Earthres Group, Inc.
toll free 800-264-4553

www.earthres.com

EARTHRES
ENGINEERING FOR SUCCESS℠

HEADQUARTERS / PHILADELPHIA REGION
P. O. Box 468, Pipersville, PA 18947
phone 215-766-1211

APPALACHIAN REGIONAL OFFICE
P. O. Box 794, Morgantown, WV 26505
phone 304-212-6866

January 23, 2023

Michael Kutney, P.G.
Permits Chief
PA Department of Environmental Protection
Pottsville District Mining Office
5 West Laurel Boulevard
Pottsville, PA 17901-2454

Re: NPDES Permit Modification Application (Permit No. PA0594121)
Heidelberg Materials Northeast LLC
Rock Hill Quarry Operation – SMP No. 7974SM1
East Rockhill Township, Bucks County
EARTHRES Project No. 061003.052

Dear Mr. Kutney:

On behalf of Heidelberg Materials Northeast LLC (Heidelberg), Earthres Group, Inc. (EARTHRES) is hereby submitting one (1) original and two (2) copies of the NPDES Permit Modification and Renewal Application for the Rock Hill Quarry Operation (SMP No. 7974SM1). As of January 1, 2023 Hanson Aggregates Pennsylvania LLC changed its name to Heidelberg Materials Northeast LLC. The Permit Modification proposes to replace the existing NPDES Discharge Point 001 with three (3) individual discharge points as well as increasing the discharge rate to accommodate the future dewatering of the currently filled quarry pit. No modifications and/or upgrades to existing Site and downstream features are proposed with the modification and consequently, the proposed discharge rate was determined based on the calculated limits of the existing conveyance system.

Consistent with our conversations with Joseph S. Blyler (Reviewing Engineer for most recent NPDES Permit approval) and Richard Tallman, this permit modification seeks to establish monitoring for the Clarifying Pond discharge, which will convey the pumped quarry pit discharge, as well as the stormwater basin discharges from Basin No. 1 and No. 2. This modification will provide monitoring of the Rock Hill Quarry (Site) discharges prior to their confluence with existing upstream flows along the unnamed tributary.

In addition, this Application contains a supplemental a Groundwater Pumping Evaluation Addendum that addresses a technical review of the groundwater model prepared on behalf of the Perkasie Regional Authority. The Addendum also provides an evaluation of quarry pumping impacts as it relates to the Pennsylvania Department of Environmental Protection's (PADEP) ongoing cleanup at the Ridge Run PFAS HSCA Site.

In support of the above mentioned permit modification, please find enclosed three (3) copies of the supplemental documents including the following:

- Application for Individual NPDES Permit Modification & Renewal Associated with Mining Activities;
- Attachment A-8: Public Notice;
- Attachment A-13: Map of Area;
- Attachment A-16: Anti-Degradation Supplement;
- Attachment C-21: NPDES Discharge Point Modification Report;
    - Attachment C-21.1: Streamstats Reports;
    - Attachment C-21.2: Hydraflow Express Output;
    - Attachment C-21.3: Flow Diagram;
    - Attachment C-21.4: Site Plan;
- Attachment D-1: Effluent Characterization Summary;
    - Attachment D-1.1: Analytical Report; and
- Attachment F-7: PPC Notification List.
- Attachment G: Groundwater Pumping Evaluation Addendum

A check in the amount of $500.00 has been included with this submittal to cover the NPDES renewal application fee.

Should you have any question or need any additional information to complete your review, please contact me at (215) 766-1211.

Sincerely,
Earthres Group, Inc.

Joseph JungTaek Kim, P.E.
Project Manager

Matthew S. Weikel, P.G.
Senior Hydrogeologist/Technical Manager

Enclosures: As stated

Cc: Andrew Gutshall (Heidelberg Materials)

Application for Individual NPDES Permit Associated with Mining Activities

5600-PM-BMP0032 Rev. 5/2020
Application

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING PROGRAMS

OFFICIAL USE ONLY
ID # _____
Date Received _____

APPLICATION FOR INDIVIDUAL NPDES PERMIT ASSOCIATED WITH MINING ACTIVITIES

Please answer all questions completely. Refer to the instructions that come with this form.

SECTION A. GENERAL APPLICANT INFORMATION

1. Application Type ☐ New ☒ Renewal ☒ Modification ☐ Transfer
☒ Fee included: See https://www.dep.pa.gov/Business/Land/Mining/BureauofDistrictMining/Pages/Fees.aspx

2. Applicant: Heidelberg Materials Northeast LLC

3. Associated Mining Permit No. or ID: 7974SM1
Except for "new", list existing NPDES Permit No: PA0594121

4. Operation Name: Rock Hill Quarry

5. License No: 24143

6. Applicant Email: andrew.gutshall@heidelbergmaterials.com

7. Permit/Project Type: (check applicable)
☐ Coal ☒ Noncoal
☒ Mining permit (surface or underground)
☐ Exploration
☐ GP-105 (Bluestone)
☐ Other _____

8. Public notice. (See instructions to determine if public notice is required.) Public notice has been submitted for publication. A draft notice is attached. ☒ Yes ☐ No

9. Production qualifications (Small business exemption)
COAL: Will coal production be at least 100,000 tons per year? ☐ Yes ☐ No
NONCOAL: Will production be at least $100,000 (1980 dollars) per year? ☒ Yes ☐ No

10. Total Affected Area (Acres): 103.2
Include all associated haul roads. Note: This acreage may be greater than the acres for the associated mining permit.

11. Estimated Timeframe: Start (or permit issuance) 7/19/2023 End (or permit expiration) 7/19/2028

12. Physical Address of Permit Location (911 compliant):
2055 N Rockhill Road, Sellersville, PA

County	Municipality	City	Boro	Twp
Bucks	East Rockhill	☐	☐	☒
		☐	☐	☐
		☐	☐	☐

13. Map View of Area
☒ Attach a map with outline of the affected area associated with the mining activity and label all outfalls.
☐ Map is included as part of mining permit documents marked as Exhibit No. _____ Date: _____

14. Receiving Stream/Watershed Name: Unnamed Tributary to Tohickon Creek/Upper Tohickon Creek Watershed
Is this stream subject to a TMDL? ☐ Yes ☒ No

15. Chapter 93 Receiving Water Designated Use: TSF, MF

16. Existing Stream Use (if different from designated use): EV Has this stream been petitioned for redesignation? ☒ Yes ☐ No

NOTE: If designated use is 'HQ' or 'EV', complete anti-degradation supplement form 5600-PM-BMP0007.

17. During mining, drainage will result in:
☒ **Point source discharge(s) (complete Section C: Outfall Information)**
☒ Surface Stream
☐ Municipal or Private Storm Sewer -- Provide name of Storm Sewer Operator:

☐ **Non-discharge**
☐ Groundwater – infiltration
☐ Containment without discharge (reuse)

☐ **Other** (Including off-site discharges) – Describe and attach documentation to support a legal right to discharge.

SECTION B. EROSION AND SEDIMENTATION (E & S) PLAN

18. E & S Plan

An E & S plan must be included as part of the associated mining permit information or attached to this application. The plan must provide a brief narrative describing the use of proposed BMPs and their performance to manage E & S for the project. If E & S BMPs to be implemented do not follow the guidelines referenced in the PA Erosion and Sediment Pollution Control Program Manual (TGD # 363-2134-008) or the Engineering Manual for Mining Operations (TGD # 563-0300-101), provide documentation to demonstrate performance equivalent to, or better than, the BMPs in the Manuals.

Check one:

☒ E & S plan meeting the above criteria is contained within the information associated with the mining permit/project listed in item #3 of this application.

☐ E & S information including a complete description of the implementation of BMPs is included with this NPDES application.

19. Best Management Practices (BMPs) Summary.

Check here if all BMPs are described as part of appropriate Modules of the mining permit/project (coal or noncoal) identified in Item No. 3. ☒

Complete the following if specific E & S Modules have not been submitted with an associated mining permit.

Check all that will be used at this mining site.

	BMP		BMP
☐	Sediment basins/traps with discharge outlet	☐	Bio-infiltration areas
☐	Constructed wetlands	☐	Vegetated swales / Stabilized channels
☐	Retention/containment basins	☐	Constructed filters/ filter bags
☐	Detention basin/pit sump	☐	Stabilized site entrances
☐	Non-discharging sedimentation traps	☐	Wheel washes
☐	Sediment fore bay	☐	Limiting disturbed area with concurrent reclamation
☐	Infiltration measures	☐	Oil/grit separators
☐	Protect Sensitive & Special Value Features	☐	Street sweeping
☐	Protect/Conserve/ Enhance Riparian areas	☐	Runoff capture/Reuse
☐	Restoration: Buffers/ Landscape/ Floodplain	☐	Temporary sediment controls (silt fence/silt-sok)
☐	Top of slope berms	☐	Top of slope diversions
☐	Rock inlets for basins	☐	Other _____
☐	Erosion control blankets/textiles	☐	Other _____

20. Reclamation and BMPs

Check here if any of the above checked BMPs will be left after final bond release. ☐

If checked, supply details, signed documentation of permission by the landowner and justification in the reclamation plan with the mining permit application. If this information is contained in the mining permit documents, please explain:

SECTION C. OUTFALL INFORMATION

This Section is to be completed when discrete outfalls are proposed. Attach additional pages for more than 4 points.

21. Identify each point in the tables below. Each discharge point must be shown and labeled as such on a map submitted with this application or as part of the mining permit/authorization. The labeling of discharge points must correspond with the labels used on the exhibit maps submitted in support of the mining permit/authorization. Non-discharging sedimentation traps and groundwater infiltration points are not outfalls and should not be included as outfalls but should be listed at the end of this section. Emergency Spillway(s) for ponds associated with non-discharge alternative must be permitted.

Describe the location and source of each point.

Discharge Point (e.g. SP 001, SP 002 etc.)	Latitude	Longitude	Receiving Stream	Source of Discharge (e.g., sedimentation pond, groundwater sump, etc.)
001	40° 24' 10.86“	-75° 18' 10.82“	Unnamed Tributary to Tohickon Creek	Clarification Pond and Pit Sump
002	40° 24' 17.67“	-75° 18' 15.77“	Unnamed Tributary to Tohickon Creek	Sedimentation Pond #1
003	40° 24' 14.49“	-75° 18' 14.22“	Unnamed Tributary to Tohickon Creek	Sedimentation Pond #2
	° ' “	° ' “		

For the same points as above, describe the flow and treatment for each point.

	Flow			
Discharge Point (e.g. SP 01, SP 02 etc.)	Average rate (mgd)	Design rate (mgd)	Frequency (Intermittent (I), Precipitation Dependent (P), Continuous (C)	Treatment
001	2.98	2.98	Intermittent	Settlement of Suspended Solids by Detention
002	N/A	N/A	Precipitation	Settlement of Suspended Solids by Detention
003	N/A	N/A	Precipitation	Settlement of Suspended Solids by Detention

Design rate is the discharge flow at the Q 7-10 stream flow for post-mining discharges, the maximum hydraulic capacity for other treatment facilities or the routed storm flow for sedimentation ponds.

Latitude/Longitude Collection Method: ☐ EMAP ☐ GPS ☐ Printed Map ☒ Other Google Earth

Check the horizontal reference datum (or projection datum) employed in the collection method.

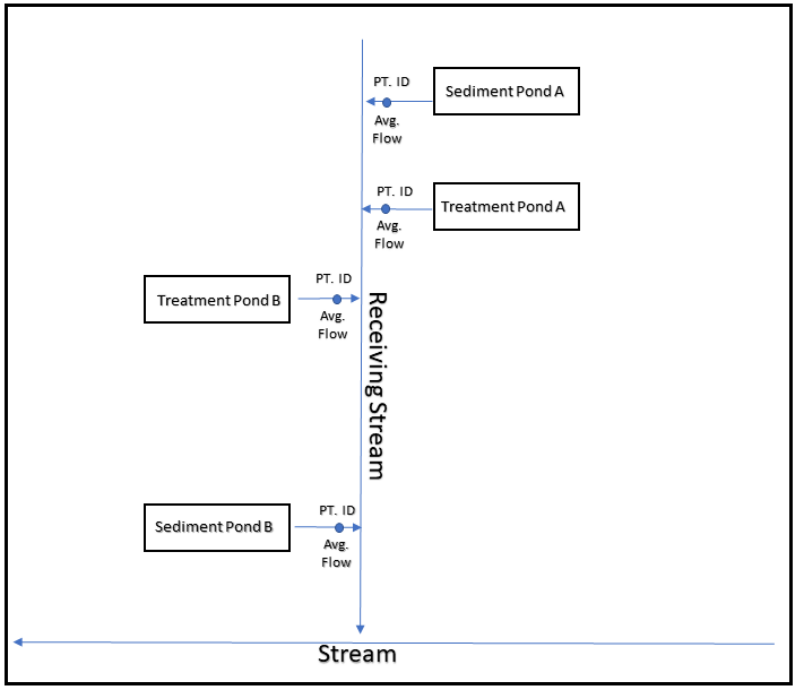
☐ NAD27 (topo maps) ☐ NAD83 (Emap) ☒ WGS84 (GEO84) (most GPS units)

For non-discharging sedimentation traps and groundwater infiltration points, provide the description and location:

Discharge/Sampling Point:	Latitude:	Longitude:	Source of Discharge (e.g., sedimentation pond, groundwater sump, etc.):

Depict the structures and corresponding discharge points, average flow rate, and receiving stream(s) in a flow diagram. Include line drawing below or attachment. [40 C.F.R. § 122.21(g)(2)] **Please see Attachment C-21.3: Flow Diagram**

Example:



22. Evaluation of Thermal Impacts. Describe how thermal impacts were evaluated and, if necessary, how they will be mitigated, in accordance with 25 Pa. Code Chapter 93.

Thermal impacts to the Unnamed Tributary to Tohickon Creek are not anticipated. The water discharged at NPDES discharge points are runoff from precipitation at the Site along with any groundwater discharge that may occur as a result of pumping from the mine pit.

23. Solid or liquid wastes not discharged. Will there be sludge or sediment produced from the treatment described above? ☒ Yes ☐ No

Will there be liquid produced from the treatment described above (not discharged via the outfall)? ☐ Yes ☒ No

Describe the material and its ultimate disposal: **Pond fines will be used with site overburden for final reclamation.**

SECTION D. EFFLUENT CHARACTERIZATION

Complete the following subsections for each discharge outfall listed in Item #21.

Discharge Point No(s).: **001**

24. Common parameters/pollutants. Complete the table for each constituent. Indicate 'E' if estimate, 'D' if based on actual data. If needed, attach a separate sheet labeled "Item #24 Common parameters/pollutants". Please include the units of measurement. If you are providing data from one discharge for two or more substantially identical effluents, indicate which outfalls the data represents. [40 CFR 122.21(k)(5)(i) and 40 CFR 122.21(g)(7)(iii)]

Constituent	Daily Max	Daily Average	Source of Information
pH	**9.0**	**N/A**	**D – See Analytical Results Attachment D-1 (Existing Permit)**
Total Suspended Solids (TSS)	**70.0 mg/l**	**35.0 mg/l**	**D – See Analytical Results Attachment D-1 (Existing Permit)**
Conductivity			**Waiver Requested**
Chemical Oxygen Demand (COD)[1]			**Waiver Requested**
Biochemical Oxygen Demand (BOD)[1]			**Waiver Requested**
Ammonia (NH3)[1]			**Waiver Requested**
Total Organic Carbon (TOC)[1]			**Waiver Requested**
Flow	**2.98 MGD**	**2.98 MGD**	**See attached NDPES Discharge Modification Report**
Temperature (high)	**Varies**	**Varies**	**Temperature of the discharge water varies with season**
Temperature (low)	**Varies**	**Varies**	

[1] Waiver option [40 CFR 122.21(k)(5)(i)]: A waiver is requested for the following constituents that are not anticipated to be present in the discharge:

☒ COD ☒ BOD ☒ NH3 ☒ TOC

In addition to the checked constituents above, a waiver for Conductivity is also requested. Please see Attachment D-1: Effluent Characterization Summary for justification.

Provide a justification for this waiver request.

See Attachment D-1: Effluent Characterization Summary.

25. Dioxins. As the applicant, do you have reason to believe that at any time dioxins were made, used, stored or buried on or directly upgradient from the site designated for mining and/or support area? [TCDD, 2,4,5-T, 2,4,5-TP, Erbon, Ronnel, TCP or HCP under 40 CFR 122.21 (g)(7)(viii) and 40 CFR 122.21 (k)(5)(iv)]

☐ Yes ☒ No

If yes, provide information and data characterizing the potential discharge on a separate sheet labeled "Item #25 Dioxins"

26. Organic Toxic Pollutants (EPA Table II) Provide waiver justification or data regarding organic toxic pollutants for the mine site.

Waiver: This section is not applicable because this operation fulfills one of the following criteria:

☐ For coal, this operation produces less than 100,000 tons per year.

☐ For noncoal, this operation has gross sales of less than $100,000 per year (1980 dollars).

If a waiver is not applicable, refer to Appendix B: Table II - Organic Toxic Pollutants. List any constituents from that table that are expected to be present in the discharge.

See Attachment D-1: Effluent Characterization Summary.

For all constituents listed above, provide a table of the estimated daily maximum concentration, the estimated daily average concentration and the source of this information on a separate attachment labeled "Item #26 Organic Toxic Pollutants".

27. Other toxic pollutants. For new mining permits, for each of the following constituents, provide an estimate of the concentration that could reasonably expected to be present in the discharges(s) and the source of this information [40 CFR 122.21 (k)(5)(iii)(A)] (EPA Table III).

For all Coal mining renewals, provide the actual data for concentrations. [40 CFR 122.21 (g)(7)(v)(B)]

For Noncoal renewals, provide data for those you expect to be present. Insert "X" for those not expected to be present [40 CFR 122.21 (g)(7)(vi)(B)]

Please include units of measurement for all concentrations reported.

Constituent	Concentration		Constituent	Concentration
Antimony, Total	**X**		Nickel, Total	**< 0.91 ug/L**
Arsenic, Total	**< 0.89 ug/L**		Selenium, Total	**< 0.59 ug/L**
Beryllium, Total	**X**		Silver, Total	**X**
Cadmium, Total	**< 0.071 ug/L**		Thallium, Total	**X**
Chromium, Total	**<2.5 ug/L**		Zinc, Total	**< 6.5 ug/L**
Copper, Total	**< 2.5 ug/L**		Cyanide, Total	**X**
Lead, Total	**< 0.84 ug/L**		Phenols, Total	**X**
Mercury, Total	**< 0.043 ug/L**			

28. Conventional and Nonconventional Pollutants. For each of the following constituents, check the boxes for those that you expect to be present in the discharge. (EPA Table IV)

☐ Bromide	☐ Nitrogen, Total Organic	☐ Sulfite	☒ Iron, Total
☐ Chlorine, Total Residual	☐ Oil and Grease	☐ Surfactants	☐ Magnesium, Total
☒ Color	☐ Phosphorus, Total	☒ Aluminum, Total	☐ Molybdenum, Total
☐ Fecal Coliform	☐ Radioactivity	☒ Barium, Total	☒ Manganese, Total
☒ Fluoride	☒ Sulfate	☒ Boron, Total	☐ Tin, Total
☐ Nitrate-Nitrite	☐ Sulfide	☐ Cobalt, Total	☒ Titanium, Total

For new outfalls, for each constituent checked above (those that you expect to be present) provide the estimated daily maximum concentration, daily average concentration and the source of the information on an attachment. For existing outfalls, report the daily maximum and daily average based on data collected within the previous five years.

See Attachment D-1: Effluent Characterization Summary.

29. Toxic Pollutants and Hazardous Substances (EPA Table V) Refer to Appendix B: Toxic Pollutants and Hazardous Substances. List any constituents from that table that are expected to be present in the discharge.

See Attachment D-1: Effluent Characterization Summary.

For all constituents listed above, provide data for each pollutant expected in the discharge or justification of why any are believed to be not present and the source of this information on a separate attachment labeled "Item #29 Toxic and Hazardous Pollutants".

SECTION D. EFFLUENT CHARACTERIZATION

Complete the following subsections for each discharge outfall listed in Item #21.

Discharge Point No(s).: 002

24. Common parameters/pollutants. Complete the table for each constituent. Indicate 'E' if estimate, 'D' if based on actual data. If needed, attach a separate sheet labeled "Item #24 Common parameters/pollutants". Please include the units of measurement. If you are providing data from one discharge for two or more substantially identical effluents, indicate which outfalls the data represents. [40 CFR 122.21(k)(5)(i) and 40 CFR 122.21(g)(7)(iii)]

Constituent	Daily Max	Daily Average	Source of Information
pH	9.0	N/A	D – See Analytical Results Attachment D-1 (Existing Permit)
Total Suspended Solids (TSS)	70.0 mg/l	35.0 mg/l	D – See Analytical Results Attachment D-1 (Existing Permit)
Conductivity			Waiver Requested
Chemical Oxygen Demand (COD)[1]			Waiver Requested
Biochemical Oxygen Demand (BOD)[1]			Waiver Requested
Ammonia (NH3)[1]			Waiver Requested
Total Organic Carbon (TOC)[1]			Waiver Requested
Flow	N/A	N/A	N/A
Temperature (high)	Varies	Varies	Temperature of the discharge water varies with season
Temperature (low)	Varies	Varies	

[1] Waiver option [40 CFR 122.21(k)(5)(i)]: A waiver is requested for the following constituents that are not anticipated to be present in the discharge:

☒ COD ☒ BOD ☒ NH3 ☒ TOC

In addition to the checked constituents above, a waiver for Conductivity is also requested. Please see Attachment D-1: Effluent Characterization Summary for justification.

Provide a justification for this waiver request.

See Attachment D-1: Effluent Characterization Summary.

25. Dioxins. As the applicant, do you have reason to believe that at any time dioxins were made, used, stored or buried on or directly upgradient from the site designated for mining and/or support area? [TCDD, 2,4,5-T, 2,4,5-TP, Erbon, Ronnel, TCP or HCP under 40 CFR 122.21 (g)(7)(viii) and 40 CFR 122.21 (k)(5)(iv)]

☐ Yes ☒ No

If yes, provide information and data characterizing the potential discharge on a separate sheet labeled "Item #25 Dioxins"

26. Organic Toxic Pollutants (EPA Table II) Provide waiver justification or data regarding organic toxic pollutants for the mine site.

Waiver: This section is not applicable because this operation fulfills one of the following criteria:

☐ For coal, this operation produces less than 100,000 tons per year.

☒ For noncoal, this operation has gross sales of less than $100,000 per year (1980 dollars).

If a waiver is not applicable, refer to Appendix B: Table II - Organic Toxic Pollutants. List any constituents from that table that are expected to be present in the discharge.

See Attachment D-1: Effluent Characterization Summary.

For all constituents listed above, provide a table of the estimated daily maximum concentration, the estimated daily average concentration and the source of this information on a separate attachment labeled "Item #26 Organic Toxic Pollutants".

27. Other toxic pollutants. For new mining permits, for each of the following constituents, provide an estimate of the concentration that could reasonably expected to be present in the discharges(s) and the source of this information [40 CFR 122.21 (k)(5)(iii)(A)] (EPA Table III).

For all Coal mining renewals, provide the actual data for concentrations. [40 CFR 122.21 (g)(7)(v)(B)]

For Noncoal renewals, provide data for those you expect to be present. Insert "X" for those not expected to be present [40 CFR 122.21 (g)(7)(vi)(B)]

Please include units of measurement for all concentrations reported.

Constituent	Concentration		Constituent	Concentration
Antimony, Total	**X**		Nickel, Total	**< 0.91 ug/L**
Arsenic, Total	**< 0.89 ug/L**		Selenium, Total	**< 0.59 ug/L**
Beryllium, Total	**X**		Silver, Total	**X**
Cadmium, Total	**< 0.071 ug/L**		Thallium, Total	**X**
Chromium, Total	**< 2.5 ug/L**		Zinc, Total	**13.0 ug/L**
Copper, Total	**< 2.5 ug/L**		Cyanide, Total	**X**
Lead, Total	**< 0.84 ug/L**		Phenols, Total	**X**
Mercury, Total	**< 0.043 ug/L**			

28. Conventional and Nonconventional Pollutants. For each of the following constituents, check the boxes for those that you expect to be present in the discharge. (EPA Table IV)

☐ Bromide	☐ Nitrogen, Total Organic	☐ Sulfite	☒ Iron, Total
☐ Chlorine, Total Residual	☐ Oil and Grease	☐ Surfactants	☐ Magnesium, Total
☒ Color	☐ Phosphorus, Total	☒ Aluminum, Total	☐ Molybdenum, Total
☐ Fecal Coliform	☐ Radioactivity	☒ Barium, Total	☒ Manganese, Total
☒ Fluoride	☒ Sulfate	☒ Boron, Total	☐ Tin, Total
☐ Nitrate-Nitrite	☐ Sulfide	☐ Cobalt, Total	☒ Titanium, Total

For new outfalls, for each constituent checked above (those that you expect to be present) provide the estimated daily maximum concentration, daily average concentration and the source of the information on an attachment. For existing outfalls, report the daily maximum and daily average based on data collected within the previous five years.

See Attachment D-1: Effluent Characterization Summary.

29. Toxic Pollutants and Hazardous Substances (EPA Table V) Refer to Appendix B: Toxic Pollutants and Hazardous Substances. List any constituents from that table that are expected to be present in the discharge.

See Attachment D-1: Effluent Characterization Summary.

For all constituents listed above, provide data for each pollutant expected in the discharge or justification of why any are believed to be not present and the source of this information on a separate attachment labeled "Item #29 Toxic and Hazardous Pollutants".

SECTION D. EFFLUENT CHARACTERIZATION

Complete the following subsections for each discharge outfall listed in Item #21.

Discharge Point No(s).: 003

24. Common parameters/pollutants. Complete the table for each constituent. Indicate 'E' if estimate, 'D' if based on actual data. If needed, attach a separate sheet labeled "Item #24 Common parameters/pollutants". Please include the units of measurement. If you are providing data from one discharge for two or more substantially identical effluents, indicate which outfalls the data represents. [40 CFR 122.21(k)(5)(i) and 40 CFR 122.21(g)(7)(iii)]

Constituent	Daily Max	Daily Average	Source of Information
pH	9.0	N/A	D – See Analytical Results Attachment D-1 (Existing Permit)
Total Suspended Solids (TSS)	70.0 mg/l	35.0 mg/l	D – See Analytical Results Attachment D-1 (Existing Permit)
Conductivity			Waiver Requested
Chemical Oxygen Demand (COD)[1]			Waiver Requested
Biochemical Oxygen Demand (BOD)[1]			Waiver Requested
Ammonia (NH3)[1]			Waiver Requested
Total Organic Carbon (TOC)[1]			Waiver Requested
Flow	N/A	N/A	N/A
Temperature (high)	Varies	Varies	Temperature of the discharge water varies with season
Temperature (low)	Varies	Varies	

[1] Waiver option [40 CFR 122.21(k)(5)(i)]: A waiver is requested for the following constituents that are not anticipated to be present in the discharge:

☒ COD ☒ BOD ☒ NH3 ☒ TOC

In addition to the checked constituents above, a waiver for Conductivity is also requested. Please see Attachment D-1: Effluent Characterization Summary for justification.

Provide a justification for this waiver request.

See Attachment D-1: Effluent Characterization Summary.

25. Dioxins. As the applicant, do you have reason to believe that at any time dioxins were made, used, stored or buried on or directly upgradient from the site designated for mining and/or support area? [TCDD, 2,4,5-T, 2,4,5-TP, Erbon, Ronnel, TCP or HCP under 40 CFR 122.21 (g)(7)(viii) and 40 CFR 122.21 (k)(5)(iv)]

☐ Yes ☒ No

If yes, provide information and data characterizing the potential discharge on a separate sheet labeled "Item #25 Dioxins"

26. Organic Toxic Pollutants (EPA Table II) Provide waiver justification or data regarding organic toxic pollutants for the mine site.

Waiver: This section is not applicable because this operation fulfills one of the following criteria:

☐ For coal, this operation produces less than 100,000 tons per year.

☒ For noncoal, this operation has gross sales of less than $100,000 per year (1980 dollars).

If a waiver is not applicable, refer to Appendix B: Table II - Organic Toxic Pollutants. List any constituents from that table that are expected to be present in the discharge.

See Attachment D-1: Effluent Characterization Summary.

For all constituents listed above, provide a table of the estimated daily maximum concentration, the estimated daily average concentration and the source of this information on a separate attachment labeled "Item #26 Organic Toxic Pollutants".

27. Other toxic pollutants. For new mining permits, for each of the following constituents, provide an estimate of the concentration that could reasonably expected to be present in the discharges(s) and the source of this information [40 CFR 122.21 (k)(5)(iii)(A)] (EPA Table III).

For all Coal mining renewals, provide the actual data for concentrations. [40 CFR 122.21 (g)(7)(v)(B)]

For Noncoal renewals, provide data for those you expect to be present. Insert "X" for those not expected to be present [40 CFR 122.21 (g)(7)(vi)(B)]

Please include units of measurement for all concentrations reported.

Constituent	Concentration		Constituent	Concentration
Antimony, Total	**X**		Nickel, Total	**1.5 ug/L**
Arsenic, Total	**< 0.89 ug/L**		Selenium, Total	**< 0.59 ug/L**
Beryllium, Total	**X**		Silver, Total	**X**
Cadmium, Total	**< 0.071 ug/L**		Thallium, Total	**X**
Chromium, Total	**3.5 ug/L**		Zinc, Total	**< 6.5 ug/L**
Copper, Total	**3.7 ug/L**		Cyanide, Total	**X**
Lead, Total	**< 0.84 ug/L**		Phenols, Total	**X**
Mercury, Total	**< 0.043 ug/L**			

28. Conventional and Nonconventional Pollutants. For each of the following constituents, check the boxes for those that you expect to be present in the discharge. (EPA Table IV)

☐ Bromide	☐ Nitrogen, Total Organic	☐ Sulfite	☒ Iron, Total
☐ Chlorine, Total Residual	☐ Oil and Grease	☐ Surfactants	☐ Magnesium, Total
☒ Color	☐ Phosphorus, Total	☒ Aluminum, Total	☐ Molybdenum, Total
☐ Fecal Coliform	☐ Radioactivity	☒ Barium, Total	☒ Manganese, Total
☒ Fluoride	☒ Sulfate	☒ Boron, Total	☐ Tin, Total
☐ Nitrate-Nitrite	☐ Sulfide	☐ Cobalt, Total	☒ Titanium, Total

For new outfalls, for each constituent checked above (those that you expect to be present) provide the estimated daily maximum concentration, daily average concentration and the source of the information on an attachment. For existing outfalls, report the daily maximum and daily average based on data collected within the previous five years.

See Attachment D-1: Effluent Characterization Summary.

29. Toxic Pollutants and Hazardous Substances (EPA Table V) Refer to Appendix B: Toxic Pollutants and Hazardous Substances. List any constituents from that table that are expected to be present in the discharge.

See Attachment D-1: Effluent Characterization Summary.

For all constituents listed above, provide data for each pollutant expected in the discharge or justification of why any are believed to be not present and the source of this information on a separate attachment labeled "Item #29 Toxic and Hazardous Pollutants".

SECTION E. CERTIFICATIONS

The information on the NPDES form must be certified as correct by one of the following, as applicable.

a) In the case of corporations, by principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge described in the NPDES form originates.
b) In the case of a partnership, by a general partner.
c) In the case of a sole proprietorship, by the proprietor.
d) In the case of a municipal, state or other public facility, by either a principal executive officer, ranking elected official or other duly authorized employee.

30. Applicant Affidavit

I certify under penalty of law that this application and all related attachments were prepared by me or under my direction or supervision. Based on my own knowledge and on inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I verify that the activity is eligible to participate in the NPDES permit, and that the BMPs, E&S Plan, and other plans and controls described are being or will be, implemented to ensure that water quality standards and effluent limits are attained. Furthermore, I agree to accept all conditions and limitations imposed by the associated permit. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment or both for knowing violations pursuant to Section 309(c)(4) of the Clean Water Act and, 18 Pa. C.S. §§4903-4904.

Sworn and Subscribed to Before Me This 18th day of January (month) 2023 (year)

Signature of Applicant or Responsible Official

Denise L. Welser

Signature of Notary Public

Mark E. Kendrick

Name (Typed) of Applicant or Responsible Official

Notary Seal

Commonwealth of Pennsylvania - Notary Seal
DENISE L WELSER - Notary Public
Lehigh County
My Commission Expires January 24, 2026
Commission Number 1324306

7660 Imperial Way

Address of Applicant

Allentown, PA 18195

Address of Applicant

Vice President

Applicant Title and Corporate Seal

31. Preparation of this report (to be completed by the person who prepared this application)

I do hereby certify to the best of my knowledge, information and belief that the submitted information is true and correct, represents actual field conditions and are in accordance with the appropriate Chapters of the Department's rules and regulations. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature

Joseph Jung Taek Kim, PE

Print Name and Title

1/19/2023

Date Signed

Earthres Group, Inc.

Company

6912 Old Easton Road

Address

Pipersville, PA 18947

City, State, Zip

(215) 766-1211

Phone

Email Address: jkim@earthres.com

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
JUNG TAEK KIM
ENGINEER
PE088887
Professional Seal
1/19/2023

NPDES No. _____
Permit No. _____

SECTION F. PREPAREDNESS, PREVENTION AND CONTINGENCY (PPC) PLAN

This completed form constitutes the PPC plan. Along with an approved erosion and sedimentation control plan and reclamation plan as well as additional information supplied in the mining activity request, this PPC plan comprises the Stormwater Pollution Prevention Plan.

☐ Option: If the permittee has a separate, comprehensive PPC plan located on the site, check this box and sign below to confirm that this document is available upon request.

