Attachment I

Conowingo Hydroelectric Project
(FERC Project No. 405)

Chlorophyll-A Monitoring Plan

CONOWINGO HYDROELECTRIC PROJECT
FERC PROJECT NO. 405

CHLOROPHYLL-A MONITORING PLAN

Prepared for:

Constellation.

Prepared by:

GOMEZ AND SULLIVAN ENGINEERS

Submitted to Maryland Department of the Environment

FINAL PLAN: ~~November 2021~~

Revised: March 2023

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LIST OF ABBREVIATIONS

CBL	Chesapeake Biological Laboratory
COC	Chain-of-Custody
COMAR	Code of Maryland Regulations
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
IR	Integrated Report
MD	Maryland
MDE	Maryland Department of the Environment
ml	milliliter
NTU	Nephelometric Turbidity Units
PA	Pennsylvania
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Checks
RPD	Relative Percent Deviation
The Reservoir	Conowingo Reservoir
TMDL	Total Maximum Daily Load
ug/L	Microgram/Liter

1 INTRODUCTION

This document proposes a plan to monitor chlorophyll-a for three (3) years in the Maryland portion of the Conowingo Dam impoundment between May 1 and September 30, as required by Section 2.4 (g) of the Joint Offer of Settlement and Explanatory Statement of Exelon Generation Company, LLC) and the Maryland Department of the Environment (MDE) (i.e., the Settlement Agreement, Exelon, 2019). The Settlement Agreement states the monitoring plan "shall be designed to determine with a high level of statistical confidence whether chlorophyll-a water quality standards are exceeded in the Maryland portion of the Reservoir between May 1 and September 30 in any particular year."

The impoundment created by Conowingo dam is known as Conowingo Pool, Conowingo Reservoir, Conowingo Lake and Conowingo Pond. For the purposes of this document, it will be referred to as Conowingo Reservoir (or the Reservoir) to stay consistent with the wording of the Settlement Agreement. The Maryland portion of the Reservoir ends approximately five (5) miles above the dam and provides recreational opportunities such as boating and fishing and is the source of drinking water to the City of Baltimore and Harford County (Conowingo pond management plan, SRBC, 2006).

A draft of this plan was provided to MDE on July 23, 2021 for review in advance of Constellation's sampling program proposed to start in 2022[1]. Prior to submittal of the draft plan, Constellation and MDE held a conference call on June 10, 2021 to discuss the intent and commitments of the sampling requirement as well as previous monitoring performed by MDE and potential methods for Constellation's sampling program. MDE provided comments on the draft plan to Constellation on August 4, 2021 and Constellation and MDE subsequently held another conference call to discuss MDE's comments. On August 31, 2021, the monitoring plan was submitted to MDE and MDE provided additional comments on September 20, 2021.

Constellation revised the monitoring plan to address MDE's September 2021 comments and provided a revised plan to MDE on October 4, 2021. Constellation also provided additional information regarding the costs to implement the plan to MDE on October 15, 2021. MDE provided one additional comment to Constellation regarding the sampling time of day via email dated October 27, 2021. Constellation responded on November 1, 2021, and MDE accepted Constellation's proposed sampling times. Appendix A contains a responsiveness summary describing how Constellation addressed MDE's comments and copies of related correspondence.

Constellation has proposed to amend the Chlorophyll-a Monitoring Plan following the completion of the 2022 monitoring effort. In 2022, the analytical methodology to determine chlorophyll-a deviated from what was specified in the monitoring plan. Analytical testing of chlorophyll-a was performed using the fluorometric method (EPA 445.0, SM10200H.3) instead of the spectrophotometric method (EPA 446.0, SM10200H). The fluorometric method is the University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory (CBL) default method for analyzing chlorophyll-a in water and sediment of fresh, estuarine, and coastal areas, as it provides slightly more sensitivity than the spectrophotometric method (J. Frank, CBL, to J. Petre,

[1] The Settlement Agreement limits the study to an annual budget of $40k.

Gomez and Sullivan Engineers, D.P.C., personal communication, November 3, 2022). The laboratory calculated method detection limits (MDL) are similar between both methods. Under the fluorometric method, CBL has determined a MDL of 0.68 µg/L for chlorophyll-a and a MDL of 0.46 µg/L for phaeophytin (CBL, 2022). In comparison, the spectrophotometric method has a MDL of 0.62 µg/L for chlorophyll-a and a MDL of 0.74 µg/L for phaeophytin (CBL, 2022). All sample preservation procedures, extraction methods, and holding times are identical between the fluorometric and spectrophotometric methods. Additionally, the measuring and reporting of chlorophyll-a done by CBL is comparable between both methods.To retain consistency through the remainder of the three-year monitoring program, Constellation proposes to continue performing chlorophyll-a analysis using the fluorometric method in 2023 and 2024.

1.1 Water Quality Background

1.1.1 Standards and Guidelines

The Maryland water quality standards are found in the Code of Maryland regulations (COMAR) at 26.08.01 – 26.08.02. Chlorophyll-a is a parameter regarded as a supporting factor for the characterization of water quality conditions (MD, 2009). Chlorophyll-a concentrations indicate the amount of algae growing in a waterbody and are measured in part to determine nutrient loading in impoundments in MD since algal growth generally increases with nutrients. A chlorophyll-a concentration of 10 ug/L is recognized as the threshold between mesotrophic and eutrophic conditions (per guidance from Carlson, 1977).

