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UNITED STATES DISTRICT COURT  
DISTRICT OF NEW JERSEY

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 UNITED STATES OF AMERICA, and )  
 NEW JERSEY DEPARTMENT OF )  
 ENVIRONMENTAL PROTECTION, )  
 )  
 Plaintiffs, )  
 )  
 v. )  
 )  
 WYETH HOLDINGS LLC, )  
 )  
 Defendant. )  
 ----- X

Civil Action No. 3: 16-cv-07219

**NATURAL RESOURCES RESTORATION**  
**CONSENT DECREE**

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## I. BACKGROUND

A. The United States of America ("United States"), on behalf of the United States Department of Commerce ("Commerce"), acting by and through the National Oceanic and Atmospheric Administration ("NOAA") and the United States Department of the Interior ("DOI") acting by and through the United States Fish and Wildlife Service ("USFWS"), filed a complaint in this action against Wyeth Holdings LLC ("Settling Defendant") pursuant to Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9607.

B. The United States in its complaint alleges that Settling Defendant is liable under Section 107 of CERCLA, 42 U.S.C. § 9607, for damages for, injury to, destruction of, or loss of Natural Resources in connection with the American Cyanamid Superfund Site ("Site"), as defined in Section IV of this Consent Decree, and the reasonable costs of assessment of Natural Resource Damages ("NRD").

C. Pursuant to 42 U.S.C. §§ 9607(f)(2) and 9615, 40 C.F.R. § 300.600 (herein referred to as the NCP); Executive Order 12580, 52 Fed. Reg. 2933 (January 23, 1987), as amended by Executive Order 12777, 56 Fed. Reg. 54757 (October 19, 1991), DOI and NOAA have been delegated authority to act on behalf of the public as the federal trustees for Natural Resources impacted by the release of hazardous substances at or from the Site.

D. New Jersey Department of Environmental Protection ("NJDEP"), filed a separate complaint alleging that Settling Defendant is liable under Section 107 of CERCLA, 42 U.S.C. § 9607, and the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11 through -23.24 ("Spill Act") for reimbursement of costs and damages for injury to, destruction of, or loss of Natural Resources in connection with the Site, as defined in Section IV of this Consent Decree, and the reasonable costs of assessment in the Spill Act, N.J.S.A. 58:10-23.11 through -23.24 and CERCLA, 42 U.S.C. § 9601(16). The State of New Jersey, acting by and through NJDEP, is a natural resource Trustee pursuant to 40 C.F.R. § 300.600 and N.J.S.A. 58:10-23.11a.

E. NOAA, DOI, and NJDEP (the "Trustees") have engaged in natural resource injury studies and restoration planning, for which the Trustees incurred costs of assessment, to identify and quantify injuries to their shared trust resources. These injured resources may include, but are not limited to, birds, mammals, fish, surface water, sediments, and other wildlife, plants, and their supporting habitats, and associated services losses.

F. NJDEP intends to file in this Court a motion to consolidate its action in this matter, to which the United States and the Settling Defendant will not object.

G. This Consent Decree only addresses the Settling Defendant's liability for In-River Natural Resource Damages, as defined in Section IV (Definitions). By the terms of this Consent Decree, the Trustees reserve and retain their right to assert claims for Natural Resource Damages to other Natural Resources in connection with the release of hazardous substances at the Site. Settling Defendant reserves all of its rights and defenses with respect to any such claims.

H. Investigations at the Site by the United States Environmental Protection Agency (“EPA”) and NJDEP concluded that waste storage and disposal impoundments at the Site contain or contained hazardous substances, including, but not limited to, volatile organic compounds (“VOCs”), semi-volatile organic compounds (“SVOCs”), and/or metals. Investigations also found that Site soils contain hazardous substances, including VOCs, SVOCs, polychlorinated biphenyls, and metals, and that groundwater underlying the Site contains metals and VOCs, such as benzene, chlorobenzene, ethylbenzene and xylene.

I. The United States, on behalf of EPA, and Settling Defendant signed a Consent Decree relating to the Site, which was entered by the United States District Court for the District of New Jersey on December 8, 2015. *United States v. Wyeth Holdings LLC*, 3:15-cv-07153-AET, Doc. # 8. (hereinafter, “2015 Consent Decree”). The United States, in the 2015 Consent Decree, reserved all rights against Settling Defendant for damages to, destruction of, or loss of Natural Resources, and for the costs of any natural resource damage assessment.

J. NJDEP and Settling Defendant entered into an Amended and Restated Administrative Consent Order, which became effective on December 23, 2015 (hereinafter, “2015 ARACO”). The 2015 ARACO replaced, nullified, and superseded prior administrative consent orders regarding the Site, and set forth the remaining remedial obligations of the Settling Defendant to NJDEP with respect to the Site. The 2015 ARACO, by its terms, did not affect or waive any claim of NJDEP against any party for damages for injuries to, destruction of, or loss of Natural Resources.

K. The Trustees analyzed EPA’s investigation data and other available data to assess potential injuries to Natural Resources and their services related to release of hazardous substances at or near the Site, as well as releases of hazardous substances from the Site into the Raritan River, Cuckels Brook, and related tributaries in order to quantify the Settling Defendant’s liability for In-River Natural Resource Damages. The Trustees outlined their assessment of injuries related to hazardous substance releases and proposed restoration projects in a draft Restoration Plan and Environmental Assessment, which was presented for public comment. The public comment period ended on June 10, 2016. After responding to the comments, the Restoration Plan and Environmental Assessment was finalized. The Trustees then entered into negotiations with the Settling Defendant and agreed, *inter alia*, to the restoration projects outlined in the Restoration Plan, and funding commitments, to be performed by the Settling Defendant. The requirements of the work to be performed by the Settling Defendant to resolve its liability for In-River Natural Resource Damages are set forth in the SOW attached at Appendix A, which is made enforceable under this Consent Decree.

L. Settling Defendant does not admit any liability to the United States or NJDEP arising out of the transactions or occurrences alleged in the complaints, nor does it acknowledge that the release or threatened release of hazardous substances at or from the Site has caused damages to, destruction of, or loss of Natural Resources.

M. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith and implementation of this

Consent Decree will expedite the restoration of natural resources injured at or in connection with the Site and will avoid prolonged and complicated litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby Ordered, Adjudged and Decreed:

## II. JURISDICTION

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331, 1345, and 1367 and 42 U.S.C. §§ 9607, and 9613(b). This Court also has personal jurisdiction over Settling Defendant. Venue is proper in this Court pursuant to 28 U.S.C. §§1391(b) and (c) because the Settling Defendant did business in and CERCLA releases occurred in this Judicial District. Solely for the purposes of this Consent Decree and the underlying complaints, Settling Defendant waives all objections and defenses that it may have to jurisdiction of the Court or to venue in this District. Settling Defendant shall not challenge the terms of this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree.

## III. PARTIES BOUND

2. This Consent Decree is binding upon the United States, the State, and upon Settling Defendant and its successors and assigns. Any change in ownership or corporate status of the Settling Defendant including, but not limited to, any transfer of assets or real or personal property, shall in no way alter such Settling Defendant's responsibilities under this Consent Decree.

3. Settling Defendant shall provide a copy of this Consent Decree to each contractor hired to perform the Work required by this Consent Decree and to each person representing the Settling Defendant with respect to the Work, and shall condition all contracts entered into hereunder for performance of the Work, as defined below, on compliance with the terms of this Consent Decree. Settling Defendant or its contractor(s) shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Settling Defendant shall nonetheless be responsible for ensuring that its contractors and subcontractors perform the Work in accordance with the terms of this Consent Decree. With regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with Settling Defendant within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3).

## IV. DEFINITIONS

4. Unless otherwise expressly provided in this Consent Decree, terms used in this Consent Decree that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree or its appendices, the following definitions shall apply solely for purposes of this Consent Decree:

“CERCLA” shall mean the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675.

“Consent Decree” shall mean this Consent Decree and all appendices attached hereto (listed in Section XX). In the event of conflict between this Consent Decree and any appendix, this Consent Decree shall control.

“Day” or “day” shall mean a calendar day unless expressly stated to be a working day. The term “working day” shall mean a day other than a Saturday, Sunday, or federal or State holiday. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or federal or State holiday, the period shall run until the close of business of the next working day.

“DOI” shall mean the United States Department of the Interior, acting through the Fish and Wildlife Service, and its successor departments, agencies, or instrumentalities.

“DOJ” shall mean the United States Department of Justice and its successor departments, agencies, or instrumentalities.

“Effective Date” shall mean the date upon which this Consent Decree is entered by the Court as recorded on the Court docket, or, if the Court instead issues an order approving the Consent Decree, the date such order is recorded on the Court docket.

“EPA” shall mean the United States Environmental Protection Agency and its successor departments, agencies, or instrumentalities.

“Federal Natural Resource Trustees” shall mean the federal agencies designated pursuant to CERCLA and 40 C.F.R. § 300.600 as trustees for Natural Resources actually or potentially injured, destroyed or lost as a result of releases of hazardous substances at or from the Site, specifically, the DOI, acting by and through the USFWS, and the United States Department of Commerce, acting by and through NOAA.

“Fish and Habitat Survey Costs” shall mean costs incurred by the NJDEP and DOI to conduct fish and habitat monitoring associated with the removal of the Weston Causeway Dam in conjunction with NJDEP’s Bureau of Freshwater Fisheries ongoing monitoring programs and will involve fish and habitat surveys prior to and after dam removal.

“Floodplain, Riparian, Upland, and Wetland NRD” shall mean injury to, destruction of, or loss of Natural Resources occurring on, in, or to any and all floodplains, upland, riparian, or wetland habitats, which includes areas that are intermittently wet and further includes, but is not limited to, injury to, destruction of, or loss of any organisms that use such habitat including species such as amphibians and birds, and the prey species that support them.

“Future Costs” shall mean all costs, including, but not limited to, direct and indirect costs that the United States and NJDEP incur in reviewing or developing plans, reports, and other deliverables submitted pursuant to this Consent Decree after September 30, 2015 for DOI, September 19, 2015, for NOAA, and June 24, 2016 for NJDEP, in overseeing and monitoring

implementation of the Restoration Work, or otherwise implementing, overseeing, or enforcing this Consent Decree, including, but not limited to, payroll costs, contractor costs, travel costs, and laboratory costs. Future Costs shall also include the Trustees' Fish and Habitat Survey Costs. Future Costs does not include costs incurred by the Trustees for Natural Resource Damage assessment related to injury to, destruction of, or loss of Natural Resources not resolved by this Consent Decree.

"In-River NRD" shall mean injury to, destruction of, or loss of Natural Resources occurring wholly within the permanently and intermittently flowing water and its underlying sediment of those portions of the Raritan River, Cuckels Brook, and related tributaries that are adjacent to or downstream of the American Cyanamid Superfund Site. These Natural Resources include, but are not limited to, surface water, sediment, fish, benthic invertebrates, periphyton, and aquatic plants. In-River NRD shall not include "Floodplain, Riparian, Upland and Wetland NRD" defined above. The phrase "intermittently flowing water" does not include flood waters.

"Interest" shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

"Natural Resource" or "Natural Resources" is defined at CERCLA § 101(16), 42 U.S.C. § 9601(16).

"Natural Resource Damages," or NRD, for the purposes of this Consent Decree, means any damages for injury to, destruction of, loss of, loss of use of, or impairment of Natural Resources resulting from the release or threatened release or disposal or presence of hazardous substances at, from, or to the Site, including, but not limited to: (i) the costs of assessing such injury, destruction, loss, loss of use, or impairment; (ii) the costs of restoration, rehabilitation, or replacement of injured or lost Natural Resources or of acquisition of equivalent resources; and (iii) the costs of identifying and planning such restoration, rehabilitation, replacement or acquisition activities.

"NJDEP" shall mean the New Jersey Department of Environmental Protection and any successor departments, agencies, or instrumentalities.

"NOAA" shall mean the National Oceanic and Atmospheric Administration of the United States Department of Commerce and any successor departments, agencies, or instrumentalities.

"Paragraph" shall mean a portion of this Consent Decree identified by an Arabic numeral or an upper or lower case letter.

"Parties" shall mean the United States, NJDEP, and Settling Defendant.

"Past Costs" shall mean all unreimbursed costs that the Trustees incurred related to the In-River NRD or the Restoration Work through: September 30, 2015 for DOI, September 19,

2015, for NOAA, and June 24, 2016 for NJDEP. Such Past Costs include, but are not limited to, direct and indirect costs, related to Restoration Work, assessment costs, enforcement, attorneys' and consultants' fees and other litigation costs, as well as building/structure demolition, removal, grading, and planting performed by NJDEP to enhance existing upland in connection with the Restoration Work specific to the Weston Causeway Dam removal project. Past Costs further includes Interest on all such costs that has accrued from the Effective Date to the date of payment.

"Plaintiffs" shall mean the United States and NJDEP.

"Restoration Project 1" shall mean the Weston Causeway Dam Removal as described in the Scope of Work.

"Restoration Project 2" shall mean the Island Farm Weir Enhanced Fish Passage Design as described in the Scope of Work.

"Restoration Work" shall mean those activities specified in the Scope of Work which is incorporated at Appendix A.

"Scope of Work or "SOW" shall mean the scope of work incorporated at Appendix A.

"Section" shall mean a portion of this Consent Decree identified by a Roman numeral.

"Settling Defendant" shall mean Wyeth Holdings LLC.

"Site" shall mean the American Cyanamid Superfund Site, encompassing approximately 575 acres, located primarily in Bridgewater Township with a portion of the Site in Bound Brook Borough, Somerset County, New Jersey, which is depicted generally on a map attached in Appendix B, and its environs, which include the nearby Raritan River, Cuckels Brook, and related tributaries, and wherever else hazardous substance and releases at or from the Site have come to be located.

"State" shall mean the State of New Jersey.

"Supervising Contractor" shall mean the principal contractors retained by Settling Defendant to supervise and direct the implementation of the Restoration Work under this Consent Decree.

"Trustee Council" shall mean a council consisting of one representative of DOI, NOAA, and NJDEP that shall address and oversee all matters related to the Restoration Work under this Consent Decree, as per the terms of a Memorandum of Agreement ("MOA") among the Trustees.

"Trustees" or "Natural Resource Trustees" shall mean: the United States Department of Commerce, acting through the National Oceanic and Atmospheric Administration; the United States Department of the Interior, acting through the United States Fish and Wildlife Service; and the New Jersey Department of Environmental Protection.



“United States” shall mean the United States of America and each department, agency, and instrumentality of the United States, including the Department of Commerce and Department of Interior.

“Work” shall mean all activities and obligations Settling Defendant is required to perform under this Consent Decree, including the work set forth in the SOW, except the activities required under Section XVII (Retention of Records).

## V. GENERAL PROVISIONS

5. Objectives of the Parties. The objectives of the Parties in entering into this Consent Decree are: (i) to perform the Restoration Work; (ii) to reimburse natural resource damage assessment costs and costs related to the Restoration Work incurred by the Trustees, as provided in 42 U.S.C. § 9607(a); (iii) to resolve Settling Defendant’s liability for In-River NRD as provided herein; and (iv) to avoid potentially costly and time-consuming litigation.

6. Commitments by Settling Defendant. Settling Defendant shall perform or fund the Restoration Projects I and II in accordance with this Consent Decree, the SOW, and all work plans and other plans, standards, specifications, and schedules set forth in this Consent Decree or developed by Settling Defendant and approved by the Trustee Council pursuant to this Consent Decree. Settling Defendant shall pay the United States and NJDEP Past Costs and Future Costs as provided in this Consent Decree.

7. Compliance With Applicable Law. All activities undertaken by Settling Defendant pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. The activities conducted pursuant to this Consent Decree shall be deemed consistent with the NCP.

8. Permits. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

## VI. PERFORMANCE OF RESTORATION WORK

9. Settling Defendant’s Restoration Requirements. Settling Defendant shall fund and perform, or cause to be performed, the Restoration Work set forth in the SOW incorporated herein at Appendix A. Other than the Work as defined in and described further in this Consent Decree, this Consent Decree does not address or impose any remediation obligations on the Settling Defendant under the 2015 Consent Decree, the 2015 ARACO, and/or federal and State law. All required timelines in the SOW shall be met, unless the Parties agree in writing to an alternate timeframe Settling Defendant shall allow for and cooperate with monitoring and oversight of all Restoration Work by the Trustees, through the Trustee Council, established under Section VII (Trustee Coordination and Oversight).

10. Project Coordinator. No later than thirty (30) days after the Entry of this Consent Decree, Settling Defendant shall notify the Trustee Council, in writing, of the name, address, telephone number, and e-mail address of its designated Project Coordinator and Alternative Project

Coordinator. The persons so designated shall be responsible for coordinating the Restoration Work and shall have technical expertise sufficient to adequately manage and supervise all aspects of the Restoration Work. The Settling Defendant may change its Project Coordinator by providing written notice to the Trustee Council at least thirty (30) days prior to the change.

11. Selection of Supervising Contractors for Restoration Work.

a. All aspects of the Restoration Work shall be under the direction and supervision of at least one Supervising Contractor, as designated by Settling Defendant. Settling Defendant has selected and the Trustees have issued an authorization to proceed regarding hiring of the following person(s) as Supervising Contractor(s): MWH Global, Inc. If at any time hereafter, Settling Defendant proposes to change the Supervising Contractor(s), Settling Defendant shall give such notice to the Trustee Council and must obtain an authorization to proceed from the Trustee Council before the new Supervising Contractor(s) perform, direct, or supervise any Restoration Work under this Consent Decree.

b. If the Trustee Council disapproves a replacement Supervising Contractor, the Trustee Council will notify Settling Defendant in writing. Settling Defendant shall submit to the Trustee Council a list of contractors, including the qualifications of each contractor, that would be acceptable to Settling Defendant within 30 days after receipt of the Trustee Council's disapproval of the contractor previously proposed. The Trustee Council will provide written notice of the names of any contractor(s) that it disapproves and an authorization to proceed with respect to any of the other contractors. Settling Defendant may select any contractor from that list that is not disapproved and shall notify the Trustee Council of the name of the contractor selected within 21 days after the Trustee Council's authorization to proceed.

c. If the Trustee Council fails to provide written notice of its authorization to proceed or disapproval as provided in this Paragraph and this failure prevents Settling Defendant from meeting one or more deadlines in a plan approved by the Trustee Council pursuant to this Consent Decree, Settling Defendant may seek relief under Section IX (Force Majeure).

**VII. TRUSTEE COORDINATION AND OVERSIGHT**

12. Trustee Council. The Trustees shall address and oversee all matters related to the Restoration Work by consensus through the Trustee Council established by the Memorandum of Agreement.