Signature: _____ Print Name: _____ Date: _____

F1. Facility Contact

This person is the designated contact for the mining facility:

Name: **Timothy S. Jacobs** Title: **Area Operations Manager**

Address: _____

Phone: (24-hr emergency) **(215) 388-8835** Email: **timothy.jacobs@heidelbergmaterials.com**

F2. PPC Team

List PPC team members (names and title) who will undertake and oversee the control measures in this plan and make necessary corrective actions:

1. **Timothy S. Jacobs – Operations Manager**
2. **Mark E. Kendrick – Vice President**
3. **Andrew J. Gutshall – Environmental Manager**
4. _____

Potential Pollutant Sources and Control

F3. Inventory

List **all chemicals**, petroleum products, solvents, paint, acids, water treatment products, fertilizer, antifreeze, ice melt/salt, etc. that are to be used and stored on site. If more space is needed, please submit table on a separate page labeled "F3: Inventory"

Chemical and trade name	Location	Quantity	Storage Management (letter key) *	Coal sites only AST Inventoried?
N/A	N/A	N/A	N/A	☐
				☐
				☐
				☐
				☐
				☐
				☐

* Key to Storage Management: A. Closed, sturdy containers B. Open-sided covered C. Secured Tarps D. Sheds/buildings/trailers E. Other

F4. History of site

a. Within 3 years prior to this being a mine site, was this site used for any industrial activity? ☐ Yes ☒ No
If yes, what products (such as those listed above) were used, stored and/or disposed of at this site?

b. Have leaks or spills occurred at this site in the past 3 years? ☐ Yes ☒ No
If yes, provide details of the event.

c. An authorized individual must evaluate the site for nonauthorized discharges such as leaking pipelines, drains, hoses and any other non-stormwater discharges.
Date of evaluation: **12/14/2022** Person who did evaluation: **Andrew J. Gutshall, P.G.**

F5. Potential Pollution Locations

Identify locations that have potential for spills or leaks at this site:

- ☒ Excavation area
- ☐ Stockpile area
- ☐ Product storage area
- ☒ Haul roads
- ☐ Other(s) (list): _____
- ☐ Vehicle refueling, maintenance or washing area
- ☒ Equipment storage and maintenance area
- ☐ Chemical preparation area
- ☐ Treatment system setup

F6. Pollution Control

The operator or designated representative agrees to the following (check each):

- ☒ 1. Maintain regular pickup and disposal of waste materials
- ☒ 2. Undertake daily inspection of site for leaks and spills.
- ☒ 3. Ensure that chemical containers and supplies are properly and promptly stored after use.
- ☒ 4. Maintain equipment so that spills/leaks are avoided.
- ☒ 5. Undertake practices to keep control measures operational.
- ☒ 6. Take corrective actions to prevent and/or contain leaks and spills.
- ☒ 7. Ensure products are stored in appropriate containers that are clearly labeled.
- ☒ 8. Locate materials storage areas away from vehicle high-traffic areas.
- ☒ 9. Control garbage onsite to prevent dispersion by water or wind.

The above items are included as part of this PPC.

F7. Emergency Procedures and Training

The operator or designated representative confirms the following (check each):

- ☒ 1. The operator has in place a procedure for stopping, containing and cleaning up spills, leaks or other releases.
- ☒ 2. The operator agrees to train all on-site working personnel in the procedures listed in this PPC.
- ☒ 3. The operator has a procedure for notifying appropriate facility personnel, emergency response and regulatory agencies (including the District Mining Office) in the event of a spill, leak or release. *

* Attach this notification list to this document. List is attached. ☐

The above items are included as part of this PPC.

Inspections

F8. Inactivity

a. Will this site be seasonally inactive? ☒ Yes ☐ No

If yes, provide time period of inactivity: **Inactivity period may vary with market demand for aggregate product.**

If yes, complete item b.

b. Please confirm the following by checking the *appropriate* box(es):

- ☒ Sites will be secured, and access limited to prevent dumping and vandalism during shutdown.
- ☒ Chemicals will be removed from the site during shutdown.
- ☒ Chemicals will be secured in locked structures during shutdown.

F9. Self-inspection and plan updates

The operator agrees to the following (check the box):

- ☒ 1. Undertake yearly, documented, self-inspections to ensure the PPC is up to date and all BMPs are working.
- ☒ 2. Retain the written self-inspection report for at least one year.
- ☒ 3. Update this PPC as necessary and upon renewal of the NPDES permit.

The above items are included as part of this PPC.

Affidavit	
I certify under penalty of law that this PPC document and any attachments related to it were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. The information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	
Name: Mark E. Kendrick **Title:** Vice President	
Signature:	**Date:** 1/10/23

Attachment A-8:

Public Notice

Public Notice

Pursuant to the "Noncoal Surface Mining Conservation and Reclamation Act" and the "Clean Streams Law" notice is hereby given that Heidelberg Materials Northeast LLC, 7660 Imperial Way, Allentown, PA 18195, has made an application to the Pennsylvania Department of Environmental Protection (PA DEP) for a National Pollution Discharge Elimination System (NPDES) Individual Permit for the Rock Hill Quarry Operation (SMP No. 7974SM1) located in East Rockhill Township, Bucks County, Pennsylvania. The application seeks to modify the existing NPDES Permit No. PA0594121. The center of the Quarry is located approximately 7.8 inches west and 5.7 inches north from the bottom right-hand corner of the Quakertown, PA U.S.G.S. 7.5-minute Quadrangle.

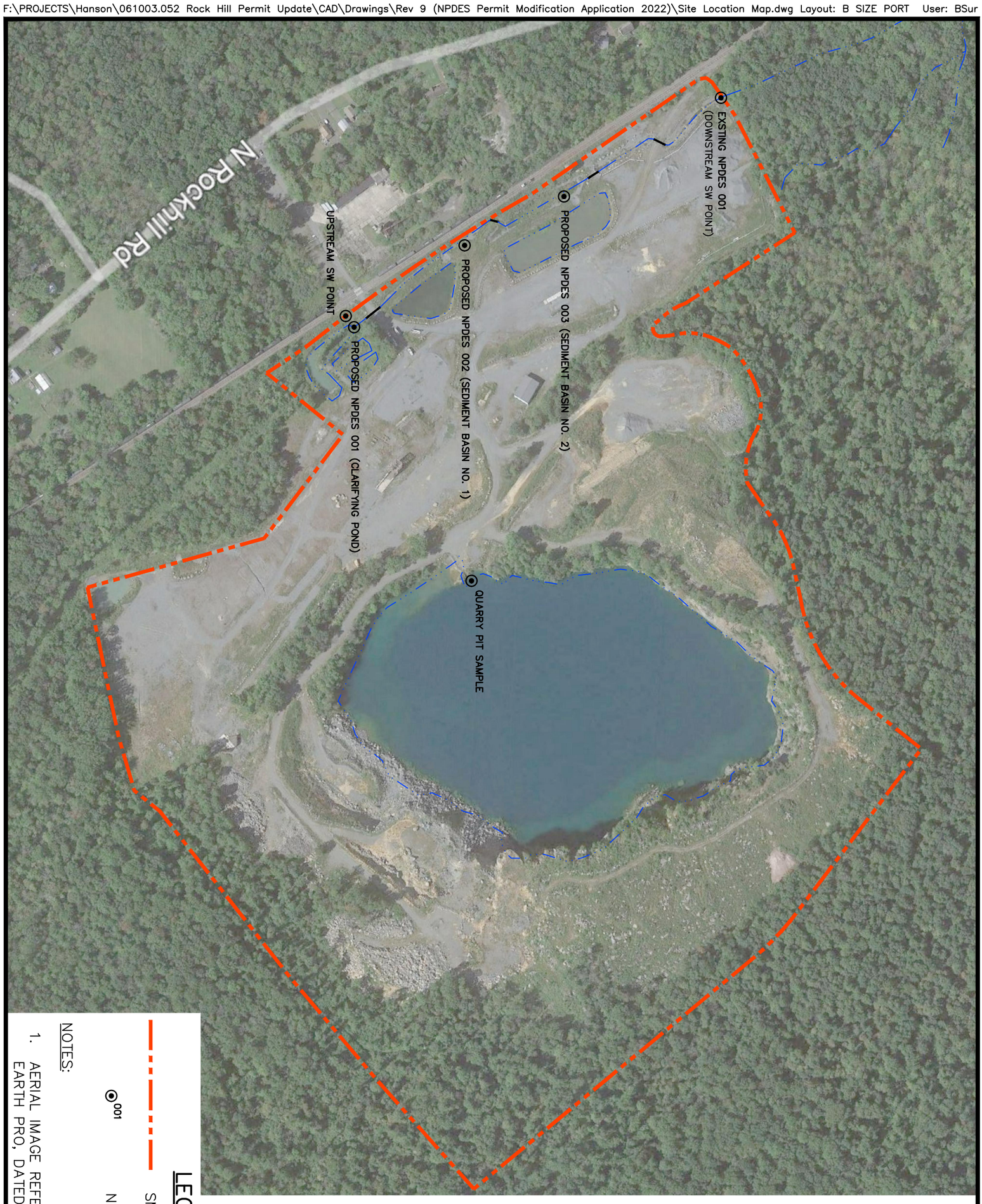
The receiving stream for the NPDES discharge point is an Unnamed Tributary to Tohickon Creek which is designated as Trout-Stocking (TSF) and Migratory Fishes (MF) in 25 PA Code Chapter 93.

The current NPDES Outfall 001 is located at the northwest corner of the existing SMP boundary. The permit modification seeks to replace the NPDES outfall with three (3) upstream points, which are existing site impoundment outfall locations, and increase the NPDES discharge rate from the existing 0.238 MGD (continuous) to 2.98 MGD (intermittent).

A copy of the application is available for public inspection at the East Rockhill Township Building, 1622 North Ridge Road, Perkasie, PA 18944. Written comments, objections, or a request for public hearing or informal conference may be submitted to the PA DEP, Pottsville District Mining Office, 5 West Laurel Boulevard, Pottsville, PA 17901 by [DATE] and must include the person's name, address, telephone number, and a brief statement as to the nature of the objection(s).

Attachment A-13:

Map View of Area



NORTH

LEGEND

SMP BOUNDARY

001 NPDES DISCHARGE POINT

NOTES:

1. AERIAL IMAGE REFERENCED FROM GOOGLE EARTH PRO, DATED SEPTEMBER 21, 2020.

EARTHRES
ENGINEERING FOR SUCCESS™
www.earthres.com

HEADQUARTERS
PHILADELPHIA REGION
P. O. Box 468
6912 Old Easton Road
Pipersville, PA 18947

APPALACHIAN
REGIONAL OFFICE
P. O. Box 794
8000 Coombs Farm Drive
Morgantown, WV 26505

DRAWN BY:	CHECKED BY:
JTK	MSW
DATE:	PROJECT NO:
1/3/2022	061003.052

DRAWING SCALE: 1" = 300'

FIGURE 1
MAP VIEW OF AREA

HEIDELBERG MATERIALS NORTHEAST LLC
SMP NO. 7974SM1
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

Attachment A-16:

Anti-Degradation Supplement

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING PROGRAMS

APPLICATION SUPPLEMENT - ANTI-DEGRADATION

General Instructions: This supplement is to be completed if the operation is proposed within areas of Special Protection Waters where a new, additional or increased discharge is proposed. In Special Protection waters, Section 1 is required. Every effort must be made to achieve total non-discharge or partial non-discharge. For more info on the Anti-degradation analysis, refer to Technical Guidance Document No. 391-0300-002.

For all coal and large noncoal surface and underground permits: Because of the interaction necessary between the department and the applicant, Section 1 must be completed prior to a formal submission of the mining permit application. It may take two or more exchanges of information between the parties to adequately complete this module. Pre-application discussions are required. Submission of a mining permit without adequate pre-application information will result in the permit application being returned to you as incomplete.

After submitting Section 1 including the Non-Discharge Alternatives Analysis, the applicant will receive communication from the department regarding the information presented in Section 1. If applicable, the applicant then completes Section 2 or the Social or Economic Justification (SEJ) (5600-PM-BMP0028). All plans described in this supplement must correlate directly with Erosion and Sedimentation Control, Operation and Reclamation plans in the permit application. All parts and supporting data, including those sections previously submitted to the department, must be included with the permit application upon formal submittal which must also include an application for an individual NPDES permit even if there is no point source discharge proposed.

For small noncoal, bluestone, General Permits and exploration activities: Complete Section 1 in conjunction with an appropriate NPDES individual permit application. Submit with the permit application package. The Department encourages pre-application discussions for any mining activity in a Special Protection watershed but it is not required for sites 5 acres or less. Section 2 will need to be completed only by Department request.

Section 1

A. General Information

This supplement is submitted in support of the following facility:

Applicant: Heidelberg Materials Northeast LLC Mining License No. 24143

Permit or Authorization No.: SMP 7974SM1 *Insert "pending" if no number has been assigned.*

Operation Name: Rock Hill Quarry

B. Receiving Streams Watershed is: ☐ HQ (high quality) or ☒ EV (exceptional value)

Provide the name(s) and existing water use(s) as identified in 25 Pa Code Section 93.9 for each of the proposed receiving streams:

Unnamed Tributary to Tohickon Creek/Upper Tohickon Creek Watershed - Current Designated Use is TSF/MF;

Existing Use is EV; Stream petitioned for upgrade

C. Non-Discharge Alternatives Evaluation (*Attach extra sheets labeled "Non-Discharge Alternatives Evaluation")*

Consider and evaluate non-discharge alternatives for the proposed storm water and/or encountered groundwater discharge(s) as required by 25 Pa Code Section 93.4c.(b)(1)(i)(A). Indicate which alternatives will be used at this site. Describe in an attachment(s) each specific alternative that will be used. If **no** specific options are feasible, provide feasibility analysis and cost data as justification.

To Be Used	
☐	1. Alternative project siting (in whole or in part)
☐	2. Alternative discharge locations/discharging to another (non-special protection) watershed
☐	3. Infiltration – galleries or land application
☒	4. Limiting disturbed area (vertically or horizontally), extent and/or duration of mining
☒	5. Recycling/reuse of water onsite
☐	6. Constructed treatment wetlands
☐	7. Holding facilities and/or wastewater hauling
☐	8. Injection (☐ pretreated) (☐ no treatment)
☐	9. Vegetated riparian buffers
☐	10. Specific pollution prevention processes
☐	11. Other(s) List:

D. Use of Non-Discharge Alternatives

In consideration of the options proposed for use in Section C. and in reference to supporting information that must be supplied for Section C., characterize the fate of stormwater runoff and/or encountered groundwater at this site. Choose #1 or #2.

☐ 1. Non-discharge alternatives will be used to address the entire discharge. No point source discharge is proposed. (Describe the implementation of the non-discharge alternative(s) you are proposing as part of the Erosion and Sedimentation plan and your NPDES permit application.)

OR

☒ 2. Non-discharge alternatives use will not account for the entire discharge. A point source discharge is anticipated. (Provide justification in Section 1.C. and chose a. or b. below.)

a. ☒ A demonstration will be made that the resulting discharge will maintain and protect the existing quality of receiving surface waters. (Section 2)

b. ☐ A demonstration will be made that the resulting discharge to the High Quality (HQ) water(s) will support the applicable existing and designated water uses (other than HQ uses) and an SEJ (Module 24) will be submitted.

STOP: Section 1 must be reviewed by the department before proceeding.

Department use only

Section 2

A. Demonstration for Maintaining and Protecting Existing Water Quality – Test for non-degradation of water quality

If no environmentally sound and cost-effective non-discharge alternative exists to address the entire discharge, provide a demonstration that a non-degrading discharge is feasible and will maintain and protect the existing water quality of the receiving stream(s). Using existing monitoring data, calculate the non-degrading effluent limits for this discharge (mass balance). Describe the technology and details of the practices that will be used to achieve these effluent limits and assess the costs. Attach separate sheets as necessary labeled "Non-degrading ABACT".

B. Anti-degradation Best Available Combination of Technologies (ABACT)

Identify the combination of Best Management Practices (BMPs) to be used during the mining operations to achieve a non-degrading discharge.

Best Management Practices (BMPs)	
☐ 1. Oversized sediment basin (8600 ft3/ac or greater)	☐ 11. Sediment traps with infiltration trench
☐ 2. Sediment basin ratio of 4:1 or greater (flow length:basin width)	☐ 12. Diversions
☐ 3. Sediment basin with 4-7 day detention	☐ 13. Constructed wetlands
☐ 4. Alternate/additional sediment controls during basin construction	☐ 14. Vegetated swales
☐ 5. Flocculants	☐ 15. Manufactured devices
☐ 6. Manual dewatering device	☐ 16. Bio-retention
☐ 7. Vegetated Riparian buffers	☐ 17. Mulch immediately after topsoiling
☐ 8. Street sweeping	☐ 18. Land Preservation or non-use
☐ 9. Channels, collectors and diversions lined with permanent vegetation, rock, geotextile or other non-erosive materials	☐ 19. Other _____
☐ 10. Water reuse	☐ 20. Other _____

Are the ABACT BMPs selected sufficient to protect the existing surface water quality? ☐ Yes ☐ No

If no, and the project is located in a HQ water, complete Module 24, Social or Economic Justification (SEJ), in the permit application.

STOP: Section 2 must be reviewed by the department before proceeding.

Department use only

Anti-Degradation Supplement

Non-Discharge Alternatives Evaluation

As part of planned future mining operations, Heidelberg Materials is proposing to dewater the currently filled Rock Hill Quarry Pit impoundment. Heidelberg Materials is proposing to replace the existing NPDES Discharge Point 001 with three (3) individual discharge points as well as increase the discharge rate to 4.61 cubic feet per second (cfs) to accommodate dewatering of the Pit. No modifications and/or upgrades to existing Site and downstream features are proposed with the modification and consequently, the proposed discharge rate was determined based on the calculated limits of the existing conveyance system.

The Pit currently holds an estimated 1,584 acre-feet or 516 million gallons of water and would require approximately 173 days of uninterrupted pumping to dewater to the permitted operating level of 460 msl, assuming no contributions from precipitation and groundwater. After depletion of the existing storage, the pumping rate needed to keep the Pit dry will decrease substantially.

Discharge from the Quarry is to an Unnamed Tributary of Tochickon Creek designated as Bog Run. Bog Run currently has a designated use as Trout Stocked Fishes, Migratory Fishes (TSF, MF) and has an existing use as Exceptional Value (EV). Water Quality Anti-Degradation Implementation Guidance (391-0300-002) (Guidance) was referenced as part of the following evaluation. The following describes specific non-discharge alternatives that will be used at the Quarry.

Limiting Disturbed Areas

The area proposed for mining has already been disturbed, and the duration of disturbance cannot be shortened. Mining operations generally last for decades, and the active life is determined by growth in the area and the corresponding need for aggregate and associated products. Heidelberg Materials intends to conduct concurrent reclamation, to the extent possible, along highwalls where mining is complete.

Recycling/Reuse of Water Onsite

A portion of water collected in the Quarry sump will be used to supply a water truck for dust suppression of roads throughout the Permit Area. In addition, the water will be utilized to water down stockpiles and in the future may be used the processing plant.

Attachment C-21:

NPDES Discharge Point Modification Report

NPDES Discharge Point Modification Report

Heidelberg Materials Northeast LLC – Rock Hill Quarry Operation

Heidelberg Materials Northeast LLC (Heidelberg) currently has an existing NPDES Discharge Point 001 (NPDES Permit No. PA0594121) and operates under Surface Mining Permit No. 7974SM1. Heidelberg is proposing to relocate the existing NPDES Discharge Point 001 to the Clarifying Pond Discharge and increase the average and design discharge rate without overloading the existing conveyance system. Concurrently, Heidelberg proposes two (2) additional NPDES discharge points, each from the existing Sediment Ponds (Sediment Pond No. 1 and Sediment Pond No. 2) at Rock Hill Quarry to handle the stormwater runoff from the quarry support areas. The individual points are proposed to isolate the quarry pit discharge pumped through the Clarifying Pond, the stormwater runoff discharge through the Sediment Ponds and the upstream offsite runoff. The isolation of the discharges is proposed to improve monitoring and control of the pumped quarry pit discharge and alleviate impacts on downstream conveyance structures.

In support of the proposed discharge points, the receiving tributary and downstream culverts (Site Culverts & Rich Hill Crossing) were evaluated to assess the resulting impact of the pumped quarry pit discharge in regards to hydraulic capacity. The assessment included a field study and survey of the culvert crossings, conditions and measurement of the mean annual flow passing through the culvert. In addition, the analysis includes an assessment of maximum allowable flow through the existing culvert crossing to determine the proposed NPDES Point 001 discharge rate. The following sections outline the results of that analysis and propose a plan for implementation of the proposed individual discharges.

Site Description

Heidelberg is proposing to replace the existing NPDES discharge point 001 at Rock Hill Quarry with three (3) upstream discharge points (see Attachment C-21.4 Site Plan). The plan does not require any additional construction of erosion and sedimentation controls. All proposed discharge points are existing impoundment discharge points with sufficient downstream controls (Pond Construction As-built Approval received, dated June 28, 2018).

As discussed above, the three (3) proposed discharge points converge prior to passing through the existing NPDES discharge point 001 location. The receiving stream at the discharge points is the Unnamed Tributary to Tohickon Creek/Upper Tohickon Watershed, Chapter 93 designation Trout Stocking, Migratory Fishes. Given the capacity of the receiving tributary and conditions downstream, it is anticipated the Rich Hill culvert crossing will be the limiting downstream conveyance structure. In support of this assumption, field study and survey were conducted to confirm existing culvert conditions and capacity.

Receiving Stream Analysis

EARTHRES completed a field study inclusive of the survey and measurement of the five (5) culvert crossings (see attached Site Plan) downstream of the proposed NPDES discharge point

001 to identify any flow limiting factors which may be at increased risk for flooding as a result of the pumped quarry pit discharge.

The field study indicates that in the immediate vicinity of the proposed discharge points the receiving channel has a stable lining consisting of R-3 and R-4 size riprap. There are four (4) constrictions along the channel prior to the confluence with a large wetland area which is capable of passing larger flood flows. See attached Site Plan and Table 1 below for a summary of the field study results.

Table 1 Downstream Constrictions

Structure	Span (in)*	Length (ft)*
Site Culvert 1	24" RCP	56.7
Site Culvert 2	24" Steel	24.7
Site Culvert 3	24" RCP	39.4
Site Culvert 4	24" Steel	40.8
Rich Hill Crossing Culvert	24" CMP (modeled as 11.5" CMP based on the culvert's approximate available flow area in existing conditions)	24.7

*Measurements are based on survey information.

Hydraulic Capacity Assessment

The above measurements and conditions were utilized to assess the hydraulic capacity of the channel for flooding events under existing conditions as well as with the addition of the proposed discharge.

Flood flow data and mean annual flow data were obtained from the USGS web-based program Streamstats to evaluate flow conditions and resultant impact through the downstream constrictions listed above. The Streamstats flow from three (3) watersheds (Upstream Clarifying Pond, Downstream, and Downstream 2) had to be combined to give the totals for the Rich Hill Crossing. Streamstats data is summarized below and can be found in Attachment C-21.1.

Table 2 Streamstats Flood Flows

	2yr	5yr	10yr	50yr	100yr
Site Culvert 1 Flows (CFS)	30.4	58.4	83.3	154.0	190.0
Site Culvert 2 Flows (CFS)	30.4	58.4	83.3	154.0	190.0
Site Culvert 3 Flows (CFS)	30.4	58.4	83.3	154.0	190.0
Site Culvert 4 Flows (CFS)	30.4	58.4	83.3	154.0	190.0
Rich Hill Crossing Culvert Flows (CFS)	94.0	180.2	256.4	473.0	584.0

Table 3 Streamstats Mean Annual Flows

	Mean Annual Flow
Site Culvert 1 Flows (CFS)*	0.0885
Site Culvert 2 Flows (CFS)*	0.0885
Site Culvert 3 Flows (CFS)*	0.0885

Site Culvert 4 Flows (CFS)*	0.0885
Rich Hill Crossing Culvert Flows (CFS)	0.2773

*Flow is from Streamstats Upstream Clarifying Pond

The flow and field survey data were used to complete hydraulic calculations for the constrictions downstream of the proposed discharge. Hydraflow Express software was utilized to calculate the maximum allowable flow capacity of the existing culverts. A summary of the calculation output is found below and Hydraflow output is provided in Attachment C-21.2.

Table 4 Hydraflow Output

	Maximum Capacity Flow (cfs)
Site Culvert 1 Flows	31.7
Site Culvert 2 Flows	47.7
Site Culvert 3 Flows	41.8
Site Culvert 4 Flows	54.5
Rich Hill Crossing Culvert Flows	4.89

The results summarized on Table 4 indicate that the downstream constrictions at the Rich Hill Crossing, with a maximum allowable flow of 4.89 cfs, will be the limiting factor in the existing conveyance system. Based on the analysis, it is anticipated that the system is currently overloaded during any significant storm event. In order to minimize impacts of the proposed NPDES increase while also maximizing pumping for dewatering of the Pit, Heidelberg proposes to discharge intermittently based on precipitation. Heidelberg is proposing to suspend discharge during any storm event exceeding the 2 year storm. This precaution will minimize impacts to the existing conveyance system to convey flow, by minimizing potential to contribute to additional flooding or channel bottom stability instability.

Considering the above mentioned mean annual flow and assuming no stormwater flow through the system during the pumped quarry pit discharge, the proposed NPDES discharge is calculated to be 4.61 cfs (2.98 MGD). The following Table 5 shows the de minimis impact the proposed pumped quarry discharge will have in comparison to the existing stormwater flows.

Table 5 Proposed Discharge vs Flood Flows Comparison

	2yr*	**5yr***	**10yr***	**50yr***	**100yr***
Site Culvert 1 Flows (%)	15.2%	7.9%	5.5%	3.0%	2.4%
Site Culvert 2 Flows (%)	15.2%	7.9%	5.5%	3.0%	2.4%
Site Culvert 3 Flows (%)	15.2%	7.9%	5.5%	3.0%	2.4%
Site Culvert 4 Flows (%)	15.2%	7.9%	5.5%	3.0%	2.4%
Rich Hill Crossing Culvert Flows (%)	4.9%	2.6%	1.8%	0.97%	0.79%

Based upon the above, EARTHRES concludes the proposed discharge increase will not adversely affect the existing conveyance.

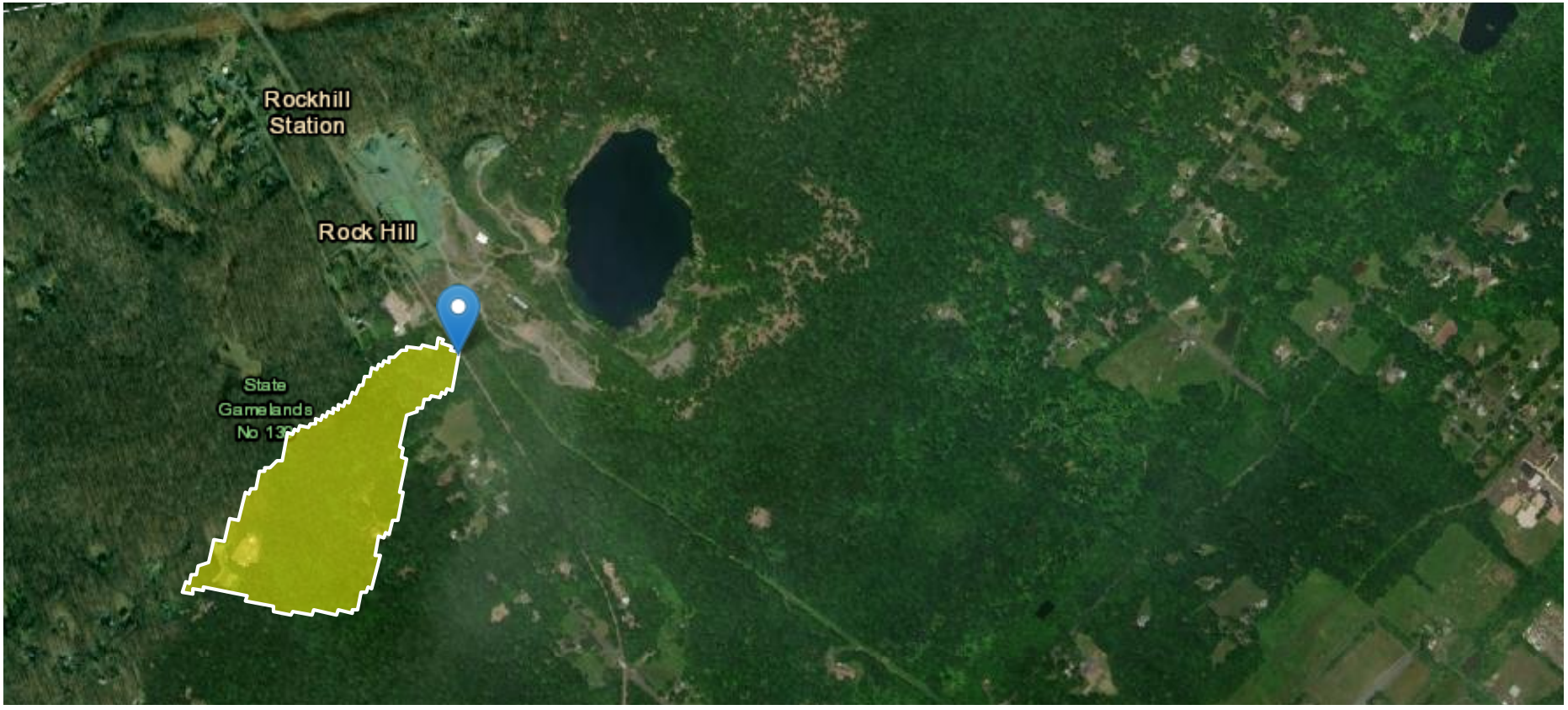
Attachment C-21.1:

Streamstats Reports

Upstream

StreamStats Report (Upstream Clarifying Pond)

Region ID: PA
Workspace ID: PA20220422180333809000
Clicked Point (Latitude, Longitude): 40.40237, -75.30285
Time: 2022-04-22 14:04:00 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLOPD	Mean basin slope measured in degrees	4.0556	degrees
CARBON	Percentage of area of carbonate rock	0	percent
DRNAREA	Area that drains to a point on a stream	0.0558	square miles
ELEV	Mean Basin Elevation	598	feet
FOREST	Percentage of area covered by forest	98.7552	percent
PRECIP	Mean Annual Precipitation	45	inches
ROCKDEP	Depth to rock	4	feet
URBAN	Percentage of basin with urban development	0	percent

Peak-Flow Statistics Parameters [Peak Flow Region 4 SIR 2019 5094]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	1.2	512
CARBON	Percent Carbonate	0	percent	0	68.5

Peak-Flow Statistics Disclaimers [Peak Flow Region 4 SIR 2019 5094]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Peak Flow Region 4 SIR 2019 5094]

Statistic	Value	Unit
50-percent AEP flood	30.4	ft^3/s

Statistic	Value	Unit
20-percent AEP flood	58.4	ft^3/s
10-percent AEP flood	83.3	ft^3/s
4-percent AEP flood	121	ft^3/s
2-percent AEP flood	154	ft^3/s
1-percent AEP flood	190	ft^3/s
0.5-percent AEP flood	229	ft^3/s
0.2-percent AEP flood	289	ft^3/s

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2019, Development of regression equations for the estimation of flood flows at ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2019–5094, 36 p. (https://doi.org/10.3133/sir20195094)

Low-Flow Statistics Parameters [Low Flow Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	4.0556	degrees	1.7	6.4
ROCKDEP	Depth to Rock	4	feet	4.13	5.21
URBAN	Percent Urban	0	percent	0	89

Low-Flow Statistics Disclaimers [Low Flow Region 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Low-Flow Statistics Flow Report [Low Flow Region 1]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.0043	ft^3/s
30 Day 2 Year Low Flow	0.0066	ft^3/s
7 Day 10 Year Low Flow	0.00127	ft^3/s
30 Day 10 Year Low Flow	0.00217	ft^3/s
90 Day 10 Year Low Flow	0.00445	ft^3/s

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	2.26	1720
ELEV	Mean Basin Elevation	598	feet	130	2700
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
FOREST	Percent Forest	98.7552	percent	5.1	100
URBAN	Percent Urban	0	percent	0	89

Annual Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Annual Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Mean Annual Flow	0.0885	ft^3/s

Annual Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	98.7552	percent	5.1	100
URBAN	Percent Urban	0	percent	0	89

General Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

General Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Harmonic Mean Streamflow	0.018	ft^3/s

General Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	98.7552	percent	5.1	100
URBAN	Percent Urban	0	percent	0	89

Base Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Base Flow 10 Year Recurrence Interval	0.0464	ft^3/s

Statistic	Value	Unit
Base Flow 25 Year Recurrence Interval	0.0416	ft^3/s
Base Flow 50 Year Recurrence Interval	0.039	ft^3/s

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Bankfull Statistics Parameters [Statewide Bankfull Noncarbonate 2018 5066]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	2.62	207
CARBON	Percent Carbonate	0	percent		

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	0.07722	940.1535

Bankfull Statistics Parameters [Piedmont P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	0.289575	939.99906

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0558	square miles	0.07722	59927.7393

Bankfull Statistics Disclaimers [Statewide Bankfull Noncarbonate 2018 5066]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Statewide Bankfull Noncarbonate 2018 5066]

Statistic	Value	Unit
Bankfull Area	1.25	ft^2
Bankfull Streamflow	4	ft^3/s
Bankfull Width	3.8	ft
Bankfull Depth	0.36	ft

Bankfull Statistics Disclaimers [Appalachian Highlands D Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	4.59	ft
Bieger_D_channel_depth	0.49	ft
Bieger_D_channel_cross_sectional_area	2.26	ft^2

Bankfull Statistics Disclaimers [Piedmont P Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Piedmont P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	4.22	ft
Bieger_P_channel_depth	0.468	ft
Bieger_P_channel_cross_sectional_area	1.79	ft^2

Bankfull Statistics Disclaimers [USA Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	4.48	ft
Bieger_USA_channel_depth	0.652	ft
Bieger_USA_channel_cross_sectional_area	3.6	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Bankfull Area	1.25	ft^2
Bankfull Streamflow	4	ft^3/s
Bankfull Width	3.8	ft

Statistic	Value	Unit
Bankfull Depth	0.36	ft
Bieger_D_channel_width	4.59	ft
Bieger_D_channel_depth	0.49	ft
Bieger_D_channel_cross_sectional_area	2.26	ft^2
Bieger_P_channel_width	4.22	ft
Bieger_P_channel_depth	0.468	ft
Bieger_P_channel_cross_sectional_area	1.79	ft^2
Bieger_USA_channel_width	4.48	ft
Bieger_USA_channel_depth	0.652	ft
Bieger_USA_channel_cross_sectional_area	3.6	ft^2

Bankfull Statistics Citations

Clune, J.W., Chaplin, J.J., and White, K.E.,2018, Comparison of regression relations of bankfull discharge and channel geometry for the glaciated and nonglaciated settings of Pennsylvania and southern New York: U.S. Geological Survey Scientific Investigations Report 2018–5066, 20 p. (https://doi.org/10.3133/sir20185066)

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_campaign=PDFCoverPages)

Application Version: 4.8.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

Downstream

StreamStats Report

Region ID: PA
Workspace ID: PA20220422182046948000
Clicked Point (Latitude, Longitude): 40.40944, -75.30806
Time: 2022-04-22 14:21:16 -0400

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLOPD	Mean basin slope measured in degrees	4.2196	degrees
CARBON	Percentage of area of carbonate rock	0	percent
DRNAREA	Area that drains to a point on a stream	0.0458	square miles
ELEV	Mean Basin Elevation	585	feet
FOREST	Percentage of area covered by forest	78.4148	percent
PRECIP	Mean Annual Precipitation	45	inches
ROCKDEP	Depth to rock	4	feet
URBAN	Percentage of basin with urban development	2.1079	percent

