nature, including basic rights to a safe home and workplace; clean water supplies for human consumption, recreation and wildlife; safe and available food supply; waste and energy management; and careful resource management for the future.

Our program is
accredited by the
National
Environmental
Health Science
and Protection



THE END

ENVIRO DIY GROUP

QUESTIONS
AND/OR
COMMENTS