13. The United States, NJDEP or the Settling Defendant, individually or collectively, may take any legal, administrative, or judicial actions appropriate to enforce the terms of this Consent Decree. The United States, NJDEP, the Trustee Council, and each of their respective representatives, shall be given access at all reasonable times to the locations being used by Settling Defendant to implement the Restoration Work, as well as all non-privileged documents relating to the Restoration Work, for the purpose of overseeing and/or monitoring the implementation of the Restoration Work.

### VIII. PAYMENTS BY SETTLING DEFENDANT

14. Payments by Settling Defendant for Past Costs.

a. United States Past Costs: Within 60 days after the Effective Date, Settling Defendant shall pay \$142,471.56, plus interest accruing from the Effective Date, to the United States to reimburse Past Costs incurred by the United States. Of this total amount:

(1) \$32,315.63, plus interest, shall be applied to Past Costs incurred by DOI.

(2) \$110,155.93, plus interest, shall be applied to Past Costs incurred by NOAA.

b. Instructions for Past Costs Payments to the United States: Past Costs Payments to the United States shall be made by Electronic Funds Transfer ("EFT") to the U.S. Department of Justice account, referencing DOJ Case Number 90-11-3-07250/2. Payments shall be made in accordance with instructions provided to Settling Defendant by the Financial Litigation Unit of the United States Attorney's Office for the District of New Jersey. Such instructions shall be provided to the Settling Defendant within two (2) days of the Effective Date. Any payments received by the Department of Justice after 4:00 p.m. (Eastern Time) will be credited on the next business day. The FLU shall provide the payment instructions to:

Wyeth Holdings LLC  
100 Route 206 North  
Peapack, NJ  
ATTN: Russell Downey, m.s. 4-LLA-401  
russell.g.downey@pfizer.com

on behalf of Settling Defendant. Settling Defendant may change the individual to receive payment instructions on its behalf by providing written notice of such change in accordance with Section XVIII (Notices and Submissions).

c. NJDEP Past Costs: Within 60 days after the Effective Date, Settling Defendant shall pay \$41,891.43, (which includes \$29,490 in demolition costs and other Past Costs), plus interest accruing from the Effective Date, to NJDEP to reimburse Past Costs incurred by the State.

d. Instructions for Past Costs Payments to the NJDEP: Past Costs Payments to the NJDEP shall be made by check payable to the "Treasurer, State of New Jersey" and submitted to:

New Jersey Department of Environmental Protection  
Office of Natural Resource Restoration  
P.O. Box 420  
Trenton, New Jersey 08625-0420  
ATTN: John N. Sacco

15. Payments by Settling Defendant for Future Costs and Stipulated Penalties. On a periodic basis, each Trustee will individually submit to Settling Defendant a bill for Future Costs with a cost summary with supporting documentation. Settling Defendant shall pay the Future Costs, plus interest, within sixty (60) days of receipt of each bill and cost summary. In addition, Settling Defendant shall pay Trustees' Fish and Habitat Survey Costs in the amount of \$50,000, plus interest (if required pursuant to paragraph 16), within 60 days of the Effective Date. Of this \$50,000, Settling Defendant shall pay: \$15,000, plus interest (if required pursuant to paragraph 16), in accordance with the instructions for payment of Future Costs to the United States in Paragraph 15(a) below; and \$35,000, plus interest (if required pursuant to paragraph 16), in accordance with the instructions for payment of Future Costs to NJDEP in Paragraph 15(b) below.

a. Instructions for Payments of Future Costs and Stipulated Penalties to the United States.

(1) Payment to DOI: Settling Defendant shall pay Future Costs incurred by DOI electronically according to instructions to be provided to Settling Defendant. Notification of payment shall be emailed to:

Department of the Interior  
Natural Resource Damage Assessment and  
Restoration Program  
Attn: Bruce Nesslage, Restoration Fund Manager  
1849 C Street, NW  
Mail Stop 4449  
Washington, D.C. 20240  
bruce\_nesslage@ios.doi.gov

and

Mark Barash, Esq.  
U.S. Department of the Interior  
Office of the Regional Solicitor  
One Gateway Center  
Suite 612  
Newtown, MA 02458-2881  
Mark.barash@sol.doi.gov

(2) Payment to NOAA: Settling Defendant shall pay Future Costs incurred by NOAA electronically according to instructions to be provided to Settling Defendant. Notification of payment shall be emailed to:

NOAA/U.S. Department of Commerce  
NOAA Office of Response and Restoration  
Attn: Kathy Salter, DARF Manager  
1315 East-West Highway  
Silver Spring, MD 20910-3281  
Email: kathy.salter@noaa.gov

and

Kate Barfield  
National Oceanic and Atmospheric Administration  
Office of General Counsel Natural Resources  
1315 East-West Highway  
SSMC3# Room 15107  
Silver Spring, MD 20910-3282  
kate.barfield@noaa.gov

(3) **Payment of Stipulated Penalties:** Settling Defendant shall pay stipulated penalties electronically according to instructions to be provided to Settling Defendant. Notification of payment shall be made to:

NOAA/U.S. Department of Commerce  
NOAA Office of Response and Restoration  
Attn: Kathy Salter, DARF Manager  
1315 East-West Highway  
Silver Spring, MD 20910-3281  
Email: kathy.salter@noaa.gov

and

Kate Barfield  
National Oceanic and Atmospheric Administration  
Office of General Counsel Natural Resources  
1315 East-West Highway  
SSMC3# Room 15107  
Silver Spring, MD 20910-3282  
kate.barfield@noaa.gov

b. Instructions for Payments of Future Costs and Stipulated Penalties to NJDEP. All payments for Future Costs and Stipulated Penalties to NJDEP shall be made by check payable to the "Treasurer, State of New Jersey" and submitted to:

New Jersey Department of Environmental Protection  
Office of Natural Resource Restoration  
P.O. Box 420  
Trenton, New Jersey 08625-0420  
ATTN: John N. Sacco

16. Interest. In the event that any payment for Past Costs or Future Costs required under this Section is not made by the date required, Settling Defendant shall pay Interest on the unpaid balance. The Interest to be paid on Past Costs under this Paragraph shall begin to accrue on the Effective Date. The Interest on Future Response Costs shall begin to accrue on the date of the bill, except that interest on the \$50,000 payment for Fish and Habitat Survey costs shall begin to accrue 60 days after the Effective Date. The Interest shall accrue through the date of Settling Defendant's payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiffs by virtue of Settling Defendant's failure to make timely payments under this Section including, but not limited to, payment of stipulated penalties pursuant to Paragraphs 28 or 29.

#### **IX. FORCE MAJEURE**

17. "Force majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of Settling Defendant, of any entity controlled by Settling Defendant, or of Settling Defendant's contractors that delays or prevents the performance of any obligation under this Consent Decree despite Settling Defendant's best efforts to fulfill the obligation. The requirement that Settling Defendant exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure and best efforts to address the effects of any potential force majeure (a) as it is occurring and (b) following the potential force majeure such that the delay and any adverse effects of the delay are minimized to the greatest extent possible. Force majeure does not include financial inability to complete the Work.

18. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree for which Settling Defendant intends or may intend to assert a claim of force majeure, Settling Defendant shall notify the Trustee Council's representative specified in Paragraph 62 orally or, in his or her absence, the Trustee Council's alternative representative, within seventy-two (72) hours of when Settling Defendant first knew that the event would likely cause a delay. Within five (5) business days thereafter, Settling Defendant shall provide in writing to the Trustee Council an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Settling Defendant's rationale for attributing such delay to a force majeure; and a statement as to whether, in the opinion of Settling Defendant, such event may cause or contribute to an endangerment to public health or welfare, or the environment. Settling Defendant shall include with any notice documentation supporting its claim that the delay was attributable to a force majeure. Settling Defendant shall be deemed to know of any circumstance of which Settling Defendant, any entity controlled by Settling Defendant, or Settling Defendant's

contractors knew or should have known. Failure to comply with the above requirements regarding an event shall preclude Settling Defendant from asserting any claim of force majeure regarding that event during the period of time of such failure to comply, provided, however, that if the Trustee Council, despite the late notice, is able to assess to its satisfaction whether the event is a force majeure under Paragraph 17 and whether Settling Defendant has exercised its best efforts under Paragraph 17, the Trustee Council may, in its unreviewable discretion, excuse in writing Settling Defendant's failure to submit timely notices under this Paragraph.

19. If the Trustee Council agrees that the delay or anticipated delay is attributable to a force majeure, the time for performance of the obligations under this Consent Decree that are affected by the force majeure will be extended by the Trustee Council for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure shall not, of itself, extend the time for performance of any other obligation. If the Trustee Council does not agree that the delay or anticipated delay has been or will be caused by a force majeure, the Trustee Council will notify Settling Defendant in writing of its decision. If the Trustee Council agrees that the delay is attributable to a force majeure, the Trustee Council will notify Settling Defendant in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure.

20. If Settling Defendant elects to invoke the dispute resolution procedures set forth in Section X (Dispute Resolution), it shall do so no later than 15 days after receipt of the Trustee Council's notice. In any such proceeding, Settling Defendant shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Settling Defendant complied with the requirements of Paragraphs 21 and 22. If Settling Defendant carries this burden, the delay at issue shall be deemed not to be a violation by Settling Defendant of the affected obligation of this Consent Decree identified to the Trustee Council and the Court.

## **X. DISPUTE RESOLUTION**

21. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes regarding this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the United States or the NJDEP to enforce obligations of Settling Defendant that has not been disputed in accordance with this Section.

22. Any dispute regarding this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 20 days from the time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be considered to have arisen when one party sends the other parties and the Trustee Council a written Notice of Dispute.

23. Statements of Position.

a. In the event that the parties cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by the Trustee Council shall be considered binding unless, within 30 days after the conclusion of the informal negotiation period, Settling Defendant invokes the formal dispute resolution procedures of this Section by serving on the United States, NJDEP, and Trustee Council a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis, or opinion supporting that position and any supporting documentation relied upon by Settling Defendant. The Statement of Position shall specify Settling Defendant's position as to whether formal dispute resolution should proceed under Paragraph 24 (Record Review) or 25.

b. Within 30 days, unless extended by agreement of the parties, after receipt of Settling Defendant's Statement of Position, the Trustee Council will serve on Settling Defendant its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by the Trustee Council. The Trustee Council's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph 24 (Record Review) or Paragraph 25. Within 30 days after receipt of the Trustee Council's Statement of Position, Settling Defendant may submit a Reply.

c. If there is disagreement between the Trustee Council and Settling Defendant as to whether dispute resolution should proceed under Paragraph 24 (Record Review) or 25, the parties to the dispute shall follow the procedures set forth in the paragraph determined by the Trustee Council to be applicable. However, if Settling Defendant ultimately appeals to the Court to resolve the dispute, the Court shall determine which paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 24 and 25.

24. Record Review. Formal dispute resolution for disputes pertaining to the selection or adequacy of any Restoration Work and all other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any Restoration Work includes, without limitation, the adequacy or appropriateness of plans, procedures to implement plans, or any other items requiring approval by the Trustee Council under this Consent Decree, and the adequacy of the performance of Restoration Work taken pursuant to this Consent Decree.

a. An administrative record of the dispute shall be maintained by the Trustee Council and shall, at a minimum, contain all statements of position, including supporting documentation, submitted pursuant to this Section. Where appropriate, the Trustee Council may allow submission of supplemental statements of position by the parties to the dispute.

b. The Trustee Council will issue a final administrative decision resolving the dispute based on the administrative record described in Paragraph 24.a. This decision shall be



binding upon Settling Defendant, subject only to the right to seek judicial review pursuant to Paragraphs 24.c and 24.d.

c. Any administrative decision made by Trustee Council pursuant to Paragraph 24.b shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by Settling Defendant with the Court and served on all Parties within ten working days after receipt of the Trustee Council's decision. The motion shall include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States and NJDEP may file a response to Settling Defendant's motion.

d. In proceedings on any dispute governed by this Paragraph, Settling Defendant shall have the burden of demonstrating that the decision of the Trustee Council is arbitrary and capricious or otherwise not in accordance with law. Judicial review of the Trustee Council's decision shall be on the administrative record compiled pursuant to Paragraph 24.a.

25. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any Restoration Work nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. Following receipt of Settling Defendant's Statement of Position submitted pursuant to Paragraph 23, the Trustee Council will issue a final decision resolving the dispute. The Trustee Council's decision shall be binding on Settling Defendant unless, within ten working days after receipt of the decision, Settling Defendant files with the Court and serves on the parties a motion for judicial review of the decision setting forth the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. The United States and NJDEP may file a response to Settling Defendant's motion.

b. Judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

26. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone, or affect in any way any obligation of Settling Defendant under this Consent Decree, not directly in dispute, unless the Trustee Council or the Court agrees otherwise. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 35. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that Settling Defendant does not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XI (Stipulated Penalties).

**XI. STIPULATED PENALTIES**

27. Settling Defendant shall be liable for stipulated penalties in the amounts set forth in Paragraphs 28 and 29 for failure to comply with the requirements of this Consent Decree specified below, unless excused under Section IX (Force Majeure). "Compliance" by Settling Defendant shall include completion of all payments and activities required under this Consent Decree, including the SOW, within the specified time schedules established by and approved under this Consent Decree.

28. Stipulated Penalty Amounts - Payment of Past Costs. The following stipulated penalties shall accrue per violation per day for the failure by Settling Defendant to pay Past Costs:

| Penalty Per Violation Per Day | Period of Noncompliance |
|-------------------------------|-------------------------|
| \$400.00                      | 1st through 14th day    |
| \$800.00                      | 15th through 30th day   |
| \$1,650.00                    | 31st day and beyond     |

29. Stipulated Penalty Amounts – Payment of Future Response Costs and Deliverables.

a. The following stipulated penalties shall accrue per violation per day for failure to timely submit Future Cost payments or the deliverables identified in Paragraph 29b:

| Penalty Per Violation Per Day | Period of Noncompliance |
|-------------------------------|-------------------------|
| \$300.00                      | 1st through 14th day    |
| \$600.00                      | 15th through 30th day   |
| \$1,400.00                    | 31st day and beyond     |

b. Compliance Milestones.

- (1) Payment of Future Costs
- (2) Submission of name of Project Coordinator
- (3) Submittal of a Dam Removal Completion Report to Dam Safety within 24 months of receipt of the final required Dam Removal Permit
- (4) Submittal of a revised Design Report for the selected fish passage alternative within three months of receiving the Trustee Council's contingent approval of the 90% Design report (SOW II.3.f/II.2.d).

30. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue:  
 (a) with respect to a decision by the Trustee Council under Paragraph 24.b or 25.a of Section X

(Dispute Resolution), during the period, if any, beginning on the 21st day after the date that Settling Defendant's reply to the Trustee Council's Statement of Position is received until the date that the Trustee Council issues a final decision regarding such dispute; or (b) with respect to judicial review by this Court of any dispute under Section X (Dispute Resolution), during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until the date that the Court issues a final decision regarding such dispute. Nothing in this Consent Decree shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

31. Following the determination by the United States or NJDEP, individually or jointly, that the Settling Defendant has failed to comply with one of the requirements of this Consent Decree listed above, the United States and/or NJDEP may give the Settling Defendant written notification of the same and describe the noncompliance. The United States and/or NJDEP may send the Settling Defendant a written demand for the payment of penalties. Penalties shall accrue and are due as provided in this Section regardless of whether the United States and/or NJDEP, as applicable, has notified the Settling Defendant of a violation.

32. Stipulated penalties shall be paid as follows: Stipulated penalties for failure to timely pay Past Costs or Future Costs shall be paid to the government that did not timely receive payment. For all other stipulated penalties, fifty percent (50%) shall be paid to the United States in accordance with payment instructions provided by the Financial Litigation Unit of the United States Attorney's Office for the District of New Jersey, and shall be deposited in the United States Treasury; and fifty percent (50%) shall be paid to the NJDEP, in accordance with the instructions set forth in Paragraph 15.

33. In the event the Settling Defendant fails to pay stipulated penalties when due, the United States and/or NJDEP may institute a legal proceeding to collect such penalties, as well as Interest accruing on any unpaid balance, as provided by law.

34. All penalties due under this Section shall be due and payable within thirty (30) days of the Settling Defendant's receipt of a demand for payment from the United States and/or NJDEP, unless the Settling Defendant invokes dispute resolution under Section X of this Consent Decree.

35. In that case, stipulated penalties shall continue to accrue as provided in this Section, but need not be paid until the following:

a. If the dispute is resolved by agreement, accrued penalties agreed to be owed shall be paid to the United States and NJDEP within thirty (30) days of the agreement;

b. If the dispute is appealed to this Court and the United States and/or NJDEP prevail in whole or in part, the Settling Defendant shall pay all accrued penalties determined by the Court to be owed to the United States and NJDEP within thirty (30) days of receipt of the Court's decision or order, except as provided for in Paragraph 35c; or

c. If this Court's decision is appealed by any Party, Settling Defendant shall pay all accrued penalties determined by this Court to be owed to the United States and/or NJDEP into an interest-bearing escrow account, established at a duly chartered bank or trust company that is insured by the FDIC, within 60 days after receipt of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every 60 days. Within 15 days after receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to the United States and/or NJDEP or to Settling Defendant to the extent that they prevail.

36. If Settling Defendant fails to pay stipulated penalties when due, Settling Defendant shall pay Interest on the unpaid stipulated penalties as follows: (a) if Settling Defendant has timely invoked dispute resolution such that the obligation to pay stipulated penalties has been stayed pending the outcome of dispute resolution, Interest shall accrue from the date stipulated penalties are due pursuant to Paragraph 35 until the date of payment; and (b) if Settling Defendant fails to timely invoke dispute resolution, Interest shall accrue from the date of demand under Paragraph 34 until the date of payment. If Settling Defendant fails to pay stipulated penalties and Interest when due, the United States may institute proceedings to collect the penalties and Interest.

37. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States or NJDEP to seek any other remedies or sanctions available by virtue of the Settling Defendant's violation of this Consent Decree.

38. Notwithstanding any other provision of this Section, the United States and/or NJDEP, in their respective unreviewable discretions, may waive any portion of stipulated penalties owed to it that have accrued pursuant to this Consent Decree.