Peak-Flow Statistics Parameters [Peak Flow Region 4 SIR 2019 5094]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	1.2	512
CARBON	Percent Carbonate	0	percent	0	68.5

Peak-Flow Statistics Disclaimers [Peak Flow Region 4 SIR 2019 5094]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Peak Flow Region 4 SIR 2019 5094]

Statistic	Value	Unit
50-percent AEP flood	26.5	ft^3/s

Statistic	Value	Unit
20-percent AEP flood	51.1	ft^3/s
10-percent AEP flood	73.1	ft^3/s
4-percent AEP flood	107	ft^3/s
2-percent AEP flood	135	ft^3/s
1-percent AEP flood	167	ft^3/s
0.5-percent AEP flood	203	ft^3/s
0.2-percent AEP flood	256	ft^3/s

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2019, Development of regression equations for the estimation of flood flows at ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2019–5094, 36 p. (https://doi.org/10.3133/sir20195094)

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	2.26	1720
ELEV	Mean Basin Elevation	585	feet	130	2700
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
FOREST	Percent Forest	78.4148	percent	5.1	100
URBAN	Percent Urban	2.1079	percent	0	89

Annual Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Annual Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Mean Annual Flow	0.0698	ft^3/s

Annual Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Low-Flow Statistics Parameters [Low Flow Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	4.2196	degrees	1.7	6.4
ROCKDEP	Depth to Rock	4	feet	4.13	5.21
URBAN	Percent Urban	2.1079	percent	0	89

Low-Flow Statistics Disclaimers [Low Flow Region 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Low-Flow Statistics Flow Report [Low Flow Region 1]

Statistic	Value	Unit

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.00386	ft^3/s
30 Day 2 Year Low Flow	0.00589	ft^3/s
7 Day 10 Year Low Flow	0.00116	ft^3/s
30 Day 10 Year Low Flow	0.00197	ft^3/s
90 Day 10 Year Low Flow	0.00396	ft^3/s

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	78.4148	percent	5.1	100
URBAN	Percent Urban	2.1079	percent	0	89

General Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

General Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Harmonic Mean Streamflow	0.0136	ft^3/s

General Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	78.4148	percent	5.1	100
URBAN	Percent Urban	2.1079	percent	0	89

Base Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Base Flow 10 Year Recurrence Interval	0.0332	ft^3/s

Statistic	Value	Unit
Base Flow 25 Year Recurrence Interval	0.0295	ft^3/s
Base Flow 50 Year Recurrence Interval	0.0275	ft^3/s

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Bankfull Statistics Parameters [Statewide Bankfull Noncarbonate 2018 5066]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	2.62	207
CARBON	Percent Carbonate	0	percent		

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	0.07722	940.1535

Bankfull Statistics Parameters [Piedmont P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	0.289575	939.99906

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0458	square miles	0.07722	59927.7393

Bankfull Statistics Disclaimers [Statewide Bankfull Noncarbonate 2018 5066]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Statewide Bankfull Noncarbonate 2018 5066]

Statistic	Value	Unit
Bankfull Area	1.07	ft^2
Bankfull Streamflow	3.38	ft^3/s
Bankfull Width	3.47	ft
Bankfull Depth	0.338	ft

Bankfull Statistics Disclaimers [Appalachian Highlands D Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	4.23	ft
Bieger_D_channel_depth	0.463	ft
Bieger_D_channel_cross_sectional_area	1.97	ft^2

Bankfull Statistics Disclaimers [Piedmont P Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Piedmont P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	3.89	ft
Bieger_P_channel_depth	0.441	ft
Bieger_P_channel_cross_sectional_area	1.54	ft^2

Bankfull Statistics Disclaimers [USA Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	4.18	ft
Bieger_USA_channel_depth	0.625	ft
Bieger_USA_channel_cross_sectional_area	3.23	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Bankfull Area	1.07	ft^2
Bankfull Streamflow	3.38	ft^3/s
Bankfull Width	3.47	ft

Statistic	Value	Unit
Bankfull Depth	0.338	ft
Bieger_D_channel_width	4.23	ft
Bieger_D_channel_depth	0.463	ft
Bieger_D_channel_cross_sectional_area	1.97	ft^2
Bieger_P_channel_width	3.89	ft
Bieger_P_channel_depth	0.441	ft
Bieger_P_channel_cross_sectional_area	1.54	ft^2
Bieger_USA_channel_width	4.18	ft
Bieger_USA_channel_depth	0.625	ft
Bieger_USA_channel_cross_sectional_area	3.23	ft^2

Bankfull Statistics Citations

Clune, J.W., Chaplin, J.J., and White, K.E.,2018, Comparison of regression relations of bankfull discharge and channel geometry for the glaciated and nonglaciated settings of Pennsylvania and southern New York: U.S. Geological Survey Scientific Investigations Report 2018–5066, 20 p. (https://doi.org/10.3133/sir20185066)

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_campaign=PDFCoverPages)

Application Version: 4.8.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

StreamStats Report (Downstream 2)

Region ID: PA
Workspace ID: PA20220422183313578000
Clicked Point (Latitude, Longitude): 40.40964, -75.30751
Time: 2022-04-22 14:33:45 -0400

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLOPD	Mean basin slope measured in degrees	5.4081	degrees
CARBON	Percentage of area of carbonate rock	0	percent
DRNAREA	Area that drains to a point on a stream	0.0741	square miles
ELEV	Mean Basin Elevation	642	feet
FOREST	Percentage of area covered by forest	99.3747	percent
PRECIP	Mean Annual Precipitation	45	inches
ROCKDEP	Depth to rock	4	feet
URBAN	Percentage of basin with urban development	0	percent

Peak-Flow Statistics Parameters [Peak Flow Region 4 SIR 2019 5094]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	1.2	512
CARBON	Percent Carbonate	0	percent	0	68.5

Peak-Flow Statistics Disclaimers [Peak Flow Region 4 SIR 2019 5094]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Peak Flow Region 4 SIR 2019 5094]

Statistic	Value	Unit
50-percent AEP flood	37.1	ft^3/s

Statistic	Value	Unit
20-percent AEP flood	70.7	ft^3/s
10-percent AEP flood	100	ft^3/s
4-percent AEP flood	145	ft^3/s
2-percent AEP flood	184	ft^3/s
1-percent AEP flood	227	ft^3/s
0.5-percent AEP flood	274	ft^3/s
0.2-percent AEP flood	345	ft^3/s

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2019, Development of regression equations for the estimation of flood flows at ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2019–5094, 36 p. (https://doi.org/10.3133/sir20195094)

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	2.26	1720
ELEV	Mean Basin Elevation	642	feet	130	2700
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
FOREST	Percent Forest	99.3747	percent	5.1	100
URBAN	Percent Urban	0	percent	0	89

Annual Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Annual Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Mean Annual Flow	0.119	ft^3/s

Annual Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Low-Flow Statistics Parameters [Low Flow Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	5.4081	degrees	1.7	6.4
ROCKDEP	Depth to Rock	4	feet	4.13	5.21
URBAN	Percent Urban	0	percent	0	89

Low-Flow Statistics Disclaimers [Low Flow Region 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Low-Flow Statistics Flow Report [Low Flow Region 1]

Statistic	Value	Unit

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.00823	ft^3/s
30 Day 2 Year Low Flow	0.0118	ft^3/s
7 Day 10 Year Low Flow	0.00274	ft^3/s
30 Day 10 Year Low Flow	0.00433	ft^3/s
90 Day 10 Year Low Flow	0.00769	ft^3/s

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	99.3747	percent	5.1	100
URBAN	Percent Urban	0	percent	0	89

General Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

General Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Harmonic Mean Streamflow	0.0245	ft^3/s

General Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	45	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	99.3747	percent	5.1	100
URBAN	Percent Urban	0	percent	0	89

Base Flow Statistics Disclaimers [Statewide Mean and Base Flow]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

Statistic	Value	Unit
Base Flow 10 Year Recurrence Interval	0.0619	ft^3/s

Statistic	Value	Unit
Base Flow 25 Year Recurrence Interval	0.0555	ft^3/s
Base Flow 50 Year Recurrence Interval	0.052	ft^3/s

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Bankfull Statistics Parameters [Statewide Bankfull Noncarbonate 2018 5066]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	2.62	207
CARBON	Percent Carbonate	0	percent		

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	0.07722	940.1535

Bankfull Statistics Parameters [Piedmont P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	0.289575	939.99906

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0741	square miles	0.07722	59927.7393

Bankfull Statistics Disclaimers [Statewide Bankfull Noncarbonate 2018 5066]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Statewide Bankfull Noncarbonate 2018 5066]

Statistic	Value	Unit
Bankfull Area	1.57	ft^2
Bankfull Streamflow	5.09	ft^3/s
Bankfull Width	4.33	ft
Bankfull Depth	0.395	ft

Bankfull Statistics Disclaimers [Appalachian Highlands D Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	5.16	ft
Bieger_D_channel_depth	0.531	ft
Bieger_D_channel_cross_sectional_area	2.76	ft^2

Bankfull Statistics Disclaimers [Piedmont P Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [Piedmont P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	4.74	ft
Bieger_P_channel_depth	0.511	ft
Bieger_P_channel_cross_sectional_area	2.22	ft^2

Bankfull Statistics Disclaimers [USA Bieger 2015]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	4.95	ft
Bieger_USA_channel_depth	0.693	ft
Bieger_USA_channel_cross_sectional_area	4.19	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Bankfull Area	1.57	ft^2
Bankfull Streamflow	5.09	ft^3/s
Bankfull Width	4.33	ft

Statistic	Value	Unit
Bankfull Depth	0.395	ft
Bieger_D_channel_width	5.16	ft
Bieger_D_channel_depth	0.531	ft
Bieger_D_channel_cross_sectional_area	2.76	ft^2
Bieger_P_channel_width	4.74	ft
Bieger_P_channel_depth	0.511	ft
Bieger_P_channel_cross_sectional_area	2.22	ft^2
Bieger_USA_channel_width	4.95	ft
Bieger_USA_channel_depth	0.693	ft
Bieger_USA_channel_cross_sectional_area	4.19	ft^2

Bankfull Statistics Citations

Clune, J.W., Chaplin, J.J., and White, K.E.,2018, Comparison of regression relations of bankfull discharge and channel geometry for the glaciated and nonglaciated settings of Pennsylvania and southern New York: U.S. Geological Survey Scientific Investigations Report 2018–5066, 20 p. (https://doi.org/10.3133/sir20185066)

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_campaign=PDFCoverPages)

Application Version: 4.8.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

Attachment C-21.2:

Hydraflow Express Output

Base Flow

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 10 2022

Site Culvert 1 (Base Flow)

Invert Elev Dn (ft)	=	530.50
Pipe Length (ft)	=	56.70
Slope (%)	=	0.18
Invert Elev Up (ft)	=	530.60
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

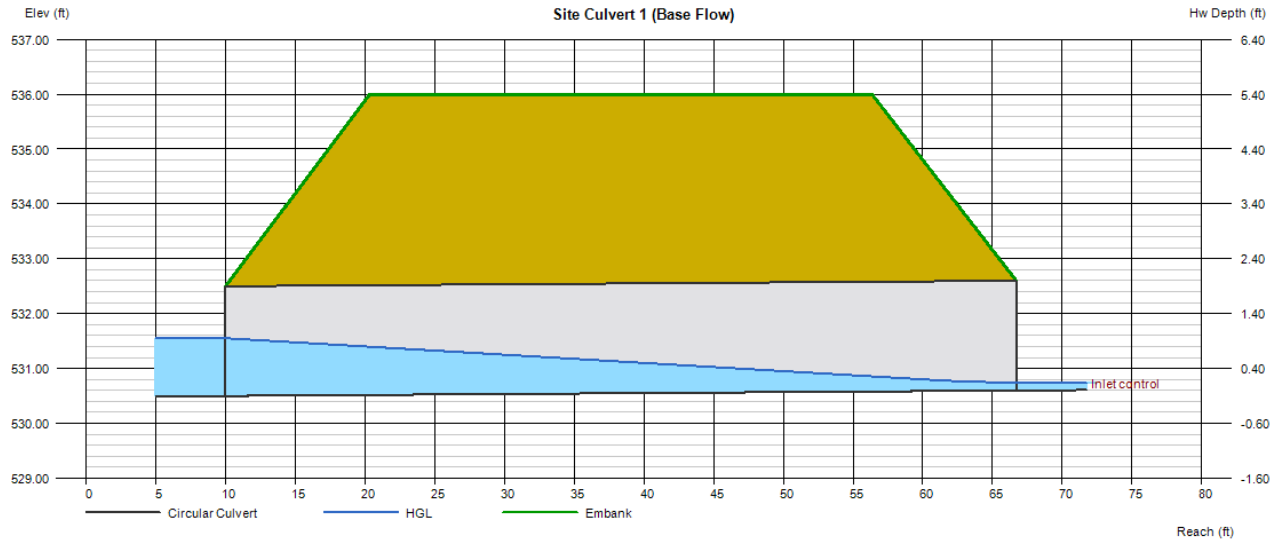
Top Elevation (ft)	=	536.00
Top Width (ft)	=	36.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	0.09
Qmax (cfs)	=	0.09
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.09
Qpipe (cfs)	=	0.09
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.05
Veloc Up (ft/s)	=	1.49
HGL Dn (ft)	=	531.55
HGL Up (ft)	=	530.70
Hw Elev (ft)	=	530.73
Hw/D (ft)	=	0.07
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 10 2022

Site Culvert 2 (Base Flow)

Invert Elev Dn (ft)	=	527.30
Pipe Length (ft)	=	24.70
Slope (%)	=	1.62
Invert Elev Up (ft)	=	527.70
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

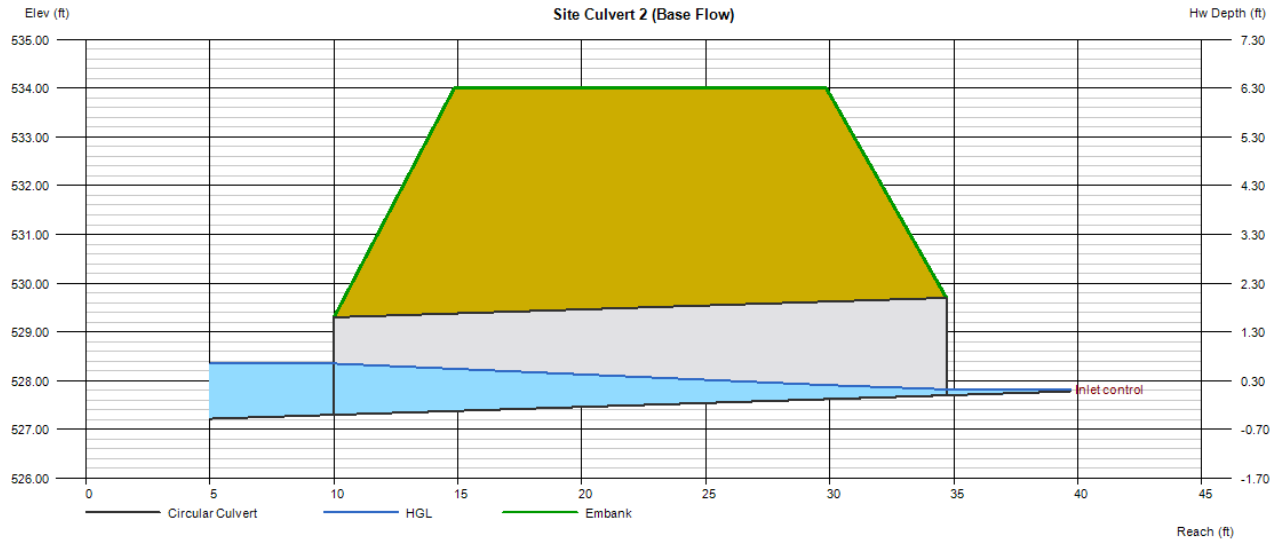
Top Elevation (ft)	=	534.00
Top Width (ft)	=	15.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	0.09
Qmax (cfs)	=	0.09
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.09
Qpipe (cfs)	=	0.09
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.05
Veloc Up (ft/s)	=	1.49
HGL Dn (ft)	=	528.35
HGL Up (ft)	=	527.80
Hw Elev (ft)	=	527.82
Hw/D (ft)	=	0.06
Flow Regime	=	Inlet Control



Culvert Report

Site Culvert 3 (Base Flow)

Invert Elev Dn (ft)	=	524.80
Pipe Length (ft)	=	39.40
Slope (%)	=	0.51
Invert Elev Up (ft)	=	525.00
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

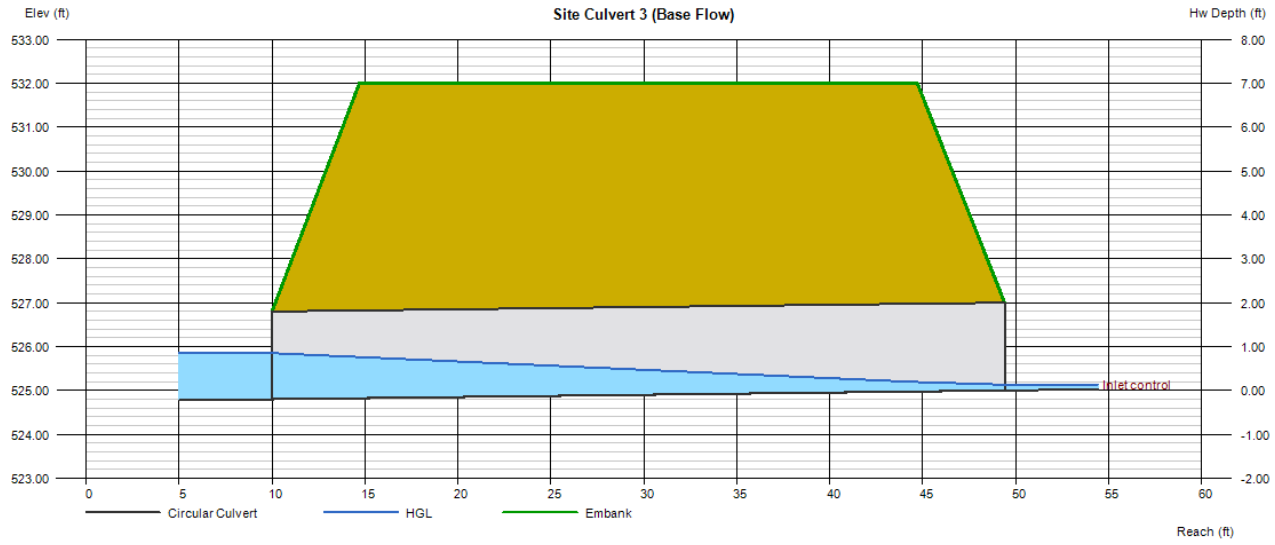
Top Elevation (ft)	=	532.00
Top Width (ft)	=	30.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	0.09
Qmax (cfs)	=	0.09
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.09
Qpipe (cfs)	=	0.09
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.05
Veloc Up (ft/s)	=	1.49
HGL Dn (ft)	=	525.85
HGL Up (ft)	=	525.10
Hw Elev (ft)	=	525.13
Hw/D (ft)	=	0.07
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 10 2022

Site Culvert 4 (Base Flow)

Invert Elev Dn (ft)	=	523.80
Pipe Length (ft)	=	40.80
Slope (%)	=	1.23
Invert Elev Up (ft)	=	524.30
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

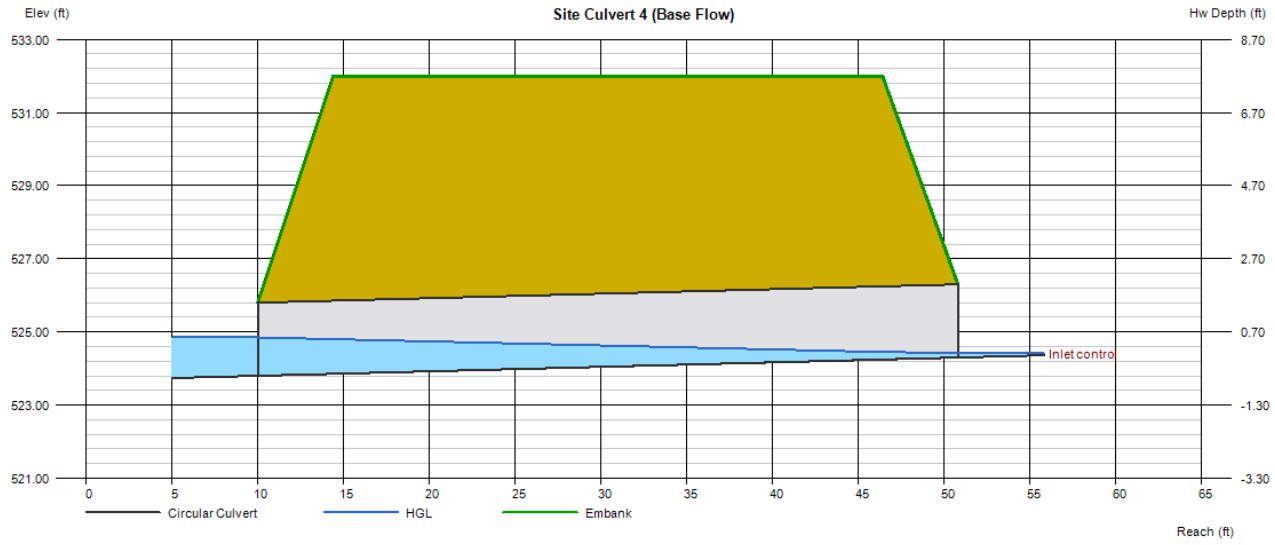
Top Elevation (ft)	=	532.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	0.09
Qmax (cfs)	=	0.09
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.09
Qpipe (cfs)	=	0.09
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.05
Veloc Up (ft/s)	=	1.49
HGL Dn (ft)	=	524.85
HGL Up (ft)	=	524.40
Hw Elev (ft)	=	524.42
Hw/D (ft)	=	0.06
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 10 2022

Rich Hill Road Crossing (Base Flow)

Invert Elev Dn (ft)	=	500.94
Pipe Length (ft)	=	24.70
Slope (%)	=	0.12
Invert Elev Up (ft)	=	500.97
Rise (in)	=	11.5
Shape	=	Circular
Span (in)	=	11.5
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

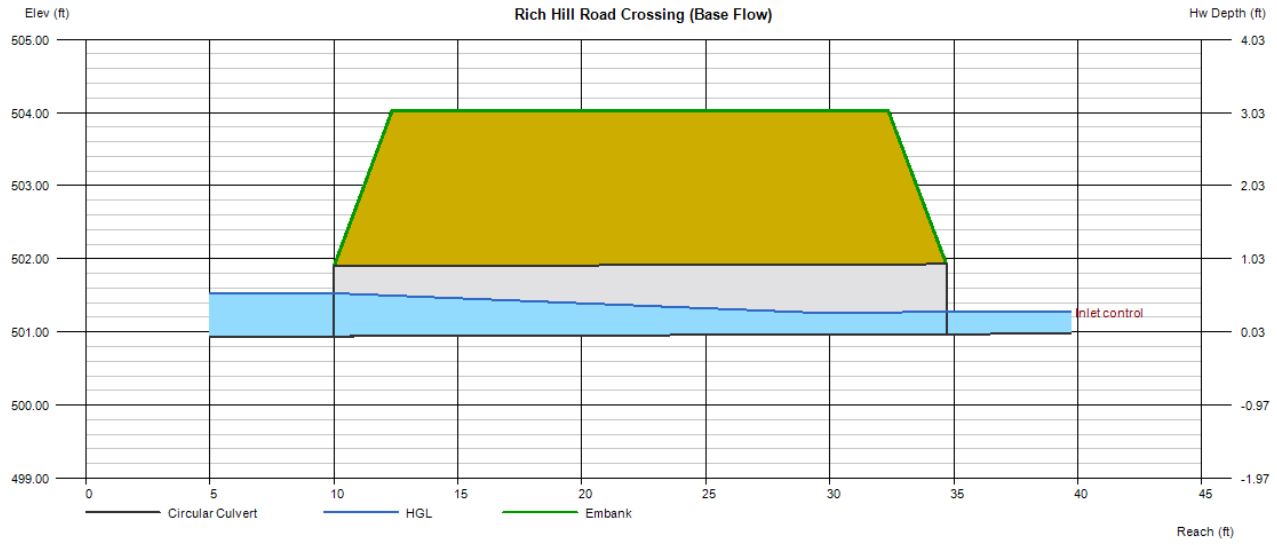
Top Elevation (ft)	=	504.03
Top Width (ft)	=	20.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	0.28
Qmax (cfs)	=	0.28
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	0.28
Qpipe (cfs)	=	0.28
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.60
Veloc Up (ft/s)	=	2.24
HGL Dn (ft)	=	501.53
HGL Up (ft)	=	501.19
Hw Elev (ft)	=	501.28
Hw/D (ft)	=	0.32
Flow Regime	=	Inlet Control



Maximum Allowable Flow

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 10 2022

Site Culvert 1 (Maximum Allowable Flow)

Invert Elev Dn (ft)	=	530.50
Pipe Length (ft)	=	56.70
Slope (%)	=	0.18
Invert Elev Up (ft)	=	530.60
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

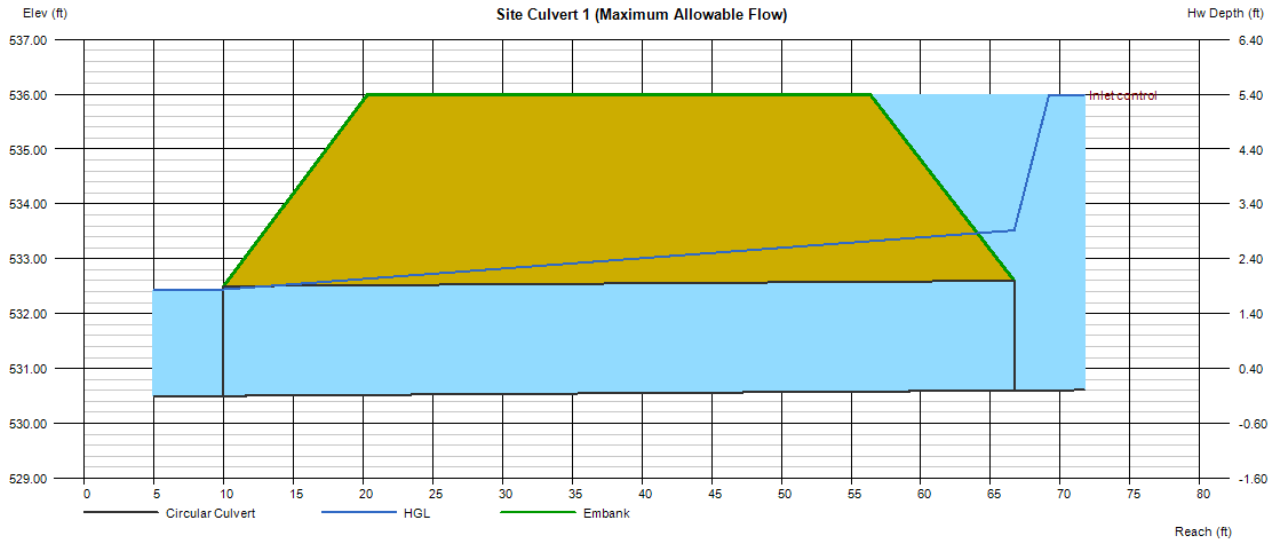
Top Elevation (ft)	=	536.00
Top Width (ft)	=	36.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	31.70
Qmax (cfs)	=	31.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	31.70
Qpipe (cfs)	=	31.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	10.17
Veloc Up (ft/s)	=	10.09
HGL Dn (ft)	=	532.44
HGL Up (ft)	=	533.52
Hw Elev (ft)	=	535.99
Hw/D (ft)	=	2.70
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 10 2022

Site Culvert 2 (Maximum Allowable Flow)

Invert Elev Dn (ft)	=	527.30
Pipe Length (ft)	=	24.70
Slope (%)	=	1.62
Invert Elev Up (ft)	=	527.70
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

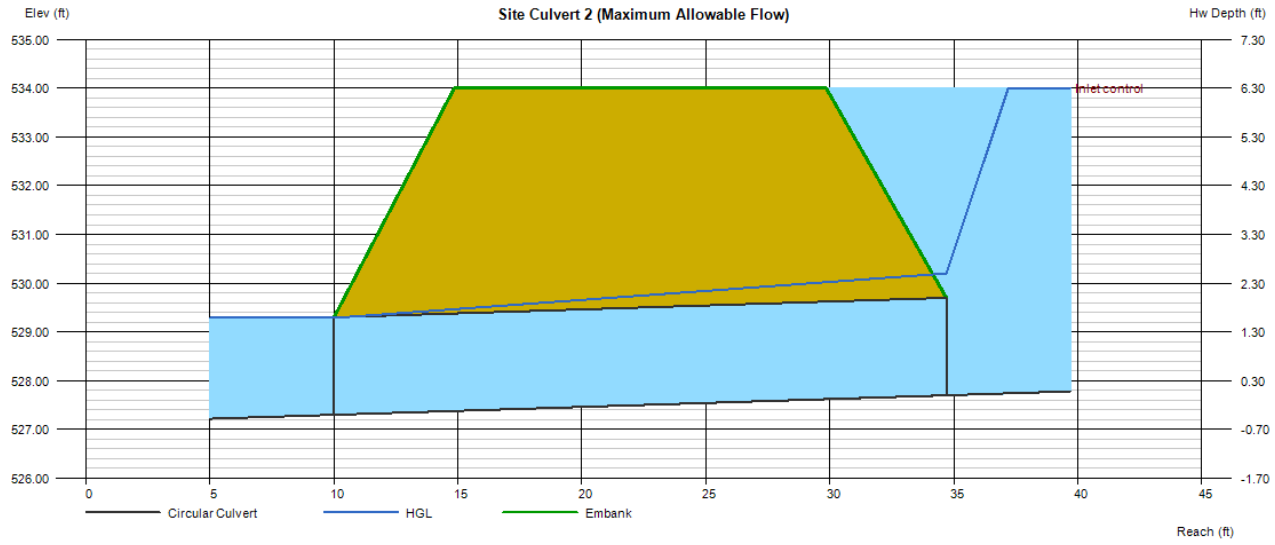
Top Elevation (ft)	=	534.00
Top Width (ft)	=	15.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	47.70
Qmax (cfs)	=	47.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	47.70
Qpipe (cfs)	=	47.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	15.20
Veloc Up (ft/s)	=	15.18
HGL Dn (ft)	=	529.29
HGL Up (ft)	=	530.20
Hw Elev (ft)	=	534.00
Hw/D (ft)	=	3.15
Flow Regime	=	Inlet Control



Culvert Report

Site Culvert 3 (Maximum Allowable Flow)

Invert Elev Dn (ft)	=	524.80
Pipe Length (ft)	=	39.40
Slope (%)	=	0.51
Invert Elev Up (ft)	=	525.00
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

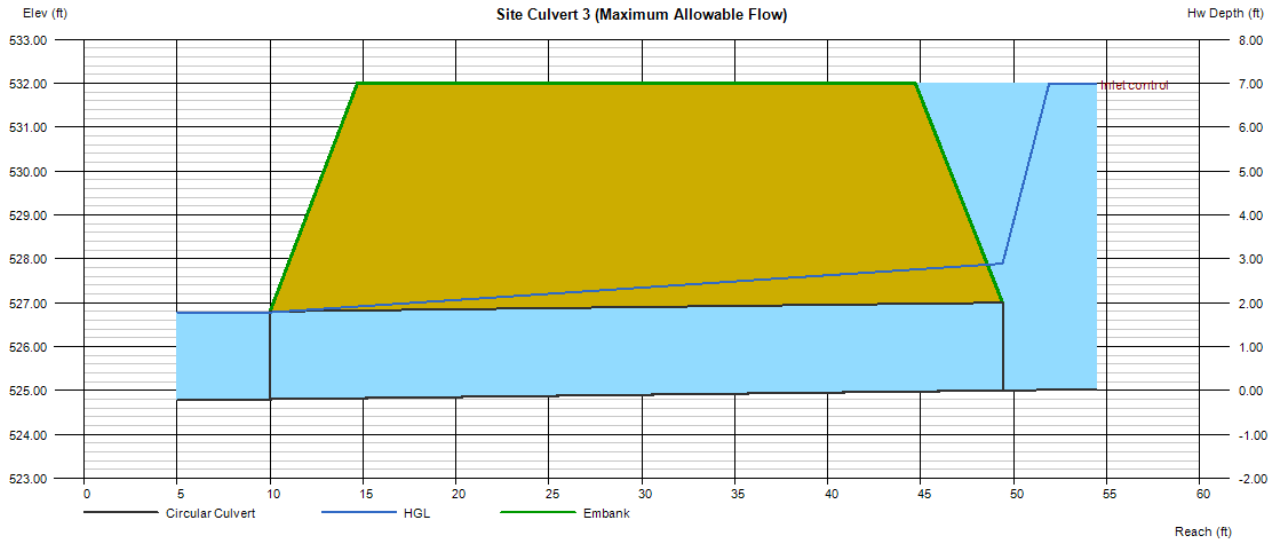
Top Elevation (ft)	=	532.00
Top Width (ft)	=	30.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	41.80
Qmax (cfs)	=	41.80
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	41.80
Qpipe (cfs)	=	41.80
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	13.33
Veloc Up (ft/s)	=	13.31
HGL Dn (ft)	=	526.78
HGL Up (ft)	=	527.89
Hw Elev (ft)	=	531.99
Hw/D (ft)	=	3.49
Flow Regime	=	Inlet Control



Culvert Report

Site Culvert 4 (Maximum Allowable Flow)

Invert Elev Dn (ft)	=	523.80
Pipe Length (ft)	=	40.80
Slope (%)	=	1.23
Invert Elev Up (ft)	=	524.30
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

