Level 3 Project Study Plan

2010 Dugway Brook Environmental Monitoring

(1) Objectives

Beginning in the summer of 2010, the Northeast Ohio Regional Sewer District (NEORSD) Dugway Brook East Interceptor Relief Sewer Alignment (DEIRS) project will resume in order to reduce the number overflows per year to the East Branch of Dugway Brook. The DEIRS project will provide wet weather flow relief in the existing Dugway East Interceptor Sewer through the cities of Cleveland and East Cleveland. In 2009, baseline data was collected on the East and West Branches of Dugway Brook during wet and dry weather conditions prior to project completion. In 2010, construction activity is progressing forward for the DEIRS project; however, no relief sewers have yet been abandoned or sanitary sewage overflows redirected to the Dugway East Interceptor. Therefore, additional baseline data can be collected. If the stormwater management program is implemented in 2010, NEORSD will not be completing the sampling on the east and west branches of Dugway Brook.

Although the DEIRS project will not affect current conditions on the West Branch, baseline data will be collected on that branch as well, prior to completion of the Dugway West Interceptor Relief Sewer Project (DWIRS). Data collection on both the East and West Branches of Dugway Brook will consist of water chemistry samples to assess the chemical and bacteriological water quality conditions upstream and downstream on Dugway Brook. Fish, macroinvertebrate and habitat assessment will also be conducted on Dugway Brook downstream of the culvert where the brook becomes open water and on a site on the West Branch downstream of Lakeview Cemetery and a NEORSD flood control dam. These results will be evaluated using the Ohio Environmental Protection Agency's (EPA) Qualitative Habitat Evaluation Index (QHEI), Index of Biotic Integrity (IBI), and Invertebrate Community Index (ICI). An examination of the individual metrics that comprise these indices will be used in conjunction with water quality data to identify impacts to the biotic communities.

(2) Point/Nonpoint Sources

Point Sources	Nonpoint Sources
Storm Sewer Outfalls	Urban runoff
Combined Sewer Overflows	Spills
Sanitary Sewer Overflows	

A map has been provided in Appendix A to show point sources that may be influencing the water quality at each sample location. These sources of pollution,

along with the nonpoint sources listed in the table above, may be impacting the health of the fish and benthic macroinvertebrate communities in Dugway Brook and will need to be taken into account when evaluating changes to these communities following completion of the DEIRS and DWIRS projects.

(3) Parameters Covered

Fish specimens will be identified to species level, counted, and examined for the presence of external anomalies including DELTs (deformities, eroded fins, lesions and tumors). An Ohio EPA Fish Data Sheet will be completed during each assessment. Quantitative fish sampling will be conducted at all locations.

Macroinvertebrate community assemblages will be collected from each location and shipped to AMT (Ravenna, Ohio)[1] for identification and enumeration. Aquatic Macroinvertebrate Taxonomy (AMT) will identify the specimens to the lowest practical taxonomic level and whenever possible, to the level of taxonomy recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987, updated September 30, 1989; November 8, 2006; and August 26, 2008)[2].

The NEORSD Macroinvertebrate Field Sheet (Appendix B) will be completed at each site during sampler retrieval. In addition, stream habitat will be measured by scoring components of the QHEI at all locations, including the substrate, instream cover, channel morphology, riparian zone and bank erosion, pool/glide and riffle/run quality and gradient.

Water chemistry samples will be collected at each electrofishing/ macroinvertebrate site. Appendix C lists the parameters to be tested along with the detection limits and practical quantitation limits. Field measurements for dissolved oxygen, pH, temperature, and specific conductance will also be performed. A Surface Water Condition Sampling Field Data Form will be completed at each site during each sampling event (Appendix D).

(4) Field Collection and Data Assessment Techniques

Field collections for fish will be conducted at two sites (see Table in Section 5). Sampling will be conducted using longline electrofishing techniques and will consist of shocking all habitat types within a sampling zone, which is 0.15

[1] It is anticipated that AMT will be contracted to complete all macroinvertebrate identification. The contract has been approved by the Northeast Ohio Regional Sewer District Board of Trustees, however, to date, it has not been accepted by AMT. An amended study plan will be submitted if someone else is awarded the contract.
[2] See Appendix I for a list of all references.

kilometers in length, while moving from downstream to upstream. The stunned fish will be collected and placed into a live well for processing.

Fish will be identified to species level, counted, and examined for the presence of external anomalies including DELTs. Fish easily identified (commonly collected from year to year) will be returned to the site from which they are collected. Subsamples of difficult-to-identify species will be brought back to the laboratory for verification by NEORSD Level 3 Fish Qualified Data Collectors (QDC) and, if necessary, sent to The Ohio State University Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Voucher specimens will be collected as described in section (14). Endangered species and those too large for preservation will not be collected as voucher specimens, but will instead be photographed. Photographed vouchers will include features that permit definitive identification of the particular species.