## **XII. COVENANTS BY THE UNITED STATES AND THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION**

39. Covenant for Settling Defendant by United States. Except as specifically provided in Section XIII (Reservation of Rights by Plaintiffs), the United States covenants not to sue or take administrative action against Settling Defendant for Natural Resource Damages pursuant to Section 107(a) of CERCLA for (a) Past Costs; (b) the In-River NRD resulting from releases of hazardous substances at, from or to the American Cyanamid Superfund Site; and (c) Future Costs. These covenants not to sue shall take effect upon the Effective Date. These covenants not to sue are conditioned upon the satisfactory performance by Settling Defendant of its obligations under this Consent Decree, including the payment of Past Costs, Future Costs, the performance of the Restoration Work, payment of all amounts that may become due to the United States under Section XI (Stipulated Penalties), and payment of any Interest owed to the United States under this Consent Decree. These covenants not to sue extend only to the Settling Defendant and its successors and do not extend to any other person. These covenants also do not affect the covenants provided in the 2015 Consent Decree.

40. Covenants for Settling Defendant by NJDEP. In consideration of the actions that have been and will be performed and the payments that will be made by Settling Defendant under this Consent Decree, and except as specifically provided in Section XIII (Reservation of Rights by

Plaintiffs), NJDEP covenants not to sue or take administrative action against Settling Defendant for Natural Resource Damages pursuant to Section 107(a) of CERCLA and the Spill Act for (a) Past Costs; (b) In-River NRD resulting from releases of hazardous substances at, from or to the American Cyanamid Superfund Site and (c) Future Costs. This covenant not to sue shall take effect upon the Effective Date. These covenants not to sue are conditioned upon the satisfactory performance by Settling Defendant of its obligations under this Consent Decree, including the payment of Past Costs, Future Costs, the performance of the Restoration Work, payment of all amounts that may become due to NJDEP under Section XI (Stipulated Penalties), and payment of any Interest owed to NJDEP under this Consent Decree. These covenants not to sue extend only to the Settling Defendant, its successors and assigns, and do not extend to any other person. These covenants do not affect the covenants provided in the 2015 ARACO.

### **XIII. RESERVATION OF RIGHTS BY PLAINTIFFS**

41. General Reservations of Rights by the United States and NJDEP. The United States and NJDEP reserve, and this Consent Decree is without prejudice to, all rights against Settling Defendant with respect to all matters not expressly included within the United States' and NJDEP's respective covenants. These reservations do not affect the reservations provided in the 2015 Consent Decree and the 2015 ARACO, except as provided in this Consent Decree.

42. Notwithstanding any other provision of this Consent Decree, the United States and NJDEP reserve all rights against Settling Defendant with respect to all matters other than those specifically expressed in Paragraphs 39 and 40; for the avoidance of doubt, this reservation of rights specifically includes:

- a. liability for failure by Settling Defendant to meet a requirement of this Consent Decree;
- b. liability, except for liability for In-River NRD, arising from the past, present, or future disposal, release, or threat of release of hazardous substances from: (1) outside the Site; or (2) from the Site, including liability for Floodplain, Riparian, Upland, and Wetland NRD;
- c. criminal liability;
- d. liability for violations of federal or state law that occur during or after implementation of the Restoration Work;
- e. liability to reimburse response costs or to implement response actions under CERCLA, the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. sec. 6901, *et. seq.*, or the Spill Act, N.J.S.A. 58:10-23.11 through 23.24 in connection with the Site, subject to the covenants not to sue and reservations of rights applicable to the United States in the 2015 Consent Decree and the 2015 ARACO; and
- f. liability for costs that the United States or NJDEP incurs related to the Site but that are not within the definition of Natural Resource Damages.

43. Special Reservations Regarding Natural Resource Damages. Notwithstanding any other provision of this Consent Decree, the Trustees each reserve the right to institute proceedings against Settling Defendant in this action or in a new action seeking recovery of Natural Resource Damages, if conditions or information relating to the Site, not known to the Trustees at the time of lodging of this Decree, are discovered that, together with any other relevant information, indicate that there is injury to, destruction of, or loss of Natural Resources of a type unknown, or of a magnitude substantially greater than was known by the Trustees as of the date of lodging of this Decree. Information and conditions known to the Trustees with respect to the Sites as of the date of lodging of this Decree shall include only the information and conditions set forth in the NOAA, DOI, or NJDEP files for the Site as of the date of lodging of this Decree.

#### XIV. COVENANTS BY SETTLING DEFENDANT

44. Covenants by Settling Defendant. Settling Defendant covenants not to sue and agrees not to assert any claims or causes of action against the United States or the State with respect to Natural Resource Damages or this Consent Decree including, but not limited to, any claim against the United States or the State, including any department, agency, or instrumentality of the United States and State, under CERCLA Sections 107 or 113 or the Spill Act relating to Natural Resource Damages.

45. Except as provided in Paragraph 55 (Res Judicata and Other Defenses), the covenants in this Section shall not apply if the United States or the State brings a cause of action on behalf of their respective Trustees or issues an order pursuant to any of the reservations in Section XIII (Reservation of Rights by Plaintiffs), other than in Paragraphs 42.a (claims for failure to meet a requirement of the Consent Decree), 42.c (criminal liability), and 42.d (violations of federal/state law during or after implementation of the Restoration Work), but only to the extent that Settling Defendant's claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

46. Settling Defendant's Reservations:

a. With Respect to Claims Against the United States. Settling Defendant reserves, and this Consent Decree is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, and brought pursuant to any statute other than CERCLA or RCRA and for which the waiver of sovereign immunity is found in a statute other than CERCLA or RCRA, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States or the State, as that term is defined in 28 U.S.C. § 2671, while acting within the scope of his or her office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, the foregoing shall not include any claim based on the Trustees' selection of Restoration Projects 1 and 2, or the oversight or approval of the Settling Defendant's deliverables or activities.

b. With Respect to Claims Against the State. Settling Defendant reserves, and this Consent Decree is without prejudice to, claims against the State, subject to the New Jersey Tort Claims Act, N.J.S.A. 59:1-1 through -12-3; the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1 through 13-10; the New Jersey Constitution, N.J. Const. art. VIII, §2, ¶2; or any other applicable provision of law, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any State employee while acting within the scope of his or her office or employment under circumstances where the State, if a private person, would be liable to the claimant. Any such claim, however, shall not include a claim for any damages caused, in whole or in part, by the act or omission of any person, including any contractor, who is not a State employee as that term is defined in N.J.S.A. 59:1-3; nor shall any such claim concern the Site, including the Trustees' selection of Restoration Projects 1 and 2, or the oversight or approval of the Settling Defendant's deliverables or activities. The foregoing applies only to claims that the Settling Defendant may bring pursuant to any statute other than the Spill Act, and for which the waiver of sovereign immunity is found in a statute other than the Spill Act.

47. Nothing in this Consent Decree shall be deemed to constitute preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

48. Nothing in this Consent Decree shall be deemed to constitute preauthorization of a claim against the Spill Fund within the meaning of N.J.S.A. 58:10-23.11k. or N.J.A.C. 7:1J, or the Sanitary Landfill Fund within the meaning of N.J.S.A. 13:1E-107 or N.J.A.C. 7:1I.

#### **XV. EFFECT OF SETTLEMENT; CONTRIBUTION**

49. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree. Each of the Parties expressly reserves any and all rights (including, but not limited to, pursuant to Section 113 of CERCLA, 42 U.S.C. § 9613), defenses, claims, demands, and causes of action that each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto. Nothing in this Consent Decree diminishes the right of the United States, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2)-(3) or NJDEP pursuant to the Spill Act, to pursue any such persons to obtain additional response costs or response action and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2) or the Spill Act.

50. The Parties agree, and by entering this Consent Decree this Court finds, that this Consent Decree constitutes a judicially approved settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2) and the Spill Act, and that the Settling Defendant is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Section 113(f)(2) of CERCLA, and the Spill Act, N.J.S.A. 58:10-23.11 f.a.(2)(a), or as may be otherwise provided by law, for "matters addressed" in this Consent Decree. Settling Defendant shall, with respect to any suit or claim brought by it for matters related to this Consent Decree, notify the United States and NJDEP in writing no later than 60 days prior to the initiation of such suit or claim.

51. When entered, this Consent Decree will constitute a judicially approved settlement within the meaning of the Spill Act, specifically, N.J.S.A. 58:10-23.11 f.a.(2)(b), for the purpose of providing protection to the Settling Defendant from contribution actions. The Parties agree, and by entering this Consent Decree this Court finds, Settling Defendant is entitled, upon fully satisfying its obligations under this Consent Decree, to protection from contribution actions or claims under the Spill Act for matters addressed in this Consent Decree.

52. In order for the Settling Defendant to obtain protection under the Spill Act, N.J.S.A. 58:10-23.11 f.b., from contribution claims concerning the matters addressed in this Consent Decree, NJDEP published notice of this Consent Decree in the New Jersey Register and on NJDEP's website on October 17, 2016, in accordance with N.J.S.A. 58:10-23.11 e.2. Such notice included the following information:

- a. the caption of this case;
- b. the name and location of the American Cyanamid Superfund Site;
- c. the name of the Settling Defendant;
- d. a summary of the terms of this Consent Decree; and
- e. there are 60 days to submit comments for this Consent Decree.

53. NJDEP, in accordance with N.J.S.A. 58:10-23.11 e2, arranged for written notice of the Consent Decree to all other potentially responsible parties of whom NJDEP had notice as of the date NJDEP published notice of the proposed settlement in this matter in the New Jersey Register in accordance with paragraph 52 above.

54. Settling Defendant shall, with respect to any suit or claim brought against it for matters related to this Consent Decree, notify in writing the United States and NJDEP within 10 days after service of the complaint on Settling Defendant. In addition, Settling Defendant shall notify the United States and NJDEP within 10 days after service or receipt of any Motion for Summary Judgment and within 10 days after receipt of any order from a court setting a case for trial. However, the failure to provide such notice within the prescribed time periods shall not affect Settling Defendant's right to contribution protection.

55. Res Judicata and Other Defenses. In any subsequent administrative or judicial proceeding initiated by the United States and/or the NJDEP for injunctive relief or recovery of response costs, cleanup and removal costs, or Natural Resource Damages reserved in Paragraphs 41, 42, and 43, or other appropriate relief relating to the Site, Settling Defendant shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States and/or the NJDEP in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XII (Covenants by the United States and NJDEP).



## XVI. ACCESS TO INFORMATION

56. Settling Defendant shall provide to the United States and NJDEP, including the Trustee Council, upon request, copies of all non-privileged records, reports, documents, and other information (including records, reports, documents, and other information in electronic form) (hereinafter referred to as "Records") within its possession or control or that of its contractors or agents relating to implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information regarding the Restoration Work. Settling Defendant shall also make available to the United States and NJDEP, including the Trustee Council, for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Restoration Work.

57. Business Confidential and Privileged Documents.

a. Settling Defendant may assert business confidentiality claims covering part or all of the Records submitted to the United States and NJDEP under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Records determined to be confidential by the United States and/or NJDEP will be afforded the protection by the United States and/or NJDEP, as applicable, specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies Records when they are submitted to the United States or NJDEP, or if the United States and/or NJDEP has notified Settling Defendant that the Records are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such Records without further notice to Settling Defendant.

b. Settling Defendant may assert that certain Records are privileged under the attorney-client privilege or any other privilege recognized by federal or state law. If Settling Defendant asserts such a privilege in lieu of providing Records, it shall provide the United States and NJDEP with the following: (1) the title of the Record; (2) the date of the Record; (3) the name, title, affiliation (e.g., company or firm), and address of the author of the Record; (4) the name and title of each addressee and recipient; (5) a description of the contents of the Record; and (6) the privilege asserted by Settling Defendant. If a claim of privilege applies only to a portion of a Record, the Record shall be provided to the United States and NJDEP in redacted form to mask the privileged portion only. Settling Defendant shall retain all Records that they claim to be privileged until the United States and NJDEP have had a reasonable opportunity to dispute the privilege claim and any such dispute has been resolved in Settling Defendant's favor.

c. No Records created or generated that are required to be submitted to the United States and NJDEP, including the Trustee Council, pursuant to the requirements of this Consent Decree shall be withheld from the United States or NJDEP on the grounds that they are privileged or confidential.

58. No claim of confidentiality or privilege shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any or any other purely factual information related to the Work or performance of the Work. Nothing in this Paragraph prevents Settling Defendant from making a claim of confidentiality or privilege with respect to any analysis, assessment or review of such data or factual information.

## **XVII. RETENTION OF RECORDS**

### **59. Retention of Records**

a. Until 10 years after Settling Defendant's receipt of the Project Completion Certificate pursuant to the SOW, Settling Defendant shall preserve and retain all non-identical copies of Records (including Records in electronic form) now in its possession or control or that come into its possession or control that relate in any manner to its liability under CERCLA or the Spill Act with respect to the Site, provided, however, that Settling Defendant who is potentially liable as an owner or operator of the Site must retain, in addition, all Records that relate to the liability of any other person under CERCLA or the Spill Act with respect to the Site. Settling Defendant must also retain, and instruct its contractors and agents to preserve, for the same period of time specified above all non-identical copies of the last draft or final version of any Records (including Records in electronic form) now in its possession or control or that come into its possession or control that relate in any manner to the performance of the Restoration Work, provided, however, that Settling Defendant (and its contractors and agents) must retain, in addition, copies of all data generated that are required to be submitted to the Trustee Council during the performance of the Work and not contained in the aforementioned Records required to be retained. Each of the above record retention requirements shall apply regardless of any corporate retention policy to the contrary.

b. Settling Defendant's obligations with respect to retaining Records do not apply to any electronic backup tapes or files that are created, deleted, or overwritten in compliance with Settling Defendant's standard document retention and disposition practices.

60. At the conclusion of this record retention period, Settling Defendant shall notify the Trustees at least 90 days prior to the destruction of any such Records, and, upon request by a Trustee, Settling Defendant shall deliver any such Records to that Trustee. Settling Defendant may assert that certain Records are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Settling Defendant asserts such a privilege, it shall provide the Trustees with the following: (a) the title of the Record; (b) the date of the Record; (c) the name, title, affiliation (e.g., company or firm), and address of the author of the Record; (d) the name and title of each addressee and recipient; (e) a description of the subject of the Record; and (f) the privilege asserted by Settling Defendant. If a claim of privilege applies only to a portion of a Record, the Record shall be provided to the Trustees in redacted form to mask the privileged portion only. Settling Defendant shall retain all Records that it claims to be privileged until the United States has had a reasonable opportunity to dispute the privilege claim and any such dispute has been resolved in Settling Defendant's favor. However, no Records

created or generated pursuant to the requirements of this Consent Decree shall be withheld on the grounds that they are privileged or confidential.

61. Settling Defendant certifies that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed, or otherwise disposed of any Records (other than identical copies) relating to its potential liability regarding the Site since January 1, 2009 and that it has fully complied with any and all EPA and NJDEP requests for information regarding the Site pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927 and the Spill Act.

### XVIII. NOTICES AND SUBMISSIONS

62. Whenever, under the terms of this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one Party to another or to the Trustee Council, it shall be directed, as applicable, to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing.

All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified in this Section shall constitute complete satisfaction of any written notice requirement of the Consent Decree, with respect to the United States, the State, and Settling Defendant, respectively. Notices required to be sent only to DOI, NOAA, NJDEP or the Trustee Council, do not need to be sent to the U.S. Department of Justice and New Jersey Attorney General's Office.

As to the United States:

Chief, Environmental Enforcement Section  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 7611  
Washington, D.C. 20044-7611  
Re: DJ # 90-11-3-07250/2

As to DOI

Mark Barash  
United States Department of the Interior  
Office of the Solicitor  
One Gateway Center  
Suite 612  
Newton, MA 02458  
mark.barash@sol.doi.gov

As to NOAA:

Carl Alderson  
NOAA Restoration Center Field Office  
JJ Howard National Marine Fisheries Science Center  
74 Magruder Road, Highlands, NJ 07732  
Carl.Alderson@noaa.gov

As to NJDEP:

J. Mark Walters, Project Manager  
Department of Environmental Protection  
Office of Natural Resource Restoration  
Mail Code 501-1  
P.O. Box 420  
Trenton, New Jersey 08625-0420  
mark.walters@dep.nj.gov

and

Section Chief  
Environmental Enforcement Section  
Department of Law and Public Safety  
Division of Law  
Richard J. Hughes Justice Complex  
25 Market Street  
P.O. Box 093  
Trenton, NJ 08625-0093  
Ph. (609) 633-8713

As to the Trustee Council

J. Mark Walters, Project Manager  
American Cyanamid Site Trustee Council  
Department of Environmental Protection  
Office of Natural Resource Restoration  
Mail Code 501-1  
P.O. Box 420  
Trenton, New Jersey 08625-0420  
mark.walters@dep.nj.gov

As to Settling Defendant:

Russell Downey, Wyeth Holdings LLC  
100 Route 206 North  
Peapack, NJ  
M.S. 4-LLA-401  
russell.g.downey@pfizer.com

#### **XIX. RETENTION OF JURISDICTION**

63. This Court retains jurisdiction over both the subject matter of this Consent Decree and Settling Defendant for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the

construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section X (Dispute Resolution).

## **XX. APPENDICES**

64. The following appendices are attached to and incorporated into this Consent Decree:

“Appendix A” is the Scope of Work.

“Appendix B” is a map of areas of the Site that are in the general vicinity of the American Cyanamid Superfund Site.

## **XXI. MODIFICATION**

65. Material modifications to this Consent Decree, including the SOW, shall be in writing, signed by the Parties, and shall be effective upon approval of the Court. Nothing in this Consent Decree shall prohibit non-material modifications to the Consent Decree, including the SOW, based upon mutual agreement of the Parties. A modification to the SOW shall be considered material if it fundamentally alters a basic feature of the Restoration Work.

66. Nothing in this Consent Decree shall be deemed to alter the Court’s power to enforce, supervise, or approve modifications to this Consent Decree.

## **XXII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT**

67. This Consent Decree shall be lodged with the Court for a period of not less than 60 days for public notice and comment. The United States and NJDEP reserve the right to withdraw or withhold their consent if the comments regarding the Consent Decree disclose facts or considerations that indicate that the Consent Decree is inappropriate, improper, or inadequate. Settling Defendant consents to the entry of this Consent Decree without further notice.

68. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of the agreement may not be used as evidence in any litigation between the Parties.

## **XXIII. SIGNATORIES/SERVICE**

69. Each undersigned representative of the Settling Defendant to this Consent Decree, the Assistant Attorney General for the Environment and Natural Resources Division of the Department of Justice, or his designee, the Acting Attorney General of New Jersey and the Assistant Commissioner for Natural and Historic Resources for NJDEP, certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Party to this document.

70. Provided this Consent Decree is not in any way modified or otherwise altered following Settling Defendant’s execution, Settling Defendant agrees not to oppose entry of this Consent

Decree by this Court or to challenge any provision of this Consent Decree unless the United States and NJDEP have notified Settling Defendant in writing that they no longer support entry of the Consent Decree.