Maryland's chlorophyll-a numeric criteria for public water-supply reservoirs (COMAR 26.08.02.03-3(H)) are as follows. The following criteria apply in freshwater reservoirs designated Class I-P, III-P or IV-P:

1) The arithmetic mean of a representative number of samples of chlorophyll a concentrations, measured during the growing season (May 1 to September 30) as a 30-day moving average may not exceed 10 micrograms per liter; and
2) The 90th-percentile of measurements taken during the growing season may not exceed 30 micrograms per liter.

1.1.2 Designated Uses

The reach of the Susquehanna River from the north side of the Conowingo dam to the Maryland/Pennsylvania border, is a Use I-P[2] waterbody, whose designated uses include water contact recreation, protection of aquatic life, and public water supply. A waterbody is considered "impaired" if it does not meet established water quality thresholds/criteria or if it does not support a designated use. Certain water quality criteria are used to determine if a designated use is not being met (narrative or numeric) (MDE, 2019).

Maryland's current Impaired Surface Waters 303(d) list is included in Maryland's Final 2018 Integrated Report (IR) of Surface Water Quality, submitted in accordance with Sections 303(d), 305(b), and 314 of the Clean Water Act. The IR categorizes waterbody-designated use-pollutant combinations as to whether water quality standards are being met and whether a TMDL has been

[2] "-P" signifies a waterbody is designated for public water supply.

completed or other solution has been initiated. This categorization system can thus lead to having a single waterbody (e.g., Conowingo Reservoir) being captured under different categories for different designated use-pollutant combinations.

In this manner, Conowingo Reservoir is listed under Category 2 (waters attaining standards for which they have been assessed), Category 3 (waters with insufficient information to determine if water quality standards are attained) and Category 5 (303(d) list of impaired waters for which a Total Maximum Daily Load (TMDL) is required) for different designated use-pollutant combinations. Total phosphorus is listed under Category 5 for impairing the designated use of public water supply for the reservoir, as indicated by chlorophyll-a concentrations. Nutrients tend to increase chlorophyll-a production.

1.1.3 Historical Data

Historical chlorophyll-a data within the Reservoir are limited. However, in 2017, the MDE conducted a monitoring study at eight (8) sampling locations between May and October. Chlorophyll-a concentrations from the eight (8) sample locations monitored during MDE's 2017 chlorophyll monitoring study ranged from 1.28 ug/L to 23.92 ug/L, with an average of 9.23 ug/L and a median of 8.09 ug/L[3].

According to data collected from the Environmental Protection Agency (EPA) Water Quality Portal (https://www.waterqualitydata.us/) for the Conowingo Reservoir in Maryland, before the MDE study for chlorophyll-a there was just one study conducted within the Reservoir for three (3) days in 2012. Other studies to note not directly within the Reservoir include a study conducted in 1999 at Funk's Pond which is connected to the Reservoir less than two (2) miles above Conowingo Dam, as well as data collected by the USGS at the gage on the dam (USGS Gage No. 01578310) via the dam catwalk off the tailrace[4].

[3] Data received via email from MDE (Matthew Stover) June 11, 2021.
[4] Specifically, sampling occurs at Unit #8, a Kaplan turbine that does not have aeration capabilities.

2 SAMPLING METHODS AND PROCEDURES

Constellation is committed to conducting chlorophyll-a monitoring for three (3) years in the Maryland portion of the Conowingo Reservoir, starting in 2022. Sampling methods are primarily based on procedures described in the MDE Water Quality Assessment Quality Assurance Project Plan (QAPP): Conowingo Impoundment Nutrient and Chlorophyll Sampling Component (MDE, 2021, "Conowingo QAPP") and summarized in this plan. MDE stated that Constellation's sampling method would be surface grab samples in various locations throughout the Maryland portion of the Conowingo Reservoir. The method for surface grab samples deviates slightly from the MDE QAPP which contains methods for both surface and deeper samples.

Due to the budget limitation specified in the Settlement Agreement[5], Constellation is proposing to conduct sampling two (2) times per month during May through September for three (3) years.

2.1 Sample Locations

Samples will be collected at a total of eight (8) locations within the MD portion of Conowingo Reservoir. Four (4) locations are consistent with the 2017 MDE sites (i.e., XLG0091, XLG0880, XLG2166 and XLG3360) with one location (Conowingo-5) being repositioned slightly downstream so that it lies within Maryland portion of the Reservoir (see Table 2.1-1 and Figure 2.1-1 for the proposed sampling locations). MDE sample locations from 2017 (i.e., XLG0091, XLG0880, XLG2166 and XLG3360) had chlorophyll-a concentrations ranging from 1.50 ug/L to 23.92 ug/L with an average of 10.38 ug/L and a median of 10.57 ug/L[6].

The MDE requested four (4) additional sampling locations within the Maryland portion of Conowingo Pond for a total of eight (8) sampling locations (see Table 2.1-1). The four (4) additional sampling locations suggested by MDE include Conowingo-1, Conowingo-2, Conowingo-3 and Conowingo-4 (see Figure 2.1-1). Note that Conowingo-1 was repositioned slightly upstream due to Constellation's 400-yard exclusion zone from the dam. The actual sampling locations may vary slightly based on site-specific conditions encountered upon sampling initiation.

2.2 Sample Collection

2.2.1 Field Parameters

At each sampling site, measurements of pH, temperature, dissolved oxygen, and conductivity will be collected *in situ* using a multiparameter water quality instrument. If the instrument has a turbidity sensor, a turbidity measurement in NTU will also be recorded. Prior to each sampling event, the instrument will be calibrated in accordance with the manufacturer's protocols. Calibration date, time and results will be recorded.