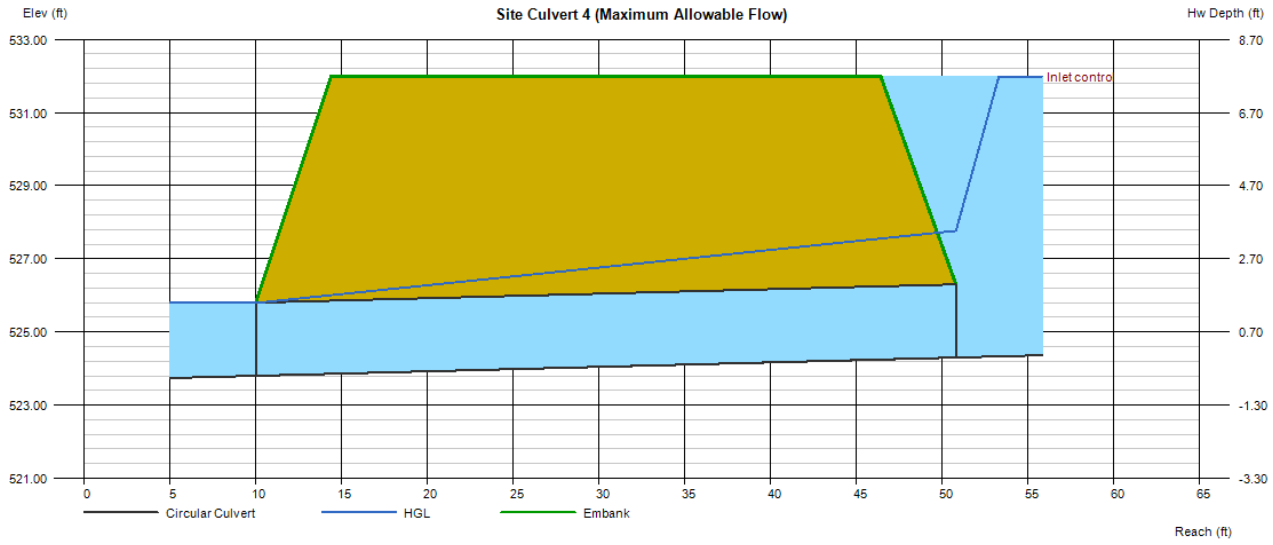
Top Elevation (ft)	=	532.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	54.50
Qmax (cfs)	=	54.50
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	54.50
Qpipe (cfs)	=	54.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	17.35
Veloc Up (ft/s)	=	17.35
HGL Dn (ft)	=	525.79
HGL Up (ft)	=	527.77
Hw Elev (ft)	=	531.99
Hw/D (ft)	=	3.84
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 10 2022

Rich Hill Road Crossing (Maximum Allowable Flow)

Invert Elev Dn (ft)	=	500.94
Pipe Length (ft)	=	24.70
Slope (%)	=	0.12
Invert Elev Up (ft)	=	500.97
Rise (in)	=	11.5
Shape	=	Circular
Span (in)	=	11.5
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

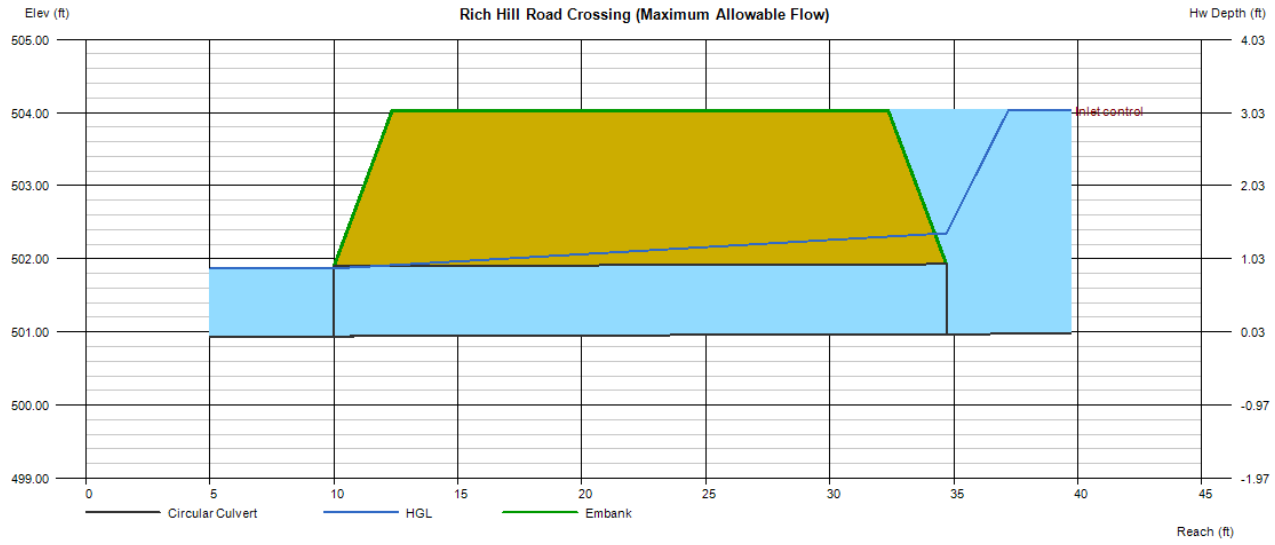
Top Elevation (ft)	=	504.03
Top Width (ft)	=	20.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	4.89
Qmax (cfs)	=	4.89
Tailwater Elev (ft)	=	(dc+D)/2

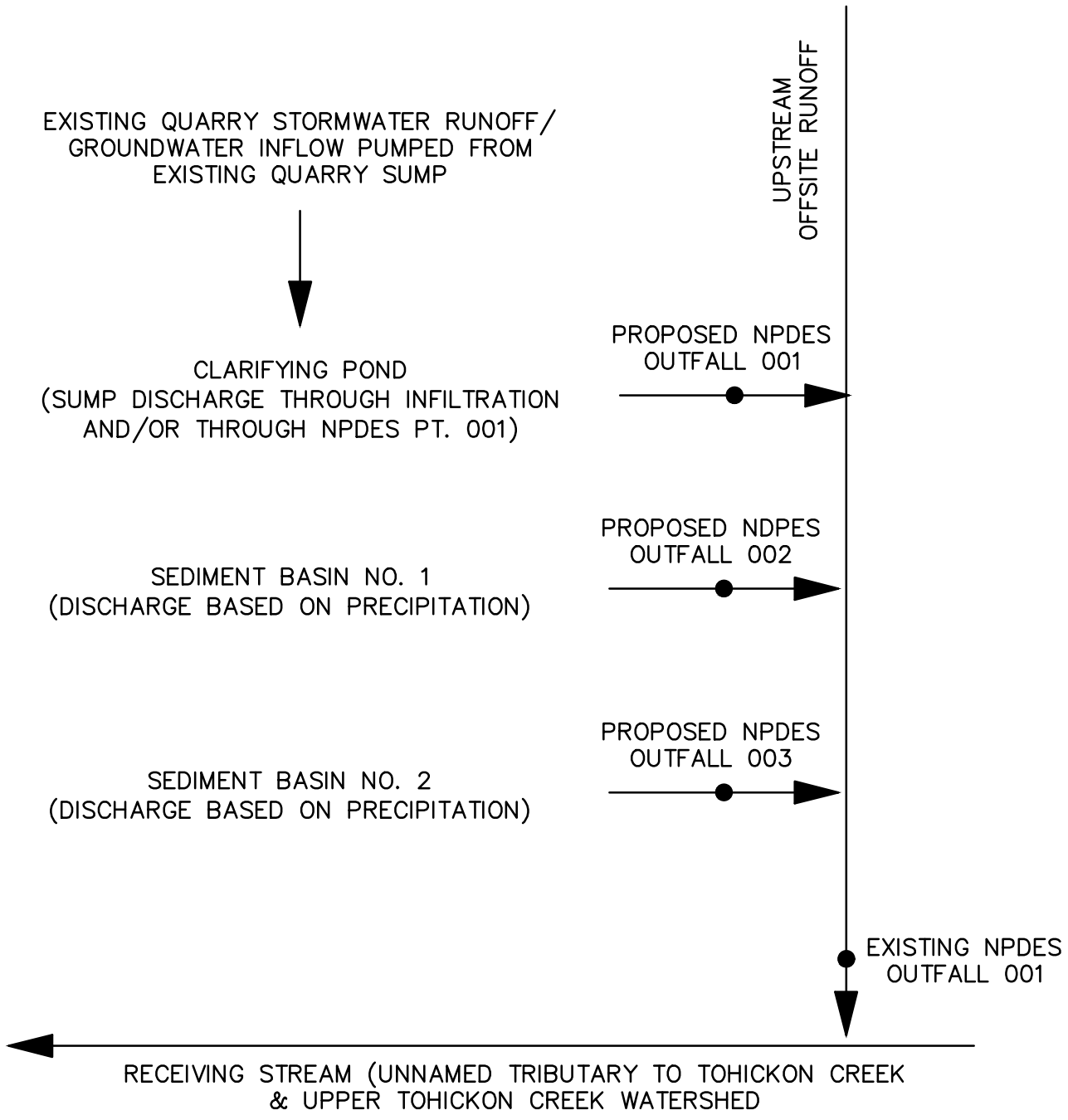
Highlighted

Qtotal (cfs)	=	4.89
Qpipe (cfs)	=	4.89
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.84
Veloc Up (ft/s)	=	6.78
HGL Dn (ft)	=	501.87
HGL Up (ft)	=	502.35
Hw Elev (ft)	=	504.03
Hw/D (ft)	=	3.19
Flow Regime	=	Inlet Control



Attachment C-21.3:

Flow Diagram



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6912 Old Easton Road
Pipersville, PA 18947

APPALACHIAN
REGIONAL OFFICE
P.O. Box 794
3000 Coombs Farm Drive
Morgantown, WV 26505

DRAWN BY:	CHECKED BY:
JTK	MSW
DATE:	PROJECT NO:
1/3/2022	061003.052

DRAWING SCALE: NOT TO SCALE

ATTACHMENT C21
FLOW DIAGRAM

HEIDELBERG MATERIALS NORTHEAST LLC
SMP NO, 7974SM1
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

Attachment C-21.4:

Site Plan

F:\PROJECTS\Hanson\061003.052 Rock Hill Permit Update\CAD\Drawings\Rev 9 (NPDES Permit Modification Application 2022)\Site Location Map.dwg Layout: D SIZE User: BSur 01/03/2023 15:37

NORTH

LEGEND

SMP BOUNDARY

001 NPDES DISCHARGE POINT

NOTES:

1. AERIAL IMAGE REFERENCED FROM GOOGLE EARTH PRO, DATED SEPTEMBER 21, 2020.

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.
200 0 100 200 400 800

DRAWN BY: JTK	CHECKED BY: MSW
DATE: 1/3/2022	PROJECT NO: 061003.052
DRAWING NUMBER: D-001	
SHEET 1 OF 1	

SITE PLAN
NPDES PERMIT MODIFICATION APPLICATION

HEIDELBERG MATERIALS NORTHEAST LLC
SMP NO. 7974SM1
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

PREPARED BY:

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ENGINEERING FOR SUCCESS™
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HEADQUARTERS PHILADELPHIA REGION
P.O. Box 468
6912 Old Easton Road
Pipersville, PA 18947

APPALACHIAN REGIONAL OFFICE
P.O. Box 794
8000 Coombs Farm Drive
Morgantown, WV 26505

PREPARED FOR:

Heidelberg Materials

JUNG TAEK KIM P.E.
LICENSE NO. PE088887

NO.	DATE	BY	REVISIONS

Attachment D-1:

Effluent Characterization Summary

Attachment D-1
Effluent Characterization Summary

Sampling Program

Effluent characterization samples were obtained from the Clarifying Pond (proposed NPDES 001); Sediment Basin No. 1 (proposed NPDES 002), and Sediment Basin No. 02 (proposed NPDES 003) on April 1, 2022. In addition, per discussion with PA DEP, additional background samples were obtained from the Quarry pit sump, as well as at upgradient and downgradient points along the unnamed tributary. The upgradient point is located west of the Clarifying Pond prior to the confluence with the Clarifying Pond discharge. The downgradient point is located at the downgradient property boundary where the existing NPDES point is located.

Analyses to be included in effluent characterization were determined from the National Pollutant Discharge Elimination System (NPDES) Application For Individual Permit To Discharge Industrial Wastewater Instruction (3800-PM-BCW0008a – 11/2016). The effluent characterization samples were analyzed for the following parameters listed in Appendix D of 40 CFR 122:

Item #24 - Common Parameters/Pollutants

pH
Total Suspended Solids (TSS)

Item #27 - Other Toxic Pollutants

Arsenic, total
Cadmium, total
Copper, total
Lead, total
Chromium, total
Mercury, total
Nickel, total
Selenium, total
Zinc, total

Item #28 - Conventional and Nonconventional Pollutants

Aluminum, total
Barium, total
Boron, total
Titanium, Total
Color
Fluoride
Iron, Total & Dissolved
Manganese, total
Sulfate

Item #29 - Toxic Pollutants and Hazardous Substances

Asbestos (Naturally Occuring)
Vanadium
Strontium

Additional Parameters

Alkalinity/Acidity
Hardness
Chloride
Total Dissolved Solids (TDS)
Total Kjeldahl Nitrogen (TKN)

List of Exemptions

The constituents detailed below are not anticipated to be present in any potential discharges from the Rock Hill Quarry. This list of exclusions was prepared giving consideration to the detailed geochemical data[1] available for the diabase geology of the Rock Hill Quarry Yorkhaven type. This data were reviewed to assess the potential for trace elements to be present in the discharge. Any trace element present in the rock at a concentration of less than 10 parts per million, (0.001 %) by weight was negated from the characterization sampling. In addition other trace elements were negated due to their common association with parameters that have already been sampled at the Site and found to be not present.

Item #24 - Common Parameters/Pollutants

A waiver is requested per 40 CFR 122.21(K)(5)(i) for sampling the following constituents: chemical oxygen demand (COD), biochemical oxygen demand (BOD), ammonia (NH3), total organic carbon (TOC) and Conductivity. COD is commonly used to indirectly measure the amount of organic compounds in water. Organic compounds are not expected in the discharge from the permitted outfalls at the Site. BOD is an indication of the organic quality of water and can be used to gauge the effectiveness of wastewater treatment plants. The organic quality of the water is not expected to be compromised from the mining of non-coal materials. Ammonia is produced for commercial fertilizers and other industrial applications, including metal finishing and treating applications as well as in the production of pharmaceuticals and dyes. Ammonia is used in mining applications for the extraction of metals. However, the mining activities at the Rock Hill Quarry do not extract metals from ore. TOC can be used as a rapid and accurate alternative to analyses for COD and BOD. As the need for COD and BOD is not expected, neither is analysis for TOC. Conductivity is commonly used to determine the ionic content within water. The existing monitoring plan includes Total Dissolved Solids (TDS), which is a direct measurement of ionic content in water. Therefore, the need to test for Conductivity is not expected.

Item #25 - Dioxins

There is no evidence that, at any time, dioxins, TCDD, 2,4,5-TP, Erbon, TCH or HCP were made, used, stored or buried on or directly upgradient from the surface mine permit area.

Item #26 - Organic Toxic Pollutants

The Organic Toxic Pollutants listed in EPA Table II (Appendix D of 40 CFR 122) are not expected to be present on the Site. Pesticides, herbicides, soil conditioners, and fertilizers are not applied within the SMP boundary.

Item #27 - Other Toxic Pollutants

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[1] Smith R C., et al., Geology and Geochemistry of Triassic Diabase in PA, Geological Society of America Bulletin, v. 86, p. 943-955, July 1975.
Woodruff, L.G., et al., Evolution of tholeiitic diabase sheet systems in the eastern United States: examples from the Culpeper Basin, Virginia-Maryland and the Gettysburg Basin, Pennsylvania, Journal of Volcanology and Geothermal Research 64 (1995)

The following Other Toxic Pollutants identified in EPA Table III (Appendix D of 40 CFR 122) are not expected to be present at the Site based upon the following:

Antimony: Antimony is a transition metal typically found as a sulfide mineral in igneous deposits. It is used as an alloying agent, flame retardant coating, as a catalyst in polymer production, and in the semiconductor industry. Antimony is reported at less than 0.1 ppm by weight in the diabase and is therefore not expected to be present in discharges from the Site. Antimony is not used or produced at this Site.

Beryllium: Beryllium is extremely uncommon in occurrence as a mineral. It may be present as a trace element in minerals of alkaline or granitic composition. Beryllium is present at 0.6 ppm by weight in the diabase geology and is therefore not expected to be present in the discharges from the Site. Beryllium is not used or produced at this Site.

Silver: Silver is a precious metal found associated with copper, lead and zinc sulfide minerals in igneous rocks. Silver is not reported to be present at any level in the diabase geology of the Site. Silver is not used or produced at this Site.

Thallium: Thallium is a transition metal associated with heavy metal sulfide minerals and potassium rich clay and granite minerals. Thallium was reported to be present at a trace level of 2.2 ppm in the diabase geology and is not expected in discharges from the Site. Thallium is not used or produced at this Site.

Cyanide: Cyanide comes from chemical manufacturing as an intermediate of a number of chemicals, electroplating and metal treatment. Cyanide can be generated from the incomplete combustion of organic nitrogen compounds and found in car exhaust. Cyanide is not expected at a non-coal mining site. Cyanide is not used or produced at this Site.

Phenols: Phenols are used in the production of phenolic resins and medicinal products. Phenols also form from the incomplete combustion of fossil fuels. Phenols are not expected at a non-coal mining site. Phenols are not used or produced at this Site.

Item #28 - Conventional and Nonconventional Pollutants

The following Conventional and Nonconventional Pollutants listed in EPA Table IV (Appendix D of 40 CFR 122) are not attributable to Site operations and/or are not expected to be present in effluent from the Site based upon the following:

Total Residual Chlorine: Total Residual Chlorine is the chlorine or chlorine type compounds used to disinfect potable water, industrial water and municipal wastewater. Water at the Site is not treated with chlorine; therefore, Total Residual Chlorine is not expected to be present in effluent from the Site.

Total Organic Nitrogen: Total organic nitrogen is a measure of nitrogen found in surface water and possibly groundwater associated with agriculture and municipal organic wastewaters. No agricultural land use occurs within the SMP boundary.

Nitrate-Nitrite: Nitrate-Nitrite is a site-specific additional parameter if agriculture is present

within the SMP boundary. No agricultural land use occurs within the SMP boundary.

Oil and Grease: Oil and grease is any substance recoverable from water in trichlorotrifluoroethane, and includes biological oils, lipids and mineral hydrocarbons. Heidelberg will follow approved PPC Plan procedures to minimize potential oil and grease accumulation from site vehicle traffic and maintenance.

Phosphorus, total: Phosphorus is a site-specific additional parameter if agriculture is present within the SMP boundary. No agricultural land use occurs within the quarry property.

Radioactivity: Radioactivity measures the presence of radioactive isotopes in water. The presence of radioactive isotopes would be due to mining of uranium or extraction of fossil fuels, including coal, petroleum and natural gas. These activities are not present at the Site.

Sulfide: Sulfide is the reduced form of sulfur produced under anaerobic decomposition of organic sulfur compounds and is typically a concern with wastewater treatment. These activities are not present at the Site.

Sulfite: Sulfite is a sulfur oxide anion present in boiler waters dissolved oxygen control, industrial wastewater, and wastewaters where sulfur dioxide is used for dechlorination. These activities are not present at the Site.

Surfactants: Surfactants are present in industrial and municipal wastewaters from the use of detergents, soaps and other cleansing agents. These activities are not present at the Site.

Bromide: Bromide is a naturally occurring anion halide found at low concentrations in freshwater. Bromide is not used or produced at the Site.

Cobalt, total: Cobalt is a metal found in copper and nickel sulfide igneous minerals mined in Canada, South America, South Africa, and Australia. Cobalt is present in the diabase geology at trace levels similar to copper and nickel. The absence of detectable copper (< 4 ug/L) and nickel (< 4 ug/L) in previous effluent samples from the Site indicates cobalt is not present in discharge from the Site.

Magnesium, total: Magnesium is a common alkaline earth metal found in a variety of minerals including sulfide, silicate and carbonate minerals. Although commonly found in ground and surface waters, Magnesium is not used or produced at the site.

Molybdenum, total: Molybdenum is found in copper sulfide igneous minerals mined in the U.S., Canada, China, and South America. Copper sulfide igneous minerals are not expected to be present at the Site. Molybdenum is not reported in the list of trace elements included with the geology of the Site.

Fecal Coliform: Fecal Coliform is an indicator of animal feces contamination or inadequate treatment of animal waste in wastewater treatment and not associated with Site operations. Animal waste is not present at the Site.

Item #29 - Toxic Pollutants and Hazardous Substances

The constituents listed in EPA Table V (Appendix D of 40 CFR 122) are not known to be present, nor are they expected to be present in discharge from the Site.

Asbestos, "Naturally Occurring": PA DEP does not have applicable water quality criteria for asbestos. However, based on an extensive evaluation of the presence of asbestos at the Site, it is not anticipated that asbestos is present in groundwater or surface water at levels that present any risk. Even taking into consideration EPA's National Recommended Water Quality Criteria for asbestos of 7 million fibers per liter (MFL) (which has not been adopted into PA DEP regulations), asbestos at the site does not present a risk to human health. Samples were collected and demonstrate non-dectable levels of asbestos in the effluent.

Attachment D-1:

Analytical Report (4/1/22)

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Edison
777 New Durham Road
Edison, NJ 08817
Tel: (732)549-3900

Laboratory Job ID: 460-255494-1
Client Project/Site: Rock Hill Quarry

For:
Hanson Aggregates PA LLC
7660 Imperial Way
Allentown, Pennsylvania 18195

Attn: Andrew Gutshall

Authorized for release by:
4/18/2022 4:01:06 PM

Julie Gilmore, Project Manager I
(484)685-0865
Julie.Gilmore@et.eurofinsus.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Definitions/Glossary

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

LCMS

Qualifier	Qualifier Description
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
^+	Continuing Calibration Verification (CCV) is outside acceptance limits, high biased.
^6+	Interference Check Standard (ICSA and/or ICSAB) is outside acceptance limits, high biased.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)

Glossary (Continued)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 460-255494-1

Laboratory: Eurofins Edison

Narrative

Job Narrative
460-255494-1

Comments
No additional comments.

Receipt
The samples were received on 4/1/2022 6:30 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 4 coolers at receipt time were 2.4º C, 3.0º C, 3.5º C and 10.3º C.

Receipt Exceptions
The method detection limit (MDL) is the lowest value detectable by the laboratory for a given analyte as determined by the MDL procedure detailed in EPA 40 CFR 136. Reported MDL values are adjusted for any dilutions and percent moisture (as applicable). The lab is unable to report values below the MDL.

GC Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
Method 6020B: The interference check standard solution (ICSA) associated with the following samples showed results for Cadmium at a level greater than 2X the reporting limit. The solution contains trace impurities of this element, and the results are not due to any matrix interference. These results are consistent with those found by the manufacturer of the ICSA solution. CP (460-255494-6)

Method 6020B: The interference check standard solution (ICSA) associated with the following samples showed results for Cadmium at a level greater than 2X the reporting limit. The solution contains trace impurities of this element, and the results are not due to any matrix interference. These results are consistent with those found by the manufacturer of the ICSA solution. Upgradient (460-255494-1), Downgradient (460-255494-2), Basin 1 (460-255494-3), Basin 2 (460-255494-4) and Pit (460-255494-5) Upgradient (460-255494-1), Downgradient (460-255494-2), Basin 1 (460-255494-3), Basin 2 (460-255494-4) and Pit (460-255494-5)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

LCMS
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: Upgradient

Date Collected: 04/01/22 10:30
Date Received: 04/01/22 18:30

Lab Sample ID: 460-255494-1

Matrix: Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**10.8**		1.60	0.20	mg/L			04/09/22 18:07	5
Sulfate	**3.18**		2.40	0.48	mg/L			04/09/22 18:07	5
Bromide	0.054	U	0.32	0.054	mg/L			04/11/22 15:45	1
Fluoride	**0.071**	**J**	0.080	0.019	mg/L			04/11/22 15:45	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zirconium	0.020	U ^+	0.050	0.020	mg/L		04/07/22 09:04	04/08/22 14:30	1

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.071	U ^6+	0.50	0.071	ug/L		04/11/22 09:10	04/12/22 13:04	1
Barium	**14.3**		4.0	0.91	ug/L		04/09/22 10:29	04/10/22 17:07	1
Iron	**450**		120	58.2	ug/L		04/09/22 10:29	04/10/22 17:07	1
Nickel	**1.4**	**J**	4.0	0.91	ug/L		04/09/22 10:29	04/10/22 17:07	1
Vanadium	0.68	U	4.0	0.68	ug/L		04/09/22 10:29	04/10/22 17:07	1
Strontium	**99.6**		4.0	0.50	ug/L		04/09/22 10:29	04/10/22 17:07	1
Arsenic	0.89	U	2.0	0.89	ug/L		04/09/22 10:29	04/10/22 17:07	1
Copper	**4.8**		4.0	2.5	ug/L		04/09/22 10:29	04/10/22 17:07	1
Boron	30.4	U	80.0	30.4	ug/L		04/09/22 10:29	04/10/22 17:07	1
Aluminum	**303**		40.0	19.5	ug/L		04/09/22 10:29	04/10/22 17:07	1
Lead	0.84	U	1.2	0.84	ug/L		04/09/22 10:29	04/10/22 17:07	1
Zinc	6.5	U	16.0	6.5	ug/L		04/09/22 10:29	04/10/22 17:07	1
Selenium	0.59	U	2.5	0.59	ug/L		04/09/22 10:29	04/10/22 17:07	1
Manganese	**78.7**		8.0	1.5	ug/L		04/09/22 10:29	04/10/22 17:07	1
Chromium	2.5	U	4.0	2.5	ug/L		04/09/22 10:29	04/10/22 17:07	1
Cobalt	0.71	U	4.0	0.71	ug/L		04/09/22 10:29	04/10/22 17:07	1
Titanium	**5.5**		4.0	1.9	ug/L		04/09/22 10:29	04/10/22 17:07	1

Method: 6020B - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	58.2	U	120	58.2	ug/L		04/04/22 22:37	04/05/22 00:59	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.043	U	0.20	0.043	ug/L		04/11/22 11:37	04/11/22 17:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.4	U	5.0	1.4	mg/L			04/13/22 17:39	1
Total Kjeldahl Nitrogen	0.50	U	1.0	0.50	mg/L		04/05/22 13:09	04/06/22 11:21	1
Color, Apparent	**25.0**		5.00	5.00	Color Units			04/03/22 07:45	1
Acidity	20.0	U	20.0	20.0	mg/L			04/08/22 13:57	1
Alkalinity	**103**		5.0	5.0	mg/L			04/08/22 16:32	1
Hardness as calcium carbonate	**100**		5.0	5.0	mg/L			04/12/22 16:35	1
Total Dissolved Solids	**163**		10.0	10.0	mg/L			04/08/22 17:36	1
Total Suspended Solids	2.5	U	2.5	2.5	mg/L			04/08/22 11:10	1
pH	**7.9**	**HF**			SU			04/04/22 18:54	1
Temperature	**21.1**	**HF**			Degrees C			04/04/22 18:54	1

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: Downgradient

Date Collected: 04/01/22 10:50
Date Received: 04/01/22 18:30

Lab Sample ID: 460-255494-2

Matrix: Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**10.8**		0.32	0.039	mg/L			04/09/22 18:22	1
Sulfate	**7.07**		0.48	0.095	mg/L			04/09/22 18:22	1
Bromide	0.054	U	0.32	0.054	mg/L			04/09/22 18:22	1
Fluoride	**0.054**	**J**	0.080	0.019	mg/L			04/09/22 18:22	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zirconium	0.020	U	0.050	0.020	mg/L		04/07/22 09:35	04/12/22 17:24	1

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.071	U ^6+	0.50	0.071	ug/L		04/11/22 09:10	04/12/22 13:14	1
Barium	**4.8**		4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:20	1
Iron	**449**		120	58.2	ug/L		04/11/22 11:07	04/11/22 17:20	1
Nickel	0.91	U	4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:20	1
Vanadium	**1.2**	**J**	4.0	0.68	ug/L		04/11/22 11:07	04/11/22 17:20	1
Strontium	**60.4**		4.0	0.50	ug/L		04/11/22 11:07	04/11/22 17:20	1
Arsenic	0.89	U	2.0	0.89	ug/L		04/11/22 11:07	04/11/22 17:20	1
Copper	**3.3**	**J**	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:20	1
Boron	30.4	U	80.0	30.4	ug/L		04/11/22 11:07	04/11/22 17:20	1
Aluminum	**256**		40.0	19.5	ug/L		04/11/22 11:07	04/11/22 17:20	1
Lead	0.84	U	1.2	0.84	ug/L		04/11/22 11:07	04/11/22 17:20	1
Zinc	**6.6**	**J**	16.0	6.5	ug/L		04/11/22 11:07	04/11/22 17:20	1
Selenium	0.59	U	2.5	0.59	ug/L		04/11/22 11:07	04/11/22 17:20	1
Manganese	**50.3**		8.0	1.5	ug/L		04/11/22 11:07	04/11/22 17:20	1
Chromium	2.5	U	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:20	1
Cobalt	0.71	U	4.0	0.71	ug/L		04/11/22 11:07	04/11/22 17:20	1
Titanium	**6.6**		4.0	1.9	ug/L		04/11/22 11:07	04/13/22 20:41	1

Method: 6020B - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	58.2	U	120	58.2	ug/L		04/04/22 22:37	04/05/22 01:01	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.043	U	0.20	0.043	ug/L		04/11/22 11:37	04/11/22 17:30	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.4	U	5.0	1.4	mg/L			04/13/22 17:39	1
Total Kjeldahl Nitrogen	0.50	U	1.0	0.50	mg/L		04/05/22 13:09	04/06/22 11:01	1
Color, True	**25.0**		5.00	5.00	Color Units			04/03/22 07:45	1
Acidity	20.0	U	20.0	20.0	mg/L			04/08/22 13:57	1
Alkalinity	**64.2**		5.0	5.0	mg/L			04/08/22 16:16	1
Hardness as calcium carbonate	**70.0**		5.0	5.0	mg/L			04/12/22 16:35	1
Total Dissolved Solids	**97.0**		10.0	10.0	mg/L			04/08/22 17:36	1
Total Suspended Solids	**4.3**		2.5	2.5	mg/L			04/08/22 11:10	1
pH	**8.0**	**HF**			SU			04/04/22 18:56	1
Temperature	**21.0**	**HF**			Degrees C			04/04/22 18:56	1

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: Basin 1
Date Collected: 04/01/22 11:50
Date Received: 04/01/22 18:30

Lab Sample ID: 460-255494-3
Matrix: Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**8.74**		0.32	0.039	mg/L			04/09/22 18:38	1
Sulfate	**10.5**		0.48	0.095	mg/L			04/09/22 18:38	1
Bromide	0.054	U	0.32	0.054	mg/L			04/09/22 18:38	1
Fluoride	**0.030**	**J**	0.080	0.019	mg/L			04/09/22 18:38	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zirconium	0.020	U	0.050	0.020	mg/L		04/07/22 09:24	04/12/22 16:55	1

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.071	U ^6+	0.50	0.071	ug/L		04/11/22 09:10	04/12/22 13:16	1
Barium	**4.6**		4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:22	1
Iron	**376**		120	58.2	ug/L		04/11/22 11:07	04/11/22 17:22	1
Nickel	0.91	U	4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:22	1
Vanadium	**2.1**	**J**	4.0	0.68	ug/L		04/11/22 11:07	04/11/22 17:22	1
Strontium	**75.4**		4.0	0.50	ug/L		04/11/22 11:07	04/11/22 17:22	1
Arsenic	0.89	U	2.0	0.89	ug/L		04/11/22 11:07	04/11/22 17:22	1
Copper	2.5	U	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:22	1
Boron	**67.5**	**J**	80.0	30.4	ug/L		04/11/22 11:07	04/11/22 17:22	1
Aluminum	**223**		40.0	19.5	ug/L		04/11/22 11:07	04/11/22 17:22	1
Lead	0.84	U	1.2	0.84	ug/L		04/11/22 11:07	04/11/22 17:22	1
Zinc	**13.0**	**J**	16.0	6.5	ug/L		04/11/22 11:07	04/11/22 17:22	1
Selenium	0.59	U	2.5	0.59	ug/L		04/11/22 11:07	04/11/22 17:22	1
Manganese	**23.6**		8.0	1.5	ug/L		04/11/22 11:07	04/11/22 17:22	1
Chromium	2.5	U	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:22	1
Cobalt	0.71	U	4.0	0.71	ug/L		04/11/22 11:07	04/11/22 17:22	1
Titanium	**8.9**		4.0	1.9	ug/L		04/11/22 11:07	04/13/22 20:45	1

Method: 6020B - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	58.2	U	120	58.2	ug/L		04/04/22 22:37	04/05/22 01:03	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.043	U	0.20	0.043	ug/L		04/11/22 11:37	04/11/22 17:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.4	U	5.0	1.4	mg/L			04/13/22 17:39	1
Total Kjeldahl Nitrogen	0.50	U	1.0	0.50	mg/L		04/05/22 13:31	04/06/22 10:31	1
Color, Apparent	**10.0**		5.00	5.00	Color Units			04/03/22 07:45	1
Acidity	20.0	U	20.0	20.0	mg/L			04/08/22 13:57	1
Alkalinity	**118**		5.0	5.0	mg/L			04/08/22 16:40	1
Hardness as calcium carbonate	**130**		5.0	5.0	mg/L			04/12/22 16:35	1
Total Dissolved Solids	**168**		10.0	10.0	mg/L			04/08/22 17:36	1
Total Suspended Solids	**4.0**		2.5	2.5	mg/L			04/08/22 11:10	1
pH	**8.1**	**HF**			SU			04/04/22 18:58	1
Temperature	**20.9**	**HF**			Degrees C			04/04/22 18:58	1

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: Basin 2

Date Collected: 04/01/22 11:20
Date Received: 04/01/22 18:30

Lab Sample ID: 460-255494-4

Matrix: Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**2.42**		1.60	0.20	mg/L			04/09/22 18:54	5
Sulfate	**8.24**		2.40	0.48	mg/L			04/09/22 18:54	5
Bromide	0.054	U	0.32	0.054	mg/L			04/11/22 16:01	1
Fluoride	**0.035**	**J**	0.080	0.019	mg/L			04/11/22 16:01	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zirconium	0.020	U	0.050	0.020	mg/L		04/07/22 09:19	04/12/22 14:17	1

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.071	U ^6+	0.50	0.071	ug/L		04/11/22 09:10	04/12/22 13:19	1
Barium	**4.9**		4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:25	1
Iron	**1000**		120	58.2	ug/L		04/11/22 11:07	04/11/22 17:25	1
Nickel	**1.5**	**J**	4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:25	1
Vanadium	**4.5**		4.0	0.68	ug/L		04/11/22 11:07	04/11/22 17:25	1
Strontium	**54.6**		4.0	0.50	ug/L		04/11/22 11:07	04/11/22 17:25	1
Arsenic	0.89	U	2.0	0.89	ug/L		04/11/22 11:07	04/11/22 17:25	1
Copper	**3.7**	**J**	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:25	1
Boron	**33.4**	**J**	80.0	30.4	ug/L		04/11/22 11:07	04/11/22 17:25	1
Aluminum	**640**		40.0	19.5	ug/L		04/11/22 11:07	04/11/22 17:25	1
Lead	0.84	U	1.2	0.84	ug/L		04/11/22 11:07	04/11/22 17:25	1
Zinc	6.5	U	16.0	6.5	ug/L		04/11/22 11:07	04/11/22 17:25	1
Selenium	0.59	U	2.5	0.59	ug/L		04/11/22 11:07	04/11/22 17:25	1
Manganese	**108**		8.0	1.5	ug/L		04/11/22 11:07	04/11/22 17:25	1
Chromium	**3.5**	**J**	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:25	1
Cobalt	0.71	U	4.0	0.71	ug/L		04/11/22 11:07	04/11/22 17:25	1
Titanium	**17.9**		4.0	1.9	ug/L		04/11/22 11:07	04/13/22 20:53	1