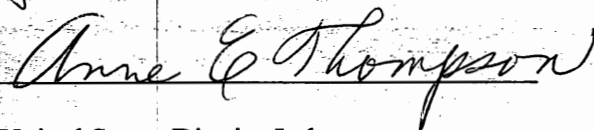
71. Settling Defendant shall identify, on the attached signature page, the name, address, and telephone number of an agent who is authorized to accept service of process by mail on behalf of that Party with respect to all matters arising under or relating to this Consent Decree. Settling Defendant agrees to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons. Settling Defendant need not file an answer to the complaint in this action unless or until the Court expressly declines to enter this Consent Decree.

#### XXIV. FINAL JUDGMENT

72. This Consent Decree and its appendices constitute the final, complete, and exclusive agreement and understanding among the Parties regarding the settlement embodied in the Consent Decree. The Parties acknowledge that there are no representations, agreements, or understandings relating to the settlement other than those expressly contained in this Consent Decree.

73. Upon entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment between and among the United States, NJDEP, and Settling Defendant. The Court enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

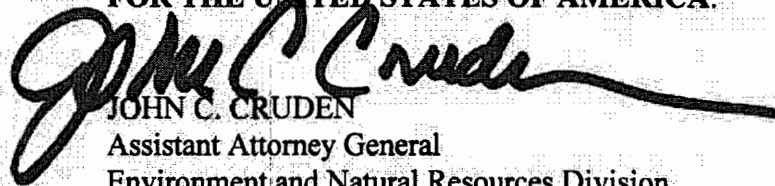
SO ORDERED THIS 1<sup>st</sup> DAY OF February 2017.



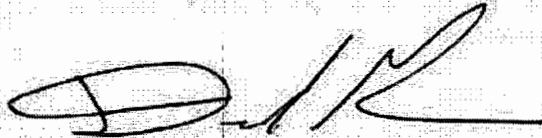
United States District Judge

Signature Page for Natural Resource Restoration Consent Decree regarding the American Cyanamid Superfund Site

**FOR THE UNITED STATES OF AMERICA:**



**JOHN C. CRUDEN**  
Assistant Attorney General  
Environment and Natural Resources Division  
U.S. Department of Justice  
Washington, D.C. 20530



**DAVID L. GORDON**  
Senior Counsel  
Environmental Enforcement Section  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 7611  
Washington, D.C. 20044-7611

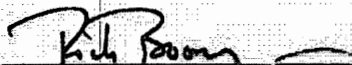
**PAUL J. FISHMAN**  
United States Attorney  
District of New Jersey

**ALLAN URGENT**  
Assistant United States Attorney  
District of New Jersey

**Signature Page for Natural Resource Restoration Consent Decree regarding the American Cyanamid Superfund Site**

**NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION**

Date: 9/9/16

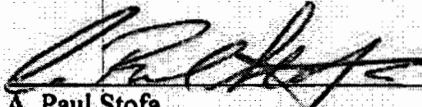
By:   
Rich Boornazian, Assistant Commissioner  
Natural and Historic Resources



**Signature Page for Natural Resource Restoration Consent Decree regarding the American Cyanamid Superfund Site**

**CHRISTOPHER S. PORRINO  
ATTORNEY GENERAL OF NEW JERSEY**

Date: 09/16/2016

By:   
A. Paul Stofa  
Deputy Attorney General

**Signature Page for Natural Resource Restoration Consent Decree regarding the American Cyanamid Superfund Site**

**FOR WYETH HOLDINGS, LLC**

\_\_\_\_\_  
Date

Signature: 

Print Name: Douglas M. Lankler

Title: Vice President

Address: Wyeth Holdings LLC c/o Pfizer Inc.

235 East 42<sup>nd</sup> Street

New York, NY 10017

Agent Authorized to Accept Service  
on Behalf of Above-signed Party:

Name (print): C T Corporation System

Address: 1536 Main Street  
Readfield, ME 04355

## APPENDIX A

### Scope of Work

The Restoration Work shall consist of two restoration projects – the Weston Causeway Dam Removal and the Island Farm Weir Fish Passage Design.

#### **Section I. Scope of Work for Project 1: Weston Causeway Dam Removal**

This restoration project consists of the removal of the Weston Causeway Dam<sup>1</sup> at Millstone River Mile 1.5, including the planning and permitting therefor.

1. Dam Removal Work Components: Settling Defendant shall implement each of the following components of the Weston Causeway Dam Removal in accordance with the schedule set forth below:

*a. Agreements, and Approvals*: Obtain the following agreements and approvals:

- Dam Demolition Agreement with NJDEP;
- An Access Agreement with Somerset County to use the Lincoln Avenue Park boat ramp;
- North Bridge Street crossing agreement with NJDOT; and
- Equipment Transit Route approval by the Somerset County Department of Public Works, Division of Engineering, Bridge Section.

*b. Survey/Dam Reconnaissance /Sampling Field Work*

- Conduct a river bed transect survey above and below the Weston Causeway Dam of sediment bedload elevations at normal summer baseline river flow. The river bed transect survey represents the elevations of the river bottom regardless of type (sediment or bedrock);
- Determine the extent of the dam impoundment through in-river reconnaissance upriver;
- For each parcel adjacent to the dam impoundment, determine property ownership and inform NJDEP Bureau of Dam Safety & Flood Control (“NJDEP Dam Safety”) and NJDEP Division of Land Use Regulation (“NJDEP Land Use”) in accordance with permitting notification requirements; and
- Incorporate into the required NJDEP permit the following submittals based on river bed sediment sampling taken from the most likely breaching locations, which have previously been completed and provided to NJDEP:
  - i. A representative grain size sediment sample that was collected and analyzed using ASTM D422-63 (Standard Test Method for Particle-Size Analysis of Soils);

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<sup>1</sup> In some historical file documentation, this dam is referred to as the “Weston Mill Dam” with a NJ File No. 25-26.

## APPENDIX A

- ii. One representative upstream sediment sample and one representative downstream sediment sample pre-dam removal that were collected and analyzed for Base Neutrals (SW846/8270), PCBs, and TAL metals; and
- iii. A follow-up river bed sediment sampling effort performed in cooperation with the Trustees to resolve a potential data gap, in which one additional upstream discrete sediment sample and one additional downstream discrete sediment sample were collected in areas of relatively fine-grained deposits immediately upstream and immediately downstream of the dam. These samples were analyzed for Base Neutrals (SW846/8270), PCBs, and TAL metals.

As a result of the aforementioned sampling efforts, nothing herein shall constitute a requirement that Settling Defendant undertake additional sediment collection, sampling or analyses after the dam removal, or undertake sediment remediation.

c. *Pre-Design Data Acquisition:* Conduct dam infrastructure coring at five separate locations to determine thickness and composition of dam apron and underlying dam fill materials. This data will not be provided as a separate deliverable, but shall be incorporated into the required NJDEP permit submittals (see below).

d. *Engineering Design Plan for Dam Removal (Technical Backup for Dam Safety Permit):* Per the New Jersey Dam Safety Standards, N.J.A.C. 7:20-1.7(h), Settling Defendant shall, as applicable and appropriate, develop the following data and information into a Dam Safety Technical Report for inclusion into the required NJDEP permit submittals:

- Develop plans and HEC-RAS modeling computations for the breach<sup>2</sup> including size, shape, and location of the initial breach and disposal of the spoil material;
- Conduct sediment (bedload) transport analyses using the HEC-RAS model to determine maximum allowable scour velocity during initial breaching. These data shall be used to control the release of sediment from the impoundment during and after the breach has been effected, and to inform the timing for dewatering the impoundment. Nothing herein shall constitute a requirement that Settling Defendant perform long-term sediment transport modeling;
- Develop computations detailing the effects of the final breach on the downstream channel, including during 10, 50 and 100 year storms;
- Identify the proposed work methods and demolition equipment and prepare a proposed work schedule for the project;
- Provide a plan (scaled drawing) of the existing dam and lake along with surrounding property lines;
- Notify adjoining property owners of the impoundment and the municipalities (Borough of Manville and Franklin Township) where the reservoir or dam is located that an application has been submitted to NJDEP Dam Safety to remove the dam;

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<sup>2</sup> The term “breach” in this Dam Safety context is refers to the complete removal of the dam. Hereafter, the term “initial breach” refers to actions that begin the release of impounded water from above the dam and the “final breach,” means the complete removal of the dam.

## APPENDIX A

- Identify the potential effects of the dam removal upon the environment, life and property downstream of the dam;
  - Develop Construction Plans and Details (two sets/copies), including estimated as-built condition, river and dam cross-section profiles, and initial/final breach profile and plans for inclusion into the Dam Safety Permit,
  - Provide Dam Safety with copies of available as-built construction plans for the Wilhousky Street [Weston Causeway] Wilbur Smith Bridge obtained from the Somerset County Department of Public Works, Division of Engineering, Bridge Section; and
  - After submitting the Dam Safety Permit application (see below), verify via affidavit that the public has been noticed of the proposed Dam Safety removal application in the Courier News, a newspaper of general circulation in the municipality where the dam is located.
- e. *NJDEP Permitting*: Settling Defendant shall:
- Provide a draft final Dam Safety Technical Report to the Trustees for review and approval. The Trustees and Settling Defendant will work together to resolve any differences prior to the submittal of the Dam Safety Permit application and Dam Safety Technical Report to NJDEP;
  - Complete and submit a Dam Safety Permit application and Dam Safety Technical Report to NJDEP Dam Safety. The information required to be included in the Dam Safety Permit application has been pre-determined by NJDEP Dam Safety and includes, as appropriate, the project location, project description, estimated construction cost, dam construction/classification information, and information showing no increase in the normal water surface elevation will occur over the historical elevation after the dam removal. The aforementioned Construction Plans and Details shall be an attachment to the Dam Safety Permit application;
  - Complete and submit an application for a NJDEP Land Use Permit (if required). The information required to be included in the application has been pre-determined by NJDEP and includes, as appropriate, the watershed identification, property ownership certification, cross-reference and status of other applicable permits (Dam Safety, etc.);
  - Provide the State Historic Preservation Office (SHPO) with supplemental documentation in accordance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), 16 U.S.C. § 470. The information required to be included in the application has been pre-determined by NJDEP and includes, as appropriate, a cover letter outlining the information that is being provided; a map of the dam, access roads, and staging area locations; photographs of the dam; the history for the dam as currently understood; as-built plans for the dam, to the extent available; information about access and egress to the dam from the downstream boat ramp; and a description of how the dam is to be removed;
  - Complete and submit an application for a NJDEP Fish & Wildlife Water Lowering Permit. The information required to be included in the application has been pre-determined by NJDEP and includes, as appropriate, the property owner certification, a map showing the project location, the reason for lowering water

## APPENDIX A

levels, the approximate date(s) the lowering will occur, the size of waterbody subject to the lowering, the extent of water level drawdown (as measured in vertical feet from crest of dam spillway), the method of water release, the depth of water that will be initially released, and a cross-reference to the status of other applicable permits (NJDEP Dam Safety, NJDEP Land Use, etc.);

- Complete and submit a D&R Canal Commission Jurisdictional Determination Application. The information required to be included in the application has been pre-determined by the D&R Canal Commission and includes, as appropriate, a map of the project location, list of municipal approvals (including anticipated construction permits), delineation of the area that may be disturbed, the type of structure that will be deconstructed, a description of the geographic area, an explanation of how the dam will be accessed, a map depicting the layout of the structure, a survey of the property, architectural elevations for the proposed final structure, and a cross-reference to the status of all other applicable permits (NJDEP Dam Safety, NJDEP Land Use, etc.); and
- Complete and submit an application for a New Jersey State Parks Special Use Permit. The information required to be included in the application has been pre-determined by NJDEP and includes, as appropriate, a description of the nature of the activities to be conducted and their expected duration and estimates of the following during the removal activities: daily visitor attendance, number of vehicles and pieces of equipment that will be present on the property, surface or subsurface disturbance on the property; a summary of the plan to handle unauthorized visitors; and whether State Park security or maintenance assistance is needed.

f. *Funding of Certain Monitoring Activities:* Settling Defendant shall fund Stony Brook-Millstone Watershed Association's work monitoring and evaluating the aquatic organism community assemblage and water quality metrics as described in the attached *Millstone River Monitoring Plan*, which shall be implemented in consultation with the Trustee Council. The monitoring to be funded by the Settling Defendant will assist the Trustees' evaluation of the impact of the project on water quality and aquatic organisms and shall not be used to evaluate Settling Defendant's performance under the Consent Decree or this Scope of Work or as a basis to withhold a Project Completion Certificate.

g. *Dam Removal:* Settling Defendant shall:

- Complete and submit an application for a Franklin Township Construction Permit. The information required to be included in the application has been pre-determined by Franklin Township and includes, as appropriate, a completed New Jersey UCC Construction Permit application, the Building Subcode Technical Section, a Zoning Permit application, and an affidavit from the dam owner authorizing that the work can be performed;

## APPENDIX A

- Following the receipt of all permit and approvals, and prior to the commencement of work, submit the required Construction Notice to NJDEP Dam Safety;
- Implement customary dam demolition practices to remove the Weston Causeway Dam once the dam is accessed by the demolition equipment via the Lincoln Avenue Park boat ramp;
- Initially breach the dam in a specific location at a prescribed and modeled low flow (the calculation of this initial breach flow will be a requirement of the Dam Safety Permit, which confirms and authorizes the maximum flow allowable for the initial breaching), and once river water is largely diverted through the initial breach, commence removal of the emergent dam structure;
- Convey off-site and dispose of at a licensed solid waste disposal/recycling facility concrete debris generated by the dam demolition. NJDEP shall be listed as the waste generator and shall select the disposal or recycling facility prior to the dam demolition phase. Excess sediment bedload formerly entrapped behind the dam, if any, will be emplaced into the dam void space and downstream scour pool in addition to being used to stabilize the river-facing wall of the former Weston Mills foundation ruin, if needed;
- Submit semi-monthly (every two weeks) status reports, as required by NJDEP Dam Safety, in compliance with the required *Construction Inspection Program* guidelines. If the demolition work is completed in 14 days or less, then only a single status report is required;
- Re-establish the natural river bed gradient through the former dam location consistent with the engineering plans and NJDEP Dam Safety Permit, thereby establishing the presence of a sufficient river channel geometry that lacks obstructions and hydraulic jumps that shall allow fish passage under normal flow conditions;
- Implement conditions expressed in the Section 106 Consultation Acceptance letter dated October 22, 2015 by the State Historic Preservation Officer (SHPO), including the requirement that excess natural/native bedload mounded behind the dam be moved from behind the dam and emplaced at the base of the riverward foundation wall (that was formerly attached to the dam) as structural support fill, as needed; and
- Following the completion of the dam removal and demobilization from the site, submit a Completion Report to NJDEP Dam Safety. This Completion Report will be accompanied by an as-built drawing that documents the re-establishment of the natural river bed gradient through the former dam location consistent with the approved engineering plans and the Dam Safety Permit. This drawing should enable the Trustees to evaluate whether Settling Defendant has established the presence of a sufficient river channel geometry that lacks obstructions and hydraulic jumps thereby allowing fish passage under normal flow conditions. The as-built drawing should also enable the Trustees to evaluate whether Settling Defendant has implemented the conditions expressed in the Section 106 Consultation Acceptance letter, dated October 22, 2015, by the State Historic Preservation Officer (SHPO) that excess natural/native bedload mounded behind the dam will be moved from behind the dam and emplaced at the base of the

## APPENDIX A

riverward foundation wall (that was formerly attached to the dam) as structural support fill, as needed.

2. Schedule for Dam Removal Work:

a. Within six (6) months of the court's entry of the Consent Decree, Settling Defendant shall complete, as described above:

- All requirements of Dam Removal Work Component I.1.b (*Survey/Dam Reconnaissance /Sampling Field Work*); and
- All requirements of Dam Removal Work Component I.1.c (*Pre-Design Data Acquisition*).

b. Within six (6) months of the completion of Dam Removal Work Component I.1.c (*Pre-Design Data Acquisition*), Settling Defendant shall complete, as described above:

- All requirements of Dam Removal Work Component I.1.d (*Engineering Design Plan for Dam Removal (Technical Backup for Dam Safety Permit)*);
- All requirements of Dam Removal Work Component I.1.e (*NJDEP Permitting*), contingent upon the Trustees approval of the Dam Safety Permit; and
- Funding of the monitoring activities set forth in the Dam Removal Component I.1.f.

c. Within 18 months of the receipt of the final required Dam Removal Permit, Settling Defendant shall complete, as described above:

- All requirements of Dam Removal Work Component I.1.g (*Dam Removal*), including removal the Weston Causeway Dam.

Notwithstanding the above schedule, if the Dam Removal Permit is issued by NJDEP Dam Safety on or before February 1 of a given calendar year, Settling Defendant shall complete in that calendar year all requirements of Dam Removal Work Component I.1.g (*Dam Removal*), including removal the Weston Causeway Dam. The riverward (west) Weston Mill foundation wall will be supported by re-contoured bedload sediment, if needed; no other restoration work on the foundation ruins or embankment is required to be performed by Settling Defendant.

d. Following the completion of the dam removal and demobilization from the site, submit a Completion Report to NJDEP Dam Safety. NJDEP Dam Safety will then perform an inspection of the completed project to confirm that all NJDEP Dam Safety permit requirements were met and, provided permit conditions have been met, subsequently issue a *Release from Dam Safety Act* letter to the Settling Defendant. Settling Defendant will forward this letter to the Trustee Council. Within a reasonable amount of time after Settling Defendant's submission of the Release from Dam Safety Act letter to the Trustee Council, the Trustee Council shall issue to the Settling Defendant a dated "Project Completion Certificate" certifying that the Dam Removal Work is complete.



## APPENDIX A

e. Following the implementation and completion of the Millstone River Monitoring Plan, Settling Defendant will provide the Trustee Council with the Final Report and Data Packages, as indicated in Section 19 of the Monitoring Plan, for review and confirmation that the work was performed in accordance with the Monitoring Plan. Within a reasonable amount of time after confirmation by the Trustees that the Millstone River monitoring was completed in accordance with the Millstone River Monitoring Plan, the Trustee Council shall issue to the Settling Defendant a dated "Project Completion Certificate" certifying that the Millstone River monitoring is complete.

### **Section II - Scope of Work for Project 2: Island Farm Weir Fish Passage Design**

This restoration project consists of the preparation of a Trustee-approved analysis of fish passage alternatives, design of an acceptable fish passage alternative, and the development of a construction cost estimate to implement that design alternative, for enhancing fish passage at the Island Farm Weir ("IFW") at Raritan River Mile 22.0.