At each sampling site, a vertical profile of physical parameters will be measured throughout the water column at a maximum of 3-meter intervals. The top readings will be taken at approximately

[5] The Settlement Agreement limits the study to an annual budget of $40k.
[6] Data received via email from MDE (Matthew Stover) June 11, 2021.

0.3 meters from the surface and bottom readings will be taken at approximately 0.3 meters from the bottom without disturbing the bottom sediment.

Secchi readings will be taken at each sampling station when feasible. A 20-cm standard Secchi disc attached to a graduated rope will be used. The disc will be lowered into the water and the depth at which the disc just disappears is noted. The disc is then raised and the depth at which the disc reappears is noted. The average of these two readings will be recorded as the "Secchi disc reading". Optimal conditions for uses of the disc are: clear sky, sun directly overhead, lowered on the shaded protected side of the boat, under a sun shade, and minimal waves or ripples. Any departure from these conditions will be specifically recorded.

On each sampling day, weather observations will be documented (cloud cover, air temperature, wind conditions, etc.)

2.2.2 Chlorophyll-a Sample Collection and Filtration

Per discussions with MDE, surface grab samples for Chlorophyll-a will be collected. Sample methods described here are slightly different than the MDE QAPP, which focused on surface and deeper sample methods. Surface water samples will be collected by boat at each sampling location during daylight hours (between 8 am and 5 pm). Samples will be collected approximately 0.3 m below the surface of the water with a labeled brown, 1 L plastic bottle or a white 1 L plastic bottle. The bottle will be primed prior to collection at each location by rinsing with ambient water (by closing it and shaking) three (3) times. The primed bottle will then be used to collect water in a different location than that which was disturbed during the priming process (i.e., a different side of the boat, for example). The sample bottle will then be completely immersed with the opening faced down until a depth of approximately 0.3 m is reached (about elbow deep). Water will be allowed to fill the bottle by slowly tipping the bottle top up, avoiding aeration. The sample will be capped underwater, so no air is left at the top, labeled, and placed immediately on bagged ice in a cooler[7]. Sample labels will include Station ID, sample date and sample time (OWRB, 2018).

Filtering kits will be provided by the subcontracting laboratory, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory (CBL). Filtering equipment will be inspected for leaks or cracks prior to field use. Samples will be filtered by the end of the day on which samples were collected, and out of direct sunlight (and incandescent light) if possible[8].

Filtration will be done as follows (adapted from Appendix B of MDE, 2021 and CBL protocol: CBL, 2021):

1. Connect tubing to filtration flask and hand pump.

2. Rinse the 250 ml filter unit (bell and collection flask) with de-ionized water three (3) times. [Do not use sample water, as this can bias results.]

[7] Any white sample bottles will be wrapped in aluminum foil and labeled on the outside before placing in a cooler.
[8] The holding time for unfiltered chlorophyll samples is 24 hours from collection.

3. Place a 47 mm GF/F Whatman pad on the filter unit, using clean forceps. Avoid touching the pad with hands and minimize pad contact with the forceps.

4. Gently shake and invert the sample water container at least three (3) times, to mix the sample water and prevent the settling of materials.

5. Rinse a 100 ml and/or 250 ml graduated cylinder three (3) times with sample water. [Use a graduated cylinder closer in volume to the anticipated filtration volume for greatest accuracy.]

6. Use the hand pump to filter 50 ml of the sample at a time, being sure to maintain a pressure below ten (10) inches of Hg so chlorophyll is not damaged.

7. If the filter pad does not show slight coloration, continue filtering up to 1000 ml of sample water until a solid coloration has been achieved.

8. Keep filtration apparatus under pressure until the filter appears dry.

9. Release the vacuum. Fold the filter in half, keeping the sample material inside the fold, and transfer the filter to a labeled foil pouch[9]. Close the foil pouch.

10. Label the foil pouch with a sticker or thick permanent marker (thin may pierce hole) with the following information:

    - Location ID, sample collection date & time, volume filtered.

11. Transfer pouch to plastic bag. Place plastic bag in additional plastic bag or plastic container to prevent water from entering from the cooler.

Sample collection date and time and filtration date, time and volume filtered will all be recorded in a field log or field data sheet, along with the weather, personnel present, and any other pertinent information. A Chain-of-Custody (COC, see Attachment 1) will also be completed with sample collection date and time and filtration date and time and volume filtered.

Equipment used to process chlorophyll-a samples will be cleaned after each sampling event with a critical cleaning detergent such as Alconox, Liquinox, or similar, rinsed with de-ionized water and air-dried.

2.2.3 Laboratory Analysis

The University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory (CBL) will conduct the chlorophyll-a analysis. The methods used for chlorophyll-a analysis and quality control activities are described in the Nutrient Analytical Services Laboratory Standard Operating Procedures (CBL, 2022). As an added precaution for turbid locations needing less than 150 ml of filtrate, a total of three (3) filters will be provided for analysis at CBL. Each filter will have had the same volume of water filtered. Official chlorophyll-a results for these locations will

[9] To make a pouch, fold an aluminum square into thirds, like a letter.

be the average of the three (3) filters and flagged as such. Filtration replicates will ensure consistency between filtration technique and chlorophyll-a results. See Table 2.2.3-1 for holding times and detection limits.

Expected field sampling days will be discussed with the contracting laboratory for planning purposes prior to sampling. Samples and a COC are to be hand-delivered or shipped overnight on bagged wet ice to the contracting laboratory each week of sampling to:

Jerry Frank
Chesapeake Biological Laboratory
146 Williams Street
Solomons, MD 20688

The COC will be relinquished upon delivery.