Method: 6020B - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	58.2	U	120	58.2	ug/L		04/04/22 22:37	04/05/22 01:06	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.043	U	0.20	0.043	ug/L		04/11/22 11:37	04/11/22 17:32	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.4	U	5.0	1.4	mg/L			04/13/22 17:39	1
Total Kjeldahl Nitrogen	**1.6**		1.0	0.50	mg/L		04/06/22 14:26	04/07/22 12:09	1
Color, True	**10.0**		5.00	5.00	Color Units			04/03/22 07:45	1
Acidity	20.0	U	20.0	20.0	mg/L			04/08/22 13:57	1
Alkalinity	**103**		5.0	5.0	mg/L			04/08/22 16:49	1
Hardness as calcium carbonate	**110**		5.0	5.0	mg/L			04/12/22 16:35	1
Total Dissolved Solids	**179**		10.0	10.0	mg/L			04/08/22 17:36	1
Total Suspended Solids	**10.2**		2.5	2.5	mg/L			04/08/22 11:10	1
pH	**8.4**	**HF**			SU			04/04/22 19:00	1
Temperature	**21.0**	**HF**			Degrees C			04/04/22 19:00	1

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: Pit

Date Collected: 04/01/22 12:15
Date Received: 04/01/22 18:30

Lab Sample ID: 460-255494-5

Matrix: Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**1.42**		0.32	0.039	mg/L			04/09/22 19:10	1
Sulfate	**6.14**		0.48	0.095	mg/L			04/09/22 19:10	1
Bromide	0.054	U	0.32	0.054	mg/L			04/09/22 19:10	1
Fluoride	**0.057**	**J**	0.080	0.019	mg/L			04/09/22 19:10	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zirconium	0.020	U	0.050	0.020	mg/L		04/07/22 09:24	04/12/22 16:52	1

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.071	U ^6+	0.50	0.071	ug/L		04/11/22 09:10	04/12/22 13:21	1
Barium	**1.9**	**J**	4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:27	1
Iron	58.2	U	120	58.2	ug/L		04/11/22 11:07	04/11/22 17:27	1
Nickel	0.91	U	4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:27	1
Vanadium	0.68	U	4.0	0.68	ug/L		04/11/22 11:07	04/11/22 17:27	1
Strontium	**22.8**		4.0	0.50	ug/L		04/11/22 11:07	04/11/22 17:27	1
Arsenic	0.89	U	2.0	0.89	ug/L		04/11/22 11:07	04/11/22 17:27	1
Copper	2.5	U	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:27	1
Boron	**44.8**	**J**	80.0	30.4	ug/L		04/11/22 11:07	04/11/22 17:27	1
Aluminum	**27.2**	**J**	40.0	19.5	ug/L		04/11/22 11:07	04/11/22 17:27	1
Lead	0.84	U	1.2	0.84	ug/L		04/11/22 11:07	04/11/22 17:27	1
Zinc	6.5	U	16.0	6.5	ug/L		04/11/22 11:07	04/11/22 17:27	1
Selenium	0.59	U	2.5	0.59	ug/L		04/11/22 11:07	04/11/22 17:27	1
Manganese	**4.1**	**J**	8.0	1.5	ug/L		04/11/22 11:07	04/11/22 17:27	1
Chromium	2.5	U	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:27	1
Cobalt	0.71	U	4.0	0.71	ug/L		04/11/22 11:07	04/11/22 17:27	1
Titanium	1.9	U	4.0	1.9	ug/L		04/11/22 11:07	04/13/22 20:55	1

Method: 6020B - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	58.2	U	120	58.2	ug/L		04/04/22 22:37	04/05/22 01:08	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.043	U	0.20	0.043	ug/L		04/11/22 11:37	04/11/22 17:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.4	U	5.0	1.4	mg/L			04/13/22 17:39	1
Total Kjeldahl Nitrogen	0.50	U	1.0	0.50	mg/L		04/05/22 13:09	04/06/22 12:09	1
Color, Apparent	5.00	U	5.00	5.00	Color Units			04/03/22 07:45	1
Acidity	20.0	U	20.0	20.0	mg/L			04/08/22 13:57	1
Alkalinity	**56.6**		5.0	5.0	mg/L			04/08/22 16:57	1
Hardness as calcium carbonate	**62.0**		5.0	5.0	mg/L			04/12/22 16:35	1
Total Dissolved Solids	**98.0**		10.0	10.0	mg/L			04/08/22 17:36	1
Total Suspended Solids	2.5	U	2.5	2.5	mg/L			04/08/22 11:10	1
pH	**8.3**	**HF**			SU			04/04/22 19:02	1
Temperature	**21.1**	**HF**			Degrees C			04/04/22 19:02	1

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: CP

Date Collected: 04/01/22 09:30
Date Received: 04/01/22 18:30

Lab Sample ID: 460-255494-6

Matrix: Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**1.42**		0.32	0.039	mg/L			04/09/22 20:14	1
Sulfate	**5.90**		0.48	0.095	mg/L			04/09/22 20:14	1
Bromide	0.054	U	0.32	0.054	mg/L			04/09/22 20:14	1
Fluoride	**0.075**	**J**	0.080	0.019	mg/L			04/09/22 20:14	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zirconium	0.020	U	0.050	0.020	mg/L		04/07/22 09:35	04/12/22 17:27	1

Method: 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.071	U ^6+	0.50	0.071	ug/L		04/11/22 09:08	04/12/22 12:46	1
Barium	**2.4**	**J**	4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:30	1
Iron	**193**		120	58.2	ug/L		04/11/22 11:07	04/11/22 17:30	1
Nickel	0.91	U	4.0	0.91	ug/L		04/11/22 11:07	04/11/22 17:30	1
Vanadium	0.68	U	4.0	0.68	ug/L		04/11/22 11:07	04/11/22 17:30	1
Strontium	**27.5**		4.0	0.50	ug/L		04/11/22 11:07	04/11/22 17:30	1
Arsenic	0.89	U	2.0	0.89	ug/L		04/11/22 11:07	04/11/22 17:30	1
Copper	2.5	U	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:30	1
Boron	**38.4**	**J**	80.0	30.4	ug/L		04/11/22 11:07	04/11/22 17:30	1
Aluminum	**215**		40.0	19.5	ug/L		04/11/22 11:07	04/11/22 17:30	1
Lead	0.84	U	1.2	0.84	ug/L		04/11/22 11:07	04/11/22 17:30	1
Zinc	6.5	U	16.0	6.5	ug/L		04/11/22 11:07	04/11/22 17:30	1
Selenium	0.59	U	2.5	0.59	ug/L		04/11/22 11:07	04/11/22 17:30	1
Manganese	**12.7**		8.0	1.5	ug/L		04/11/22 11:07	04/11/22 17:30	1
Chromium	2.5	U	4.0	2.5	ug/L		04/11/22 11:07	04/11/22 17:30	1
Cobalt	0.71	U	4.0	0.71	ug/L		04/11/22 11:07	04/11/22 17:30	1
Titanium	**5.1**		4.0	1.9	ug/L		04/11/22 11:07	04/13/22 20:57	1

Method: 6020B - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	58.2	U	120	58.2	ug/L		04/04/22 22:37	04/05/22 01:10	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.043	U	0.20	0.043	ug/L		04/11/22 11:37	04/11/22 17:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.4	U	5.0	1.4	mg/L			04/13/22 17:39	1
Total Kjeldahl Nitrogen	0.50	U	1.0	0.50	mg/L		04/05/22 13:09	04/06/22 11:03	1
Color, Apparent	**5.00**		5.00	5.00	Color Units			04/03/22 07:45	1
Acidity	20.0	U	20.0	20.0	mg/L			04/08/22 13:57	1
Alkalinity	**55.2**		5.0	5.0	mg/L			04/08/22 17:05	1
Hardness as calcium carbonate	**56.0**		5.0	5.0	mg/L			04/12/22 16:35	1
Total Dissolved Solids	**84.0**		10.0	10.0	mg/L			04/08/22 17:36	1
Total Suspended Solids	**3.1**		2.5	2.5	mg/L			04/08/22 11:10	1
pH	**8.0**	**HF**			SU			04/04/22 19:04	1
Temperature	**20.9**	**HF**			Degrees C			04/04/22 19:04	1

Client Sample ID: Field Blank(Pit)

Lab Sample ID: 460-255494-7
Matrix: Water
Date Collected: 04/01/22 08:45
Date Received: 04/01/22 18:30

Method: 537 IDA - EPA 537 Isotope Dilution

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	0.40	U	1.62	0.40	ng/L		04/06/22 07:04	04/07/22 22:02	1
Perfluorooctanesulfonic acid	0.40	U	1.62	0.40	ng/L		04/06/22 07:04	04/07/22 22:02	1
Perfluorooctanoic acid	0.40	U	1.62	0.40	ng/L		04/06/22 07:04	04/07/22 22:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*133*		*16 - 200*	*04/06/22 07:04*	*04/07/22 22:02*	*1*
13C8 PFOA	*117*		*48 - 162*	*04/06/22 07:04*	*04/07/22 22:02*	*1*
13C8 PFOS	*118*		*51 - 159*	*04/06/22 07:04*	*04/07/22 22:02*	*1*

Client Sample ID: Field Blank(CP)

Lab Sample ID: 460-255494-8
Matrix: Water
Date Collected: 04/01/22 09:10
Date Received: 04/01/22 18:30

Method: 537 IDA - EPA 537 Isotope Dilution

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	0.41	U	1.62	0.41	ng/L		04/06/22 07:04	04/07/22 22:13	1
Perfluorooctanesulfonic acid	0.41	U	1.62	0.41	ng/L		04/06/22 07:04	04/07/22 22:13	1
Perfluorooctanoic acid	0.41	U	1.62	0.41	ng/L		04/06/22 07:04	04/07/22 22:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*125*		*16 - 200*	*04/06/22 07:04*	*04/07/22 22:13*	*1*
13C8 PFOA	*112*		*48 - 162*	*04/06/22 07:04*	*04/07/22 22:13*	*1*
13C8 PFOS	*117*		*51 - 159*	*04/06/22 07:04*	*04/07/22 22:13*	*1*

Client Sample ID: CP(PFOS)

Lab Sample ID: 460-255494-9
Matrix: Water
Date Collected: 04/01/22 09:05
Date Received: 04/01/22 18:30

Method: 537 IDA - EPA 537 Isotope Dilution

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	**0.51**	**J**	1.62	0.41	ng/L		04/06/22 07:04	04/07/22 22:24	1
Perfluorooctanesulfonic acid	**3.01**	**I**	1.62	0.41	ng/L		04/06/22 07:04	04/07/22 22:24	1
Perfluorooctanoic acid	**5.58**		1.62	0.41	ng/L		04/06/22 07:04	04/07/22 22:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*117*		*16 - 200*	*04/06/22 07:04*	*04/07/22 22:24*	*1*
13C8 PFOA	*115*		*48 - 162*	*04/06/22 07:04*	*04/07/22 22:24*	*1*
13C8 PFOS	*112*		*51 - 159*	*04/06/22 07:04*	*04/07/22 22:24*	*1*

Client Sample ID: Pit(PFOS)

Lab Sample ID: 460-255494-10
Matrix: Water
Date Collected: 04/01/22 08:40
Date Received: 04/01/22 18:30

Method: 537 IDA - EPA 537 Isotope Dilution

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid	**0.54**	**J**	1.65	0.41	ng/L		04/06/22 07:04	04/07/22 22:35	1
Perfluorooctanesulfonic acid	**1.57**	**J**	1.65	0.41	ng/L		04/06/22 07:04	04/07/22 22:35	1
Perfluorooctanoic acid	**6.18**		1.65	0.41	ng/L		04/06/22 07:04	04/07/22 22:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*122*		*16 - 200*	*04/06/22 07:04*	*04/07/22 22:35*	*1*
13C8 PFOA	*121*		*48 - 162*	*04/06/22 07:04*	*04/07/22 22:35*	*1*
13C8 PFOS	*115*		*51 - 159*	*04/06/22 07:04*	*04/07/22 22:35*	*1*

Lab Chronicle

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: Upgradient

Lab Sample ID: 460-255494-1

Date Collected: 04/01/22 10:30

Matrix: Water

Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	838272	04/09/22 18:07	VMI	TAL EDI
Total/NA	Analysis	300.0		1	838704	04/11/22 15:45	VMI	TAL EDI
Total Recoverable	Prep	200.7 Rev 4.4			242030	04/07/22 09:04	WBK6	ELLE
Total Recoverable	Analysis	200.7 Rev 4.4		1	242668	04/08/22 14:30	T8CQ	ELLE
Dissolved	Filtration	FILTRATION			837333	04/04/22 22:34	VAD	TAL EDI
Dissolved	Prep	3010A			837335	04/04/22 22:37	VAD	TAL EDI
Dissolved	Analysis	6020B		1	837381	04/05/22 00:59	VAD	TAL EDI
Total/NA	Prep	3020A			621075	04/11/22 09:10	NBS	TAL BUF
Total/NA	Analysis	6020B		1	621408	04/12/22 13:04	BMB	TAL BUF
Total/NA	Prep	3010A			838260	04/09/22 10:29	NNW	TAL EDI
Total/NA	Analysis	6020B		1	838367	04/10/22 17:07	MDC	TAL EDI
Total/NA	Prep	7470A			621208	04/11/22 11:37	NVK	TAL BUF
Total/NA	Analysis	7470A		1	621295	04/11/22 17:28	BMB	TAL BUF
Total/NA	Analysis	1664A		1	838981	04/13/22 17:39	PXP	TAL EDI
Total/NA	Prep	351.2			241206	04/05/22 13:09	F8AU	ELLE
Total/NA	Analysis	351.2		1	241655	04/06/22 11:21	JCG7	ELLE
Total/NA	Analysis	SM 2120B		1	837124	04/03/22 07:45	VBG	TAL EDI
Total/NA	Analysis	SM 2310B		1	838132	04/08/22 13:57	RAK	TAL EDI
Total/NA	Analysis	SM 2320B		1	838472	04/08/22 16:32	MMC	TAL EDI
Total/NA	Analysis	SM 2340C		1	838760	04/12/22 16:35	HTV	TAL EDI
Total/NA	Analysis	SM 2540C		1	838168	04/08/22 17:36	HTV	TAL EDI
Total/NA	Analysis	SM 2540D		1	838077	04/08/22 11:10	HTV	TAL EDI
Total/NA	Analysis	SM 4500 H+ B		1	837276	04/04/22 18:54	KSS	TAL EDI

Client Sample ID: Downgradient

Lab Sample ID: 460-255494-2

Date Collected: 04/01/22 10:50

Matrix: Water

Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	838272	04/09/22 18:22	VMI	TAL EDI
Total Recoverable	Prep	200.7 Rev 4.4			242055	04/07/22 09:35	WBK6	ELLE
Total Recoverable	Analysis	200.7 Rev 4.4		1	243896	04/12/22 17:24	WJM9	ELLE
Dissolved	Filtration	FILTRATION			837333	04/04/22 22:34	VAD	TAL EDI
Dissolved	Prep	3010A			837335	04/04/22 22:37	VAD	TAL EDI
Dissolved	Analysis	6020B		1	837381	04/05/22 01:01	VAD	TAL EDI
Total/NA	Prep	3020A			621075	04/11/22 09:10	NBS	TAL BUF
Total/NA	Analysis	6020B		1	621408	04/12/22 13:14	BMB	TAL BUF
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	838499	04/11/22 17:20	MDC	TAL EDI
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	839019	04/13/22 20:41	VAD	TAL EDI
Total/NA	Prep	7470A			621208	04/11/22 11:37	NVK	TAL BUF
Total/NA	Analysis	7470A		1	621295	04/11/22 17:30	BMB	TAL BUF

Lab Chronicle

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: Downgradient

Lab Sample ID: 460-255494-2

Date Collected: 04/01/22 10:50

Matrix: Water

Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1664A		1	838981	04/13/22 17:39	PXP	TAL EDI
Total/NA	Prep	351.2			241206	04/05/22 13:09	F8AU	ELLE
Total/NA	Analysis	351.2		1	241655	04/06/22 11:01	JCG7	ELLE
Total/NA	Analysis	SM 2120B		1	837124	04/03/22 07:45	VBG	TAL EDI
Total/NA	Analysis	SM 2310B		1	838132	04/08/22 13:57	RAK	TAL EDI
Total/NA	Analysis	SM 2320B		1	838472	04/08/22 16:16	MMC	TAL EDI
Total/NA	Analysis	SM 2340C		1	838760	04/12/22 16:35	HTV	TAL EDI
Total/NA	Analysis	SM 2540C		1	838168	04/08/22 17:36	HTV	TAL EDI
Total/NA	Analysis	SM 2540D		1	838077	04/08/22 11:10	HTV	TAL EDI
Total/NA	Analysis	SM 4500 H+ B		1	837276	04/04/22 18:56	KSS	TAL EDI

Client Sample ID: Basin 1

Lab Sample ID: 460-255494-3

Date Collected: 04/01/22 11:50

Matrix: Water

Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	838272	04/09/22 18:38	VMI	TAL EDI
Total Recoverable	Prep	200.7 Rev 4.4			242045	04/07/22 09:24	UJLA	ELLE
Total Recoverable	Analysis	200.7 Rev 4.4		1	243896	04/12/22 16:55	WJM9	ELLE
Dissolved	Filtration	FILTRATION			837333	04/04/22 22:34	VAD	TAL EDI
Dissolved	Prep	3010A			837335	04/04/22 22:37	VAD	TAL EDI
Dissolved	Analysis	6020B		1	837381	04/05/22 01:03	VAD	TAL EDI
Total/NA	Prep	3020A			621075	04/11/22 09:10	NBS	TAL BUF
Total/NA	Analysis	6020B		1	621408	04/12/22 13:16	BMB	TAL BUF
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	838499	04/11/22 17:22	MDC	TAL EDI
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	839019	04/13/22 20:45	VAD	TAL EDI
Total/NA	Prep	7470A			621208	04/11/22 11:37	NVK	TAL BUF
Total/NA	Analysis	7470A		1	621295	04/11/22 17:31	BMB	TAL BUF
Total/NA	Analysis	1664A		1	838981	04/13/22 17:39	PXP	TAL EDI
Total/NA	Prep	351.2			241213	04/05/22 13:31	F8AU	ELLE
Total/NA	Analysis	351.2		1	241655	04/06/22 10:31	JCG7	ELLE
Total/NA	Analysis	SM 2120B		1	837124	04/03/22 07:45	VBG	TAL EDI
Total/NA	Analysis	SM 2310B		1	838132	04/08/22 13:57	RAK	TAL EDI
Total/NA	Analysis	SM 2320B		1	838472	04/08/22 16:40	MMC	TAL EDI
Total/NA	Analysis	SM 2340C		1	838760	04/12/22 16:35	HTV	TAL EDI
Total/NA	Analysis	SM 2540C		1	838168	04/08/22 17:36	HTV	TAL EDI
Total/NA	Analysis	SM 2540D		1	838077	04/08/22 11:10	HTV	TAL EDI
Total/NA	Analysis	SM 4500 H+ B		1	837276	04/04/22 18:58	KSS	TAL EDI

Client Sample ID: Basin 2

Lab Sample ID: 460-255494-4

Date Collected: 04/01/22 11:20

Matrix: Water

Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		5	838272	04/09/22 18:54	VMI	TAL EDI
Total/NA	Analysis	300.0		1	838704	04/11/22 16:01	VMI	TAL EDI
Total Recoverable	Prep	200.7 Rev 4.4			242041	04/07/22 09:19	UJLA	ELLE
Total Recoverable	Analysis	200.7 Rev 4.4		1	243733	04/12/22 14:17	WJM9	ELLE
Dissolved	Filtration	FILTRATION			837333	04/04/22 22:34	VAD	TAL EDI
Dissolved	Prep	3010A			837335	04/04/22 22:37	VAD	TAL EDI
Dissolved	Analysis	6020B		1	837381	04/05/22 01:06	VAD	TAL EDI
Total/NA	Prep	3020A			621075	04/11/22 09:10	NBS	TAL BUF
Total/NA	Analysis	6020B		1	621408	04/12/22 13:19	BMB	TAL BUF
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	838499	04/11/22 17:25	MDC	TAL EDI
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	839019	04/13/22 20:53	VAD	TAL EDI
Total/NA	Prep	7470A			621208	04/11/22 11:37	NVK	TAL BUF
Total/NA	Analysis	7470A		1	621295	04/11/22 17:32	BMB	TAL BUF
Total/NA	Analysis	1664A		1	838981	04/13/22 17:39	PXP	TAL EDI
Total/NA	Prep	351.2			241699	04/06/22 14:26	F8AU	ELLE
Total/NA	Analysis	351.2		1	242201	04/07/22 12:09	JCG7	ELLE
Total/NA	Analysis	SM 2120B		1	837124	04/03/22 07:45	VBG	TAL EDI
Total/NA	Analysis	SM 2310B		1	838132	04/08/22 13:57	RAK	TAL EDI
Total/NA	Analysis	SM 2320B		1	838472	04/08/22 16:49	MMC	TAL EDI
Total/NA	Analysis	SM 2340C		1	838760	04/12/22 16:35	HTV	TAL EDI
Total/NA	Analysis	SM 2540C		1	838168	04/08/22 17:36	HTV	TAL EDI
Total/NA	Analysis	SM 2540D		1	838077	04/08/22 11:10	HTV	TAL EDI
Total/NA	Analysis	SM 4500 H+ B		1	837276	04/04/22 19:00	KSS	TAL EDI

Client Sample ID: Pit

Lab Sample ID: 460-255494-5

Date Collected: 04/01/22 12:15

Matrix: Water

Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	838272	04/09/22 19:10	VMI	TAL EDI
Total Recoverable	Prep	200.7 Rev 4.4			242045	04/07/22 09:24	UJLA	ELLE
Total Recoverable	Analysis	200.7 Rev 4.4		1	243896	04/12/22 16:52	WJM9	ELLE
Dissolved	Filtration	FILTRATION			837333	04/04/22 22:34	VAD	TAL EDI
Dissolved	Prep	3010A			837335	04/04/22 22:37	VAD	TAL EDI
Dissolved	Analysis	6020B		1	837381	04/05/22 01:08	VAD	TAL EDI
Total/NA	Prep	3020A			621075	04/11/22 09:10	NBS	TAL BUF
Total/NA	Analysis	6020B		1	621408	04/12/22 13:21	BMB	TAL BUF
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	838499	04/11/22 17:27	MDC	TAL EDI
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	839019	04/13/22 20:55	VAD	TAL EDI

Client Sample ID: Pit

Lab Sample ID: 460-255494-5

Date Collected: 04/01/22 12:15

Matrix: Water

Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			621208	04/11/22 11:37	NVK	TAL BUF
Total/NA	Analysis	7470A		1	621295	04/11/22 17:33	BMB	TAL BUF
Total/NA	Analysis	1664A		1	838981	04/13/22 17:39	PXP	TAL EDI
Total/NA	Prep	351.2			241206	04/05/22 13:09	F8AU	ELLE
Total/NA	Analysis	351.2		1	241655	04/06/22 12:09	JCG7	ELLE
Total/NA	Analysis	SM 2120B		1	837124	04/03/22 07:45	VBG	TAL EDI
Total/NA	Analysis	SM 2310B		1	838132	04/08/22 13:57	RAK	TAL EDI
Total/NA	Analysis	SM 2320B		1	838472	04/08/22 16:57	MMC	TAL EDI
Total/NA	Analysis	SM 2340C		1	838760	04/12/22 16:35	HTV	TAL EDI
Total/NA	Analysis	SM 2540C		1	838168	04/08/22 17:36	HTV	TAL EDI
Total/NA	Analysis	SM 2540D		1	838077	04/08/22 11:10	HTV	TAL EDI
Total/NA	Analysis	SM 4500 H+ B		1	837276	04/04/22 19:02	KSS	TAL EDI

Client Sample ID: CP

Lab Sample ID: 460-255494-6

Date Collected: 04/01/22 09:30

Matrix: Water

Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	838272	04/09/22 20:14	VMI	TAL EDI
Total Recoverable	Prep	200.7 Rev 4.4			242055	04/07/22 09:35	WBK6	ELLE
Total Recoverable	Analysis	200.7 Rev 4.4		1	243896	04/12/22 17:27	WJM9	ELLE
Dissolved	Filtration	FILTRATION			837333	04/04/22 22:34	VAD	TAL EDI
Dissolved	Prep	3010A			837335	04/04/22 22:37	VAD	TAL EDI
Dissolved	Analysis	6020B		1	837381	04/05/22 01:10	VAD	TAL EDI
Total/NA	Prep	3020A			621011	04/11/22 09:08	NBS	TAL BUF
Total/NA	Analysis	6020B		1	621407	04/12/22 12:46	BMB	TAL BUF
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	838499	04/11/22 17:30	MDC	TAL EDI
Total/NA	Prep	3010A			838496	04/11/22 11:07	NNW	TAL EDI
Total/NA	Analysis	6020B		1	839019	04/13/22 20:57	VAD	TAL EDI
Total/NA	Prep	7470A			621208	04/11/22 11:37	NVK	TAL BUF
Total/NA	Analysis	7470A		1	621295	04/11/22 17:35	BMB	TAL BUF
Total/NA	Analysis	1664A		1	838981	04/13/22 17:39	PXP	TAL EDI
Total/NA	Prep	351.2			241206	04/05/22 13:09	F8AU	ELLE
Total/NA	Analysis	351.2		1	241655	04/06/22 11:03	JCG7	ELLE
Total/NA	Analysis	SM 2120B		1	837124	04/03/22 07:45	VBG	TAL EDI
Total/NA	Analysis	SM 2310B		1	838132	04/08/22 13:57	RAK	TAL EDI
Total/NA	Analysis	SM 2320B		1	838472	04/08/22 17:05	MMC	TAL EDI
Total/NA	Analysis	SM 2340C		1	838760	04/12/22 16:35	HTV	TAL EDI
Total/NA	Analysis	SM 2540C		1	838168	04/08/22 17:36	HTV	TAL EDI
Total/NA	Analysis	SM 2540D		1	838077	04/08/22 11:10	HTV	TAL EDI
Total/NA	Analysis	SM 4500 H+ B		1	837276	04/04/22 19:04	KSS	TAL EDI

Lab Chronicle

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Client Sample ID: Field Blank(Pit)

Lab Sample ID: 460-255494-7
Matrix: Water
Date Collected: 04/01/22 08:45
Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 IDA			241436	04/06/22 07:04	RC3V	ELLE
Total/NA	Analysis	537 IDA		1	242117	04/07/22 22:02	UUV6	ELLE

Client Sample ID: Field Blank(CP)

Lab Sample ID: 460-255494-8
Matrix: Water
Date Collected: 04/01/22 09:10
Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 IDA			241436	04/06/22 07:04	RC3V	ELLE
Total/NA	Analysis	537 IDA		1	242117	04/07/22 22:13	UUV6	ELLE

Client Sample ID: CP(PFOS)

Lab Sample ID: 460-255494-9
Matrix: Water
Date Collected: 04/01/22 09:05
Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 IDA			241436	04/06/22 07:04	RC3V	ELLE
Total/NA	Analysis	537 IDA		1	242117	04/07/22 22:24	UUV6	ELLE

Client Sample ID: Pit(PFOS)

Lab Sample ID: 460-255494-10
Matrix: Water
Date Collected: 04/01/22 08:40
Date Received: 04/01/22 18:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 IDA			241436	04/06/22 07:04	RC3V	ELLE
Total/NA	Analysis	537 IDA		1	242117	04/07/22 22:35	UUV6	ELLE

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300
TAL BUF = Eurofins Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600
TAL EDI = Eurofins Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

Accreditation/Certification Summary

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Laboratory: Eurofins Edison

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Connecticut	State	PH-0200	09-30-22
DE Haz. Subst. Cleanup Act (HSCA)	State	N/A	01-01-23
Georgia	State	12028 (NJ)	06-30-22
Massachusetts	State	M-NJ312	06-30-22
New Jersey	NELAP	12028	06-30-22
New York	NELAP	11452	04-01-23
Pennsylvania	NELAP	68-00522	02-28-23
Rhode Island	State	LAO00376	12-31-22
USDA	US Federal Programs	P330-20-00244	11-03-23

Laboratory: Eurofins Buffalo

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arkansas DEQ	State	88-0686	07-06-22
Connecticut	State	PH-0568	09-30-22
Florida	NELAP	E87672	06-30-22
Georgia	State	10026 (NY)	04-01-23
Georgia	State Program	N/A	03-31-09 *
Georgia (DW)	State	956	03-31-22 *
Illinois	NELAP	200003	09-30-22
Iowa	State	374	03-01-23
Iowa	State Program	374	03-01-09 *
Kansas	NELAP	E-10187	01-31-23
Kentucky (DW)	State	90029	12-31-22
Kentucky (UST)	State	30	04-01-22 *
Kentucky (WW)	State	KY90029	12-31-22
Louisiana	NELAP	02031	06-30-22
Maine	State	NY00044	12-04-22
Maryland	State	294	03-31-23
Massachusetts	State	M-NY044	06-30-22
Michigan	State	9937	04-01-22 *
Michigan	State Program	9937	04-01-09 *
New Hampshire	NELAP	2973	09-11-19 *
New Hampshire	NELAP	2337	11-17-22
New Jersey	NELAP	NY455	06-30-22
New York	NELAP	10026	03-31-23
Oregon	NELAP	NY200003	06-12-22
Pennsylvania	NELAP	68-00281	07-31-22
Rhode Island	State	LAO00328	12-30-22
Tennessee	State	02970	04-01-23
Texas	NELAP	T104704412-18-10	07-31-22
USDA	US Federal Programs	P330-18-00039	03-25-24
Virginia	NELAP	460185	09-14-22
Washington	State	C784	02-10-23
Wisconsin	State	998310390	08-31-22

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
A2LA	Dept. of Defense ELAP	1.01	11-30-22
A2LA	ISO/IEC 17025	0001.01	11-30-22
Alaska	State	PA00009	06-30-22
Alaska (UST)	State	17-027	02-28-23
Arizona	State	AZ0780	03-12-23
Arkansas DEQ	State	88-0660	08-10-22
California	State	2792	02-02-22 *
Colorado	State	PA00009	06-30-22
Connecticut	State	PH-0746	06-30-23
DE Haz. Subst. Cleanup Act (HSCA)	State	019-006 (PA cert)	01-31-23
Delaware (DW)	State	N/A	01-31-23
Florida	NELAP	E87997	06-30-22
Georgia (DW)	State	C048	01-31-22 *
Hawaii	State	N/A	01-31-23
Illinois	NELAP	200027	01-31-23
Iowa	State	361	03-02-22 *
Kansas	NELAP	E-10151	10-31-22
Kentucky (DW)	State	KY90088	12-31-22
Kentucky (UST)	State	1.01	11-30-22
Kentucky (WW)	State	KY90088	01-01-23
Louisiana	NELAP	02055	06-30-22
Maine	State	2019012	03-12-23
Maryland	State	100	06-30-22
Massachusetts	State	M-PA009	06-30-22
Michigan	State	9930	01-31-23
Minnesota	NELAP	042-999-487	12-31-22
Missouri	State	450	01-31-25
Montana (DW)	State	0098	01-01-23
Montana (UST)	State	<cert No.>	02-01-23
Nebraska	State	NE-OS-32-17	01-31-23
New Hampshire	NELAP	2730	01-10-23
New Jersey	NELAP	PA011	06-30-22
New York	NELAP	10670	04-01-23
North Carolina (DW)	State	42705	07-31-22
North Carolina (WW/SW)	State	521	12-31-22
North Dakota	State	R-205	01-31-23
Oklahoma	NELAP	R-205	08-31-22
Oregon	NELAP	PA200001	09-11-22
PALA	Canada	1978	09-16-24
Pennsylvania	NELAP	36-00037	01-31-23
Rhode Island	State	LAO00338	12-30-22
South Carolina	State	89002	01-31-23
Tennessee	State	02838	01-31-23
Texas	NELAP	T104704194-21-40	08-31-22
USDA	US Federal Programs	P330-19-00197	07-03-22
Vermont	State	VT - 36037	10-28-22
Virginia	NELAP	460182	06-14-22
Washington	State	C457	04-12-22
West Virginia (DW)	State	9906 C	12-31-22
West Virginia DEP	State	055	04-12-22

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: Hanson Aggregates PA LLC
Job ID: 460-255494-1
Project/Site: Rock Hill Quarry

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Wyoming	State	8TMS-L	01-31-23
Wyoming (UST)	A2LA	1.01	11-30-22

Method Summary

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL EDI
537 IDA	EPA 537 Isotope Dilution	EPA	ELLE
200.7 Rev 4.4	Metals (ICP)	EPA	ELLE
6020B	Metals (ICP/MS)	SW846	TAL BUF
6020B	Metals (ICP/MS)	SW846	TAL EDI
7470A	Mercury (CVAA)	SW846	TAL BUF
1664A	HEM and SGT-HEM	1664A	TAL EDI
351.2	Nitrogen, Total Kjeldahl	MCAWW	ELLE
SM 2120B	Color, Colorimetric	SM	TAL EDI
SM 2310B	Acidity	SM	TAL EDI
SM 2320B	Alkalinity	SM	TAL EDI
SM 2340C	Hardness, Total (mg/l as CaC03)	SM	TAL EDI
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL EDI
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL EDI
SM 4500 H+ B	pH	SM	TAL EDI
200.7 Rev 4.4	Preparation, Total Recoverable Metals	EPA	ELLE
3010A	Preparation, Total Metals	SW846	TAL EDI
3020A	Preparation, Total Metals	SW846	TAL BUF
351.2	Nitrogen, Total Kjeldahl	MCAWW	ELLE
537 IDA	EPA 537 Isotope Dilution	EPA	ELLE
7470A	Preparation, Mercury	SW846	TAL BUF
FILTRATION	Sample Filtration	None	TAL EDI

Protocol References:

1664A = EPA-821-98-002
EPA = US Environmental Protection Agency
MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.
None = None
SM = "Standard Methods For The Examination Of Water And Wastewater"
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300
TAL BUF = Eurofins Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600
TAL EDI = Eurofins Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

Sample Summary

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

Job ID: 460-255494-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
460-255494-1	Upgradient	Water	04/01/22 10:30	04/01/22 18:30
460-255494-2	Downgradient	Water	04/01/22 10:50	04/01/22 18:30
460-255494-3	Basin 1	Water	04/01/22 11:50	04/01/22 18:30
460-255494-4	Basin 2	Water	04/01/22 11:20	04/01/22 18:30
460-255494-5	Pit	Water	04/01/22 12:15	04/01/22 18:30
460-255494-6	CP	Water	04/01/22 09:30	04/01/22 18:30
460-255494-7	Field Blank(Pit)	Water	04/01/22 08:45	04/01/22 18:30
460-255494-8	Field Blank(CP)	Water	04/01/22 09:10	04/01/22 18:30
460-255494-9	CP(PFOS)	Water	04/01/22 09:05	04/01/22 18:30
460-255494-10	Pit(PFOS)	Water	04/01/22 08:40	04/01/22 18:30

Chain of Custody Record

619841

eurofins | Environment Testing America

TAL-8210

Address: _____

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Matt Weikel	Site Contact:	Date: 4/1/22	COC No: 619841
Company Name: Earthres Group, Inc.	Tel/Email: mweikel@earthres.com	Lab Contact: Julie Gilmore	Carrier:	1 of 1 COCs
Address: 6912 Old Easton Rd.	Analysis Turnaround Time			Sampler: CJS/WTR
City/State/Zip: Pipersville, PA 18947	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone: 215-766-1211	TAT if different from Below _____			Walk-in Client:
Fax: 215-766-1245	☒ 2 weeks ☐ 1 week ☐ 2 days ☐ 1 day			Lab Sampling:
Project Name: Rock Hill				Job / SDG No.: 255494
Site: Rock Hill Quarry				
PO #				

460-255494 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	See attached	Sample Specific Notes:
Upgradient	4/1/22	1030	G	SW	11	N	N	1	1
Downgradient		1050	G	SW	11	N	N	1	2
Basin 1		1150	G	SW	11	N	N	1	3
Basin 2		1120	G	SW	11	N	N	1	4
Pit		1215	G	SW	11	N	N	1	5
CP		0930	G	SW	11	N	N	1	6
Field Blank (Pit)		0845	G	DI	2	N	N	1	7
Field Blank (CP)		0910	G	DI	2	N	N	1	8
CP (PFOS)		0905	G	SW	2	N	N	1	9
Pit (PFOS)		0840	G	SW	2	N	N	1	10

SUB WORK

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:
Bill to Hanson (Rock Hill).