1. Pre-Design Cooperation Commitment: Prior to the implementation of the following scope of work, the Trustee Council shall notify New Jersey Water Supply Authority (NJWSA) and New Jersey American Water Company (NJAW) that an enhanced fish passage design is being conducted in order to obtain their agreement to share with Settling Defendant the necessary data, and provide the site access, necessary to complete the design work.

2. Preliminary Design Work Sequence Components: Settling Defendant shall implement each of the following components related to Preliminary Design Work Sequence in accordance with the schedule set forth below.

a. *Access Agreements*: Negotiate and execute access agreements with New Jersey Water Supply Authority (NJWSA) and New Jersey American Water Company (NJAW).

b. *Pre-Design Data Gathering and Reduction/Interpretation*

- Conduct a horizontal and vertical survey of the Island Farm Weir, including river bed survey transects across the river channel upstream and downstream of the IFW, and a survey of the shoreline embankment walls to the NAD83/NAVD88 datums in New Jersey State Plane coordinates (dependent on site access to IFW). To the extent that bedrock can be visually observed during the river bed survey, that shall be noted; however, in areas of deep, turbid, or turbulent waters that preclude visual observation, the survey will represent the elevation of the river bottom regardless of type (sediment or bedrock);
- If needed in the design process, geotechnical borings in the river at selected downstream locations from the IFW will be advanced to obtain depth to bedrock data (dependent on site access to IFW);
- Because the IFW will not be removed, no change in impoundment hydraulics or sediment transport will occur; therefore, samples for potential sediment contaminant analyses are not needed and will not be collected;

## APPENDIX A

- Perform a scientific literature review on key species' behavioral characteristics (particularly American shad and blueback herring) to inform the fish passage design;
- Conduct a review of NJAW operational logs to ascertain whether seasonal water withdrawal trends exist that can be accounted for in the enhanced fish passage design; and
- Estimate the minimum discharge over the IFW using NJAW withdrawal data and the downriver USGS 01403060 Raritan River below Calco Dam at Bound Brook Gage data. This data will not be provided as a separate deliverable, but shall be incorporated into the enhanced fish passage design submittals, as set forth below.

c. *HEC-RAS Modeling*: Develop inputs, calibrate, and run a HEC-RAS model to model the efficacy of various fish passage configurations. This data will not be provided as a separate deliverable, but shall be incorporated into the enhanced fish passage design submittals, as set forth below.

d. *Enhanced Fish Passage Design Process*

- Produce an Alternative Analysis Report identifying alternative enhanced fish passage configurations along with associated pros/cons, followed by the selection of the preferred alternative. The alternatives to be evaluated are expected to include (1) no action, (2) a bypass channel, (3) fish ladder modification, and (4) a rock ramp (nature-like fishway). No conceptual or engineering designs will be produced in this report; however, a narrative description supported by maps and sketches using existing and available data will be developed to substantiate the selection of the preferred alternative;
- Prepare a 30% Design of the selected alternative, including preliminary drawings of preferred alternative, and attend a meeting to review the preliminary design with the Trustee Council (design to be reviewed and approved by the Trustee Council before proceeding);
- Produce a 90% Design, including a technical analysis report, appropriate drawings, and a  $\pm 25\%$  contingency Opinion of Probable Construction Cost ("OPCC") (to be reviewed and approved by the Trustee Council for approval before proceeding); Trustee Council comments on the 90% design will be addressed and included in the Final Design; and
- Produce a Final Design, for review and approval by the Trustee Council, including one complete set of revised drawings, construction specifications, and project manual & Final Construction Cost Estimate (10% contingency OPCC).
- If the Final Design is not approved by the Trustee Council because the Trustee Council's comments on the 90% Design were not addressed, submit a revised Final Design consistent with Trustee Council comments on the 90% Design.

e. *Limitations on Settling Defendant's Obligations*: Nothing herein shall constitute a requirement that Settling Defendant undertake obligations related to the IFW Fish Passage after the Trustee Council has issued a "Project Completion Certificate" confirming that the Restoration Work for this scope of work is complete. The Settling Defendant's obligations and

## APPENDIX A

responsibilities do not extend to any work that may be undertaken after issuance of such Certificate, including, but not limited to, work related to: (i) constructing the final designed passage, (ii) any deviations from the cost estimates, or (iii) required updates or changes to the design after approval by the Trustee Council of the Final Enhanced Fish Design deliverable.

### 3. Schedule for IFW Fish Passage Design:

a. Within three (3) months of the effective date of the later of the NJWSA or NJAW access agreement, Settling Defendant shall implement all requirements of Preliminary Design Sequencing Components II.2.b (Pre-Design Data Gathering and Reduction/Interpretation), except those requirements addressed in the following subparagraph.

b. Except as provided in the third bullet below, within 18 months of the effective date of the later of the NJWSA or NJAW access agreements, the following field work tasks will be completed:

- Conduct a horizontal and vertical survey of the Island Farm Weir, including river bed survey transects across the river channel upstream and downstream of the IFW, and a survey of the shoreline embankment walls; and,
- If deemed necessary by the contractor selected to perform the Enhanced Fish Passage Design to compensate for a lack of data, conduct geotechnical borings in the river at selected downstream locations from the IFW to obtain depth to bedrock data.

Notwithstanding the above schedule, if the effective date of the later of the NJWSA or NJAW access agreement is on or before February 1 of a given calendar year, Settling Defendant shall complete in that calendar year all such horizontal and vertical survey requirements and geotechnical boring requirements.

c. Within three (3) months of the acquisition of the aforementioned survey and geotechnical data, Settling Defendant shall implement the Alternatives Analysis Report requirement of Preliminary Design Sequencing Components II.2.d (*Enhanced Fish Passage Design Process*).

d. Within three (3) months of the completion of the Alternatives Analysis Report and selection of the preferred fish passage alternative, Settling Defendant shall produce a 30% Design of the selected alternative, including preliminary drawings of preferred alternative and submit to the Trustee Council for approval.

e. Within three (3) months of receipt of the Trustee Council's approval of the 30% Design report, Settling Defendant shall produce a 90% Design, including drawings with a 20% contingency OPCC and submit to the Trustee Council for approval.

f. Within three (3) months of receipt of the Trustee Council's contingent approval of the 90% Design report, Settling Defendant shall produce a Final Design, including complete set of revised drawings, construction specifications, and project manual & Final Construction Cost Estimate (10% contingency OPCC) and submit to the Trustee Council.



## APPENDIX A

Following the submittal of the Final Design to the Trustee Council, the Settling Defendant's obligations on the IFW restoration project will be completed, and the Trustee Council shall, within a reasonable period of time following receipt of the Final Design, issue to the Settling Defendant a dated "Project Completion Certificate" certifying that the Restoration Work for Project 2 of this scope of work is complete.

**Millstone River Monitoring Plan**  
**Chemical, Biological and Benthic Macroinvertebrate**  
**Monitoring**  
**Pre- and Post-Removal of Weston Causeway Dam**

**To Be Performed by:**

Stony Brook-Millstone Watershed Association  
31 Titus Mill Road  
Pennington, NJ 08534  
(609) 737-3735  
www.thewatershed.org

|                              |           |  |
|------------------------------|-----------|--|
| <b>SBMWA Project Manager</b> | Signature |  |
|                              | Name      | Erin M. Stretz   |
|                              | Date      | July 12, 2016  |
| <b>MWH Project Manager</b>   | Signature |   |
|                              | Name      | John W. Jengo, PG, LSRP  |
|                              | Date      | July 12, 2016  |

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## 1. INTRODUCTION

The following proposed work plan was developed by the Stony Brook-Millstone Watershed Association's (SBMWA) and Mr. John W. Jengo, PG, LSRP (MWH) for the monitoring of the Millstone River prior to, and after, the removal of the Weston Causeway Dam at Millstone River Mile 1.5. This work plan documents the standard operating procedures and quality control methods used in the program to deliver reliable and accurate data. The work plan's approach was guided by the United States Environmental Protection Agency's (EPA) *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers*<sup>1</sup> (Barbour et al., 1999) and EPA's *US EPA Region 2 Guidance for the Development of Quality Assurance Project Plans for Environmental Monitoring Projects* (Ringel and Lynes, 2004).<sup>2</sup>

## 2. DISTRIBUTION LIST

**Table 2-1: Distribution List for Data Sharing and Reporting**

| Name  | Contact Information                     |
|---|---|
| Stony Brook-Millstone Watershed Association (SBMWA) | Erin Stretz <estretz@thewatershed.org>  |
| John W. Jengo, PG, LSRP (MWH)                       | John Jengo <John.Jengo@mwhglobal.com>   |
| Trustee Council Representative                      | Melissa Foster <melissa_foster@fws.gov> |
| Data users (with written data request only)         | Varies                                  |

## 3. PROGRAM/TASK ORGANIZATION

**Table 3-1: Program Personnel and Responsibility**

| Name                          | Title/Responsibility                 |
|-------------------------------|--------------------------------------|
| Erin M. Stretz (SBMWA)        | Program Manager                      |
| John W. Jengo, PG, LSRP (MWH) | Technical Advisor                    |
| Erin M. Stretz (SBMWA)        | Field/Sampling Leader                |
| Erin M. Stretz (SBMWA)        | QA Officer/Laboratory Manager/Leader |

## 4. PROJECT DESCRIPTION

### 4.1. Project Background

Historically, the Millstone River supported large populations of migrating and spawning anadromous fish; however, the erection of dams on the river blocked the passage of these fish, preventing their use of many miles of historically important habitat for spawning. Therefore, to restore the populations of anadromous

<sup>1</sup> Michael T. Barbour, Jeroen Gerritsen, Blaine D. Snyder, and James B. Stribling. 1999, *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers: Periphyton, Benthic Macroinvertebrates, and Fish*, 2<sup>nd</sup> Edition, EPA 841-B-99-002, U.S. Environmental Protection Agency; Office of Water; Washington, D.C., 339 p.

<sup>2</sup> Donna Ringel and Carol Lynes, *US EPA Region 2 Guidance for the Development of Quality Assurance Project Plans for Environmental Monitoring Projects*, April 12, 2004, 17 p.



fish, as well as improve recreation on the river and remove dangerous structures that are no longer proving a service to their owners, the Weston Causeway Dam has been prioritized for removal. In anticipation of the probable removal of the dam in 2017, the following chemical and invertebrate monitoring plan was developed to obtain information on pre-dam and post-dam removal water quality and macroinvertebrate populations.

#### **4.2 Intended Usage of Data**

Dam removal in the Raritan River watershed has gained significant momentum within the past 10 years as a means of stream and wildlife restoration. However, stream monitoring for these projects is still lacking and monitoring data are greatly desired by many involved organizations. Therefore, the Watershed Association has designed a program following NOAA guidelines<sup>3</sup> to monitor the biological [biota], chemical, and habitat characteristics of the Millstone River both and after a dam removal so that the benefits of dam removal can be quantified and habitat quality protected.

Upon completion of the monitoring program, the Watershed Association will evaluate the data to assess general stream health and evaluate the changes following dam removal. SBMWA will produce a final report on our findings which will be submitted to MWH and the Trustee Council. In addition, data packages including all raw data will be provided to MWH and the Trustee Council at the end of both the “pre-removal” and “post-removal” data acquisition periods. SBMWA will provide the report to other interested parties, as requested.

### **5. PROJECT/TASK DESCRIPTION**

#### **5.1 Type and Frequency of Monitoring Events**

This project will include chemical, biological, and habitat monitoring at four (4) sampling sites on the lower Millstone River. The sampling locations were selected based on proximity to the Weston Causeway Dam and the current extent of its impoundment to assess ecological conditions in the existing habitats created by the dam at locations that will be safely accessible to a sampling team. These locations are:

1. Upstream of the upper limits of the dam impoundment.
2. 250 feet upstream of the dam (within the impoundment)
3. 200 feet downstream of the dam
4. Millstone River just upstream of its confluence with the Raritan River<sup>4</sup>

The sampling sites are depicted on **Figure 1** and on the more detailed maps in **Appendix A**. Detailed site

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<sup>3</sup> Alderson, C. 2012. Stony Brook-Millstone Watershed Association Millstone River Dam Removal Monitoring Plan: Blackwells Mills Dam. Unpublished document provided to SBMWA by NOAA.

<sup>4</sup> The presence of the Island Farm Weir, located 1.5 miles downstream from the Weston Causeway Dam, created an impoundment that extends upstream to the Weston Causeway Dam. The Trustees have provided the following coordinates to locate this sampling location SBMWA-8: 40.542097, -74.568804. The Trustees understand that this location will not be representative of a riffle-type habitat; however, given that the methods laid out herein dictate a multi-habitat sample, the Trustees believe it is appropriate to sample there.

descriptions, including geographic coordinates, are included in **Appendix B**. If samplers are unable to safely access an area of the river, the sampling site locations may be altered.

Monitoring for standard physical and chemical water quality parameters (e.g., temperature, dissolved oxygen, conductivity, and turbidity) of each site will be performed during **baseflow conditions**<sup>5</sup> twice (2) per month from March-October prior to the dam removal and 1.5 years following the dam removal, as outlined in **Table 5-1** below. This time frame coincides with key months in anadromous life history (migration/spawning) stages. Additional monitoring may be performed if warranted by concerns due to water quality, flow, or temperature. Water will be analyzed in the field for temperature, dissolved oxygen, and conductivity using a YSI meter; turbidity will be measured in the field with a LaMotte turbidity kit. Water quality measurements will be taken at dawn, or as close to dawn as possible, at each sampling location to minimize the large diurnal variation that can occur. Samples will be collected and analyzed in accordance with the New Jersey Department of Environmental Protection (NJDEP) *Field Sampling Procedures Manual* (FSPM).<sup>6</sup> Available, pre-existing water quality data collected during the month of September at sampling locations SBMWA-6, 7, 8, and 9 (see **Figure 1** below) will be used to establish the fall pre-dam removal condition.

**Table 5-1: Water Quality Monitoring Timetable**

| Year                | Months    |       |     |      |      |        |       |         |
|---------------------|-----------|-------|-----|------|------|--------|-------|---------|
|                     | March     | April | May | June | July | August | Sept. | October |
| 2017                | 2         | 2     | 2   | 2    | 2    | 2      | 2     | 2       |
| 2018                | 2         | 2     | 2   | 2    | 2    | 2      | 2     | 2       |
| Subtotal            | 4         | 4     | 4   | 4    | 4    | 6      | 6     | 6       |
| <b>Total Events</b> | <b>32</b> |       |     |      |      |        |       |         |

Benthic macroinvertebrate collections will be completed in the spring and fall of each sampling year (prior to the dam removal and 1.5 years following the dam removal, see **Table 5-2**). Sampling will be performed according to Barbour et al. (1999), which has established practical guidelines for collection and analysis. During each sampling event, stream and riparian habitat will be assessed for substrate composition, sediment deposition and embeddedness, channel flow status, velocity/depth regimes, bank stability, channel alteration and sinuosity, bank vegetative protection and riparian vegetative zone width, and stream width. A water quality parameter measurement round will be coordinated to occur contemporaneously with each benthic macroinvertebrate sampling event.

In addition, archived benthos samples collected at locations SBMWA-6, 7, 8, and 9 (**Figure 1**) during the month of September 2014 and up to two other years (2013 and 2012, if available), will be analyzed to

<sup>5</sup> Baseflow conditions can be determined by evaluating discharge data from the USGS Blackwells Mills gauging station found at: <http://waterdata.usgs.gov/usa/nwis/uv?01402000>.

<sup>6</sup> New Jersey Department of Environmental Protection (NJDEP) *Field Sampling Procedures Manual*, August 2005, 573 p., accessible at <<http://www.nj.gov/dep/srp/guidance/fspm/pdf/fsmp2005.pdf>>.

identify their benthic macroinvertebrate assemblages. The results of these analyses will be used to represent a fall pre-removal baseline for comparison to the fall 2017 and fall 2018 post-removal samples.

**Table 5-2: Water Quality and Benthic Macroinvertebrate Sampling Schedule**

| Activity                           | 2017<br>(Pre-Removal) |               | 2017<br>(Post-Removal) | 2018<br>(Post-Removal) |               |               |
|------------------------------------|-----------------------|---------------|------------------------|------------------------|---------------|---------------|
|                                    | Spring                | Summer        | Fall                   | Spring                 | Summer        | Fall          |
| Water Quality Measurements         | X (see above)         | X (see above) | X (see above)          | X (see above)          | X (see above) | X (see above) |
| Benthic Macroinvertebrate Sampling | X                     |               | X                      | X                      |               | X             |
| Data Reporting                     |                       |               | X                      |                        |               | X             |

Note: This schedule is predicated on removing the Weston Causeway Dam in August 2017; the final pre-removal [Summer 2017] monitoring will take place in early July 2017 just prior to the dam's removal.

## 6. MEASUREMENT QUALITY OBJECTIVES

### 6.1 Data Precision, Accuracy, Measurement Range

Table 6-1 details the precision, accuracy, and measurement range for the physical, chemical, and biological monitoring to be performed on the Millstone River.

**Table 6-1: Precision, Accuracy, and Measurement Range of Monitoring Program**

| Matrix  | Parameter                  | Precision   | Accuracy  | Measurement Range                               |
|---|----------------------------|---|---|---|
| Water   | Temperature                | ±0.1°C  | ±0.2°C  | -5 – 55°C                                       |
| Water   | Dissolved Oxygen           | ±0.01 mg/L  | 0 to 20 mg/L, ± 2% of the reading or ±0.2 mg/L, whichever is greater; 20 to 50 mg/L, ± 6% of the reading. | 0 – 50 mg/L                                     |
| Water   | Conductivity               | ±0.1 mS/cm  | ±1.0% of the reading or 1.0 uS/cm, whichever is greater.  | 0 – 200 mS/cm                                   |
| Water   | Turbidity                  | +5 JTUs   | +10%  | 0 – >400 JTUs                                   |
| Stream Substrate (Cobble, sand, submerged macrophytes, woody debris, vegetated banks) | Benthic Macroinvertebrates | Subsampling will occur so that at least 100 organisms will be required for assemblage analysis. | Multiple scientists checking the net, trays for full collection. Reference collection maintained in lab.  | Must collect composite sample of ≥100 organisms |

The accuracy and precision data listed for temperature, dissolved oxygen, and conductivity is as reported by the meter manufacturer, YSI. The turbidity test will be performed with the LaMotte Turbidity in Water Test Kit Code 7519. Field tests like this, in general, can be expected to have an error rate of plus or minus 10%.