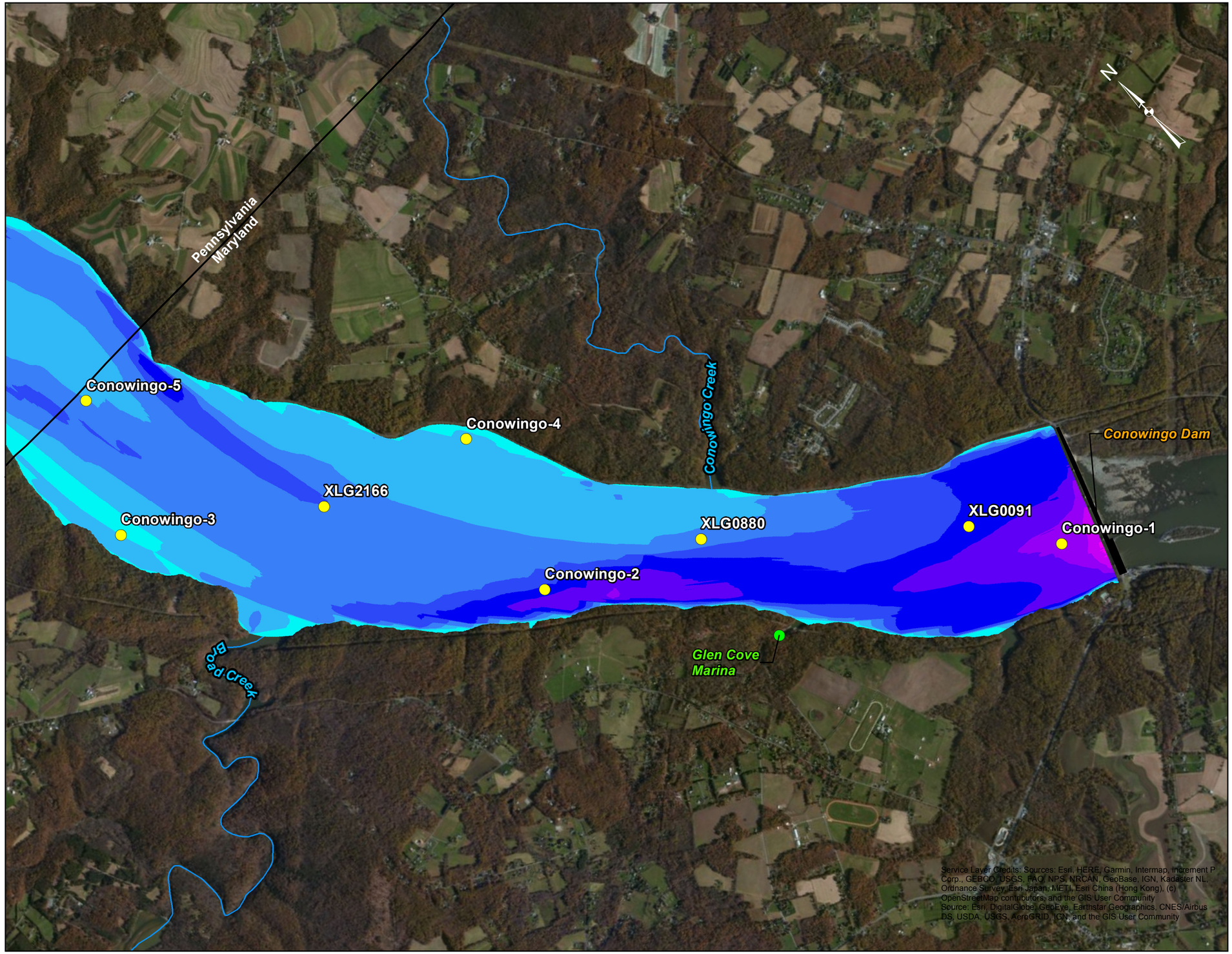
Table 2.1-1. Proposed Conowingo Reservoir Chlorophyll-a Monitoring Locations

Station ID	Latitude	Longitude	Description
XLG0091	39.667000	-76.182700	Mid-Channel. Close to Conowingo dam.
XLG0880	39.680600	-76.201400	Mid-Channel. Across from Conowingo Creek.
XLG2166	39.702400	-76.224300	Mid-Channel. Across from Broad Creek.
Conowingo-5	39.72051	-76.23288	Mid-Channel. Just below MD/PA border
Conowingo-1	39.65994	-76.17675	New station, nearest dam (at least 400 yards upstream of the dam for safety)
Conowingo-2	39.68635	-76.21532	New station, upstream of Glen Cove Marina
Conowingo-3	39.71175	-76.23978	New station, west side of Conowingo Reservoir, upstream of Broad Creek confluence
Conowingo-4	39.69828	-76.21016	New station, east side of Conowingo Reservoir, upstream of Conowingo Creek confluence

Table 2.2.3-1. CBL Chlorophyll-a Analysis Information

Parameter	Abbr.	Detection Limit	Method/Reference	Maximum Holding Time
Chlorophyll-a	CHLA	0.74 ug/l	EPA Method 445.0	30 days at -20°C

CBL, 2022



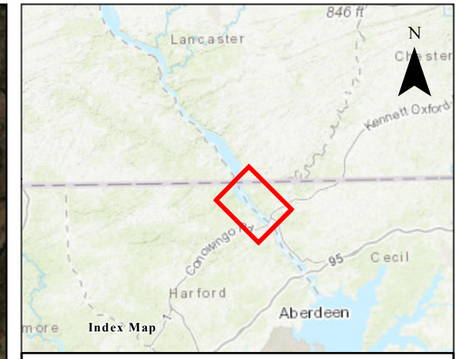


Figure 2.1-1:
Proposed Chlorophyll-a Monitoring Locations

Legend

- Proposed Station Location
- Boat Access
- Named Tributaries

Conowingo Pond Bathymetry (2020)