Fish will be preserved in 10 percent formalin in the field, soaked in tap water for 24 to 48 hours after 5 to 7 days, then transferred to solutions of 30 and 50 percent ethanol for 5 to 7 days each and, finally, to 70 percent ethanol for long-term storage. Specimens larger than six inches will be slit along the right side and then soaked in formalin for approximately 10 to 14 days before being transferred to water and solutions of 30, 50 and 70 percent ethanol. Label information will include location (description and coordinates), date, time, collectors' names, and sample identification code for each specimen collected.

Macroinvertebrate sampling will be conducted using quantitative and qualitative sampling techniques. Quantitative sampling will include installation of five replicates of modified Hester-Dendy multi-plate artificial substrate sampler (HD) that is colonized for a six-week period. Multiple HD samplers will be installed at one or all of the locations in case samplers are lost due to vandalism, burial, etc. Qualitative sampling will be conducted using a D-frame dip net when HD samplers are retrieved. The NEORSD Macroinvertebrate Field Sheet will be completed during the HD retrieval. Voucher specimens will be collected as described in section (14). All macroinvertebrate community assemblages will be sent to a Level 3 QDC for identification and enumeration. The Level 3 QDC will identify specimens to the lowest practical taxonomic level and when the condition of the specimen allows, to the level of taxonomy recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987, updated September 30, 1989; November 8, 2006; and August 26, 2008). Voucher specimens will be collected as described in section (14). Stream flow will be measured with a Marsh-McBirney FloMate Model 2000 Portable Flow Meter, which measures flow in feet per second, when the HD samplers are installed and retrieved.

A detailed description of the sampling and analysis methods utilized in the fish community and macroinvertebrate surveys, including calculations of the IBI and ICI, can be found in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volumes II* (1987, updated January 1, 1988; November 8, 2006; and August 26, 2008) and *III* (1987, updated September 30, 1989; November 8, 2006; and August 26, 2008).

Water chemistry and bacteriological sampling will be completed at all sites. Techniques used for water quality sampling and chemical analyses will follow the *Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices* (2009). Chemical water quality samples from each site will be collected with two 4-liter disposable polyethylene cubitainers with disposable polypropylene lids and two 473-mL plastic bottles. All water quality samples will be collected as grab samples. One duplicate sample and one field blank will be collected at a randomly selected site, at the frequency not less than 10% of the total samples collected, for this study plan. The acceptable relative percent difference (RPD) for field duplicate samples will be ≤30 percent; results outside this range will trigger further evaluation and investigation into causes for disparities. RPD values above 30 percent, with results less then ten times the practical quantitation limit, will be reviewed on a case-by-case basis to determine if there is any merit for further investigation. Acid preservation of the samples, as specified in the NEORSD laboratory's standard operating procedure for each parameter, will occur in the field. Appendix C lists the analytical method, method detection limit, and practical quantitation limit for each parameter analyzed. Field analyses include the use of a either a YSI-556 MPS Multi-Parameter Water Quality Meter or YSI 600XL sonde to measure dissolved oxygen, water temperature, specific conductivity and pH; and when necessary, a Hanna HI 98129 meter to measure pH. Specifications for these meters have been included in Appendix E.

The QHEI, as described in Ohio EPA's, *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)* (2006) will be used to assess aquatic habitat conditions at each sample location by Level 3 QDCs.

Species assemblages and individual metrics will be analyzed. Graphs that show current and historic QHEI, IBI, and ICI scores and how these scores compare to attainment status of biocriteria will be prepared. Water chemistry data collected will be compared to Ohio Water Quality Standards to determine whether any excursions from the applicable water quality criteria have occurred. Comparisons between water quality and biological community health will only be made if at least three water quality samples have been collected from that site.

(5) Sampling Locations

The following chemistry, habitat, electrofishing, and macroinvertebrate sample locations, listed from upstream to downstream on Dugway Brook, will be surveyed during the 2010 field season. HD and water chemistry collection sites are located within each electrofishing zone, indicated by River Mile, unless otherwise noted. GPS coordinates are recorded at the downstream end of each electrofishing zone.