For the macroinvertebrate assessment, accuracy and precision can be assured both in the field and in the lab. Sampling procedures are standardized and repeated for each sampling event. In the field, all nets, trays, and other equipment used in the collection procedure will be fully rinsed and double-checked for clinging organisms. During the sorting procedure in the lab, the gridded trays will be checked by other scientists for the full collection of organisms from each grid, as outlined in Section 12.3. A reference collection of organisms and a taxonomic library are maintained in the lab to ensure accurate identifications to family. At least 100 organisms will be required to perform a macroinvertebrate assemblage analysis.

## **6.2 Data Representativeness**

Monitoring sites were selected to represent the various habitat types indicative of a dammed river. Of the four sites, one site is upstream of the dam's impoundment, one site is located within the impoundment, one site is immediately downstream of the dam, and one is farther downstream of the dam, just above the Island Farm Weir. These sites were selected to demonstrate the differences between the variable habitats created by dams.

## **6.3 Data Comparability**

A standardized protocol will be used for both the water quality and benthic macroinvertebrate sampling. Water quality monitoring will be performed with a meter and a LaMotte turbidity kit. Results will be expressed in standard units for each parameter. The benthic macroinvertebrate collection and analysis procedures are based on Barbour et al. (1999). These procedures are also outlined in this document. The benthic macroinvertebrate identification will be performed at the family level, making the data comparable to other studies.

## **6.4 Data Completeness**

There are no legal or compliance uses anticipated for the data collected for this project. In addition, there is no fraction of the planned data that must be collected in order to fulfill any statistical criteria. It is expected that at least 85% of the sampling events will be completed unless unanticipated high water conditions prevent sampling.

## **7. SPECIAL TRAINING NEEDS/CERTIFICATION**

The Watershed Association staff working on this project will include Erin M. Stretz. Each individual on the sampling team has extensive experience with water quality monitoring, including the use and calibration of the multiparameter meters and LaMotte kits to be used for this project. The sampling team is also well practiced with benthic aquatic macroinvertebrate collection procedures compliant with rapid bioassessment protocols established by the EPA. The team is qualified to perform macroinvertebrate

identification to the family-level. Fully trained volunteers may assist with data collection and analysis as appropriate.

## **8. DOCUMENTATION AND RECORDS**

For water quality measurements, the data sheet is completed on-site with the results of the meter and turbidity measurements. For macroinvertebrate sampling, the physical, habitat, and macroinvertebrate sampling data sheets are also completed on-site. A lab data sheet is completed during the identification session to tally the number of individuals found in each macroinvertebrate family. Each of these original data sheets are kept indefinitely. Examples of the data sheets used can be found in **Appendix C**. These results will be transferred to an Excel database and entered into the EPA's Water Quality Exchange online database.

Macroinvertebrate sample jars used in the field are labeled with the following information: date, site name, stream name, sample location, sample team, and the preservative used (95% Ethanol). After macroinvertebrate subsorting and identification, the organisms are transferred to a smaller vial labeled with the following information: site name, stream name, sample location, date collected, date identified, sample team, and the taxonomist. The sample vials are stored for a minimum of three years after project completion.

## **9. SAMPLING PROCESS DESIGN**

### **9.1 Rationale for Selection of Sampling Sites**

The four sampling locations were selected based on proximity to the Weston Causeway Dam and its impoundment on the lower Millstone River. Sampling sites were chosen in order to assess ecological conditions in existing habitats, including locations to fit each of the following parameters:

1. Upstream of the dam's impoundment.
2. 250 feet upstream of the dam (within the impoundment)
3. 200 feet downstream of the dam
4. Above the Island Farm Weir at approximately 40.542097 latitude, -74.568804 longitude.

Habitat conditions at each site will be assessed prior to each macroinvertebrate sample using the Benthic Macroinvertebrate Field Data Sheet, found in **Appendix C-4**. The locations sampled at each site will be determined by the percentage of each habitat type found. For example, if 50% of the available habitat is cobble, then 10 of the 20 sampling jabs or kicks will be conducted in cobble.

### **9.2 Sample Design Logistics**

**Table 9-1** outlines the sample design for each water quality parameter.

**Table 9-1: Water Quality Parameter Test Method and Sampling Frequency/Period**

| Parameter         | Test Method             | Sampling Frequency | Sampling Period |
|-------------------|-------------------------|--------------------|-----------------|
| Water Temperature | YSI Meter               | Twice a month      | March-October   |
| Dissolved Oxygen  | YSI Meter               | Twice a month      | March-October   |
| Conductivity      | YSI Meter               | Twice a month      | March-October   |
| Turbidity         | LaMotte Kit – Code 7519 | Twice a month      | March-October   |

Water quality measurements will be collected at each site as follows:

1. Complete the Water Quality Field Data Sheet, found in **Appendix C-2**, with the monitor names, date, and weather conditions. Record the time that sampling begins at each site.
2. To measure water temperature, dissolved oxygen, and conductivity:
  - Submerge the probe at a point nearest the center of the stream that can be accessed safely. The probe measures approximately 8 inches from the tip to the conductivity ports, the full length of which must be submerged to obtain an accurate reading. If the water depth is less than 8 inches, position the probe at an angle, facing downstream, to submerge it completely.
  - If the river is not actively flowing at the point of measurement, the probe will be stirred gently, as suggested by the YSI Pro2030 User Manual.
  - Keep the probe submerged in the water until the readings stabilize, then the results will be saved to the meter.
3. To measure turbidity:
  - Rinse one of the turbidity columns in the river water three times then, facing upstream, fill to the 50 milliliter line just below the water's surface.
  - Rinse the second turbidity column with tap water and fill to the 50 milliliter line.
  - Place the tubes next to each other and note the difference in clarity. If the black dot is equally clear in both tubes, the turbidity is zero. If the black dot in the tube containing sample water is less clear, proceed to the next step.
  - Vigorously shake the Standard Turbidity Reagent and add 0.5 milliliters to the tube containing tap water. Stir the water using the stirring rod provided in the LaMotte kit. Compare the black dots at the bottom of the tubes. If the dot in the tube with river water is more clear, turbidity is <5 JTUs. If the dot in the tube with tap is more clear, add the Standard Turbidity Reagent in 0.5 milliliter increments until the clarity of the black dots in both tubes match. The result is recorded as 10 times the amount of reagent added, in milliliters. For example, if 2.0 milliliters of reagent is added, the result is 20 JTUs.
4. Measure the river depth at the point where the meter was used.
5. Record data on the Water Quality Monitoring Data Sheet.

**Table 9-2** shows the sample design for benthic macroinvertebrate sampling.

**Table 9-2: Benthic Macroinvertebrate Parameter Test Method and Sampling Frequency/Period**

| Parameter                  | Sampling Method              | Sampling Frequency       | Sampling Period              |
|----------------------------|------------------------------|--------------------------|------------------------------|
| Benthic Macroinvertebrates | D-Net, Multihabitat approach | Twice a year (2017-2018) | Once each in Spring and Fall |

The benthic macroinvertebrate sampling procedure will be conducted as follows:

1. Perform physical and habitat assessments, using the data sheets shown in Appendix C-2 and C-3.
2. Determine the percentage of each habitat type within stream reach (100 meters), as shown on the Benthic Macroinvertebrate Field Data Sheet, in Appendix C-4.
3. Beginning at the sampling site farthest downstream, collect macroinvertebrates with a total of 20 jabs or kicks into the D-Net. The percentage of jabs/kicks taken in each habitat type will correspond to the percentage of each habitat type's presence in the stream reach, as noted in the Benthic Macroinvertebrate field data sheet. (Habitat types consisting of less than 5% of the stream reach will not be sampled).
  - To sample cobble habitats, the net will be anchored to the stream bottom using rocks. Larger rocks in the kicking area will be rubbed for clinging organisms. The substrate will be kicked up within 1.5 feet of the net for approximately 60 seconds.
  - To sample wood snags, vegetated banks, and submerged plants, the net will be rubbed and/or jabbed along 1.5 foot sections of organic material.
  - To sample sandy bottoms, the net will be jabbed quickly along the benthic surface for a length of 1.5 feet.
4. Occasionally, about every other jab/kick, empty the D-Net into the plastic collection tray.
5. After 20 jabs/kicks have been performed, empty the net into the plastic tray for the last time, using the squirt bottle to completely rinse the net. The net will be inspected and picked clean of clinging organisms.
6. Larger pieces of debris in the collection tray will be rinsed, picked clean of organisms, and removed from the sample.
7. Pour the contents of the plastic tray through the sieve to remove water and return to the tray. Rinse the sieve into the tray using alcohol. The sieve will be inspected and picked clean of organisms.
8. Pour the tray into the sample jar using alcohol to rinse the tray. The tray will then be inspected for organisms and, if found, will be put into the sample jar.
9. Complete the label with the date, site name, stream name, sample location, sample team, and the preservative used.

## 10. SAMPLING METHOD REQUIREMENT

Table 10-1 outlines the sample design for benthic macroinvertebrate sampling.

**Table 10-1: Water Quality and Benthic Macroinvertebrate Sampling Equipment, Container and Holding Time Requirements**

| Matrix    | Parameter          | Sampling Equipment   | Sampling Holding Container                      | Maximum Holding Time |
|-----------|--------------------|--|---|----------------------|
| Water     | Temperature        | YSI Pro2030 DO/Cond Meter  | None  | Immediately          |
| Water     | Dissolved oxygen   | YSI Pro2030 DO/Cond Meter  | None  | Immediately          |
| Water     | Conductivity       | YSI Pro2030 DO/Cond Meter  | None  | Immediately          |
| Water     | Turbidity          | LaMotte Turbidity Columns; Standard turbidity reagent; 5 mL dropper; Distilled water | None  | Immediately          |
| Substrate | Macroinvertebrates | Detailed below   | 24 ounce Wide-Mouthed Mason Jar or Plastic Jars | 3 years              |

The equipment required for water quality monitoring is as follows:

- Water Quality Monitoring Data Sheet
- Clipboard, pens
- Waders
- YSI Pro2030 Meter
- LaMotte Turbidity Kit Code 7519 (Two turbidity columns, Standard Turbidity Reagent, 0.5 ml dropper, Stirring rod)
- Yard Stick

The equipment required for biological sampling is as follows:

- Benthic Macroinvertebrate Field Data Sheet
- Clipboard, pens
- Waders
- D-Frame Net, 500-micron mesh
- Sieve, 500-micron mesh
- Plastic tray
- Sample Jar with label
- 95% Ethanol



- Forceps
- Squirt bottle, to use with ambient water

The equipment required for the physical and habitat assessments conducted along with macroinvertebrate samples are as follows:

- Physical Assessment Data Sheet
- Habitat Assessment Data Sheet
- Clipboard, pens
- Waders
- Tape measure and Yard Stick

## **11. SAMPLE HANDLING AND CUSTODY PROCEDURES**

Water quality monitoring will be performed on-site, so samples will not be preserved or saved for laboratory analysis. Macroinvertebrate sample jars used in the field are labeled with the following information: date, site name, stream name, sample location, sample team, and the preservative used (95% Ethanol). After macroinvertebrate identification, the organisms are transferred to a smaller vial labeled with the following information: site name, stream name, sample location, date collected, date identified, sample team, and the taxonomist. The samples will remain in the custody of SBMWA and are stored for a minimum of three years after project completion.

## **12. ANALYTICAL METHODS REQUIREMENTS**

### **12.1 Water Quality Assessments**

All aspects of the water quality monitoring program will be performed in the field, using a YSI meter, for water temperature, dissolved oxygen, and conductivity, and a LaMotte Turbidity test kit. The Chemical Monitoring Data Sheet, found in Appendix C-1, will be completed in the field with the results from each test on site.

### **12.2 Physical and Habitat Assessments**

The physical, habitat, and macroinvertebrate field data sheets, found in Appendix C, will be completed prior to collecting each sample. The purpose of these assessments is to rate the physical influences on the stream benthic macroinvertebrate assemblage and to pinpoint whether the assemblage is limited by poor habitats rather than by water quality. They also require an assessment of habitat types and substrate components, which determines the locations that are sampled for macroinvertebrates. The High Gradient Habitat Assessment Field Data Sheet, Physical Data Sheet, and Benthic Macroinvertebrate Field Data Sheet from the EPA Rapid Bioassessment Protocols will be used.

Criteria assessed by the High-Gradient Habitat Assessment Field Data Sheet, located in Appendix C-3, include:

- Percent of substrate favorable for epifaunal substrate and fish colonization
- Embeddedness
- Presence of four types of velocity/depth regimes
- Sediment deposition
- Percent of channel filled with water
- Appearance of channel alteration
- Frequency of riffles and bends
- Stream bank stability
- Streambank vegetation coverage
- Width of riparian zone

Four categories from optimal to poor are provided for each parameter; after the selection of a condition category for each parameter, the total habitat score will indicate the habitat condition of the stream. The score is divided by 200, the highest total possible score for the habitat assessment, and compared to the following table:

| <b>Score Range</b> | <b>Habitat Condition</b> |
|--------------------|--------------------------|
| 0.85 – 1.00        | Reference Condition      |
| 0.65 – 0.84        | Good Condition           |
| 0.35 – 0.64        | Fair Condition           |
| 0.00 – 0.34        | Poor Condition           |

The Physical Characterization Data Sheet, in Appendix C-2, further details parameters referenced in the Habitat Assessment Data Sheet. The stream reach length, width, depth, and velocity are defined. Dominant types of riparian and aquatic vegetation are indicated, as well as percent components of the substrate, including bedrock, boulder, cobble, gravel, sand, silt, and clay. Other variables noted include stream odors, oils, and deposits. The Water Quality section of this data sheet is to be omitted, as a more specific data sheet will be used to record water chemistry results (see Appendix C-1).

The Benthic Macroinvertebrate Field Data Sheet, in Appendix C-4, is used to guide biological sampling locations. The percentage of cobble, snags, vegetated overhanging banks, sand, submerged macrophytes, and other habitats must be recorded prior to sampling. Twenty sampling attempts (i.e. jabs/kicks/scoops) are divided between the available habitats quantified above to obtain the most representative sample possible. After macroinvertebrate sampling is complete, samplers list all macroinvertebrate families and other aquatic organisms observed in the field. Because of the nature of sub-sampling, some organisms will

be left out of the final macroinvertebrate count. The field observations portion of the Benthic Macroinvertebrate Field Data Sheet ensures that all organisms are documented.

### 12.3 Macroinvertebrate Sub-sampling and Identification

The sample sorting procedure is as follows:

1. Pour the sample collection jar through a sieve to remove alcohol. Rinse sample with water and pour into a plastic tray marked with 12 grids. Fill the tray to about a quarter inch full with water.
2. Roll a 12-sided die to determine which square to sort. Use forceps to remove every organism from the selected square into a smaller tray. Keep a count of the number of organisms picked.
  - a. Note: Organisms overlapping two squares will be counted within the square containing their head. Pieces of worms broken by the collection process will be counted if the segment contains a head or mouthpart.
3. Continue with #2 until at least 100 organisms or 2 squares are picked, whichever is greater.
4. Squares are checked by another sorter to confirm a full collection. If additional organisms are found during this QA/QC, they will be added to the sorted sample.
5. Macroinvertebrates are identified to family and moved into the final sample vial containing 95% ethyl alcohol. This vial is labeled with site name, stream name, sample location, date collected, date identified, sample team, and the taxonomist.

### 12.4 Macroinvertebrate Assessment Metrics

Macroinvertebrate samples will be analyzed using two metrics: the high gradient macroinvertebrate index (HGMI) and the New Jersey Impairment Score (NJIS) developed by NJDEP. Using the NJIS to augment the HGMI analysis will allow these scores to be compared to previous macroinvertebrate samples collected by the SBMWA, all of which have been analyzed with NJIS to this point.

The HGMI family-level criteria are:

- Number of EPT families
- Percent of families that are not insects
- Percent EPT organisms (Excluding Hydropsychidae)
- Number of scraper families
- Family Biotic Index (FBI)
  - $FBI = \text{Sum}(x_i t_i) / n$ 
    - $x_i$  = total number of individuals within each taxon (family)
    - $t_i$  = pollution tolerance score of that taxon (family)

- n = number of total organisms in the sample

The NJIS family-level criteria are:

- FBI
- Total Taxa Richness (number of different families)
- EPT Richness (number of EPT families)
- Percent EPT organisms
- Percent Dominance of any one family

### **13. QUALITY CONTROL REQUIREMENTS**

#### **13.1. Field QC Checks**

The water quality meter is calibrated for dissolved oxygen and conductivity according to the procedures outlined in Section 16. Sample jars for macroinvertebrates are properly labeled prior to collection and the physical, habitat, and benthic macroinvertebrate data sheets are checked for completion before leaving the sampling site. All nets, sieves, and trays are fully rinsed and checked by multiple samplers to ensure the full collection of organisms from sampling equipment.

#### **13.2. Laboratory QC Checks**

During the sorting procedure for macroinvertebrates, the selected squares within the gridded tray are double checked by a QA/QC checker. Any additional organisms that are found by the QA/QC checker are added to the sorted collection. They are also used to determine the accuracy of the original sorter as follows:

$$A \div (A + B) = \% \text{ Efficiency}$$

When: A = # of Organisms Originally Sorted and B = # of Organisms Recovered by Checker

If the percent efficiency falls below 90%, the sub-sampler is retrained as quickly as possible.

Accurate taxonomy is assured through the use of tested macroinvertebrate identification guides and a maintained reference collection of commonly found macroinvertebrates in our area. Any questions or concerns that arise from a taxonomist are researched and resolved as a team, seeking outside professional assistance as needed. Additionally, 10% of the year's macroinvertebrate samples will be sent to a qualified laboratory, Normandeau Associates Inc., to be re-identified to the family taxonomic level. These results will be compared to the original identifications to check for accuracy.

### **14. INSTRUMENT/EQUIPMENT TESTING, INSPECTION & MAINTENANCE REQUIREMENTS**

The water chemistry meter, test kit, nets, sieves, and waders are checked by the Field/Sampling Leader for proper condition before each field outing. The YSI meter is examined for water tightness and damage.

The DO sensor is maintained in a membrane filled with a potassium chloride solution. The LaMotte turbidity test kit reagent will be checked for expiration date and replaced, as needed. The macroinvertebrate assessments will be conducted with D-frame nets and brass sieves. The nets are made of heavy cotton and polyester canvas with a 500-micron mesh net attached to a five-foot long pole. Nets are assembled and inspected by the Field/Sampling Leader. Any net that does not meet standards is taken apart and reassembled, if possible. Nets that cannot be reassembled are replaced. The sieves are U.S. Standard Sieve Series #35 (500-micron mesh) and are 8.5 inches in diameter. Laboratory identifications are performed with Wolfe stereomicroscopes under 20x/40x magnification; light bulbs are replaced as necessary. All supplies and equipment are purchased under the supervision of the Field/Sampling Leader and Laboratory Manager. All equipment is held at the Watershed Center for Environmental Advocacy, Science, and Education.