Bathymetry Elevation (NGVD29)

- 100' to 109.2'
- 90' to 100'
- 80' to 90'
- 70' to 80'
- 60' to 70'
- 50' to 60'
- 40' to 50'
- 30' to 40'
- <30'

1 inch = 0.5 miles

0 0.25 0.5 1 Miles

EXELON GENERATION COMPANY, LLC
CONOWINGO HYDROELECTRIC PROJECT
PROJECT NO. 405

Exelon.

Path: X:\GISMaps\project_maps\chlorophyll_plan\figure_2_1-1_proposed_monitoring_locations(8).mxd

2.3 QA/QC Methods

A duplicate field sample will be collected for every ten (10) chlorophyll-a samples. The duplicate will be collected in water undisturbed by the first sample within fifteen (15) minutes. Duplicate and sample filtrations will be done one after the other. Filtration time will be recorded for both the sample and field duplicate.

Field logs and/or field sheets will be reviewed for completeness and accuracy at the end of each field day. Anything appearing unusual or out of range will be investigated and addressed by qualified staff.

2.4 Data Management and Data QA/QC

The Relative Percent Deviation (RPD) will be included in the report for field duplicates. Laboratory Quality Assurance/Quality Checks (QA/QC) will be included in the laboratory reports attached with each monitoring report.

2.5 Reporting

Deliverables for chlorophyll-a monitoring (per the Settlement Agreement) will include:

1. An annual report with all measured chlorophyll-a levels, field parameters, sampling dates and monitoring locations by December 31 of each monitoring year (2022 – 2024).
2. A final report that provides an analysis of all the results of all the chlorophyll-a monitoring completed by June 30 of the year after the final year of monitoring (i.e., June 30, 2025).

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Contract#/Billing Reference

Page _____ of _____.

Project:						# of Containers									
Client:						Container type									
Send Results to:						Parameters to be Analyzed/ Volumes Filtered									Client Comments
Address:															
Phone:															
CBL ID #	Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials										
Relinquished by:		Date/Time	Received by:			Relinquished by:			Received for Laboratory by:				Date/Time		
Relinquished by:		Date/Time	Received by:			Date/Time	Shipper:		Airbill No.:						
Relinquished by:		Date/Time	Received by:			Laboratory Comments:							Temp.		

APPENDIX A. AGENCY CONSULTATION

	MDE Comment	Comment Date	How Addressed
General Comments			
1	Collection of Physical Water Quality Parameters - The collection of in situ physical water parameters -such as dissolved oxygen, pH, salinity, water clarity, and temperature - is standard protocol in a monitoring regime such as this. The physical data provide valuable insight into the condition of the water at the given locations. This is also relatively inexpensive and can be done rather quickly at each location during sample collection since a sampling crew will already be present at each station to collect the Chlorophyll-A samples. Collection of these physical WQ parameters in situ during the monitoring program should be included as part of your plan.	August 4, 2021	The collection of physical parameters was added as recommended. Exelon is not proposing to collect salinity as previous results from MDE's 2017 sampling effort show that salinity was always 0.2 ppt or less.
2	Number and Locations of Stations - We have suggested monitoring at eight (8) locations on the Maryland portion of the Susquehanna River upstream from Conowingo Dam. The Monitoring Plan you provided shows just six sites. Can you please provide a justification for the decrease in sites from our recommendation? Is this a smaller number of stations due to cost? MDE realizes that there is a limited and capped annual budget associated with this monitoring effort however, eight stations would seem to be a reasonable number and provide the best data.	August 4, 2021	Exelon's draft plan limited the sampling to six (6) locations due to budget limitations and built-in contingencies for unexpected events related to the sampling program. Exelon revised the final plan to include sampling at the eight (8) locations generally proposed by MDE.
3	Budget - Since the sampling regime is directly associated with a capped budget, can you please provide the bid costs for this monitoring in an itemized fashion for MDE to review?	August 4, 2021	Exelon plans to obtain updated cost proposals for the sampling program upon MDE's final approval of the sampling plan. Exelon will submit a budget tracker to MDE at the end of each sampling period with the annual reports due on December 31 from 2022-2024.
Specific Comments			
1	Standards and Guidelines Correction: Maryland does have numeric water quality criteria for chlorophyll a, specifically for public water supply reservoirs. This can be found at COMAR 26.08.02.03-3.	August 4, 2021	Edits made to final plan.
2	Designated Uses MDE would add the clarification that "A waterbody is considered impaired if it does not meet established water quality thresholds/criteria or if it does not support a designated use."	August 4, 2021	Edits made to final plan.
3	Designated Uses Suggest rewording this sentence *The IR includes assessments of waterbodies throughout the state in such a way that categorizes if or how designated uses are being met; and if designated uses are not being met, what pollutant(s) or cause(s) are hindering the designated uses from being met.*	August 4, 2021	Suggested edits made to final plan.