Location	Latitude	Longitude	River Mile	Description	Quadrangle	Purpose
Forest Hills Park Forest Hills Blvd. and Forest Hills Ave.	N41.5218°	W81.5850°	N/A	Dugway Brook, East Branch Upstream of DEIRS Alignment	East Cleveland	Evaluate water chemistry prior to DEIRS Alignment
East 110th Street Salt Dome Road	N41.5479°	W81.6076°	N/A	Dugway Brook, East Branch Downstream of DEIRS Alignment	East Cleveland	Evaluate water chemistry prior to DEIRS Alignment
North of Lakeshore Blvd. North of NEORSD Netting facility	N41.5509°	W81.6086°	0.37	Dugway Brook Main Branch North of Lakeshore Blvd.	East Cleveland	Evaluate water chemistry, fish, habitat and macroinvertebrates
Lakeview Cemetery downstream of NEORSD flood control dam.	N41.5122°	W81.5905°	N/A	Dugway Brook, West Branch Upstream section	East Cleveland	Evaluate water chemistry, fish, habitat and macroinvertebrates prior to DWIRS alignment
10658 Dupont Avenue	N41.5446°	W81.6118°	N/A	*Dugway Brook, West Branch	East Cleveland	Evaluate water chemistry prior to DWIRS alignment
*This is the furthest downstream access location of all regulators tributary to the West Branch of Dugway Brook. It should be noted that there are two regulators (D-61 & D-03A) downstream of this location that will not be captured during sample collection as there is no access to the culvert downstream of this location.						

(6) Schedule

At least one electrofishing survey per site where applicable will be conducted between June 15 and October 15, 2010. Specific dates have not been scheduled. Stream flow and weather conditions will be assessed weekly to determine when each electrofishing pass will be conducted.

Artificial substrate samplers will be installed on Dugway Brook once, between June 15 and August 19, 2010, at all applicable sites and retrieved six weeks later. During retrieval of the HD, a qualitative sample will also be obtained. Specific

dates have not been scheduled. Stream flow and weather conditions will be assessed weekly to determine when the HD installations and retrievals will be conducted.
Water quality samples will be collected at each site a minimum of three times between June 15 and October 15, 2010.

QHEI habitat evaluations will be conducted one time at applicable sites in 2010 between June 15 and October 15. These evaluations will be conducted around the same time as one of the electrofishing surveys.

(7) QA/QC

Quality assurance and quality control of sampling and analysis methods for habitat, fish, and macroinvertebrate evaluations will follow Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volumes II* (1987, updated January 1, 1988, November 8, 2006, and August 26, 2008) and *III* (1987, updated September 30, 1989, November 8, 2006, and August 26, 2008), and *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)* (2006).

Electrofishing equipment will be used according to the guidelines listed in the operation and maintenance manual provided by Smith-Root, Inc. Malfunctioning equipment will not be used to conduct surveys. Proper steps will be taken to correct the problem as soon as possible, whether by repairing in the field or at the NEORSD Environmental & Maintenance Services Center (EMSC), or by contacting the supplier or an appropriate service company.

Subsamples of difficult-to-identify fish species will be brought back to the laboratory for verification by Level 3 Fish Qualified Data Collectors (QDC), and if necessary, sent to The Ohio State University College Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Voucher specimens will be collected as described in section (14). Endangered species and those too large for preservation will not be collected as voucher specimens, but will instead be photographed. Photographed vouchers will include features that permit definitive identification of the particular species.

All macroinvertebrate community assemblages will be collected and shipped to AMT for identification and enumeration. AMT will identify specimens to the lowest practical taxonomic level and when the condition of the specimen allows, to the level of taxonomy recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987, updated September 30, 1989, November 8, 2006, and August 26, 2008). The AMT QA/QC manual is attached in Appendix F. All macroinvertebrate specimens will be returned to NEORSD.

Voucher specimens for each site will be separated into individual vials and maintained as described in section (14). The remaining specimens for each site will be returned in a single container labeled with the site number and collection method and date. All specimens and accompanying chain-of-custody documentation will be retained by NEORSD and stored at EMSC for a period not less than ten years.

Water samples obtained for chemical analyses will be collected, labeled, and then placed on ice inside the field truck. The field truck will remain locked at all times when not occupied/visible. Sampling activities, including sample time and condition of surface water sampled, will be entered in a QDC log book and on the Surface Water Condition Sampling Field Data Form. The samples will then be delivered immediately to the NEORSD Analytical Services cooler, after which the door to the cooler will be locked, and the samples will be transferred to the custody of Analytical Services. The NEORSD Analytical Services Quality Manual and associated Standard Operating Procedures are on file with Ohio EPA. The Quality Assurance Officer at Analytical Service will send updates, revisions, and any information on document control to Ohio EPA as needed.