## **15. INSTRUMENT CALIBRATION AND FREQUENCY**

The YSI meter will be calibrated according to the instructions given in the YSI Pro2030 User Manual. Dissolved oxygen will be calibrated prior to each sampling event. Conductivity will be calibrated monthly with a potassium chloride conductivity calibration solution at 25 degrees Celsius. Calibration events will be recorded in a meter calibration log kept in an Excel spreadsheet at the Watershed Association. The temperature sensor, dissolved oxygen (DO) sensor, and conductivity ports will be checked monthly for deposits and scrubbed clean and/or sanded according to the directions given in the YSI Pro 2030 User Manual. To maintain the accuracy of the Lamotte turbidity test kit reagent, it will be checked monthly for expiration dates and replaced, as needed.

## **16. DATA ACQUISITION REQUIREMENTS**

For the macroinvertebrate assessment analysis, pollution tolerance values assigned to organisms and metric calculation formulas are taken from the literature and documentation provided by the NJDEP (methods available at <http://www.state.nj.us/dep/wms/bfbm/amnet.html>).

## **17. DATA MANAGEMENT**

The Water Quality Field Data Sheet, found in Appendix C-2, will be used for bimonthly samples. The Physical, Habitat, and Macroinvertebrate Field Data Sheets, found in Appendix C-2 through Appendix C-4, will be used for bi-annual biological samples. These field data sheets are inspected by the field leader at the end of the identification day for review of completeness and accuracy. Sample jars are labeled with the date, site name, stream name, sample location, sample team, and the preservative used.

The Laboratory Manager/Leader will review field labels for macroinvertebrate samples and remove from the dataset any that cannot be attributed to specific samplers or locations, have not been properly preserved, or that exceed the maximum holding time. New vial labels are adhered after identification and will be verified that they include site name, stream name, sample location, date collected, date identified, sample team, and the name of the taxonomist. The Benthic Macroinvertebrate Sorting and Benthic Macroinvertebrate Laboratory Bench Sheet, found in Appendix C-5 and C-6, will be reviewed for

completeness and accuracy at the end of the identification session. All data will be entered into an Excel digital database for internal storage and submitted to the EPA Water Quality Exchange online database.

## **18. ASSESSMENT AND RESPONSE ACTIONS**

Review of monitoring activities is the responsibility of the Field/Sampling Leader, Laboratory Manager, Project Manager and the Quality Assurance Officer. If errors in monitoring techniques are identified, re-training will be scheduled as quickly as possible, prior to the next sampling event. If any particular families of macroinvertebrates are found to be more difficult to identify by taxonomists, additional information regarding identification of problem macroinvertebrates will be issued. If an error of greater than 20% is found in macroinvertebrate re-identification, the original taxonomist will be retrained as quickly as possible.

All field and laboratory activities may be reviewed by SBMWA and/or MWH staff as requested. Systems and data quality audits are performed by the QA Officer twice yearly. Any identified procedural problems will be corrected based on recommendations from the QA Officer.

## **19. REPORTS**

A final report will be produced and distributed after the monitoring period is complete. The report will consist of data results, interpretation of data, and internal assessments. In addition, data packages with the raw data collected will be provided at the end of the "pre-removal" and "post-removal" data acquisition periods (i.e., one data package will be transmitted for each sampling period). The Project Manager is responsible for report production and distribution. Reports will be forwarded to MWH and the Trustee Council NRD representatives.

## **20. DATA REVIEW, VALIDATION AND VERIFICATION**

All field and laboratory data are reviewed by the Project Manager and QA Officer to determine if the data meet quality assurance/quality control plan objectives. Decisions to reject or qualify data are made by the Project Manager and the QA Officer.

## **21. VALIDATION AND VERIFICATION METHODS**

Macroinvertebrate sorting methods are verified for accuracy during each event to eliminate any size bias in the lab. If an error of greater than 10% is found, the sorter will be retrained as quickly as possible. Macroinvertebrate identifications are verified by a re-identification by a qualified outside laboratory. If an error of greater than 20% is discovered, the taxonomist will be retrained as quickly as possible.

Once the data has been entered into the database, it will be checked for errors by the QA Officer. Errors in data entry will be corrected. Outliers and inconsistencies will be flagged for further review, or discarded. Problems with data quality will be discussed in the final reports to data users.

## **22. RECONCILIATION WITH DATA QUALITY OBJECTIVES (DQO'S)**

As soon as possible after each sampling event, calculations and determinations for precision, completeness, and accuracy will be made and corrective action implemented if needed. If data quality indicators do not meet the program's specifications, data will be flagged. The cause of failure will be evaluated. If the cause is found to be equipment failure, calibration/maintenance techniques will be reassessed and improved and the Quality Assurance Project Plan will be updated. If the problem is found to be sampling team error, monitors will be re-trained. Any limitations on data use will be detailed in the final report and in other documentation as needed.

If failure to meet project specifications for precision and accuracy is found to be unrelated to equipment, methods, or sample error, specifications may be revised for the next sampling event.

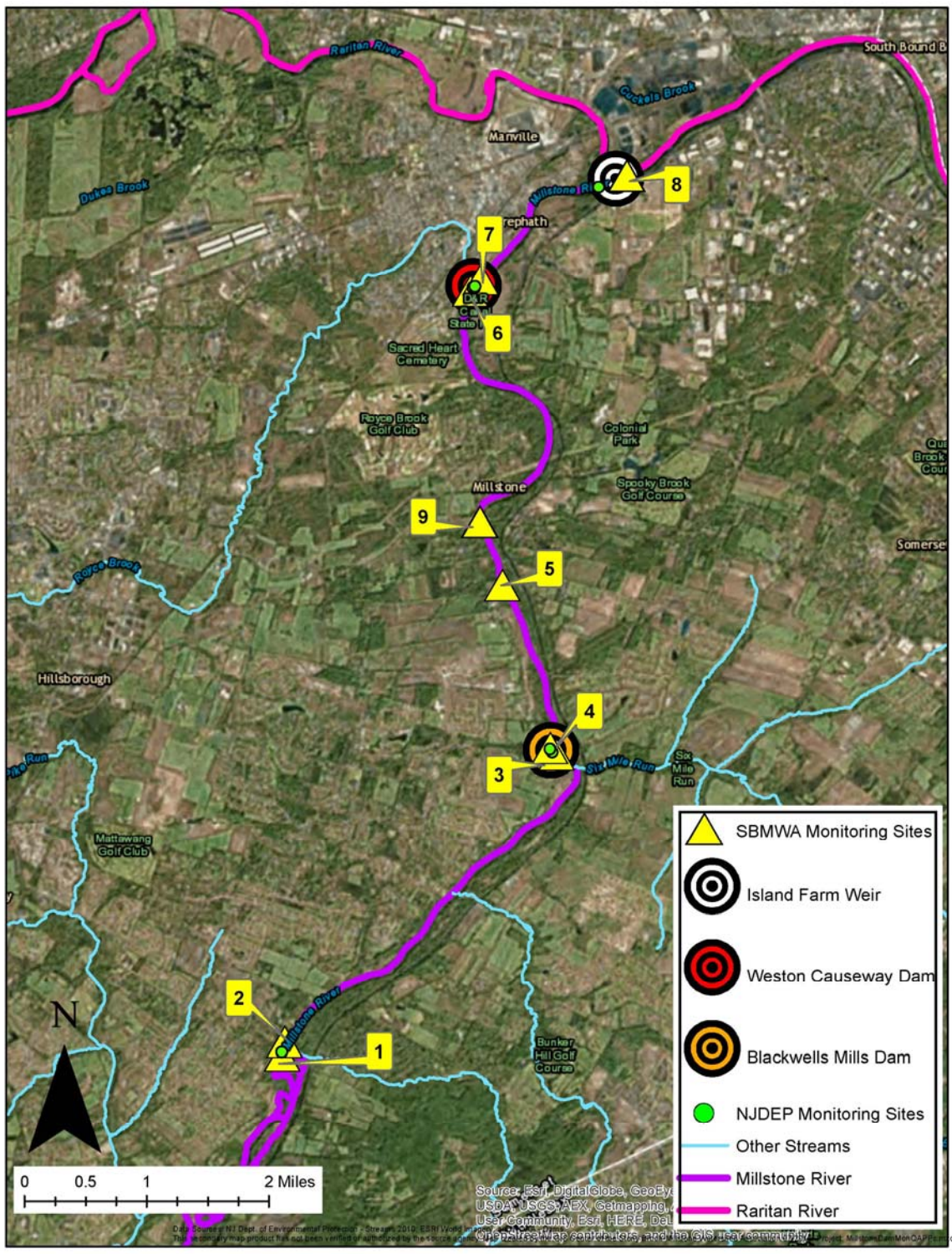


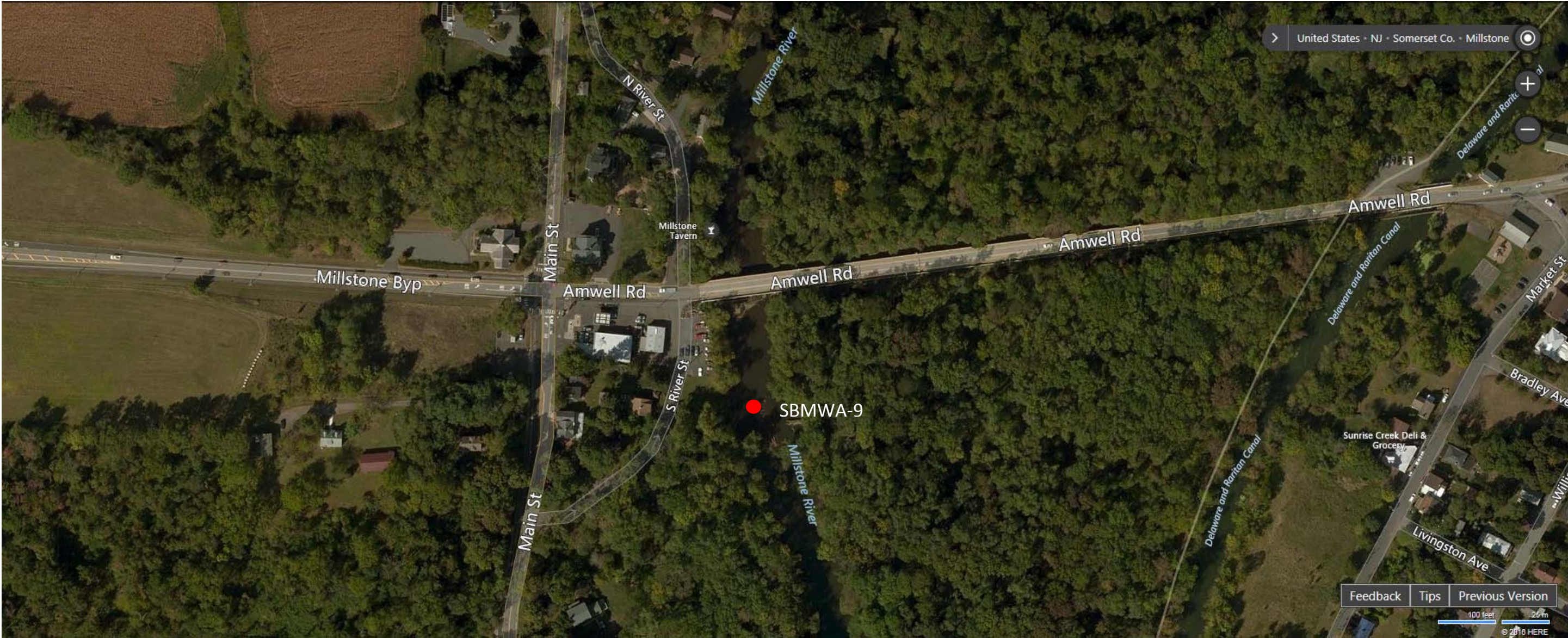
Figure 1. SBMWA Monitoring Sites Along the Millstone River. Existing data from locations SBMWA-6, 7, 8, and 9 will be used to establish fall baseline (pre-dam removal) conditions.



**APPENDIX A:**

**WESTON CAUSEWAY DAM REMOVAL MILLSTONE RIVER SAMPLING LOCATIONS**

**APPENDIX A: WESTON CAUSEWAY DAM REMOVAL MILLSTONE RIVER SAMPLING LOCATIONS**



SBMWA-9: Millstone River 200 feet upstream of Amwell Road Bridge; this was a permanent riffle location beyond the upper limits of the Weston Causeway Dam impoundment prior to the dam’s 2015-2016 collapse.

**APPENDIX A: WESTON CAUSEWAY DAM REMOVAL MILLSTONE RIVER SAMPLING LOCATIONS**



SBMWA-7: Millstone River 200 feet downstream of the Weston Causeway Dam.

SBMWA-6: Millstone River 250 feet upstream of the Weston Causeway Dam.

APPENDIX A: WESTON CAUSEWAY DAM REMOVAL MILLSTONE RIVER SAMPLING LOCATIONS



SBMWA-8: Millstone River just upstream of its confluence with the Raritan River (and approximately 750 feet upstream of Island Farm Weir) at coordinates 40.542097, -74.568804.

## APPENDIX B:

### SAMPLING SITE DESCRIPTIONS

#### **Site 1 Upstream of Impoundment**

**Site Name:** SBMWA-9

**Parameters:** Upstream of the Weston Causeway Dam impoundment

**Location:** South River Street, at grassy patch approximately 175 feet south of intersection with Amwell Road

Approximately 2.6 miles upstream of Weston Causeway Dam

Millstone Borough, Somerset County, NJ

**Coordinates:**

**Monitoring Methods:** Physical and chemical water quality parameters (e.g., temperature, dissolved oxygen, conductivity, and turbidity), benthic macroinvertebrate, habitat assessment

#### **Site 2 Upstream of Dam- Within Impoundment**

**Site Name:** SBMWA-6

**Parameters:** 250 feet upstream of the Weston Causeway Dam, just upriver of former millrace channel and Wilhousky Street Bridge

**Location:** Approximately 250 feet upstream of the Weston Causeway Dam

Manville Borough, Somerset County, NJ

**Coordinates:**

**Monitoring Methods:** Physical and chemical water quality parameters (e.g., temperature, dissolved oxygen, conductivity, and turbidity), benthic macroinvertebrate, habitat

#### **Site 3 Downstream of Dam (Accessed via Lincoln Ave Park Boat Ramp)**

**Site Name:** SBMWA-7

**Parameters:** 200 feet downstream of the Weston Causeway Dam, accessible by Lincoln Ave Park Ramp

**Location:** South end of Lincoln Avenue Park

Approximately 200 feet downstream of the Weston Causeway Dam on shallow, mid-river sand bar

Manville Borough, Somerset County, NJ

**Coordinates:**

**Monitoring Methods:** Physical and chemical water quality parameters (e.g., temperature, dissolved oxygen, conductivity, and turbidity), benthic macroinvertebrate, habitat

**Site 4**            **Downstream of Dam, upstream of Island Farm Weir**

**Site Name:** SBMWA-8

**Parameters:** Access point to be determined

**Location:** Upstream of Island Farm Weir

Approximately 750 feet above Island Farm Weir

Franklin Township, Somerset County, NJ

**Coordinates:** 40.542097, -74.568804

**Monitoring Methods:** Physical and chemical water quality parameters (e.g., temperature, dissolved oxygen, conductivity, and turbidity), benthic macroinvertebrate, habitat

**APPENDIX C-1:**  
**CHEMICAL MONITROING DATA SHEET**

**CHEMICAL MONITORING DATA SHEET**

Date: \_\_\_\_\_ Monitoring Team Name(s): \_\_\_\_\_

Weather Conditions Circle One: Sunny Partly Cloudy Overcast  
Intermittent Rain Steady Rain Heavy RainTime since last heavy rain \_\_\_\_\_ days Equipment Used: YSI Meter, Lamotte Turbidity KitComments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_→ Site Name: **SBMWA-9** Location: Upstream of the Weston Causeway Dam Impmt Begin Time \_\_\_\_\_

Current Air Temperature \_\_\_\_\_ °C Stream Depth at sample area \_\_\_\_\_

Water Temperature \_\_\_\_\_ °C Turbidity \_\_\_\_\_ JTU

Dissolved Oxygen/Percent Saturation \_\_\_\_\_ mg/L \_\_\_\_\_ %

Conductivity \_\_\_\_\_ mS/cm Specific Conductance \_\_\_\_\_ mS/cm

→ Site Name: **SBMWA-6** Location: 250 ft Upstream of the Weston Causeway Dam Begin Time \_\_\_\_\_

Current Air Temperature \_\_\_\_\_ °C Stream Depth at sample area \_\_\_\_\_

Water Temperature \_\_\_\_\_ °C Turbidity \_\_\_\_\_ JTU

Dissolved Oxygen/Percent Saturation \_\_\_\_\_ mg/L \_\_\_\_\_ %

Conductivity \_\_\_\_\_ mS/cm Specific Conductance \_\_\_\_\_ mS/cm

→ Site Name: **SBMWA-7** Location: 200 ft Downstream of the Weston Causeway Dam Begin Time \_\_\_\_\_

Current Air Temperature \_\_\_\_\_ °C Stream Depth at sample area \_\_\_\_\_

Water Temperature \_\_\_\_\_ °C Turbidity \_\_\_\_\_ JTU

Dissolved Oxygen/Percent Saturation \_\_\_\_\_ mg/L \_\_\_\_\_ %

Conductivity \_\_\_\_\_ mS/cm Specific Conductance \_\_\_\_\_ mS/cm

→ Site Name: **SBMWA-8** Location: Approx. 750 feet Upstream of Island Farm Weir Begin Time \_\_\_\_\_