	MDE Comment	Comment Date	How Addressed
	to something like "The IR categorizes waterbody-designated use-pollutant combinations as to whether water quality standards are being met and whether a TMDL has been completed or other solution has been initiated.		
4	Designated Uses Another addition: This categorization system can thus lead to having a single waterbody (e.g., Conowingo Reservoir) being captured under different categories for different designated use-pollutant combinations.	August 4, 2021	Suggested edits made to final plan.
5	Designated Uses Suggest rewording this sentence: *Conowingo Reservoir is listed under Category 2 (waters attaining standards for which they have been assessed), Category 3 (waters with insufficient information to determine if water quality standards are attained) and Category 5 (303(d) list of impaired waters for which a Total Maximum Daily Load (TMDL) is required).* to something like "In this manner, Conowingo Reservoir is listed under....(TMDL) is required) for different designated use-pollutant combinations."	August 4, 2021	Edits made to final plan.
6	Historical Data Correction: Sampling was started in May of 2017.	August 4, 2021	Edits made to final plan.
7	Sampling Methods and Procedures If any sampling methods deviate from the MDE QAPP, please highlight them in this section.	August 4, 2021	Deviations from the MDE QAPP were explained in the final plan. The method for surface grab samples deviates slightly from the MDE QAPP which focuses on surface and deeper samples.
8	Sample Locations If only 6 stations are possible we'd prefer that Conowingo-2 and Conowingo-3 are the ones that do not get sampled. And instead sample Conowingo-1 and Conowingo-4 along with the original 4 locations.	August 4, 2021	Exelon revised the final plan to include sampling at the eight (8) locations generally proposed by MDE.
9	Sample Locations This statement was written in the context largely of sampling small (1st-4th order) flowing streams, not impounded water. In this case we do want to sample an area with likely lower surface flow which is why we are prioritizing Conowingo-4.	August 4, 2021	Exelon revised the final plan to include sampling at the eight (8) locations generally proposed by MDE.
10	Sample Filtration #7 First bullet typo on work “locations”	August 4, 2021	Edits made to final plan.
11	In Section 2.2.1, if the sonde unit used for recording physical water parameters has a turbidity sensor, the turbidity should be documented as well and recorded in NTU. Update the Plan to reflect this note.	September 20, 2021	The requested edits have been made in the October 2021 REV 1 plan.
12	On page 2-3, point #7 describes filtering the sample to collect and save a filtrate. We were under the impression you were not collecting the filtrate. If you are not, this bullet point is not necessary.	September 20, 2021	The requested edits have been made in the October 2021 REV 1 plan.

	MDE Comment	Comment Date	How Addressed
13	Include a provision in the Monitoring Plan that if the $40,000 annual budget is not exceeded once a contract is awarded, Exelon will seek to amend the plan to increase the frequency of sampling from twice monthly to three or four times a month (per station) as originally requested by MDE.	September 20, 2021	Response provided to MDE in separate letter dated October 15, 2021.
14	Include a statement that Exelon will supply MDE with the bid costs for the Chlorophyll-A monitoring in an itemized fashion for review. It is requested that Exelon provide both the low and high bid for the three different frequencies of sampling (2x/month, 3X/month, 4X/month).	September 20, 2021	Response provided to MDE in separate letter dated October 15, 2021.
15	Requested language in the plan to better define the sampling window each day.	October 27, 2021	Response provided to MDE via email on November 1, 2021. Sampling window of 8 am to 5 pm added to the final plan. MDE concurred via email dated November 2, 2021.

Copies of Correspondence

From: Danucalov, Andrea H:(Exelon Power) <Andrea.Danucalov@exeloncorp.com>
Sent: Friday, July 23, 2021 4:36 PM
To: Denise Keehner -MDE-; Heather Nelson -MDE-; David Seaborn -MDE-; Gregory Busch -MDE-; allison.ohanlon@maryland.gov; Matthew Stover -MDE-
Cc: David Frazier; Bethany Belmonte; Jason George
Subject: EXTERNAL EMAIL -Conowingo Hydroelectric Project (P-405) - Chlorophyll-A Levels in the Reservoir - Draft Monitoring Plan
Attachments: Conowingo Chlorophyll-a_Monitoring_Plan_Agency_Draft.pdf

All,

Pursuant to Section 2.4 paragraph (g) of the Joint Offer of Settlement signed on October 29, 2019, Exelon is providing a draft of the Chlorophyll-A Monitoring Plan for your review and comment.

We would like to setup a meeting the week of August 16, 2021 to review any comments or questions. Pending your approval of the plan, monitoring will start May 1, 2022.

Please let me know if you have any questions.

Thanks you and have a good weekend!

Andrea

Andrea Danucalov
FERC License Compliance Manager

Exelon.

Exelon Generation
Conowingo Hydroelectric Generating Station
2569 Shures Landing Road
Darlington, MD 21034
Skype: 267.533.1125
Cell: 610.301.1664
andrea.danucalov@exeloncorp.com

From: David Seaborn -MDE- <david.seaborn@maryland.gov>
Sent: Wednesday, August 4, 2021 2:51 PM
To: Danucalov, Andrea H:(Exelon Power) <Andrea.Danucalov@exeloncorp.com>
Cc: Heather Nelson -MDE- <hnelson@maryland.gov>
Subject: [EXTERNAL] Comments on draft Chlorophyll-A Monitoring Plan

Hello Andrea,

Thank you for providing a draft of the Chlorophyll-A Monitoring Plan, pursuant to Section 2.4(g) of the Settlement Agreement on July 23, 2021 for MDE to review and comment upon.

We have reviewed the draft Monitoring Plan and have provided specific comments embedded digitally in the pdf document (see attached). Let us know if you have trouble accessing those comments.