(8) Work Products

Within one year of completion of the project, fish data (species, numbers, pollution tolerances, the incidence of DELT anomalies, IBI scores), macroinvertebrate data (types and numbers of macroinvertebrates collected and ICI scores), habitat data (QHEI raw data and scores), and water chemistry results will be submitted to the Ohio EPA. Additionally, reports summarizing, interpreting, graphically presenting, and discussing the IBI, ICI and QHEI scores in relation to restoration activities and excursions from water quality standards may be prepared for internal use.

(9) Qualified Data Collectors

The following Level 3 Qualified Data Collectors (QDC) will be involved with this study:

Name	Address	Email Address	Phone Number	QDC Specialty(s)
[1]John W. Rhoades	4747 East 49th Street Cuyahoga Hts., Ohio 44125	rhoadesj@neorsd.org	216-641-6000	QDC – 008 CWQA /FCB/SHA/BMB
Cathy Zamborsky	4747 East 49th Street Cuyahoga Hts., Ohio 44125	zamborskyc@neorsd.org	216-641-6000	QDC - 009 CWQA/SHA
[2,5]Seth Hothem	4747 East 49th Street Cuyahoga Hts., Ohio 44125	hothems@neorsd.org	216-641-6000	QDC - 010 CWQA/FCB/SHA
Kathryn Crestani	4747 East 49th Street Cuyahoga Hts., Ohio 44125	crestanik@neorsd.org	216-641-6000	QDC - 011 CWQA/SHA
[6]Tom Zablotny	4747 East 49th Street Cuyahoga Hts., Ohio 44125	zablotnyt@neorsd.org	216-641-6000	QDC - 018 CWQA/FCB/SHA
[3] Ron Maichle	4747 East 49th Street Cuyahoga Hts., Ohio 44125	maichler@neorsd.org	216-641-6000	QDC - 145 CWQA/SHA/BMB
Francisco Rivera	4747 East 49th Street Cuyahoga Hts., Ohio 44125	riveraf@neorsd.org	216-641-6000	QDC - 262 CWQA
[4]Tiffany Moore	Aquatic Macroinvertebrate Taxonomy 8927 Weaver Road, Revenna, Ohio,44266	tiffany@digitaldesignmedia.com	330-626-2310	QDC - 017 BMB

[1] Lead Project Manager
[2] Stream Habitat Assessment (SHA) Project Manager
[3] Benthic Macroinvertebrate Biology (BMB) Project Manager
[4] Benthic Macroinvertebrate Identification
[5] Fish Community Biology (FCB) Project Manager
[6] Chemical Water Quality Assessment (CWQA) Project Manager

The following is a list of persons not qualified as a QDC who may be involved in the project. Prior to the start of sampling, the project manager will explain to each individual the proper methods for sampling. Sampling will only be completed under the direct observation of a QDC. The lead project manager will be responsible for reviewing all reports and data analysis prepared by qualified personnel prior to completion.

Name	Address	Email Address	Phone Number
Nick Barille	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Barillen@neorsd.org	216-641-6000
Joseph Broz	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Brozj@neorsd.org	216-641-6000
Tim Dobriansky	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Dobrianskyt@neorsd.org	216-641-6000
Kyle Frantz	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Frantzk@neorsd.org	216-641-6000
Kristina Granlund	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Granlundk@neorsd.org	216-641-6000
Rae Grant	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Grantr@neorsd.org	216-641-6000
Eric Hinton	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Hintone@neorsd.org	216-641-6000
John Junkin	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Junkinj@neorsd.org	216-641-6000
Mark Matteson	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Mattesonm@neorsd.org	216-641-6001
Jillian Novak	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Novakj@neorsd.org	216-641-6000
Cathy O'Grady	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Ogradyc@neorsd.org	216-641-6000

Name	Address	Email Address	Phone Number
Kevin Roff	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Roffk@neorsd.org	216-641-6000
Frank Schuschu	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Schuschuf@neorsd.org	216-641-6000
Wolfram von Kiparski	4747 East 49th Street Cuyahoga Hts., Ohio 44125	Vonkiparskiw@neorsd.org	216-641-6000
Summer Co-op	4747 East 49th Street Cuyahoga Hts., Ohio 44125	To Be Determined	216-641-6000
Summer Co-op	4747 East 49th Street Cuyahoga Hts., Ohio 44125	To Be Determined	216-641-6000
Summer Co-op	4747 East 49th Street Cuyahoga Hts., Ohio 44125	To Be Determined	216-641-6000

(10) Documentation of approval of project manager and other personnel as level 3 qualified data collectors

See attached (Appendix G).

(11) Contract laboratory contact information

Any fish that is not positively identified in the field or NEORSD laboratory will be sent to The Ohio State University Museum of Biological Diversity for verification by the Curator and/or Associate Curator of Fish. Fish will be identified to the species level.