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
	EARTHRES	4/1/22 1400		EETN-KOP	4/1/22 1400
Sean Mooney	EETN-KOP	4/1/22 17:00		ETA	4/1/22 17:
	ETA	4/1/22			4/1/22 1836

Page 23 of 31

4/18/2022

Client Sample Results

Client: Hanson Aggregates PA LLC
Project/Site: Rock Hill Quarry

TestAmerica Job ID: 460-146882-1

Client Sample ID: NPDES 001
Date Collected: 12/12/17 10:50
Date Received: 12/13/17 11:45

Lab Sample ID: 460-146882-1
Matrix: Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	ND		0.40	mg/L			12/20/17 05:05	1
Fluoride	0.13		0.080	mg/L			12/20/17 05:05	1
Sulfate	10		0.60	mg/L			12/20/17 05:05	1

Method: 300.0 - Anions, Ion Chromatography - DL

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6.6		0.24	mg/L			12/20/17 12:04	2

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	TQL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	97		8.0	2.0	ug/L		12/16/17 09:00	12/16/17 21:35	2
Iron	240		120	20	ug/L		12/16/17 09:00	12/16/17 21:35	2
Cadmium	ND		2.0	0.2	ug/L		12/16/17 09:00	12/16/17 21:35	2
Barium	7.8		4.0	2.0	ug/L		12/16/17 09:00	12/16/17 21:35	2
Nickel	ND		4.0	4.0	ug/L		12/16/17 09:00	12/16/17 21:35	2
Arsenic	ND		2.0	3.0	ug/L		12/16/17 09:00	12/16/17 21:35	2
Copper	ND		4.0	4.0	ug/L		12/16/17 09:00	12/16/17 21:35	2
Aluminum	ND		40	10	ug/L		12/16/17 09:00	12/16/17 21:35	2
Lead	ND		1.2	1.0	ug/L		12/16/17 09:00	12/16/17 21:35	2
Zinc	ND		16	5.0	ug/L		12/16/17 09:00	12/16/17 21:35	2
Selenium	ND		10	5.0	ug/L		12/16/17 09:00	12/16/17 21:35	2

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	TQL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		120	20	ug/L		12/19/17 11:49	12/19/17 14:46	2

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	TQL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.20	.05	ug/L		12/15/17 11:53	12/15/17 14:18	1

General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	ND		5.4	mg/L			12/20/17 15:30	1
Nitrogen, Kjeldahl	ND		0.20	mg/L		12/18/17 10:48	12/19/17 11:50	1
Color	5.0		5.0	Color Units			12/14/17 06:37	1
Acidity	38		20	mg/L			12/19/17 09:54	1
Alkalinity	130		5.0	mg/L			12/15/17 14:03	1
Hardness as calcium carbonate	140		5.0	mg/L			01/09/18 12:21	1
Total Dissolved Solids	200		10	mg/L			12/18/17 13:10	1
Total Suspended Solids	1.1		1.0	mg/L			12/18/17 08:02	1
pH	7.9	HF		SU			12/20/17 13:40	1

A22

	TQL
Total Chromium	4.0
Total Vanadium	100
Total Cobalt	19
Total Zirconium	—
Total Strontium	10
Total Boron	16000
Total Titanium	—

255494

Eurofins TestAmerica Edison
Receipt Temperature and pH Log

Page ____ of ____

Job Number: 4

Number of Coolers: 4 **IR Gun #** KOP2

Cooler Temperatures

	RAW	CORRECTED		RAW	CORRECTED		RAW	CORRECTED
Cooler #1:	2.4 °C	°C	Cooler #4:	0.3 °C	°C	Cooler #7:	°C	°C
Cooler #2:	3.5 °C	°C	Cooler #5:	°C	°C	Cooler #8:	°C	°C
Cooler #3:	3.6 °C	°C	Cooler #6:	°C	°C	Cooler #9:	°C	°C

TALS Sample Number	Ammonia (pH<2)	COD (pH<2)	Nitrate Nitrite (pH<2)	Metals* (pH<2)	Hardness (pH<2)	Pest (pH 5-9)	EPH or QAM (pH<2)	Phenols (pH<2)	Sulfide (pH>9)	TKN (pH<2)	TOC (pH<2)	Total Cyanide (pH>12)	Total Phos (pH<2)	Other	Other
1				G2						G2					
2				G2						G2					
3				G2						G2					
4				G2						G2					
5				G2						G2					
6				G2						G2					

If pH adjustments are required record the information below:

Sample No(s). adjusted: _____

Preservative Name/Conc.: _____ Volume of Preservative used (ml): _____

Lot # of Preservative(s): _____ Expiration Date: _____

The appropriate Project Manager and Department Manager should be notified about the samples which were pH adjusted.

** Samples for Metal analysis which are out of compliance must be acidified at least 24 hours prior to analysis.*

Initials: _____ **Date:** 4/1/22

EDS-WI-038, Rev 4.1
10/22/2019

4/18/2022

Eurofins Edison
777 New Durham Road
Edison, NJ 08817
Phone: 732-549-3900 Fax: 732-549-3679

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Gilmore, Julie L	Carrier Tracking No(s):	COC No: 460-64589.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Julie.Gilmore@Eurofinset.com	State of Origin: Pennsylvania	Page: Page 1 of 2
Company: Eurofins Lancaster Laboratories Env, LLC		Accreditations Required (See note):		Job #: 460-255494-1
Address: 2425 New Holland Pike, ,	Due Date Requested: 4/12/2022			
City: Lancaster	TAT Requested (days):			
State, Zip: PA, 17601				
Phone: 717-656-2300(Tel)	PO #:			
Email:	WO #:			
Project Name: Rock Hill Quarry	Project #: 46011424			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	351.2/3351.2_Prep Nitrogen, Total Kjeldahl	200.7/200.7_P_TR Zirconium	537_IDA/3535_PFC (MOD) PFNA, PFOA, PFOS	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
Upgradient (460-255494-1)	4/1/22	10:30 Eastern		Water			X	X		2	
Downgradient (460-255494-2)	4/1/22	10:50 Eastern		Water			X	X		2	
Basin 1 (460-255494-3)	4/1/22	11:50 Eastern		Water			X	X		2	
Basin 2 (460-255494-4)	4/1/22	11:20 Eastern		Water			X	X		2	
Pit (460-255494-5)	4/1/22	12:15 Eastern		Water			X	X		2	
CP (460-255494-6)	4/1/22	09:30 Eastern		Water			X	X		2	
Field Blank(Pit) (460-255494-7)	4/1/22	08:45 Eastern		Water					X	2	
Field Blank(CP) (460-255494-8)	4/1/22	09:10 Eastern		Water					X	2	
CP(PFOS) (460-255494-9)	4/1/22	09:05 Eastern		Water					X	1	

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing Northeast, LLC places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing Northeast, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing Northeast, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing Northeast, LLC.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 1	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		4/4/22 1535			4/4/22 1535	
2		4/4/22 1838				
3					4/4/22 1850	

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks: 1.6

Eurofins Edison
777 New Durham Road
Edison, NJ 08817
Phone: 732-549-3900 Fax: 732-549-3679

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Gilmore, Julie L	Carrier Tracking No(s):	COC No: 460-64589.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: Julie.Gilmore@Eurofinset.com	State of Origin: Pennsylvania	Page: Page 2 of 2
Company: Eurofins Lancaster Laboratories Env, LLC		Accreditations Required (See note):		Job #: 460-255494-1
Address: 2425 New Holland Pike, ,	Due Date Requested: 4/12/2022			
City: Lancaster	TAT Requested (days):			
State, Zip: PA, 17601				
Phone: 717-656-2300(Tel)	PO #:			
Email:	WO #:			
Project Name: Rock Hill Quarry	Project #: 46011424			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	351.2/351.2_Prep Nitrogen, Total Kjeldahl	200.7/200.7_P_TR Zirconium	537_IDA/3535_PFC (MOD) PFNA, PFOA, PFOS	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
Pit(PFOS) (460-255494-10)	4/1/22	08:40 Eastern		Water					X	2	

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing Northeast, LLC places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing Northeast, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing Northeast, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing Northeast, LLC.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 1	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		4/4/22 1535	ESTAL		4/4/22 1535	ESTAL
2	Relinquished by:	Date/Time: 4/4/22 1838	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 4/4/22 10:55	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 1.6

Eurofins Edison
777 New Durham Road
Edison, NJ 08817
Phone: 732-549-3900 Fax: 732-549-3679

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Gilmore, Julie L	Carrier Tracking No(s):	COC No: 460-64624.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Julie.Gilmore@et.eurofinsus.com	State of Origin: Pennsylvania	Page: Page 1 of 1
Company: Eurofins Environment Testing Northeast,		Accreditations Required (See note):		Job #: 460-255494-1
Address: 10 Hazelwood Drive, ,	Due Date Requested: 4/14/2022			
City: Amherst	TAT Requested (days):			
State, Zip: NY, 14228-2298	PO #:			
Phone: 716-691-2600(Tel) 716-691-7991(Fax)	WO #:			
Email:	Project #: 46011424			
Project Name: Rock Hill Quarry	SSOW#:			
Site:				

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	7470A/7470A_Prep Mercury (CVAA)	6020B/3020A Total Cd	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
Upgradient (460-255494-1)	4/1/22	10:30 Eastern		Water			X	X	1	
Downgradient (460-255494-2)	4/1/22	10:50 Eastern		Water			X	X	1	
Basin 1 (460-255494-3)	4/1/22	11:50 Eastern		Water			X	X	1	
Basin 2 (460-255494-4)	4/1/22	11:20 Eastern		Water			X	X	1	
Pit (460-255494-5)	4/1/22	12:15 Eastern		Water			X	X	1	
CP (460-255494-6)	4/1/22	09:30 Eastern		Water			X	X	1	

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing Northeast, LLC places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing Northeast, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing Northeast, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing Northeast, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 1	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	4/6/22 1900	EEAdi		4-7-22 1000	TAB
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 2.7 ICE

Login Sample Receipt Checklist

Client: Hanson Aggregates PA LLC

Job Number: 460-255494-1

Login Number: 255494
List Number: 1
Creator: Rivera, Kenneth

List Source: Eurofins Edison

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Hanson Aggregates PA LLC

Job Number: 460-255494-1

Login Number: 255494
List Number: 3
Creator: Yeager, Brian A

List Source: Eurofins Buffalo
List Creation: 04/07/22 02:07 PM

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	2.7 ICE IR GUN #1
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time (Excluding tests with immediate HTs)..	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	True	

Login Sample Receipt Checklist

Client: Hanson Aggregates PA LLC

Job Number: 460-255494-1

Login Number: 255494
List Number: 2
Creator: Metzger, Katherine A

List Source: Eurofins Lancaster Laboratories Environment Testing, LLC
List Creation: 04/04/22 08:09 PM

Question	Answer	Comment
The cooler's custody seal is intact.	N/A	Not present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable (</=6C, not frozen).	True	
Cooler Temperature is recorded.	True	
WV: Container Temperature is acceptable (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
Sample custody seals are intact.	N/A	

Request for Laboratory Analytical Services - Chain of Custody

ATTENTION TO:

Did you complete a Submit a Sample Form Online? Yes ☐ No ☐

Lab Use Only	Project No.:	Client No.:	**Purchase Order Number:**	**Client Job Number:**	
	Date Logged In:	Logged In By:			

Report Results To	Name:	Andrew Gutshall	**Invoice To**	Name:	Andrew Gutshall
	Company:	Hanson Aggregates Pa, LLC		Company:	Hanson Aggregates Pa, LLC
	Address:	7660 Imperial Way		Address:	7660 Imperial Way
	City, State, Zip:	Allentown, PA 18195		City, State, Zip:	Allentown, PA 18195
	Phone:	610-366-4819 Fax:		Phone:	610-366-4819
	Email results to:	Andrew.Gutshall@LehighHanson.com		Email:	Andrew.Gutshall@LehighHanson.com
				Fax:	

If a hard copy of invoice is needed, check here ☐

Date Results Needed: Standard TA assumed if left blank; please do not use vague terms like ASAP

Rush Charges Authorized ? (circle one): Yes / No

Quality System Requirements (if applicable)

Accreditations required to be followed: yes no

Circle which ones to follow:
ISO (Please specify):
cGMP:
Other (Please specify):

Client Sample ID	Sample Description	Sample Location (Please specify if NY state)	Sample Date & Time	NOA Per EPA Method 100.2	Analysis Requested			Special Instructions or Comments
Upgradient	Surface water sample		4/1/22 1030	X				
Downgradient	Surface water sample		4/1/22 1050	X				
Basin 1	Surface water sample		4/1/22 1150	X				
Basin 2	Surface water sample		4/1/22 1120	X				
Pit	Surface water sample		4/1/2022 1215	X				
CP	Surface water sample		4/1/22 0930	X				

Chain of Custody	Relinquished By (Signature): [signature]	Date: 4/4/22	Time: 1630	**Chain of Custody**	Received By (Signature): [signature] Date: 04/04/22 Time:
	Relinquished By (Print Name): William Russo	Relinquished To:	Fedex		Received By (Print Name): Relinquished To:
	Company Name: Eastnres	Method of Shipment:	Fedex		Company Name: Method of Shipment:
Chain of Custody	Relinquished By (Signature):	Date:	Time:	**Chain of Custody**	Received By (Signature): Date: Time:
	Relinquished By (Print Name):	Relinquished To:			Received By (Print Name): Relinquished To:
	Company Name:	Method of Shipment:			Company Name: Method of Shipment:

RS_09182019

Pennsylvania - HQ
350 Hochberg Road
Monroeville, PA 15146

724.325.1776 **Phone**
724.733.1799 **Fax**

Washington
Columbia Basin Analytical Laboratories
2710 North 20th Avenue
Pasco, WA 99301

509.545.4989 **Phone**
509.544.6010 **Fax**

Do Not Lift Using This Tag

Do Not Lift Using This Tag

edEx Pouch Here

ORIGIN ID:ABEA (215) 766-1211
BARBARA JONES
EARTHRES GROUP, INC.
6912 OLD EASTON ROAD

PIPERSVILLE, PA 18947
UNITED STATES US

SHIP DATE: 05APR22
ACTWGT: 48.00 LB
CAD: 106811403/INET4460

BILL SENDER

TO BRYAN BANDLI
RJ LEE GROUP
350 HOCHBERG RD

MONROEVILLE PA 15146
(724) 387-1933

REF: 061003.062-04
INV:
PO:

DEPT: PIPERSVILLE

J2210220105011uv

FedEx Express

56DJZ/BDF9/FE4A

RT 465

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9191
04.06

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RK# 201 7764 9706 9191

WED - 06 APR 10:30A
PRIORITY OVERNIGHT

A LBEA

15146
PA-US PIT

RJ Lee Group, Inc
350 Hochberg Road
Monroeville, PA 15146
Tel: (724) 325-1776 | Fax (724) 733-1799

Final Laboratory Report

TEM Non Potable Water Analysis

Ms. Clair Wischusen
Fox Rothschild LLP
2700 Kelly Road
Suite 300
Warrington, PA 18976
US

Report Date: 04/14/2022
Sample Receipt Date: 04/06/2022
RJ Lee Group Job No.: LLH901997-37
Authorization/P.O. No.:
Samples Received: 6
Client Job No.:

Method: EPA 100.1 600/4-03-043

Client Sample Number	RJLG Sample Number	Date Prepped	Date Analyzed	Filter Area (mm^2)	Volume (ml)	Area Analyzed (mm^2)	Confidence Interval >0.50 µm	Asbestos Structures >0.50 µm Chry	Asbestos Structures >0.50 µm Amph	Analytical Sensitivity (MFL) >0.50 µm	Concentration (MFL) >0.50 µm
Upgradient	3179818.HTW2	04/06/2022	04/14/2022	1220	20.0	0.18682	0-4	0	0	0.3	< 0.3
Downgradient	3179819.HTW2	04/06/2022	04/14/2022	1220	20.0	0.18682	0-4	0	0	0.3	< 0.3
Basin 1	3179820.HTW2	04/06/2022	04/14/2022	1220	20.0	0.18682	0-4	0	0	0.3	< 0.3
Basin 2	3179821.HTW2	04/06/2022	04/14/2022	1220	10.0	0.18682	0-4	0	0	0.7	< 0.7
Pit	3179822.HTW1	04/06/2022	04/14/2022	1220	100.0	0.18682	0-4	0	0	0.1	< 0.1
CP	3179823.HTW2	04/06/2022	04/14/2022	1220	20.0	0.18682	0-4	0	0	0.3	< 0.3

NOTES
1. Water samples collected more than 24 hours before receipt may be out of compliance. Drinking water samples are filtered within 24 hours of receipt.
2. "<" indicates results less than analytical sensitivity. "---" indicates that sample was not analyzed.
3. Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA LAP, LLC #100364, NVLAP #101208-0, NY ELAP #10884) facility.
4. If RJ Lee Group, Inc. did not collect the samples analyzed, the verifiability of the laboratory's results are limited to the reported values.
5. Abbreviations: N/A-Not Applicable, Chry-Chrysotile Asbestos, Amph-Amphibole Asbestos, MFL-million fibers per liter.
6. Samples will be held for 30 days and then disposed of per Federal regulations.
7. These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which these results are used or interpreted.

DISCLAIMER

RJ Lee Group, Inc. is accredited by the New York Department of Health Environmental Laboratory Program (NY ELAP) and the Pennsylvania Department of Environmental Protection (PA DEP) for asbestos in water analysis by TEM. This report may not be used to claim product endorsement by NY ELAP, PA DEP or any other regulatory or laboratory accrediting agency. Any reproduction of this document must be in full in order for the report to be valid. This report is not valid unless it bears the name of a NY ELAP and PA-DEP approved signatory.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limiting provisions and no responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples covered by this report, RJ Lee Group will store the samples for a period of thirty (30) days before discarding. A shipping and handling fee will be assessed for the return of any sample.

RJ Lee Group, Inc.

Final Laboratory Report (cont'd)

RJ Lee Group Job No: LLH901997-37
Client Job No/Name:

Client: Fox Rothschild LLP
Report Date: 04/14/2022

Authorized Signature: 

Ashleigh Sload, Scientist

NOTES

1. Water samples collected more than 24 hours before receipt may be out of compliance. Drinking water samples are filtered within 24 hours of receipt.
2. "<" indicates results less than analytical sensitivity. "---" indicates that sample was not analyzed.
3. Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA LAP, LLC #100364, NVLAP #101208-0, NY ELAP #10884) facility.
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Attachment F-7:

PPC Notification List

Emergency contact list & phone numbers

Provide a contact list and phone numbers for the facility response coordinator, National Response Center, cleanup contractors with whom you have an agreement for response, and all Federal, State, and local agencies who must be contacted in case of a discharge.

Facility Response Coordinator & team members:

Team Member	Name & Title	Day Phone #	Cell Phone #
Facility Response Coordinator (primary)	Timothy J. Poppenberg Area Operations Manager	(610) 366-4815	(610) 850-4760
Emergency Information Coordinator	Andrew J. Gutshall Area Environmental Manager	(610) 366-4819	(484) 955-2407
Divisional Emergency Team Member	Timothy J. Poppenberg Operations Manager	(610) 366-4815	(610) 850-4760
Divisional Emergency Team Member	Mark E. Kendrick Vice President	(610) 366-4627	(484) 894-0773

Local Emergency Response Agencies:

Bucks County Emergency Services (Fire, Police, Ambulance)	911

State Emergency Response Agencies:

DEP Regional Office: Southeast Region 24 hr release reporting	(484) 250-5900
County Emergency Management Agency: Bucks	(215) 340-8700
Pennsylvania Emergency Management Agency	(800) 424-7362 or (717) 783-8150

Federal Emergency Response Agencies:

National Response Center	(800) 424-8802

List of Emergency Response Contractors:

Note: No emergency response contractors should be necessary. However, in the event that a contracted responder is necessary, the following are available to provide assistance:

Emergency Response Contractor(s)	Phone Number
Elk Environmental Services (www.elkenv.com)	(800) 851-7156 – Emergency Response Line (610) 372-4760

Attachment G:

Groundwater Pumping Evaluation Addendum

Groundwater Pumping Evaluation Addendum

Rock Hill Quarry

East Rockhill Township
Bucks County, Pennsylvania
EARTHRES Project # 061003.052

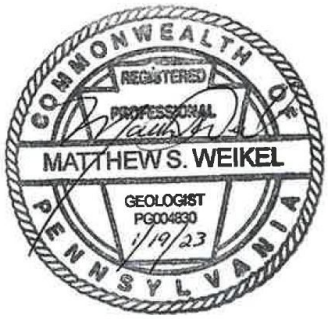
January 2023

Prepared for:

Heidelberg Materials Northeast LLC
Rock Hill Quarry
7660 Imperial Way
Allentown, PA 18195

Prepared by:

EarthRes Group, Inc.
P.O. Box 468
Pipersville, PA 18947
Phone: (215) 766-1211



Matthew S. Weikel, P.G.

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ATTACHMENTS

1.0 INTRODUCTION

Earthres Group, Inc. (EARTHRES) has prepared this Groundwater Pumping Addendum (Addendum) to support an NPDES modification for planned future dewatering activities at the Heidelberg Materials Rock Hill Quarry in East Rockhill Township Bucks County, Pennsylvania (Quarry or Heidelberg). This Addendum provides supplementary information to the 2018 Groundwater Pumping Evaluation report and addresses a technical comment raised by the Perkasie Borough Authority technical review, model updates including updated stream calibration, updated calibration analysis, updated zone of influence assessment, and characterization sampling of Quarry groundwater for per-and polyfluoroalkyl substances (PFAS) and related modeling. The latter are provided specifically to evaluate the potential for Quarry pumping to affect the Ridge Run PFAS Hazardous Site Cleanup Act (HSCA) Site, which is currently subject to on-going remediation and interim response actions related to PFAS.

1.1 Planned Dewatering of Rock Hill Quarry Pit

As part of planned future mining operations, Heidelberg proposes to pump at a rate of up to 4.61 cubic feet per second (cfs) or 2.98 million gallons per day (MGD) in order to dewater the currently filled Quarry pit impoundment (Pit). The Pit currently holds an estimated 1,584 acre-feet or 516 million gallons of water and would require 173 days of uninterrupted pumping to dewater to the operating level of 460 msl, assuming no contributions from precipitation and groundwater. After depletion of the existing storage, the pumping rate needed to keep the Pit dry will decrease substantially. The 2018 GPE evaluated the influence of pumping groundwater from the Quarry and found that groundwater and direct precipitation inflow to the Pit will be approximately 0.07 MGD for long-term average conditions.

Dewatering of the Pit will be facilitated by pumping to an existing gravity line that outlets to the Clarifying Pond. A seepage interceptor was also installed during construction of the stormwater management facility and feeds into an 18-inch HDPE gravity line. The interceptor was installed to enhance the subsurface drainage and relieve seepage forming as water from the impoundment drains toward the stream valley and encounters poor subsurface drainage characteristics due to the diabase geology. The pumping and on-site conveyance system was evaluated to ensure existing capacity to pump at the 4.61 cfs as described within the NPDES Discharge Point Modification Report included in the NPDES Modification Application.

2.0 MODEL ADJUSTMENTS & RESULTS

EARTHRES completed several model adjustments to improve the model in support of the current NPDES Modification Application. An adjustment was made in response to a technical review of the model on behalf of the Perkasie Regional Authority pertaining to depiction of drawdown within the Quarry footprint (see Section 2.1). Adjustments to stream parameters of the Unnamed Tributary to Tohickon Creek were made to improve simulated flows in support of the NPDES Modification Application (Section 2.2). Additional calibration targets were added to the model to provide a more robust evaluation of the model calibration (Section 2.3) and a sensitivity analysis was performed. Based on these adjustments an updated drawdown map is provided for the Quarry.

2.1 Quarry Drain & Layer Adjustment

The technical review by Perkasie Regional Authority's consultant (Mercuri Associates, 2018) noted the following:

> *"One question that arises from reviewing the files is: Figure 3- Full Expansion Drawdown Map shows drawdown of 130 feet, down to 460 mean sea level, in the center of the quarry, but only 30 feet of drawdown in the northeast corner, the water elevation in the quarry is all the same elevation, approximately 595 feet, and the drawdown in the quarry should show that drawdown is 130 feet in the entire open quarry pit."*

The depiction arose due to the sloping topography within the Pit area which resulted in the Quarry bottom and drain feature at 460 MSL being split between both Layer 2 and Layer 3. To address this, the model layering in the vicinity of the Quarry was adjusted so that the entire Quarry bottom and resulting drawdown could be shown in Layer 2. This minor adjustment did not significantly affect the Quarry pumping rate which was indicated to be 0.039 million gallons per day (MGD) plus direct precipitation (0.035 MGD) for a total of 0.074 MGD. To summarize the drains utilized by the model are the following:

Table 1. Quarry Drain Properties

Drain ID	Conductance $(ft^2/d)/(ft^2)$	Bottom Elevation (ft)	Model Layer
1	0.01	464.0	1
2	0.01	514.0	1
3	0.01	564.0	2

A map of the revised drawdown is included in Figure 1. The slight gradient in the drawdown shown across the Quarry pit is due to the sloping water table present in the pre-pumping condition.

2.2 Unnamed Tributary Adjustment

As part of this Addendum a more detailed evaluation of the Unnamed Tributary flow at the Rich Hill crossing (SW-3) was completed using site-specific data following completion of the onsite stormwater management system in 2018. Flow was measured at SW-3 on March 24, 2022, April 1, 2022, and June 8, 2022 indicating flows of 0.51 cfs, 1.2 cfs, and 0.4 cfs respectively. Flows on these days were compared to the regional USGS gauges 01459500 and 01465500 to evaluate background hydrologic conditions at the time of the measurements and further evaluate the baseflow at SW-3.

Table 2. Background Stream Flows

Date	SW-3 (cfs)	01459500 (cfs)	01465500 (cfs)
3/24/2022	0.51	51.9	372
4/1/2022	1.20	249	1,260
6/8/2022	0.40	41.7	151

Review of White and Sloto (1990) indicates the 2-year baseflow for USGS 01459500 (Tohickon Creek near Pipersville) to range from 0.257 to 0.293 million gallons per day per mile squared (MGD/mi^2) or 38.7 to 44.1 cfs. Similarly the 2-year baseflow for USGS 01465500 (Neshaminy Creek) is 0.374 – 0.398 (MGD/mi^2) or 121-129 cfs. Comparison to the site-specific data indicates that flow conditions on June 8, 2022 approximated the baseflow values. Therefore, the flow at SW-3 of 0.4 cfs may be considered to approximate baseflow conditions. This value is somewhat higher than the 10-YR baseflow indicated by Streamstats, of 0.21 cfs (18,922 cfd) that was used as a calibration target in the 2018 GPE. Based on this data, the Unnamed Tributary was further evaluated and adjusted to reflect the more accurate baseflow value.

As discussed in the 2018 GPE, the Unnamed Tributary is represented using a MODFLOW drain. More precise elevations were assigned to the drain bottom nodes for this Addendum using the 2-foot contour data from the topographic base map for the Quarry. This resulted in an overall lowering of the drain bottom and increase in baseflow that better matched the observed flow. The drain conductance was also increased from 1 to 5 $(ft^2/d)/(ft)$ resulting in a final calibrated flow of 30,965 cfd or within 10% of baseflow value.

Table 3. Model Calibration Flow Residuals

Stream Point ID	Model Simulated Baseflow ft^3/day	Target Baseflow ft^3/day	Flow Residual %
SW-1	179,688	192,171*	6.5
SW-2	143,526	141,420*	-1.5
SW-3	30,965	34,560	10.4

No other parameters such as hydraulic conductivity or recharge were adjusted with this iteration of the groundwater model.

2.3 Updated Groundwater Level Calibration Targets

The calibration of the groundwater model was evaluated using a larger dataset of groundwater level observations surrounding the Quarry. This data consists of the background data that was collected as part of the Surface Mine Permit (SMP) Application but was not completed or available when the model was first developed. No new data was collected for the evaluation. In total, data from twelve (12) surrounding residential wells and three (3) Quarry monitoring wells was included to assess calibration. Where multiple water levels from a well were available, the average value was used as the calibration target. In other cases, only one (1) water level measurement was available. Calibration targets and residual values for individual wells and calibration statistics are included in Table 2 and a calibration plot is included in Attachment A. The calibration plot shows a good calibration with points generally falling on the 1 to 1 correlation line with some above and below the line.

Table 4: Model Calibration Head Residuals			
Well ID	Observed Head	Computed Head	Residual Head
MW-3	558.5	563.16	-4.66
MW-2	574.69	566.63	8.06
MW-1	603.6	585.77	17.83
MP-2	578.46	565.90	12.56
MP-1	535.08	531.84	3.24
MP-3	469.5	494.02	-24.52
MP-5	535.7	520.70	15.00
MP-10	527.14	534.23	-7.09
MP-12	531.6	549.43	-17.83
MP-6	536.1	547.94	-11.84
MP-8	531.8	541.75	-9.95
MP-11	518.6	528.87	-10.27
MP-13	542.2	556.30	-14.10
MP-14	528.63	525.02	3.61
MP-16	535.2	518.21	16.99

Model Calibration Statistics	
Mean Residual Head	-1.53
Absolute Value Median Residual Head	11.84
Root Mean Squared Error (RMSE)	13.20
RMSE/Δ Head	0.098
Absolute Value Median Residual Head / Δ Head	0.088

The calibration statistics indicate an RMSE of less than 10% of the full range of head observations, which is within acceptable limits. Based on this data, the model is considered well calibrated based on the existing data.

2.4 Model Sensitivity Analysis

A sensitivity analysis was completed for the model to evaluate hydraulic conductivity, recharge, and stream conductance. Each of the tested parameters were varied from 20% to 300% of the calibrated value to assess the effect on the heads and flows in the model. Plots of the resulting RMSE of the simulated heads and the simulated flow at SW-3 with each adjustment are included in Attachment A. The analysis indicates the simulated heads are moderately to highly sensitive to hydraulic conductivity and are highly sensitive to recharge. Simulated flow to SW-3 is moderately sensitive to the hydraulic conductivity and highly sensitive to both recharge and stream conductance. The model is considered well calibrated to these parameters based on the site-specific data.

2.5 Simulated Drawdown

The Quarry's cone of depression was re-evaluated to assess potential lowering of the local water table based on the model adjustments completed herein. A drawdown map was prepared by subtracting the head array values for the future pumping simulation from the head array of the pre-Quarry simulation. The resulting drawdown map or Zone of Influence (ZOI) map is shown on Figure 1 with the ZOI delineated at the 10 ft drawdown contour. Figure 1 also shows the residential wells that were identified and monitored as part of the background evaluation of groundwater in 2018. As shown on Figure 1, the model simulation indicates that the 10 ft drawdown contour (ZOI) does not extend more than 500 feet beyond the property boundary to the north or south and does not extend to residential areas to the southwest. A table of pre-pumping water levels, simulated water levels under Quarry pumping conditions, and resulting drawdown is provided below for all observations. No known private or public water supplies are located within the predicted 10 ft ZOI. Therefore, Quarry pumping is not anticipated to adversely impact surrounding well use or availability of local groundwater resources.

Table 5. Simulated Quarry Pumping Drawdown

Well ID	Pre Quarry Water Level (feet msl)	Simulated Water Level During Quarry Pumping (feet msl)	Drawdown (feet)
MW-3	559.45	540.12	19.32
MW-2	555.76	525.30	30.47
MW-1	576.28	469.37	106.91
MP-2	563.90	559.54	4.36
MP-1	531.79	531.70	0.09
MP-3	493.00	490.49	2.51
MP-5	519.28	515.59	3.69
MP-10	534.09	533.86	0.23
MP-12	549.23	548.99	0.24
MP-6	547.25	546.46	0.78
MP-8	541.58	541.35	0.23

Table 5. Simulated Quarry Pumping Drawdown (Continued)			
Well ID	Pre Quarry Water Level (feet msl)	Simulated Water Level During Quarry Pumping (feet msl)	Drawdown (feet)
MP-11	528.81	528.71	0.11
MP-13	555.91	555.46	0.45
MP-14	524.94	524.80	0.14
MP-16	516.34	511.71	4.63

The data and analysis performed for this Addendum indicates that potential hydrologic impacts due to proposed Quarry pumping are minimal. No adverse impacts to surrounding wells or flow diminution to nearby streams is anticipated. The hydrologic balance will be continually assessed through implementation of the monitoring plan in conjunction with the record of the Quarry pumping rate.

The proposed monitoring network includes collection of regular static water level measurements from the wells located around the perimeter of the proposed pit (MW-1 MW-2, MW-3, MW-4) as indicated in Module 8 of the SMP. Data generated from the monitoring network will provide regular monitoring of groundwater levels and will enable detection of potential impacts to surface water and groundwater.