Additionally, we have two overarching items to discuss:

1) Collection of Physical Water Quality Parameters - The collection of in situ physical water parameters - such as dissolved oxygen, pH, salinity, water clarity, and temperature - is standard protocol in a monitoring regime such as this. The physical data provide valuable insight into the condition of the water at the given locations. This is also relatively inexpensive and can be done rather quickly at each location during sample collection since a sampling crew will already be present at each station to collect the Chlorophyll-A samples. Collection of these physical WQ parameters in situ during the monitoring program should be included as part of your plan.

2) Number and Locations of Stations - We have suggested monitoring at eight (8) locations on the Maryland portion of the Susquehanna River upstream from Conowingo Dam. The Monitoring Plan you provided shows just six sites. Can you please provide a justification for the decrease in sites from our recommendation? Is this a smaller number of stations due to cost? MDE realizes that there is a limited and capped annual budget associated with this monitoring effort however, eight stations would seem to be a reasonable number and provide the best data.

3) Budget - Since the sampling regime is directly associated with a capped budget, can you please provide the bid costs for this monitoring in an itemized fashion for us to review?

You had suggested in your transmittal email that we have a meeting the week of 8/16 to discuss comments, so please let us know after your review of our comments, if you still find a meeting is necessary in order for you to send in your "final" plan by the prescribed due date.

Thank you,

David Seaborn
--

David Seaborn, Ph.D.
Deputy Program Manager, Wetlands and Waterways
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
hezm2wiefsvrD q evjgerh2ksz
410-537-4465 (O)
443-621-1009 (C)
Website | Facebook | Twitter

August 31, 2021

Heather L. Nelson
Program Manager
Federal Consistency Coordinator
Wetlands and Waterways Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
hnelson@maryland.gov

Sent Via Email

RE: Conowingo Hydroelectric Project (FERC Project No. 405) Chlorophyll-a Monitoring Plan

Dear Ms. Nelson:

On October 29, 2019, Exelon Generation Company, LLC (Exelon) and the Maryland Department of the Environment (MDE) submitted a Joint Offer of Settlement (the Settlement) to the Federal Energy Regulatory Commission (FERC) regarding the new hydropower license for the Conowingo Hydroelectric Project, FERC Project No. 405. On March 19, 2021, the FERC issued a new 40-year license to the Exelon for the continued operation and maintenance of the Conowingo Hydroelectric Project.

Section 2.4(g) of the Settlement specifies that Exelon will submit to MDE for approval a plan for monitoring chlorophyll-a levels in the Maryland portion of Conowingo Reservoir within 180 days of the effective date of the new license. In accordance with this requirement, Exelon is providing herein its Chlorophyll-A Monitoring Plan for MDE approval.

A draft of this plan was provided to MDE on July 23, 2021 for review. Prior to submittal of the draft plan, Exelon and MDE held a conference call on June 10, 2021 to discuss the intent and commitments of the sampling requirement as well as previous monitoring performed by MDE and potential methods for Exelon's sampling program. MDE provided comments on the draft plan to Exelon on August 4, 2021 and Exelon and MDE subsequently held another conference call to discuss MDE's comments on August 20, 2021. The attached Chlorophyll-A Monitoring Plan addresses the comments received by MDE and Appendix A contains a response summary.

Regarding MDE's request for Exelon to submit an itemized budget for this effort, Exelon will submit a budget tracker to MDE at the end of each sampling period with the annual reports due on December 31. The budget tracker will list the amount spent by Exelon towards this effort in relation to the annual maximum of $40,000 as specified in the Settlement.

Exelon is prepared to implement the Chlorophyll-A Monitoring Plan upon approval from MDE. If you have any questions regarding this information, please contact me at 267.533.1125 or by email at Andrea.Danucalov@exeloncorp.com.

Sincerely Yours,

Andrea Danucalov
FERC License Compliance Manager
Exelon Generation
Conowingo Hydroelectric Dam
2569 Shures Landing Road
Darlington, MD 21034

Enclosure

cc: David Seaborn, MDE

September 20, 2021

via electronic mail
Andrea Danucalov
FERC License Compliance Manager
Exelon Generation Company, LLC
Conowingo Hydroelectric Generating Station
2569 Shures Landing Road
Darlington, MD 21034
Andrea.Danucalov@exeloncorp.com

Re: Conowingo Dam Water Quality Settlement Agreement, by and between the State of Maryland, Department of the Environment, and Exelon Generation Company, LLC, Chlorophyll-A Monitoring Plan

Ms. Danucalov,

The Maryland Department of the Environment (MDE), Wetlands and Waterways Program, acknowledges receipt of the Chlorophyll-A Monitoring Plan (Plan) sent by Jason George of Gomez and Sullivan Engineers on August, 31, 2021 in accordance with Section 2.4(g)(1) of the Conowingo Dam Water Quality Settlement Agreement, by and between the State of Maryland, Department of the Environment, and Exelon Generation Company, LLC (Settlement Agreement). MDE has reviewed the Plan and has the following comments:

1. In Section 2.2.1, if the sonde unit used for recording physical water parameters has a turbidity sensor, the turbidity should be documented as well and recorded in NTU. Update the Plan to reflect this note.

2.On page 2-3, point #7 describes filtering the sample to collect and save a filtrate. We were under the impression you were not collecting the filtrate. If you are not, this bullet point is not necessary.

3. Include a provision in the Monitoring Plan that if the $40,000 annual budget is not exceeded once a contract is awarded, Exelon will seek to amend the plan to increase the frequency of sampling from twice monthly to three or four times a month (per station) as originally requested by MDE.