Dr. Ted Cavender, Curator of Fish / Mr. Marc Kibbey, Associate Curator of Fish
1315 Kinnear Road, Columbus, Ohio 43212
cavender.1@osu.edu / kibbey.3@osu.edu
614-292-7873

Identification of macroinvertebrates will be completed by AMT, Ravena, Ohio. Benthic macroinvertebrates will be identified to the lowest practical level as recommended in Ohio EPA's *Biological Criteria for the Protection of Aquatic Life, Volume III* (1987, updated September 30, 1989, November 8, 2006, and August 26, 2008).

Tiffany Moore (QDC# 017)
AMT
8927 Weaver Road
Ravenna, Ohio 44266
tiffany@digitaldesignmedia.com
(330) 626-2310

(12) Copy of ODNR collector's permit

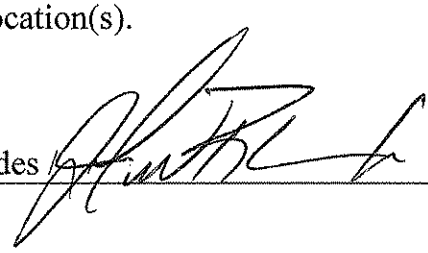
To be submitted electronically when issued to NEORSD by ODNR (Appendix H). Twenty-four hours prior to biological collection, the county ODNR wildlife officer will be contacted by a NEORSD QDC. See table below for contact information for ODNR Wildlife Officers by county. A message may be left instructing: type of sampling, location of sampling, and duration.

County	Contact Person	Phone Number
Cuyahoga County	Hollie J. Fluharty	(330) 245-3033

The most current wildlife officer contact information should always be checked at the following web address:
http://www.dnr.state.oh.us/Home/wild_resourcessubhomepage/about_the_division_landingpage/contactdefault/WildlifeOfficersbyCounty/tabid/7004/Default.aspx

(13) Catalog Statement

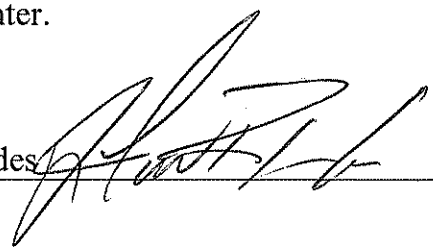
A digital photo catalog of all sampling locations will be maintained for 10 years and will include photos of the specific sampling location(s), the riparian zone adjacent to the sampling location(s) and the general land use in the immediate vicinity of the sampling location(s).

Print/Signature: John W. Rhoades  Date: 04/12/10

(14) Voucher Specimen Statement

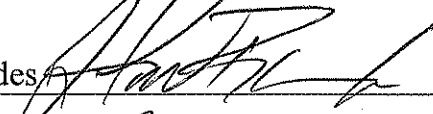
NEORSD will maintain a benthic macroinvertebrate and fish voucher collection which includes two specimens, or appropriate photo vouchers, of each species or taxa collected during the course of biological sampling from any stream within the NEORSD's service area. When benthic macroinvertebrates from multiple surface waters are collected within the same year and identified by the same QDC, one voucher collection will be created to represent the specimens collected from those streams. When fish specimens from multiple surface waters are collected within the same year, one voucher collection will be created to represent the specimens collected from those streams. A separate collection for each sampling event will not be maintained.

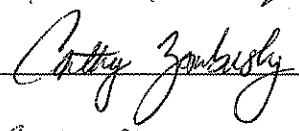
NEORSD will provide specimens or photo vouchers to the Director upon request. This collection will be stored at the NEORSD laboratory in the Environmental and Maintenance Services Center.

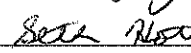
Print/Signature: John W. Rhoades  Date: 04/12/10

(15) Trespassing Statement

I have not been convicted or pleaded guilty to a Violation of section 2911.21 of the Revised Code (criminal trespass) or a substantially similar municipal ordinance within the previous five years.

Print/Signature: John W. Rhoades  Date: 04/12/10

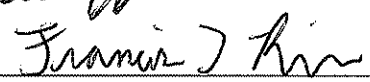
Print/Signature: Cathy Zamborsky /  Date: 4/12/10

Print/Signature: Seth Hothem /  Date: 4/12/10

Print/Signature: Kathryn Crestani /  Date: 4/12/2010

Print/Signature: Tom Zablotny /  Date: 4-14-2010

Print/Signature: Ron Maichle /  Date: 04-12-10

Print/Signature: Francisco Rivera /  Date: 4/12/10

Appendix A