3.0 EVALUATION OF RIDGE RUN PFAS HSCA SITE

Rock Hill monitoring well MW-4 was sampled by PADEP on February 22, 2018 to gather data in support of PADEP's on-going investigation and clean-up activities for the Ridge Run PFAS HSCA Site. The Rock Hill Quarry lies at the North-eastern edge of the Ridge Run Site boundary that was initially delineated by PADEP as a one-mile radius centered around (2) two North Penn Water Authority (NPWA) public supply wells (See Figure 2, Environtrac, 2017). For reference, Figure 2 shows the 1-mile Ridge Run HSCA Site boundary, the approximate outline of the property at 1419 Bethlehem Pike which was the source of PFAS contamination, the two (2) NPWA wells, the Quarry and geology. The property at 1419 Bethlehem Pike will be referred to in this report as the Ridge Run Property to distinguish it from the initial 1-mile Site boundary delineated by PADEP. The analysis presented herein provides an assessment of what effects, if any, Quarry pumping may have on the Ridge Run site activities, clean up, and background PFAS concentrations. As part of this assessment, EARTHRES evaluated the Ridge Run HSCA Site activities and sampling results, assessed area hydrogeology, collected samples from the Quarry Pit and Clarifying Pond discharge for PFAS and completed additional modeling simulations. Model results indicate that Quarry pumping will not influence the Ridge Run HSCA Site because pumping will not extend the PFAS plume and will have limited impact on the natural groundwater flow near the Quarry.

3.1 Ridge Run PFAS HSCA Site

Documents reviewed by EARTHRES pertaining to the Ridge Run PFAS HSCA Site include the following:

Table 6. Primary Ridge Run PFAS Documents

Document	Date	Author
Ridge Run PFAS HSCA Work Plan	1/12/2017	EnviroTrac
Ridge Run PFAS HSCA Site Public Hearing Presentation	7/11/2018	PADEP
Ridge Run PFAS HSCA Statement of Decision	4/18/2019	PADEP
Ridge Run Site Investigation Report	3/10/2020	EnviroTrac
November 2021 Monitoring Well Sample Results	2/23/2022	Tetratech

As detailed in PADEP's Site Investigation Report (Envirotrac, 2020), in November 1986, a tire fire occurred at 1419 Bethlehem Pike. The fire was extinguished using firefighting foams contaminated with PFAS. Soil sampling conducted in 2019 identified a source area for PFAS located on the northern portion of the property, corresponding to the site of the fire. PFAS was detected in August and September 2016 in two (2) public water wells (NPWA-74 & 73) located approximately 0.6 miles from Rock Hill Quarry. PFAS levels were detected in exceedance of the United States Environmental Protection Agency (US EPA) Health Advisory level (HAL) of 70 nanograms per liter (ng/L) established in 2016, which resulted in the wells being taken off-line. From February 2017 through October 2019, a total of 156 potable wells were sampled to

develop a baseline survey of potentially PFAS impacted wells. PADEP has been actively pursuing site remediation and treatment systems for impacted residents. PADEP's interim response actions consist of installation and maintenance of point of entry treatment systems (POET) on impacted residential wells located in proximity to the Ridge Run Property. Additionally, remedial measures are being undertaken at the source area using implementation of permeable reactive barrier technology.

3.2 Hydrogeologic Setting

The Ridge Run HSCA Site and surrounding area are underlain by Triassic rocks of the Brunswick Formation, Lockatong Formation, and Triassic Diabase (see Figure 2). Within this geology, groundwater is stored and moves primarily through fractures in the bedrock including bedding plane partings, joints, and faults, if present. The water table is generally a subdued reflection of topography and groundwater typically flows downhill discharging to local streams (Low et al, 2002). Groundwater potentiometric surface maps completed for the Ridge Run Property confirm that groundwater gradients are directed to the southeast toward Three Mile Run Creek (Tetratech, 2022).

As shown on Figure 2, the Brunswick Formation underlies the Ridge Run Property and underlies the low-lying area adjacent to Three Mile Run Creek. The Brunswick Formation consists primarily of shale, mudstone, and siltstone. These rocks are moderately resistant to weathering with a moderate permeability and porosity (Geyer & Wilshusen, 1982). By contrast, the Diabase is a crystalline igneous intrusive rock that is very resistant to weathering and exhibits very low porosity and permeability (Geyer & Wilshusen, 1982). Due to its high resistance to weathering, the Diabase forms a ridge line that rises over 100 feet above Three Mile Run Creek. The Diabase ridge is located north of the Three Mile Run Creek and north of the Property. The Quarry is underlain only by the Diabase.

Within the Brunswick Formation, permeability is typically greatest in the strike direction and lowest perpendicular to the plane of bedding. Therefore, wells aligned along geologic strike are more likely to exhibit pumping effects than wells that are not aligned the geologic strike (Greenman, 1955). Site investigations indicate that the geologic structure within the Brunswick Formation trends (strikes) in the northeast/southwest direction with beds that are inclined (dip) gently (< 30 degrees) to the northwest (Environtrac, 2020).

Based on these aquifer characteristics, wells located along geologic strike from the Ridge Run Property (northeast), and within the same geologic formation, including the NPWA, wells would be susceptible to influencing and capturing contaminated groundwater from the Property.

Wells that are cross-strike from the Ridge Run Property (northwest or southeast) and/or in a different geologic formation (e.g., in the Diabase in which the Quarry is located) would be less susceptible to influencing and capturing contaminated groundwater from the Property.

3.3 Evaluation of Potable Well Results

Figure 3A depicts the Ridge Run Property, NPWA wells, the geology, and an overlay of the potable well sampling results contained within the Envirotrac Site Investigation Report. The potable well results are color-coded based on the level of PFAS detected. Sampling from the Ridge Run Property wells indicated combined PFOA/PFOS concentrations of up to 24,700 ng/L (MW-6S) (see Table 5, Envirotrac, 2020) and levels decrease significantly at distance from the Ridge Run Property. Figure 3B depicts the same results along with the groundwater potentiometric surface simulated by the EARTHRES model. The groundwater contours indicate the general direction of groundwater flow with flow occurring from high head potential to low head potential, except where influenced by groundwater pumping.

Review of the potable well sampling results indicates a general plume distribution that is elongated in the strike direction and toward the NPWA wells as shown by the well sites impacted at over 70 ng/L (red). This pattern is consistent with and suggests that contamination was pulled along geologic strike by pumping of the NPWA wells.

In addition to the red sites, the sampling results indicate a more diffuse and wider area of impact corresponding with the yellow sites (21 – 40 ng/L combined PFOA/PFOS). This zone appears to be centered on the Ridge Run Property and extends along strike toward the NPWA wells but also southeast beyond Three Mile Run Creek as well as to the northwest across a geologic contact and into the diabase geology. There are also several other yellow and orange sites that appear unrelated to the main cluster surrounding the Property.

Finally, the majority of potable well results within the 1-mile HSCA Site boundary indicate concentrations below 20 ng/L or non-detect (blue and green sites, respectively). Low level detections occur throughout the 1-mile HSCA Site boundary and have occurred in remote areas such as along the top of the Diabase ridge (more than 100 feet higher in elevation than the Ridge Run Site).

Given the hydrogeologic conditions and physical constraints i.e. the hydraulic gradient directed away from the Diabase ridge, the low permeability of the Diabase, the low permeability of the Brunswick in the cross-strike direction toward the ridge, it is likely that a mode of contaminant transport other than groundwater advection from the Property has contributed to found PFAS concentrations within the 1-mile HSCA Site boundary.

Given the physical and hydrogeologic constraints, the low-level concentrations (e.g., the blue, green, and potentially yellow areas depicted on Figure 3B) may be characterized as diffuse area-wide background levels, the source of which is unknown but could include aerial deposition resulting from the fire or deposition from rain water.

3.4 Rock Hill Quarry Sampling

As part of the investigation, PADEP collected a sample from Rock Hill monitoring well MW-4 on February 22, 2018 which tested positive for low level PFAS constituents, significantly below

the HAL of 70 ug/L. Given this data and in consultation with PADEP, EARTHRES collected grab samples from the Quarry Pit and Clarifying Pond Discharge on April 1, 2022 for further analysis of PFAS, specifically PFOA, PFOS, and PFBS compounds. The sampling results are summarized below, along with the results from the PADEP sample from MW-4 collected in February 22, 2018.

Table 7. Rock Hill Quarry PFAS Sampling Results				
Sample ID	Date	PFOA (ng/L)	PFOS (ng/L)	PFBS (ng/L)
MW-4	2/22/2018	4	<2	NS
Quarry Pit	4/1/2022	6.18	1.57 J	0.54 J
Clarifying Pond	4/1/2022	5.58	3.01 I	0.51 J

Review of the results indicates the detection of PFAS compounds in the Quarry Pit water and Clarifying Pond at levels similar to those found in MW-4 and significantly below the EPA HAL of 70 ng/L. Based on review of the PADEP potable well sample results, the concentrations identified at Rock Hill Quarry are consistent with background levels found within the 1-mile Site boundary of the Ridge Run PFAS HSCA Site.

The found concentration levels within the Quarry Pit water are below the Pennsylvania Maximum Contaminant Levels (MCLs) of 14 ng/L for PFOA and 18 ng/L for PFOS in public drinking water supplies and are below the EPA HAL of 70 ng/L. The found levels are also below the Pennsylvania Act 2 cleanup standard for groundwater of 70 ng/L. In addition, the found levels are orders of magnitude below the draft EPA Aquatic Life Ambient Water Quality Criteria of 940 ug/L for PFOA and 8.4 ug/L for PFOS (EPA, 2022[1]). A search by EARTHRES for public water supply intakes located within 10 miles of the Quarry discharge point indicates no intakes within 10 miles, confirming that discharge from the Quarry will not impact public drinking water supplies. Based on comparison of existing PFAS concentrations presented in Table 7 with the above regulatory criteria, the Quarry discharge will not adversely impact surface or groundwater quality or local sources of drinking water.

3.5 Assessment of Potential Rock Hill Quarry Effects

Quarry pumping was further assessed to evaluate what potential effects, if any, Quarry dewatering could have on the Ridge Run Site activities, remedial response measures, and background levels of PFAS. The interim response actions consist of installation and maintenance of POET systems on impacted residential wells located in proximity to the Ridge Run Site. Additionally, remedial measures are being undertaken at the source area using reactive barrier remediation technology.

[1] EPA, 2022. Fact Sheet: Draft 2022 Aquatic Life Ambient Water Quality Criteria for Perfluorooctanoic acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS), https://www.epa.gov/system/files/documents/2022-04/pfoa-pfos-draft-factsheet-2022.pdf

Additional modeling simulations were completed to evaluate the Quarry's contributing area under current and future pumping conditions. Particle tracking was implemented within the model using the USGS MODPATH code. Particles were located within the Quarry and were tracked backward to determine their point of origin to determine the contributing area.

Figure 4A shows the simulated groundwater flow paths reaching the Quarry under current non-pumping conditions. As expected, the pathlines indicate the flow paths under non-pumping conditions originate from upgradient areas to the north.

Figure 4B shows the simulated groundwater flow paths under future pumping conditions. As depicted on Figure 4B, the majority of the flow paths originate within close proximity to the Quarry with most of the paths originating from the north, upgradient of the Quarry. Fewer pathways extend southwest from the diabase ridge on the other side of the Unnamed Tributary valley. Pathlines from the southwest represent deeper groundwater flow paths that, under non-pumping conditions, flow beneath the Unnamed Tributary enroute to Three Mile Run Creek or Bog Run.

The capture zone analysis demonstrates conclusively that Quarry pumping will not capture or influence contaminated groundwater from beneath the Ridge Run Property or NPWA wells. In addition to modeling, several hydrogeologic factors also support this conclusion. Rock Hill Quarry is located both cross strike and hydraulically upgradient of these locations. The Quarry is also located within a different geologic unit (Diabase as opposed to the Brunswick Formation). These factors combined with the distance (0.6 miles from the NPWA wells and 1.4 miles from the Property) ensure that dewatering of the Rock Hill Quarry will not capture groundwater from beneath the Ridge Run Site or NPWA wells or otherwise influence the remedial activities and interim response action undertaken by PADEP.

With respect to local groundwater conditions, Quarry pumping has limited potential to capture a small amount of groundwater originating from the Diabase ridge southwest of the Quarry. EARTHRES completed additional particle tracking to evaluate groundwater flow paths originating from the Diabase ridge. Figure 5A and 5B show the groundwater flow paths under current conditions as well as future Quarry pumping conditions.

Based on the model results, groundwater from this Diabase ridge flows naturally toward the Unnamed Tributary of Bog Run, Bog Run, and Three Mile Run (see Figure 5A). Quarry pumping results in minor changes to a small number of flow paths in this area but does not impact the overall flow paths as shown by comparison of Figure 5A and 5B. The groundwater captured by the Quarry is deep groundwater from the ridge that flows naturally toward the Unnamed Tributary and becomes susceptible to capture upon nearing the Quarry. Thus, while according to PADEP's potable well sampling, low-level PFAS was detected in a few wells located on this ridge, it is unlikely that Quarry pumping will impact flow from these wells.

Based on this analysis, Quarry pumping has the potential to capture a small portion of the groundwater that would otherwise discharge naturally to Bog Run or Three Mile Run. This pumped water will be discharged back to surface water via NPDES 001 and flow to Bog Run

where it would eventually discharge naturally in the absence of Quarry pumping. Given these conditions, Quarry pumping is not anticipated to adversely affect the existing background conditions related to PFAS. Furthermore, it is concluded that Quarry pumping will have limited influence on the natural groundwater flow paths, will not direct PFAS toward potable wells or streams that are not currently in the flow path of PFAS, and as such will not alter the existing groundwater conditions with respect to PFAS.

The capture zone analysis demonstrates conclusively that Quarry pumping will not influence the Ridge Run HSCA Site because it will not extend the PFAS plume and will have limited impact on the natural groundwater flow near the Quarry.

Based on the modeling results and the hydrogeologic factors discussed within, it is concluded the Quarry will not impact the on-going site remediation response actions being conducted for the Ridge Run HSCA Site.

4.0 CONCLUSIONS

This Addendum provides supplementary information to the 2018 Groundwater Pumping Evaluation report and incorporates several model adjustments, an updated calibration analysis, and zone of influence assessment. In addition, the Quarry Pit water was evaluated for per-and polyfluoroalkyl substances (PFAS). Quarry pumping was further assessed to evaluate what potential effects Quarry dewatering could have on the Ridge Run PFAS HSCA Site, if any, related to site activities, remedial response measures, and background levels. The findings and conclusions of this Addendum are consistent with the conclusions of the 2018 Groundwater Pumping Evaluation

Based on the modeling results and the hydrogeologic factors discussed within, it is concluded that Quarry pumping will not capture or influence contaminated groundwater from beneath the Ridge Run Site. Additionally, the Quarry will not impact the on-going site remediation response actions being conducted for the Ridge Run HSCA Site.

Review of sampling results indicates detection of PFAS compounds in the Pit water and Clarifying Pond at levels similar to those found in MW-4 and significantly below the HAL of 70 ng/L, below the Pennsylvania MCLs, and below the draft EPA aquatic effects levels. Based on comparison with these criteria, Quarry discharge will not adversely impact surface or groundwater quality or sources of drinking water.

Based on review of the regional potable well sample results, the PFAS concentrations identified at Rock Hill Quarry are consistent with the background levels found within the 1-mile Site boundary of the Ridge Run HSCA Site.

Based on the model results, it is concluded that Quarry pumping will have limited influence on the nearby flow paths of groundwater, will not direct PFAS toward any potable wells or to areas that are not currently in the flow path of PFAS and as such will not alter the existing groundwater conditions with respect to PFAS.

The data and analysis performed for this evaluation indicates that potential hydrologic impacts including stream flow diminution and well impacts due to proposed Quarry pumping are minimal. The hydrologic balance will be continually assessed through implementation of the monitoring plan in conjunction with the record of the Quarry pumping rate.

The proposed monitoring network includes collection of static water levels for monitoring wells located around the perimeter of the proposed Pit. Data generated from the monitoring network will provide regular monitoring of groundwater levels during pumping and will enable detection of potential impacts to surface water and groundwater.

EARTHRES concludes that the proposed pumping will not adversely affect the availability of groundwater for existing supplies and that the proposed monitoring program provides adequate protection for water features in and around the permit area.

5.0 REFERENCES

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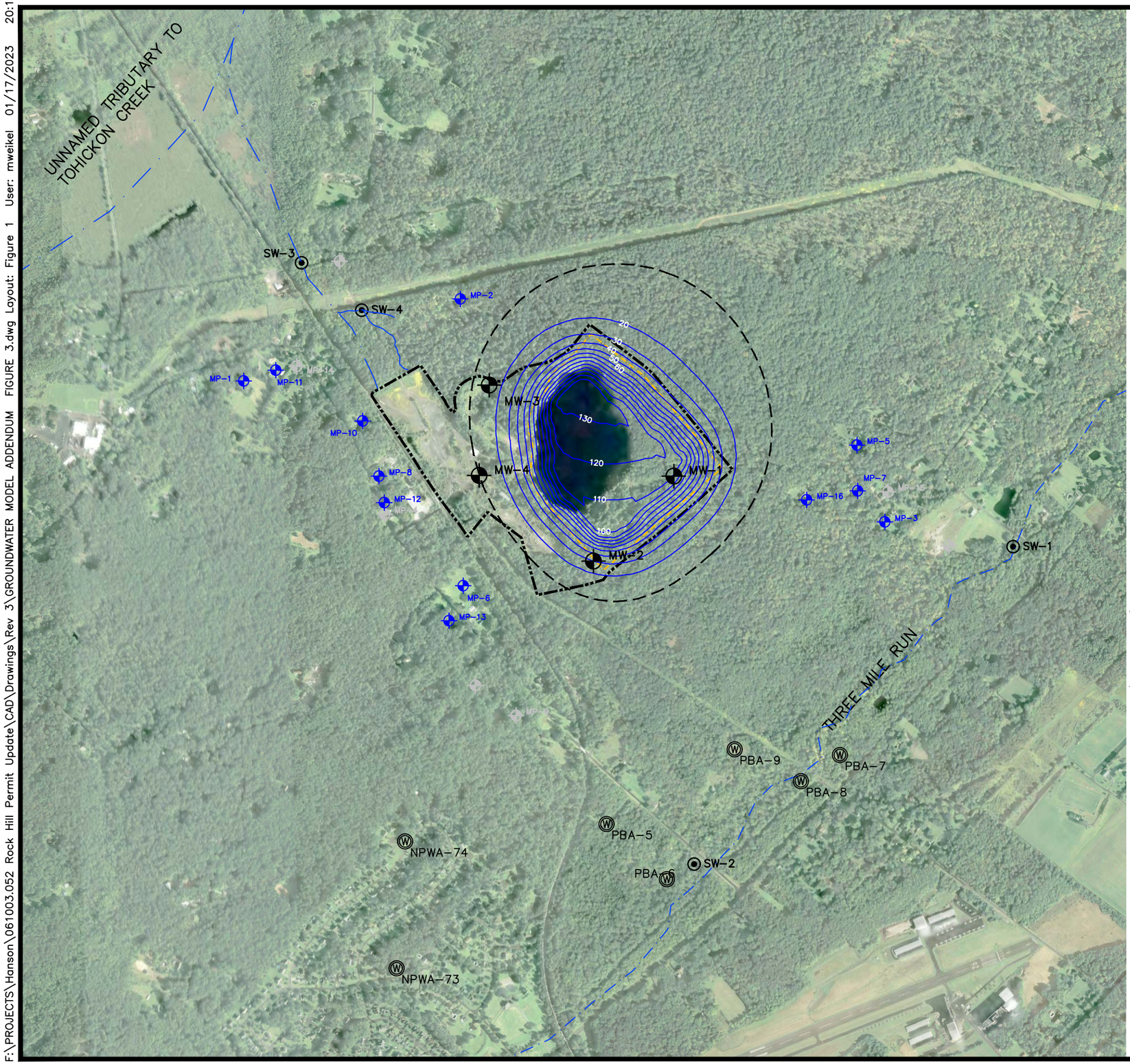
FIGURES



LEGEND

- PUBLIC WATER SUPPLY WELL
- MONITORING WELL
- RESIDENTIAL WELL (INCLUDED IN BACKGROUND MONITORING)
- RESIDENTIAL WELL (NOT MONITORED)
- SURFACE WATER MONITORING POINT
- 10 FT Z.O.I.
- GROUNDWATER DRAWDOWN CONTOUR
- LIMIT OF MINING
- SMP BOUNDARY
- SURFACE WATER

NOTES:

1. SMP BOUNDARY AND LIMIT OF MINING PROVIDED BY HANSON AGGREGATES PENNSYLVANIA LLC – ROCK HILL QUARRY FROM EXISTING SITE MAP, EXHIBIT 9. (2/20/18).
2. SITE IMAGERY OBTAINED FROM PASDA, 2017 STATEWIDE COLOR.
3. GROUNDWATER CONTOURS FROM LAYER 2 OF THE MODEL (50' – 150' BELOW GROUND SURFACE).

FIGURE 1
SIMULATED DRAWDOWN MAP

ROCKHILL QUARRY
HEIDELBERG MATERIALS NORTHEAST LLC.
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

DRAWN BY:	CHECKED BY:
JJB	MSW
DATE:	PROJECT NO:
1/17/2023	061003.052
DRAWING SCALE:	
1"=1,000'	

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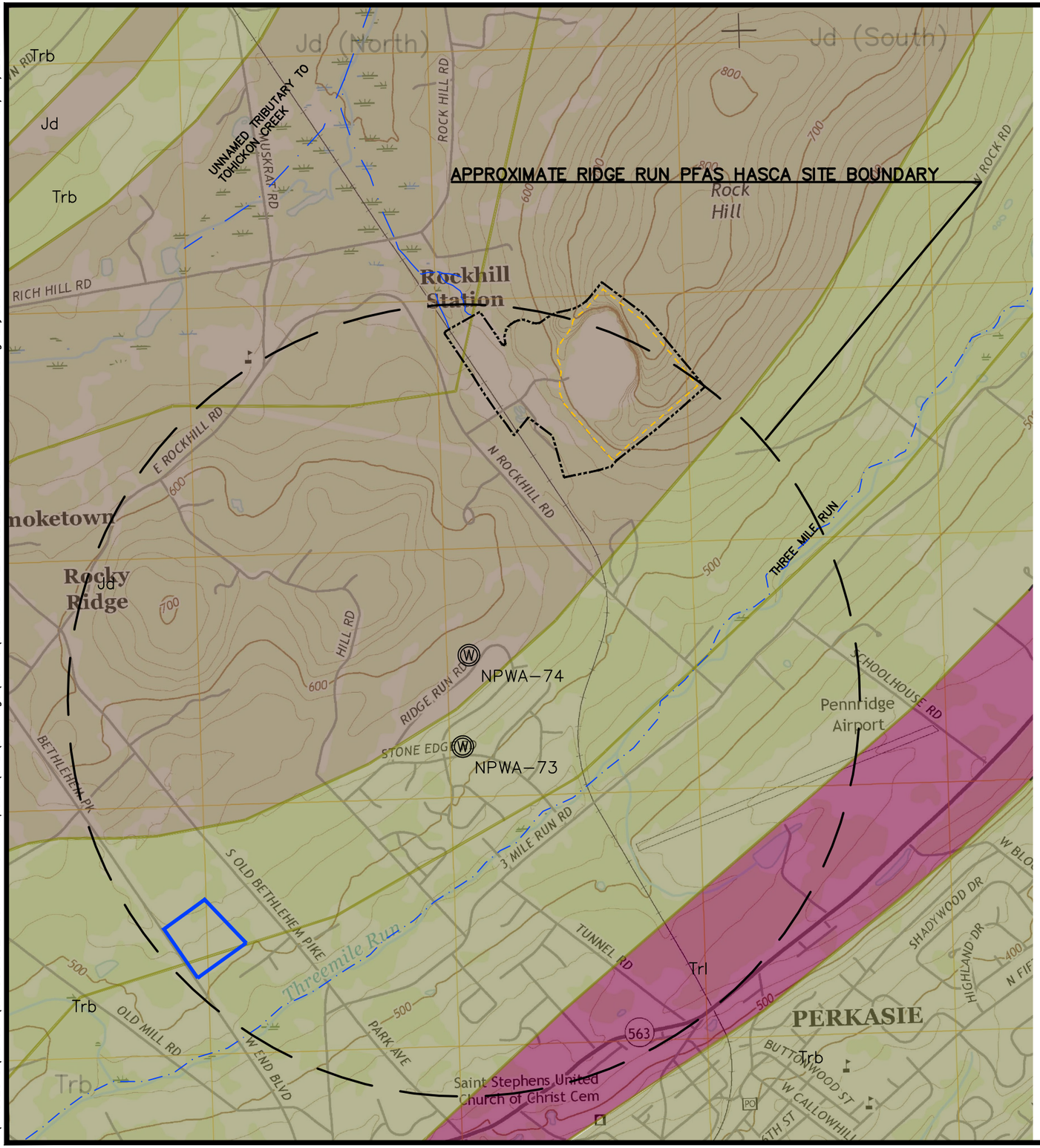
F:\PROJECTS\Hanson\061003.052 Rock Hill Permit Update\CAD\Drawings\Rev 3\GROUNDWATER MODEL ADDENDUM FIGURE 3.dwg Layout: Figure 1 User: mweikel 01/17/2023 20:19



NORTH

GEOLOGY

- Jd DIABASE FORMATION
- Trb BRUNSWICK FORMATION
- Trl LOCKATONG FORMATION

LEGEND

- PUBLIC WATER SUPPLY WELL
- LIMIT OF MINING
- SMP BOUNDARY
- SURFACE WATER
- GEOLOGIC CONTACT
- 1419 BETHLEHEM PIKE PROPERTY BOUNDARY
  RIDGE RUN PROPERTY (APPROXIMATE)

NOTES:

1. SMP BOUNDARY AND LIMIT OF MINING PROVIDED BY HANSON AGGREGATES PENNSYLVANIA LLC – ROCK HILL QUARRY FROM EXISTING SITE MAP, EXHIBIT 9. (2/20/18).
2. 1–MILE HSCA SITE BOUNDARY REFERENCED FROM FIGURE 2, RIDGE RUN PFAS HSCA WORK PLAN PREPARED BY ENVIROTRAC (2017).

SOURCE: USGS 7.5 MINUTE QUADRANGLE - QUAKERTOWN, PA

FIGURE 2
RIDGE RUN PFAS HSCA SITE LOCATION

ROCKHILL QUARRY
HEIDELBERG MATERIALS NORTHEAST LLC
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

DRAWN BY: JJB	CHECKED BY: MSW
DATE: 1/17/2023	PROJECT NO: 061003.052
DRAWING SCALE: 1"=1,500'	

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Morgantown, WV 26505

NORTH

GEOLOGY

- Jd DIABASE FORMATION
- Trb BRUNSWICK FORMATION
- Trl LOCKATONG FORMATION

LEGEND

- MONITORING WELL
- PUBLIC WATER SUPPLY WELL
- LIMIT OF MINING
- SMP BOUNDARY
- SURFACE WATER
- GEOLOGIC CONTACT
- 1419 BETHLEHEM PIKE PROPERTY BOUNDARY
  RIDGE RUN PROPERTY (APPROXIMATE)

Maximum Combined PFOA & PFOS Concentration (ppt)

- ≥ 70
- 41 - 69
- 21 - 40
- Above Detection Limit - 20
- ND

NOTES:
1. SMP BOUNDARY AND LIMIT OF MINING PROVIDED BY HANSON AGGREGATES PENNSYLVANIA LLC – ROCK HILL QUARRY FROM EXISTING SITE MAP, EXHIBIT 9. (2/20/18).
2. BACKGROUND IMAGE AND PFAS RESULTS REFERENCED FROM FIGURE 5, SITE INVESTIGATION REPORT, PREPARED BY ENVIROTRAC (2020).

FIGURE 3A
RIDGE RUN HSCA POTABLE WELL RESULTS

ROCKHILL QUARRY
HEIDELBERG MATERIALS NORTHEAST LLC.
EAST ROCK HILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

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DATE: 1/17/2023		DRAWING SCALE: 1"=1,200'

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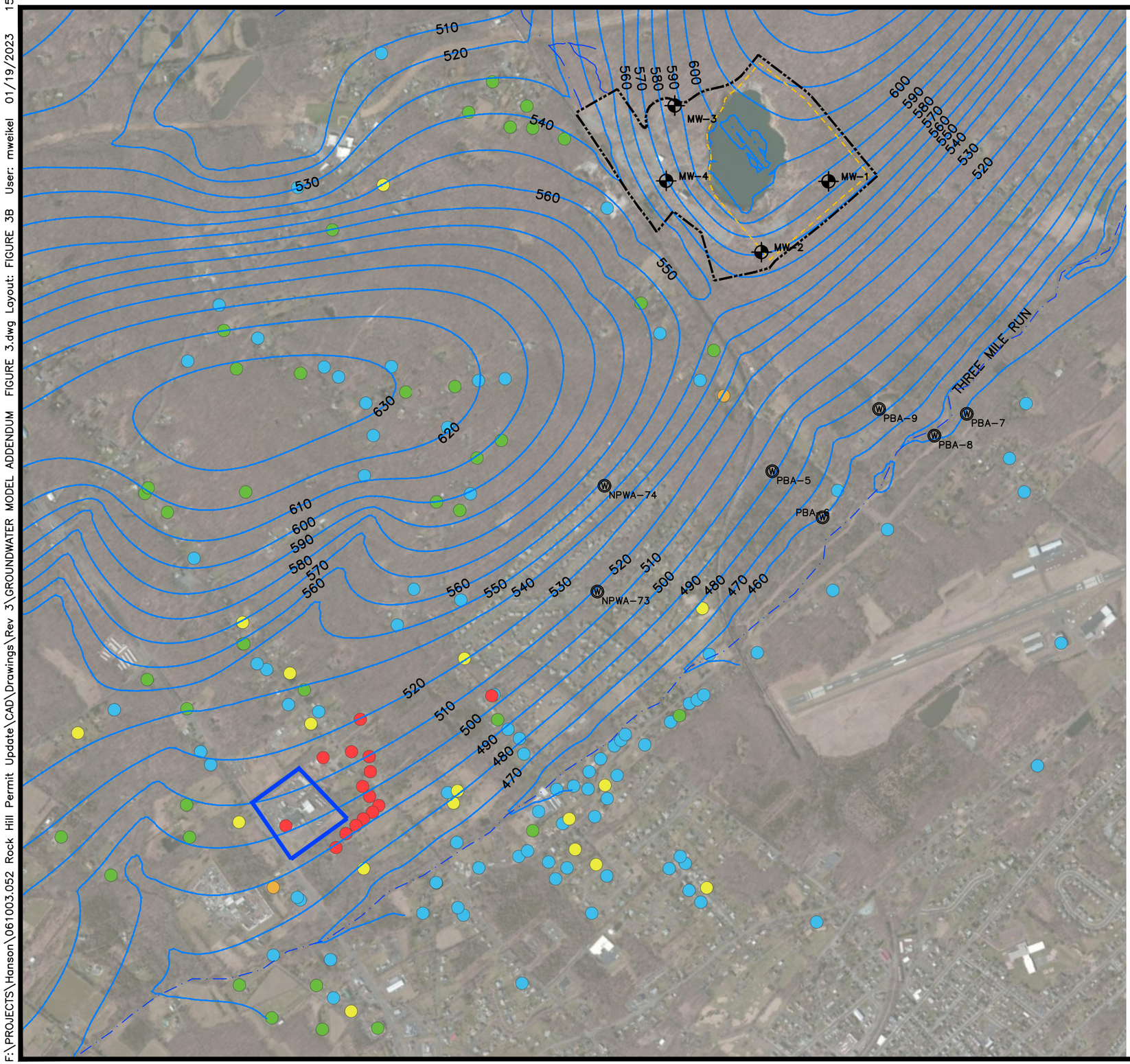

LEGEND

- MONITORING WELL
- PUBLIC WATER SUPPLY WELL
- LIMIT OF MINING
- SMP BOUNDARY
- SURFACE WATER
- GEOLOGIC CONTACT
- 1419 BETHLEHEM PIKE PROPERTY BOUNDARY RIDGE RUN PROPERTY (APPROXIMATE)
- GROUNDWATER CONTOUR

Maximum Combined PFOA & PFOS Concentration (ppt)

- ≥ 70
- 41 - 69
- 21 - 40
- Above Detection Limit - 20
- ND

NOTES:
1. SMP BOUNDARY AND LIMIT OF MINING PROVIDED BY HANSON AGGREGATES PENNSYLVANIA LLC – ROCK HILL QUARRY FROM EXISTING SITE MAP, EXHIBIT 9. (2/20/18).
2. BACKGROUND IMAGE AND PFAS RESULTS REFERENCED FROM FIGURE 5, SITE INVESTIGATION REPORT, PREPARED BY ENVIROTRAC (2020).