Current Air Temperature \_\_\_\_\_ °C Stream Depth at sample area \_\_\_\_\_

Water Temperature \_\_\_\_\_ °C Turbidity \_\_\_\_\_ JTU

Dissolved Oxygen/Percent Saturation \_\_\_\_\_ mg/L \_\_\_\_\_ %

Conductivity \_\_\_\_\_ mS/cm Specific Conductance \_\_\_\_\_ mS/cm



**APPENDIX C-2:**

**PHYSICAL CHARACTERISTICS/WATER QUALITY FIELD DATA SHEET**

**PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET  
(FRONT)**

|                   |                 |                                |                   |
|-------------------|-----------------|--------------------------------|-------------------|
| STREAM NAME       |                 | LOCATION                       |                   |
| STATION # _____   | RIVERMILE _____ | STREAM CLASS                   |                   |
| LAT _____         | LONG _____      | RIVER BASIN                    |                   |
| STORET #          |                 | AGENCY                         |                   |
| INVESTIGATORS     |                 |                                |                   |
| FORM COMPLETED BY |                 | DATE _____<br>TIME _____ AM PM | REASON FOR SURVEY |

|                                |  |  |  |
|--------------------------------|--|--|--|
| <b>WEATHER CONDITIONS</b>      | <p><b>Now</b></p> <input type="checkbox"/> storm (heavy rain)<br><input type="checkbox"/> rain (steady rain)<br><input type="checkbox"/> showers (intermittent)<br>_____% <input type="checkbox"/> %cloud cover<br><input type="checkbox"/> clear/sunny  | <p><b>Past 24 hours</b></p> <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> _____%                                    | <p><b>Has there been a heavy rain in the last 7 days?</b><br/> <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><b>Air Temperature</b> _____ °C</p> <p><b>Other</b> _____</p> |
| <b>SITE LOCATION/MAP</b>       | Draw a map of the site and indicate the areas sampled (or attach a photograph)   |  |  |
| <b>STREAM CHARACTERIZATION</b> | <p><b>Stream Subsystem</b><br/> <input type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal</p> <p><b>Stream Origin</b><br/> <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed<br/> <input type="checkbox"/> Non-glacial montane <input type="checkbox"/> Mixture of origins<br/> <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____</p> | <p><b>Stream Type</b><br/> <input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater</p> <p><b>Catchment Area</b> _____ km<sup>2</sup></p> |  |

**PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET  
(BACK)**

|  |   |   |
|--|---|---|
| <b>WATERSHED FEATURES</b>                    | <b>Predominant Surrounding Landuse</b><br><input type="checkbox"/> Forest <input type="checkbox"/> Commercial<br><input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial<br><input type="checkbox"/> Agricultural <input type="checkbox"/> Other _____<br><input type="checkbox"/> Residential   | <b>Local Watershed NPS Pollution</b><br><input type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources<br><input type="checkbox"/> Obvious sources<br><br><b>Local Watershed Erosion</b><br><input type="checkbox"/> None <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy  |
| <b>RIPARIAN VEGETATION (18 meter buffer)</b> | <b>Indicate the dominant type and record the dominant species present</b><br><input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous<br>dominant species present _____  |   |
| <b>INSTREAM FEATURES</b>                     | Estimated Reach Length _____ m<br>Estimated Stream Width _____ m<br>Sampling Reach Area _____ m <sup>2</sup><br>Area in km <sup>2</sup> (m <sup>2</sup> x1000) _____ km <sup>2</sup><br>Estimated Stream Depth _____ m<br>Surface Velocity (at thalweg) _____ m/sec   | <b>Canopy Cover</b><br><input type="checkbox"/> Partly open <input type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded<br><br><b>High Water Mark</b> _____ m<br><br><b>Proportion of Reach Represented by Stream Morphology Types</b><br><input type="checkbox"/> Riffle _____ % <input type="checkbox"/> Run _____ %<br><input type="checkbox"/> Pool _____ %<br><br><b>Channelized</b> <input type="checkbox"/> Yes <input type="checkbox"/> No<br><br><b>Dam Present</b> <input type="checkbox"/> Yes <input type="checkbox"/> No  |
| <b>LARGE WOODY DEBRIS</b>                    | LWD _____ m <sup>2</sup><br>Density of LWD _____ m <sup>2</sup> /km <sup>2</sup> (LWD/ reach area)  |   |
| <b>AQUATIC VEGETATION</b>                    | <b>Indicate the dominant type and record the dominant species present</b><br><input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating<br><input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae<br>dominant species present _____<br>Portion of the reach with aquatic vegetation _____ % |   |
| <b>WATER QUALITY</b>                         | Temperature _____ °C<br>Specific Conductance _____<br>Dissolved Oxygen _____<br>pH _____<br>Turbidity _____<br>WQ Instrument Used _____   | <b>Water Odors</b><br><input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage<br><input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical<br><input type="checkbox"/> Fishy <input type="checkbox"/> Other _____<br><br><b>Water Surface Oils</b><br><input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globbs <input type="checkbox"/> Flecks<br><input type="checkbox"/> None <input type="checkbox"/> Other _____<br><br><b>Turbidity (if not measured)</b><br><input type="checkbox"/> Clear <input type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid<br><input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other _____ |
| <b>SEDIMENT/SUBSTRATE</b>                    | <b>Odors</b><br><input type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum<br><input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None<br><input type="checkbox"/> Other _____<br><br><b>Oils</b><br><input type="checkbox"/> Absent <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Profuse     | <b>Deposits</b><br><input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand<br><input type="checkbox"/> Relict shells <input type="checkbox"/> Other _____<br><br><b>Looking at stones which are not deeply embedded, are the undersides black in color?</b><br><input type="checkbox"/> Yes <input type="checkbox"/> No   |

| INORGANIC SUBSTRATE COMPONENTS<br>(should add up to 100%) |                      |                                 | ORGANIC SUBSTRATE COMPONENTS<br>(does not necessarily add up to 100%) |   |                                |
|---|----------------------|---------------------------------|---|---|--------------------------------|
| Substrate Type  | Diameter             | % Composition in Sampling Reach | Substrate Type  | Characteristic                              | % Composition in Sampling Area |
| Bedrock   |                      |                                 | Detritus  | sticks, wood, coarse plant materials (CPOM) |                                |
| Boulder   | > 256 mm (10")       |                                 |   |   |                                |
| Cobble  | 64-256 mm (2.5"-10") |                                 | Muck-Mud  | black, very fine organic (FPOM)             |                                |
| Gravel  | 2-64 mm (0.1"-2.5")  |                                 |   |   |                                |
| Sand  | 0.06-2mm (gritty)    |                                 | Marl  | grey, shell fragments                       |                                |
| Silt  | 0.004-0.06 mm        |                                 |   |   |                                |
| Clay  | < 0.004 mm (slick)   |                                 |   |   |                                |

**APPENDIX C-3:**  
**HABITAT ASSESSMENT FIELD DATA SHEET**

**HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)**

|                                 |  |                        |                         |
|---------------------------------|--|------------------------|-------------------------|
| STREAM NAME _____               |  | LOCATION _____         |                         |
| STATION # _____ RIVERMILE _____ |  | STREAM CLASS _____     |                         |
| LAT _____ LONG _____            |  | RIVER BASIN _____      |                         |
| STORET # _____                  |  | AGENCY _____           |                         |
| INVESTIGATORS _____             |  |                        |                         |
| FORM COMPLETED BY _____         |  | DATE _____ AM _____ PM | REASON FOR SURVEY _____ |

| Habitat Parameter                              | Condition Category  |  |   |  |
|--|---|--|---|--|
|  | Optimal   | Suboptimal   | Marginal  | Poor   |
| <b>1. Epifaunal Substrate/ Available Cover</b> | Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new/fall, but not yet prepared for colonization (may rate at high end of scale). | 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.  | Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.   |
| <b>SCORE</b>                                   | 20 19 18 17 16  | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0  |
| <b>2. Embeddedness</b>                         | Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.  | Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.  | Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.   | Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.   |
| <b>SCORE</b>                                   | 20 19 18 17 16  | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0  |
| <b>3. Velocity/Depth Regime</b>                | All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)   | Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).   | Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).   | Dominated by 1 velocity/depth regime (usually slow-deep).  |
| <b>SCORE</b>                                   | 20 19 18 17 16  | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0  |
| <b>4. Sediment Deposition</b>                  | Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.   | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.   | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| <b>SCORE</b>                                   | 20 19 18 17 16  | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0  |
| <b>5. Channel Flow Status</b>                  | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.   | Water fills >75% of the available channel; or <25% of channel substrate is exposed.  | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.   | Very little water in channel and mostly present as standing pools.   |
| <b>SCORE</b>                                   | 20 19 18 17 16  | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0  |

Parameters to be evaluated in sampling reach

**HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)**

| Habitat Parameter   | Condition Category   |  |   |   |
|---|--|--|---|---|
|   | Optimal  | Suboptimal   | Marginal  | Poor  |
| <b>6. Channel Alteration</b>  | Channelization or dredging absent or minimal; stream with normal pattern.  | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.  | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.  | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.   |
| <b>SCORE</b>  | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| <b>7. Frequency of Riffles (or bends)</b>                                 | Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.     | Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.  | Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.   | Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.   |
| <b>SCORE</b>  | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| <b>8. Bank Stability (score each bank)</b>                                | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.   | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.   | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.  | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.   |
| Note: determine left or right side by facing downstream.                  |  |  |   |   |
| <b>SCORE ___ (LB)</b>   | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| <b>SCORE ___ (RB)</b>   | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |
| <b>9. Vegetative Protection (score each bank)</b>                         | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| <b>SCORE ___ (LB)</b>   | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| <b>SCORE (RB)</b>   | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |
| <b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b> | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.  | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.   | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.   | Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.   |
| <b>SCORE ___ (LB)</b>   | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| <b>SCORE (RB)</b>   | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |

Total Score \_\_\_\_\_

**APPENDIX C-4:**  
**BENTHIC MACROINVERTEBRATE FIELD DATA SHEET**

**BENTHIC MACROINVERTEBRATE FIELD DATA SHEET**

|                                 |  |                                |                         |
|---------------------------------|--|--------------------------------|-------------------------|
| STREAM NAME _____               |  | LOCATION _____                 |                         |
| STATION # _____ RIVERMILE _____ |  | STREAM CLASS _____             |                         |
| LAT _____ LONG _____            |  | RIVER BASIN _____              |                         |
| STORET # _____                  |  | AGENCY _____                   |                         |
| INVESTIGATORS _____             |  |                                | LOT NUMBER _____        |
| FORM COMPLETED BY _____         |  | DATE _____<br>TIME _____ AM PM | REASON FOR SURVEY _____ |

|                   |   |
|-------------------|---|
| HABITAT TYPES     | Indicate the percentage of each habitat type present<br><input type="checkbox"/> Cobble _____% <input type="checkbox"/> Snags _____% <input type="checkbox"/> Vegetated Banks _____% <input type="checkbox"/> Sand _____%<br><input type="checkbox"/> Submerged Macrophytes _____% <input type="checkbox"/> Other ( _____ ) _____%  |
|                   | Gear used <input type="checkbox"/> D-frame <input type="checkbox"/> kick-net <input type="checkbox"/> Other _____<br>How were the samples collected? <input type="checkbox"/> wading <input type="checkbox"/> from bank <input type="checkbox"/> from boat<br>Indicate the number of jabs/kicks taken in each habitat type.<br><input type="checkbox"/> Cobble _____ <input type="checkbox"/> Snags _____ <input type="checkbox"/> Vegetated Banks _____ <input type="checkbox"/> Sand _____<br><input type="checkbox"/> Submerged Macrophytes _____ <input type="checkbox"/> Other ( _____ ) _____ |
| SAMPLE COLLECTION |   |
| GENERAL COMMENTS  |   |

**QUALITATIVE LISTING OF AQUATIC BIOTA**

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

|                   |   |   |   |   |   |                    |   |   |   |   |   |
|-------------------|---|---|---|---|---|--------------------|---|---|---|---|---|
| Periphyton        | 0 | 1 | 2 | 3 | 4 | Slimes             | 0 | 1 | 2 | 3 | 4 |
| Filamentous Algae | 0 | 1 | 2 | 3 | 4 | Macroinvertebrates | 0 | 1 | 2 | 3 | 4 |
| Macrophytes       | 0 | 1 | 2 | 3 | 4 | Fish               | 0 | 1 | 2 | 3 | 4 |

**FIELD OBSERVATIONS OF MACROBENTHOS**

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

|                 |   |   |   |   |   |             |   |   |   |   |   |               |   |   |   |   |   |
|-----------------|---|---|---|---|---|-------------|---|---|---|---|---|---------------|---|---|---|---|---|
| Porifera        | 0 | 1 | 2 | 3 | 4 | Anisoptera  | 0 | 1 | 2 | 3 | 4 | Chironomidae  | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa        | 0 | 1 | 2 | 3 | 4 | Zygoptera   | 0 | 1 | 2 | 3 | 4 | Ephemeroptera | 0 | 1 | 2 | 3 | 4 |
| Platyhelminthes | 0 | 1 | 2 | 3 | 4 | Hemiptera   | 0 | 1 | 2 | 3 | 4 | Trichoptera   | 0 | 1 | 2 | 3 | 4 |
| Turbellaria     | 0 | 1 | 2 | 3 | 4 | Coleoptera  | 0 | 1 | 2 | 3 | 4 | Other         | 0 | 1 | 2 | 3 | 4 |
| Hirudinea       | 0 | 1 | 2 | 3 | 4 | Lepidoptera | 0 | 1 | 2 | 3 | 4 |               |   |   |   |   |   |
| Oligochaeta     | 0 | 1 | 2 | 3 | 4 | Sialidae    | 0 | 1 | 2 | 3 | 4 |               |   |   |   |   |   |
| Isopoda         | 0 | 1 | 2 | 3 | 4 | Corydalidae | 0 | 1 | 2 | 3 | 4 |               |   |   |   |   |   |
| Amphipoda       | 0 | 1 | 2 | 3 | 4 | Tipulidae   | 0 | 1 | 2 | 3 | 4 |               |   |   |   |   |   |
| Decapoda        | 0 | 1 | 2 | 3 | 4 | Empididae   | 0 | 1 | 2 | 3 | 4 |               |   |   |   |   |   |
| Gastropoda      | 0 | 1 | 2 | 3 | 4 | Simuliidae  | 0 | 1 | 2 | 3 | 4 |               |   |   |   |   |   |
| Bivalvia        | 0 | 1 | 2 | 3 | 4 | Tabinidae   | 0 | 1 | 2 | 3 | 4 |               |   |   |   |   |   |
|                 |   |   |   |   |   | Culicidae   | 0 | 1 | 2 | 3 | 4 |               |   |   |   |   |   |



**APPENDIX C-5:**

**BENTHIC MACROINVERTEBRATE SORTING DATA SHEET**

## BENTHIC MACROINVERTEBRATE SORTING DATA SHEET

Site Number: \_\_\_\_\_ Date: \_\_\_\_\_

Identifier Name(s): \_\_\_\_\_  
\_\_\_\_\_

Total Number of Organisms Picked: \_\_\_\_\_

Total Number of Squares Picked: \_\_\_\_\_

Mark each square that you remove samples from with an 'X'.

|          |          |          |           |
|----------|----------|----------|-----------|
| <b>1</b> | <b>4</b> | <b>7</b> | <b>10</b> |
| <b>2</b> | <b>5</b> | <b>8</b> | <b>11</b> |
| <b>3</b> | <b>6</b> | <b>9</b> | <b>12</b> |

**APPENDIX C-6:**

**BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET**

**BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)**

page \_\_\_\_\_ of \_\_\_\_\_

|                    |                 |  |
|--------------------|-----------------|--|
| STREAM NAME _____  |                 | LOCATION _____   |
| STATION # _____    | RIVERMILE _____ | STREAM CLASS _____   |
| LAT _____          | LONG _____      | RIVER BASIN _____  |
| STORET # _____     |                 | AGENCY _____   |
| COLLECTED BY _____ | DATE _____      | LOT # _____  |
| TAXONOMIST _____   | DATE _____      | SUBSAMPLE TARGET <input type="checkbox"/> 100 <input type="checkbox"/> 200 <input type="checkbox"/> 300 <input type="checkbox"/> Other _____ |

Enter Family and/or Genus and Species name on blank line.

| Organisms     | No. | LS | TI | TCR | Organisms   | No. | LS | TI | TCR |
|---------------|-----|----|----|-----|-------------|-----|----|----|-----|
| Oligochaeta   |     |    |    |     | Megaloptera |     |    |    |     |
| Hirudinea     |     |    |    |     | Coleoptera  |     |    |    |     |
| Isopoda       |     |    |    |     |             |     |    |    |     |
| Amphipoda     |     |    |    |     | Diptera     |     |    |    |     |
| Decapoda      |     |    |    |     |             |     |    |    |     |
| Ephemeroptera |     |    |    |     | Gastropoda  |     |    |    |     |
|               |     |    |    |     |             |     |    |    |     |
|               |     |    |    |     | Pelecypoda  |     |    |    |     |
| Plecoptera    |     |    |    |     |             |     |    |    |     |
|               |     |    |    |     | Other       |     |    |    |     |
|               |     |    |    |     |             |     |    |    |     |
| Trichoptera   |     |    |    |     |             |     |    |    |     |
|               |     |    |    |     |             |     |    |    |     |
|               |     |    |    |     |             |     |    |    |     |
| Hemiptera     |     |    |    |     |             |     |    |    |     |
|               |     |    |    |     |             |     |    |    |     |

Taxonomic certainty rating (TCR) 1-5: 1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: 1 = immature; P = pupa; A = adult TI = Taxonomists initials

Total No. Organisms \_\_\_\_\_

Total No. Taxa \_\_\_\_\_

**BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (BACK)**

|   |  |
|---|--|
| <p><b>SUBSAMPLING/SORTING INFORMATION</b></p> <p>Sorter _____</p> <p>Date _____</p> | <p>Number of grids picked: _____</p> <p>Time expenditure _____ No. of organisms _____</p> <p>Indicate the presence of large or obviously abundant organisms:</p> <p>_____</p> <hr/> <p>QC:    <input type="checkbox"/> YES    <input type="checkbox"/> NO    QC Checker _____</p><br><div style="text-align: center;"> <math display="block">\left( \frac{\text{\# organisms originally sorted}}{\text{\# organisms recovered by checker}} + \frac{\text{\# organisms originally sorted}}{\text{\# organisms recovered by checker}} \right) = \text{\% sorting efficiency}</math> </div> <p>≥90%, sample passes _____</p> <p>&lt;90%, sample fails, action taken _____</p> |
| <p><b>TAXONOMY</b></p> <p>ID _____</p> <p>Date _____</p>                            | <p>Explain TCR ratings of 3-5:</p> <p>_____</p> <p>Other Comments (e.g. condition of specimens):</p> <p>_____</p> <hr/> <p>QC:    <input type="checkbox"/> YES    <input type="checkbox"/> NO    QC Checker _____</p><br><p>Organism recognition            <input type="checkbox"/> pass            <input type="checkbox"/> fail<br/>         Verification complete        <input type="checkbox"/> YES            <input type="checkbox"/> NO</p>   |

**Appendix B: AmCy Site and Sediment NRD Compensation Project Locations**

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