FIGURE 3B
RIDGE RUN HSCA POTABLE WELL RESULTS
(WITH SIMULATED GROUNDWATER CONTOURS)

ROCKHILL QUARRY
HEIDELBERG MATERIALS NORTHEAST LLC.
EAST ROCK HILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

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DATE: 1/17/2023			

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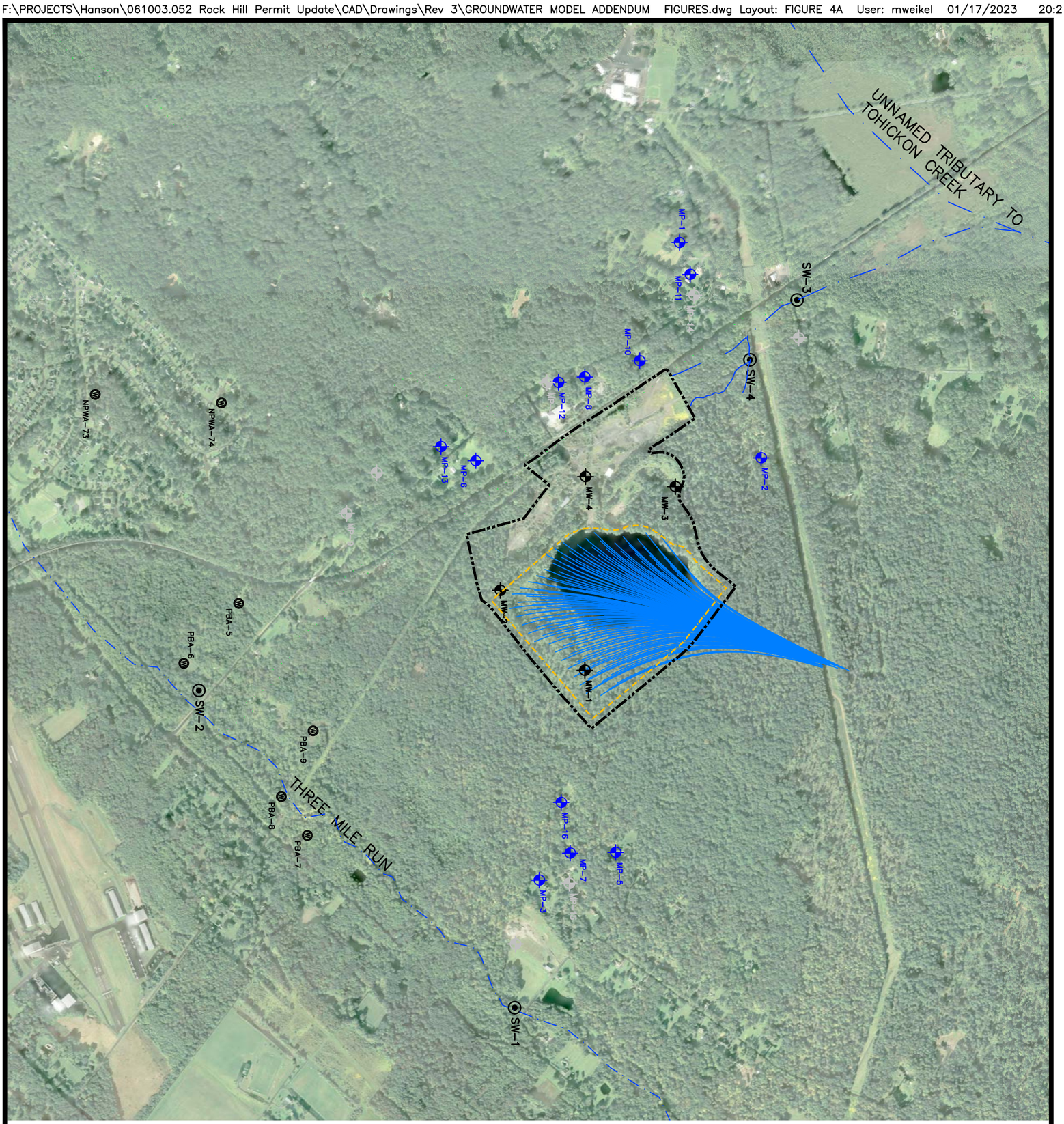

LEGEND

- PUBLIC WATER SUPPLY WELL
- MONITORING WELL
- RESIDENTIAL WELL (INCLUDED IN BACKGROUND MONITORING)
- RESIDENTIAL WELL (NOT MONITORED)
- SURFACE WATER MONITORING POINT
- LIMIT OF MINING
- SMP BOUNDARY
- GROUNDWATER FLOW PATH

NOTES:

1. SMP BOUNDARY AND LIMIT OF MINING PROVIDED BY HANSON AGGREGATES PENNSYLVANIA LLC – ROCK HILL QUARRY FROM EXISTING SITE MAP, EXHIBIT 9. (2/20/18).
2. SITE IMAGERY OBTAINED FROM PASDA, 2017 STATEWIDE COLOR.

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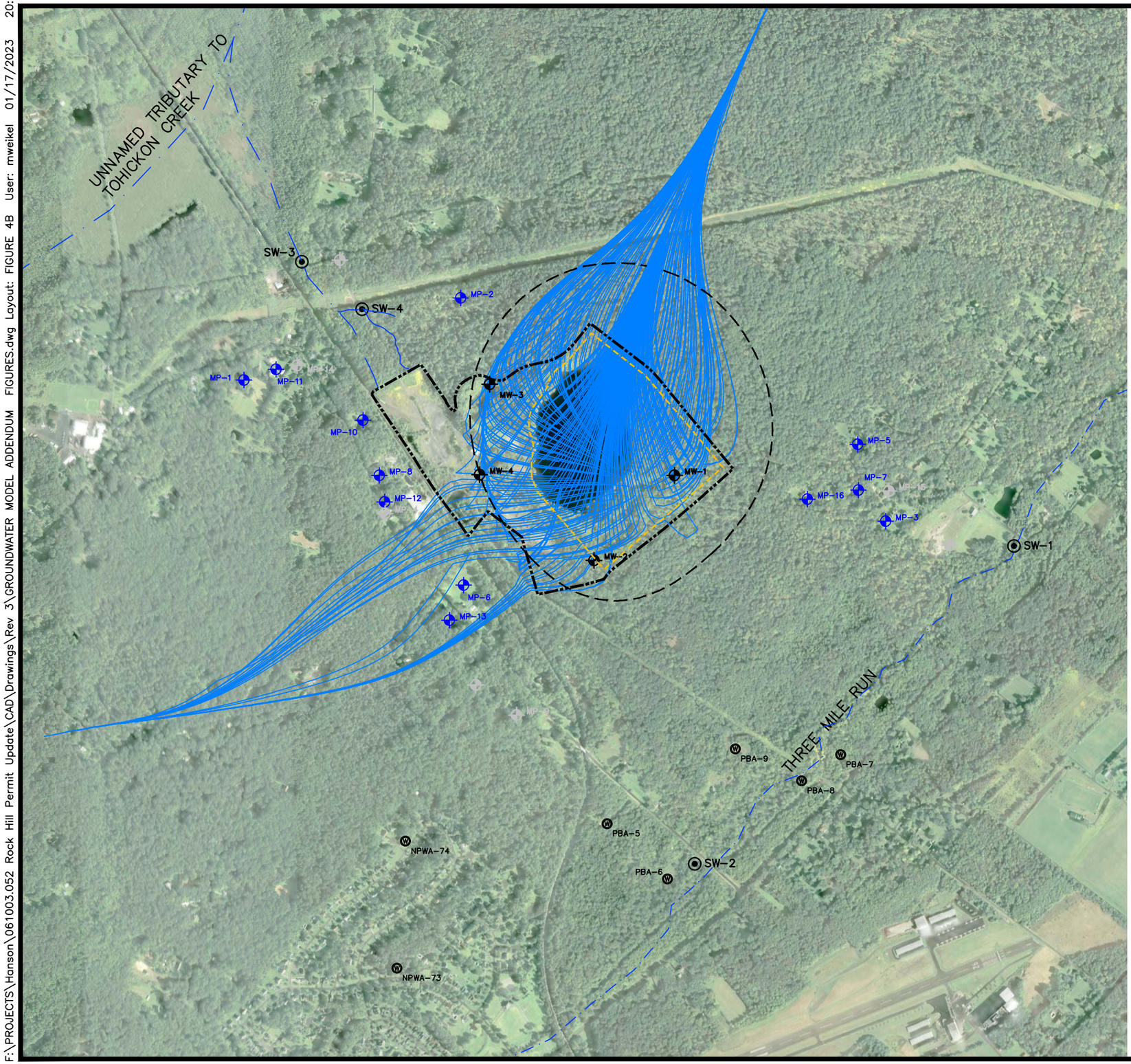
1/17/2023	061003.052

DRAWING SCALE: 1"=1,000'

FIGURE 4A
ROCK HILL QUARRY CONTRIBUTING AREA
(NO QUARRY PUMPING)

ROCKHILL QUARRY
HEIDELBERG MATERIALS NORTHEAST LLC.
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA



NORTH

LEGEND

- PUBLIC WATER SUPPLY WELL
- MONITORING WELL
- RESIDENTIAL WELL (INCLUDED IN BACKGROUND MONITORING)
- RESIDENTIAL WELL (NOT MONITORED)
- SURFACE WATER MONITORING POINT
- LIMIT OF MINING
- SMP BOUNDARY
- GROUNDWATER FLOW PATH
- 10 FT Z.O.I.

NOTES:
1. SMP BOUNDARY AND LIMIT OF MINING PROVIDED BY HANSON AGGREGATES PENNSYLVANIA LLC – ROCK HILL QUARRY FROM EXISTING SITE MAP, EXHIBIT 9. (2/20/18).
2. SITE IMAGERY OBTAINED FROM PASDA, 2017 STATEWIDE COLOR.

FIGURE 4B
ROCK HILL QUARRY CONTRIBUTING AREA
(ACTIVE QUARRY PUMPING)

ROCKHILL QUARRY
HEIDELBERG MATERIALS NORTHEAST LLC.
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

DRAWN BY:	CHECKED BY:
JJB	MSW
DATE:	PROJECT NO:
1/17/2022	061003.052
DRAWING SCALE:	
1"=1,000'	

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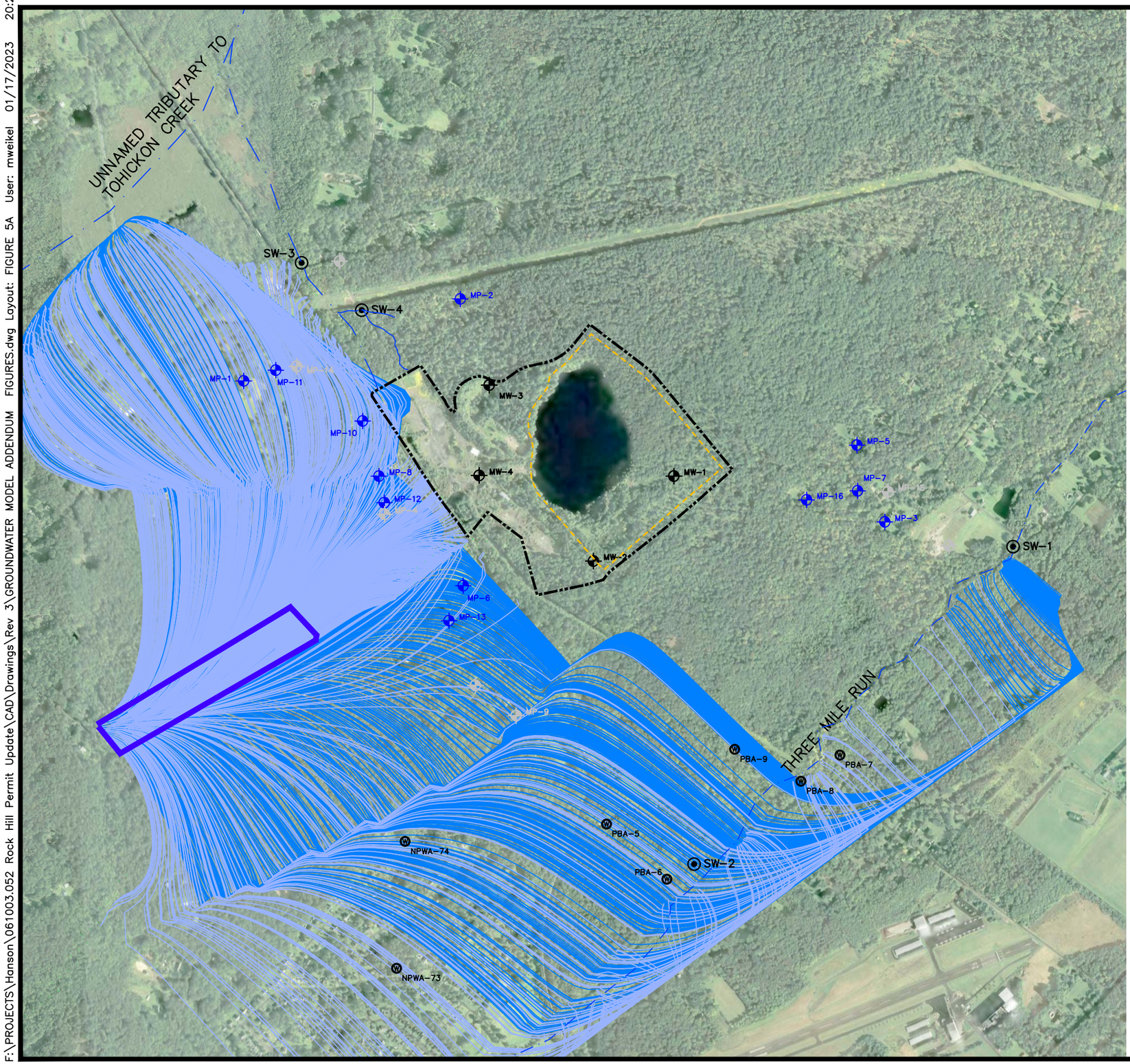

NORTH

LEGEND

- PUBLIC WATER SUPPLY WELL
- MONITORING WELL
- RESIDENTIAL WELL (INCLUDED IN BACKGROUND MONITORING)
- RESIDENTIAL WELL (NOT MONITORED)
- SURFACE WATER MONITORING POINT
- LIMIT OF MINING
- SMP BOUNDARY
- GROUNDWATER FLOW PATH (DEEP)
- GROUNDWATER FLOW PATH (SHALLOW)
- ORIGIN OF PARTICLES

NOTES:

1. SMP BOUNDARY AND LIMIT OF MINING PROVIDED BY HANSON AGGREGATES PENNSYLVANIA LLC – ROCK HILL QUARRY FROM EXISTING SITE MAP, EXHIBIT 9. (2/20/18).
2. SITE IMAGERY OBTAINED FROM PASDA, 2017 STATEWIDE COLOR.

FIGURE 5A
GROUNDWATER FLOWPATHS WEST OF QUARRY
(NO QUARRY PUMPING)

ROCKHILL QUARRY
HEIDELBERG MATERIALS NORTHEAST LLC.
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

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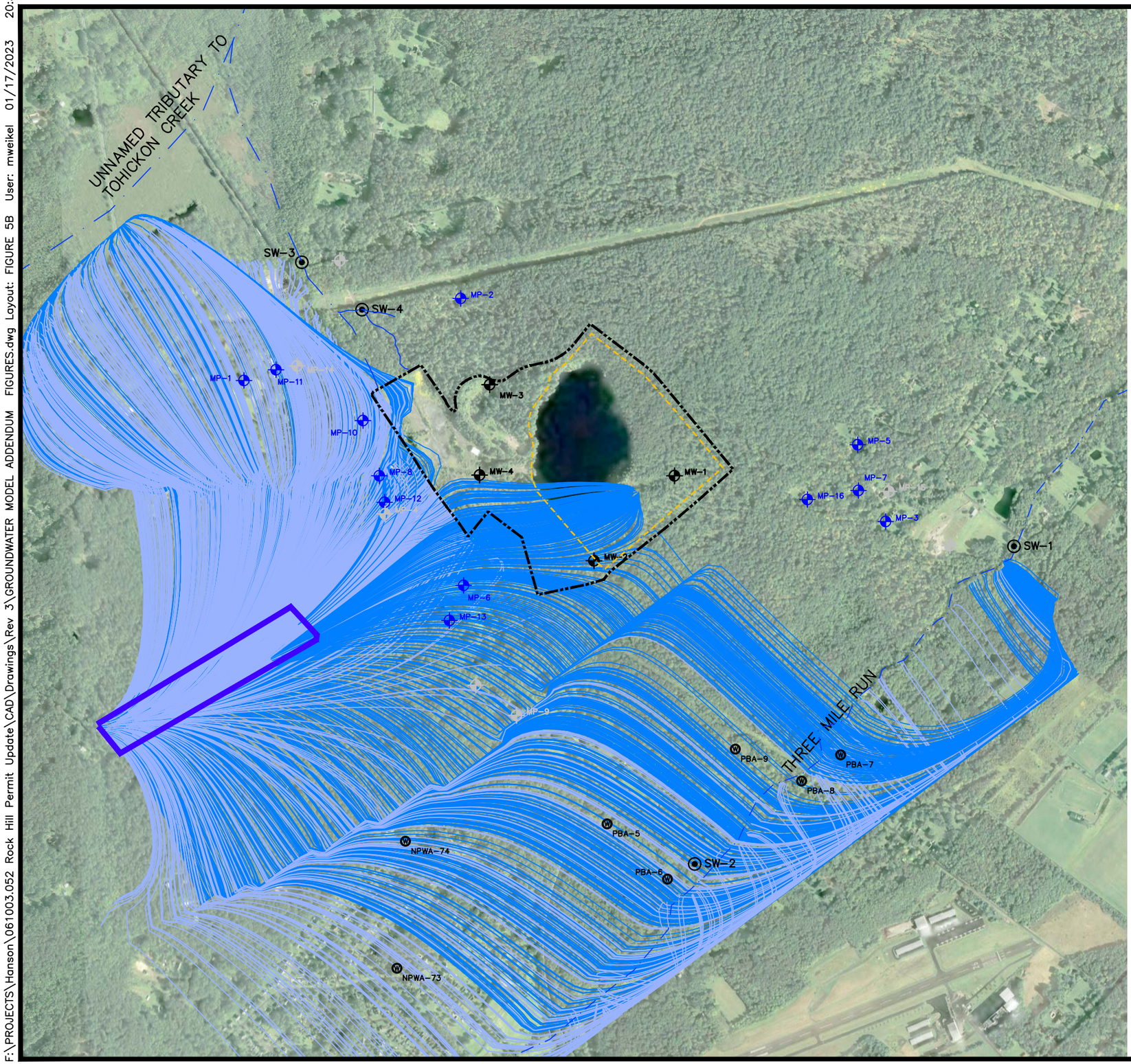
F:\PROJECTS\Hanson\061003.052 Rock Hill Permit Update\CAD\Drawings\Rev 3\GROUNDWATER MODEL ADDENDUM FIGURES.dwg Layout: FIGURE 5A User: mweikel 01/17/2023 20:22



NORTH

LEGEND

- PUBLIC WATER SUPPLY WELL
- MONITORING WELL
- RESIDENTIAL WELL (INCLUDED IN BACKGROUND MONITORING)
- RESIDENTIAL WELL (NOT MONITORED)
- SURFACE WATER MONITORING POINT
- LIMIT OF MINING
- SMP BOUNDARY
- GROUNDWATER FLOW PATH (DEEP)
- GROUNDWATER FLOW PATH (SHALLOW)
- ORIGIN OF PARTICLES

NOTES:

1. SMP BOUNDARY AND LIMIT OF MINING PROVIDED BY HANSON AGGREGATES PENNSYLVANIA LLC – ROCK HILL QUARRY FROM EXISTING SITE MAP, EXHIBIT 9. (2/20/18).
2. SITE IMAGERY OBTAINED FROM PASDA, 2017 STATEWIDE COLOR.

FIGURE 5B
GROUNDWATER FLOWPATHS WEST OF QUARRY
(WITH QUARRY PUMPING)

ROCKHILL QUARRY
HEIDELBERG MATERIALS NORTHEAST LLC.
EAST ROCKHILL TOWNSHIP, BUCKS COUNTY
PENNSYLVANIA

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DATE:	PROJECT NO:
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DRAWING SCALE:	
1"=1,000'	

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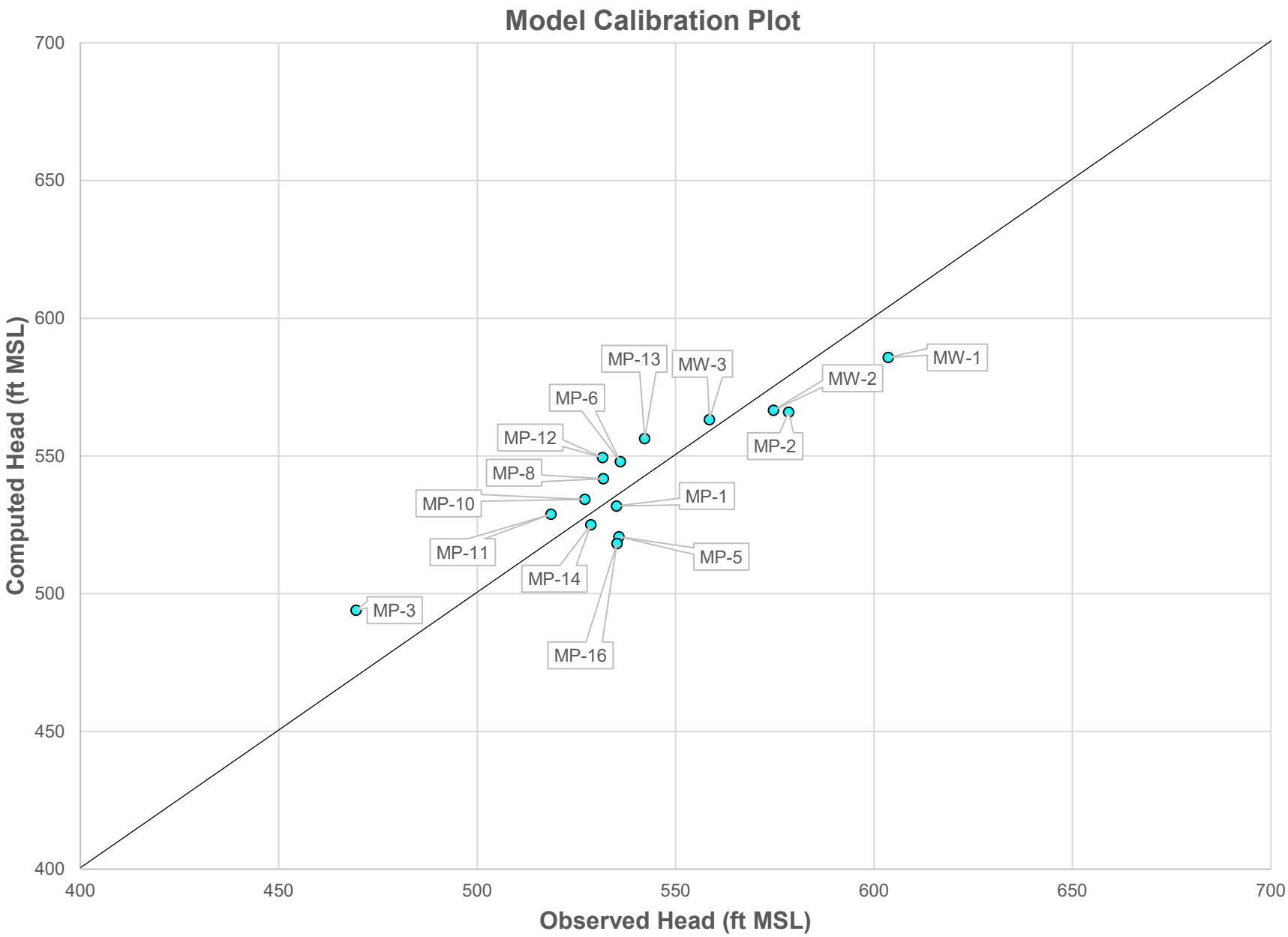
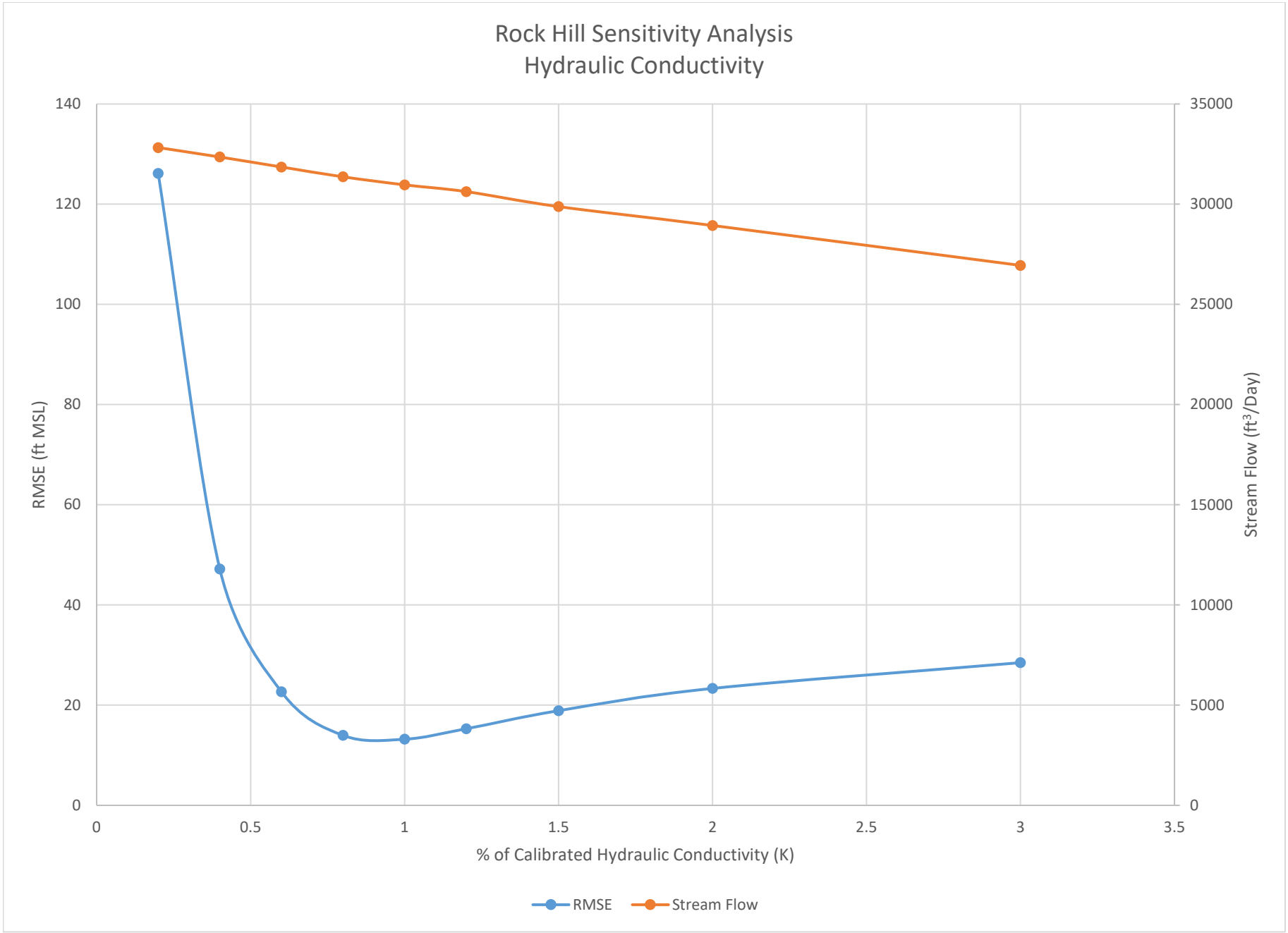
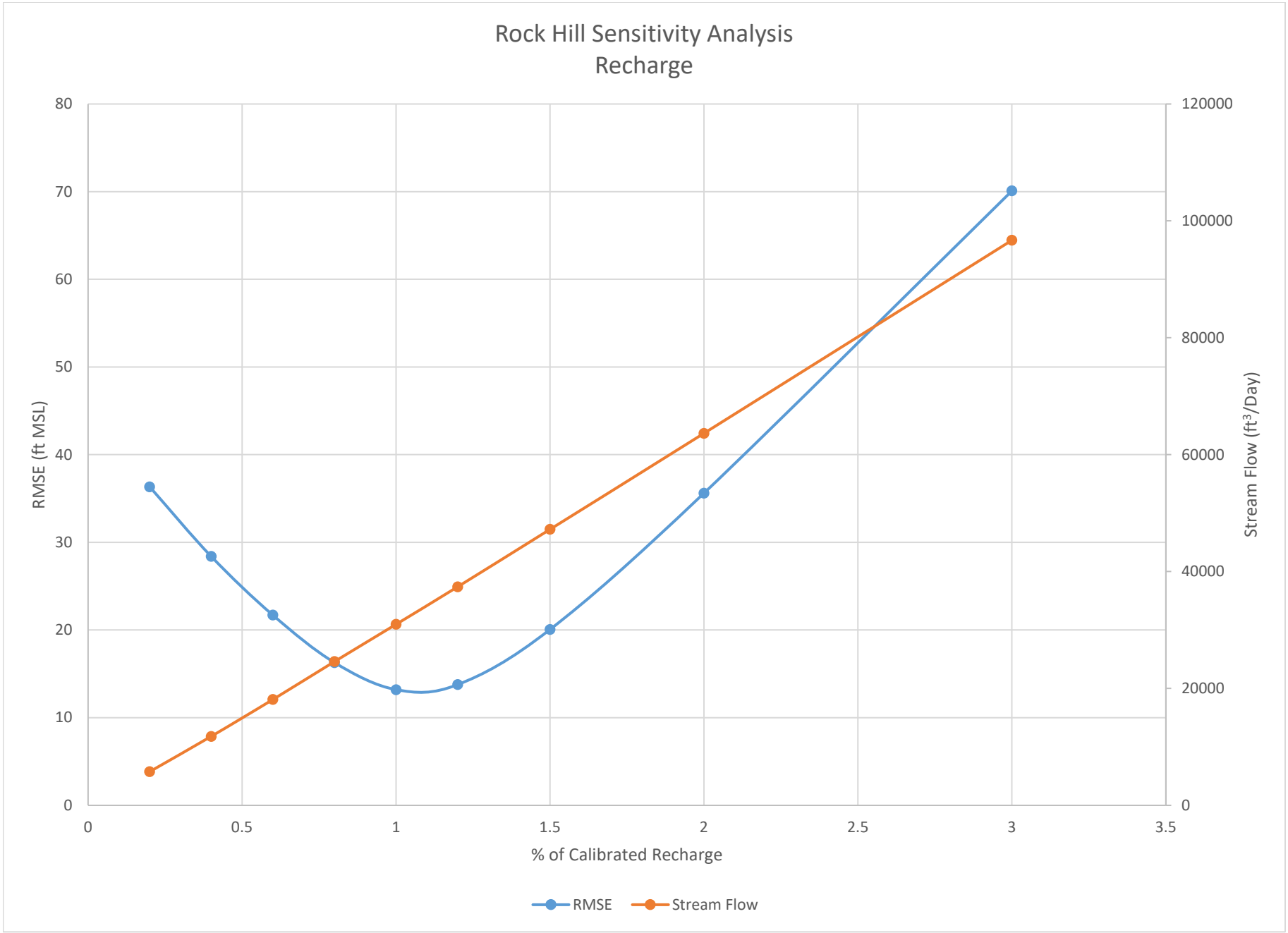
F:\PROJECTS\Hanson\061003.052 Rock Hill Permit Update\CAD\Drawings\Rev 3\GROUNDWATER MODEL ADDENDUM FIGURES.dwg Layout: FIGURE 5B User: mweikel 01/17/2023 20:34

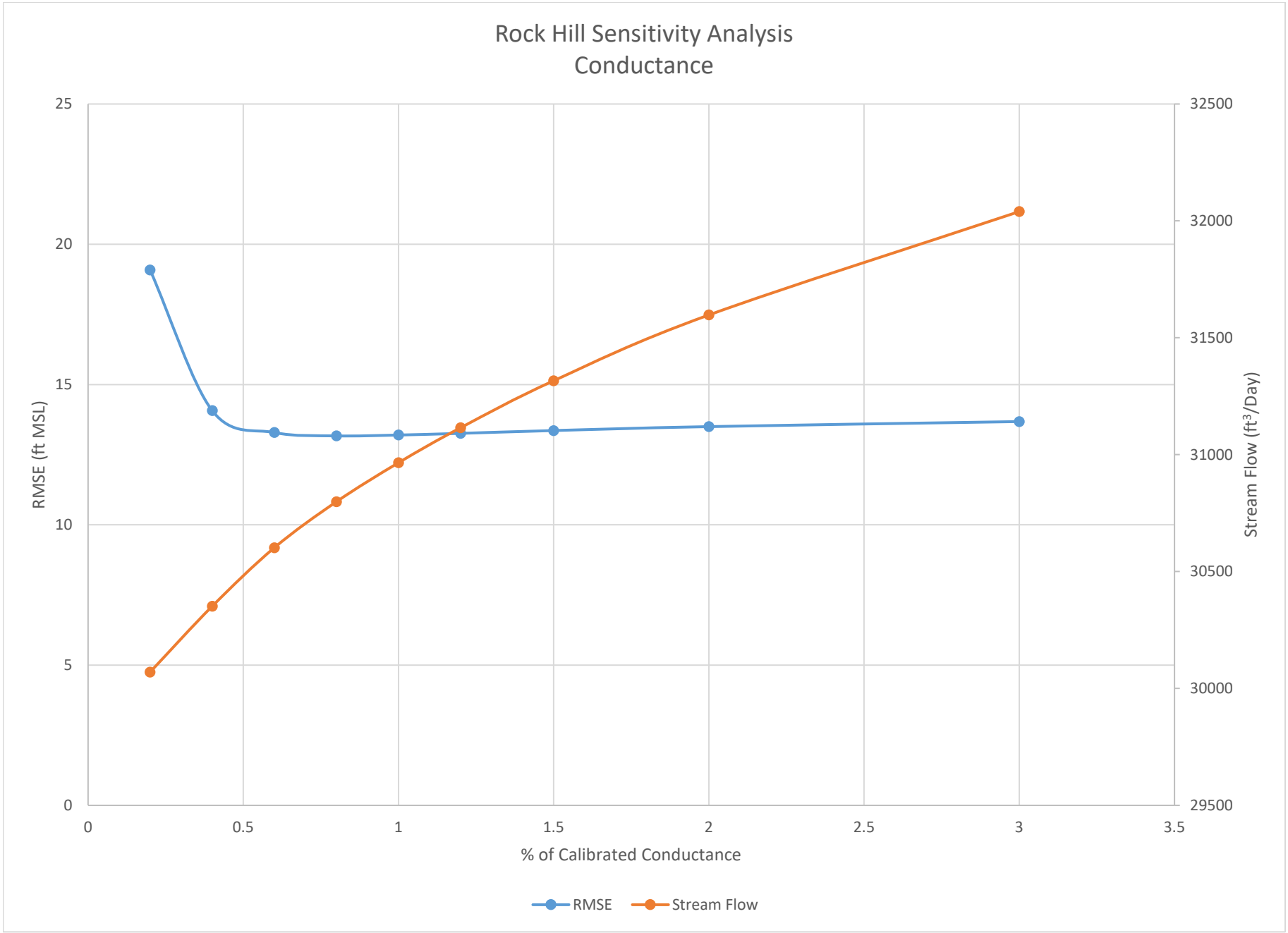
ATTACHMENT A

Model Calibration Information


Model Calibration Plot
Computed Head (ft MSL)
Observed Head (ft MSL)
700
650
600
550
500
450
400
400
450
500
550
600
650
700
MW-1
MW-2
MW-3
MP-1
MP-2
MP-3
MP-5
MP-6
MP-8
MP-10
MP-11
MP-12
MP-13
MP-14
MP-16


Rock Hill Sensitivity Analysis
Hydraulic Conductivity
RMSE (ft MSL)
Stream Flow (ft³/Day)
% of Calibrated Hydraulic Conductivity (K)
0
20
40
60
80
100
120
140
0
5000
10000
15000
20000
25000
30000
35000
0
0.5
1
1.5
2
2.5
3
3.5
RMSE
Stream Flow


Rock Hill Sensitivity Analysis
Recharge
RMSE (ft MSL)
Stream Flow (ft³/Day)
% of Calibrated Recharge
0
10
20
30
40
50
60
70
80
0
20000
40000
60000
80000
100000
120000
0
0.5
1
1.5
2
2.5
3
3.5
RMSE
Stream Flow


Rock Hill Sensitivity Analysis
Conductance
RMSE (ft MSL)
Stream Flow (ft³/Day)
% of Calibrated Conductance
0
5
10
15
20
25
29500
30000
30500
31000
31500
32000
32500
0
0.5
1
1.5
2
2.5
3
3.5
RMSE
Stream Flow