4. Include a statement that Exelon will supply MDE with the bid costs for the Chlorophyll-A monitoring in an itemized fashion for review. It is requested that Exelon provide both the low and high bid for the three different frequencies of sampling (2x/month, 3X/month, 4X/month).

Please amend the Plan and resubmit within the next fourteen (14) days. If you have any questions, please contact David Seaborn, Deputy, Wetlands and Waterways Program at david.seaborn@maryland.gov or call 410-537-4465.

Sincerely,

Heather L. Nelson, Manager
Wetlands and Waterways Program
Maryland Department of the Environment

(via electronic mail)
cc: Jason George, Gomez and Sullivan Engineers
Matthew Stover, Chief, Water Quality Standards Section, MDE

October 4, 2021

Heather L. Nelson
Program Manager
Federal Consistency Coordinator
Wetlands and Waterways Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
hnelson@maryland.gov

Sent Via Email

RE: Conowingo Hydroelectric Project (FERC Project No. 405)
MDE Offer of Settlement - Chlorophyll-a Monitoring Plan

Dear Ms. Nelson:

On October 29, 2019, Exelon Generation Company, LLC (Exelon) and the Maryland Department of the Environment (MDE) submitted a Joint Offer of Settlement (the Settlement) to the Federal Energy Regulatory Commission (FERC) regarding the new hydropower license for the Conowingo Hydroelectric Project, FERC Project No. 405. On March 19, 2021, the FERC issued a new 50-year license to Exelon for the continued operation and maintenance of the Conowingo Hydroelectric Project.

Section 2.4(g) of the Settlement specifies that Exelon will submit to MDE for approval a plan for monitoring chlorophyll-a levels in the Maryland portion of Conowingo Reservoir within 180 days of the effective date of the new license. In accordance with this requirement, Exelon provided its Chlorophyll-A Monitoring Plan for MDE approval on August 31, 2021. MDE provided subsequent comments in a letter to Exelon dated September 20, 2021. The attached Chlorophyll-A Monitoring Plan addresses the September 20, 2021 comments with the exception of comments #3 and #4 which pertain to Exelon's consultant procurement process, budgets and potential increases in sample frequencies. As noted in *Appendix A – Agency Consultation*, Exelon is requesting additional time to discuss these comments with MDE. In addition, we are currently working with our vendor to obtain a proposal to support this work and request an extension until November 4, 2021.

In addition to the MDE comments, Exelon also made a minor change to the August 31, 2021 monitoring plan. This change is in *Section 2.2.2 Chlorophyll-a Sample Collection and Filtration*; in the 1st paragraph the clause "between 9:00 AM and 3:00 PM" was replaced with "during daylight hours." This change was made to address concerns of field sampling staff who requested more flexibility with respect to field work starting and ending time.

If you have any questions regarding this information, please contact me at 267.533.1125 or by email at Andrea.Danucalov@exeloncorp.com.

Sincerely Yours,

Andrea Danucalov
FERC License Compliance Manager
Exelon Generation
Conowingo Hydroelectric Dam
2569 Shures Landing Road
Darlington, MD 21034

Enclosure

cc: David Seaborn, MDE

October 15, 2021

Heather L. Nelson
Program Manager
Federal Consistency Coordinator
Wetlands and Waterways Program
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
hnelson@maryland.gov

Sent Via Email

RE: Conowingo Hydroelectric Project (FERC Project No. 405) Chlorophyll-A Monitoring Plan

Dear Ms. Nelson:

Thank you for allowing us extra time to gather additional data concerning the estimated costs to implement the Chlorophyll-A Monitoring Plan submitted to MDE on August 31, 2021 (and revised on October 4, 2021). We believe that the plan meets the requirements of the Offer of Settlement dated October 29, 2019. Paragraph 2.4(g) states the following:

> *(g) Chlorophyll-A Levels in the Reservoir.*
>
> > *(1) No later than one hundred eighty (180) days after the Effective Date, Exelon shall submit to MDE for approval a plan for monitoring chlorophyll-A levels in the Maryland portion of the Reservoir (the "Chlorophyll-A Monitoring Plan"). The Chlorophyll-A Monitoring Plan shall provide for collection of three (3) years of data on chlorophyll-A levels in the Maryland portion of the Reservoir between May 1 and September 30, in accordance with a monitoring protocol to be provided by MDE no later than thirty days after approval of the Chlorophyll-A Monitoring Plan by MDE, and shall be designed to determine with a high level of statistical confidence whether chlorophyll-A WQS are exceeded in the Maryland portion of the Reservoir between May 1 and September 30 in any particular year. Exelon shall be required to expend no more than a maximum of $40,000 per year in connection with the costs of the Chlorophyll-A Monitoring Plan and any associated annual reporting as described below. Exelon shall comply with the Chlorophyll-A Monitoring Plan after it is approved by MDE.*
> >
> > *(2) Pursuant to the Chlorophyll-A Monitoring Plan, Exelon shall provide MDE with (a) annual reports of all measured chlorophyll-A levels and dates and locations of monitoring in the Maryland portion of the Reservoir by December 31 of the year in which the monitoring occurred; and (b) a final report that analyzes and presents the results of all chlorophyll-A monitoring completed by June 30 of the year after the final year of monitoring.*

The plan that we have provided was designed to determine with a high level of statistical confidence whether chlorophyll-A water quality standards are exceeded in the Maryland portion of the Conowingo Pond between May 1 and September 30 in any particular year. We have obtained a quote from Normandeau to do the field work and also a quote from Gomez and Sullivan who will provide project management support and complete the annual reports due each year as well as the final report due in 2025. Both vendors bring expertise in the area, along with extensive familiarity of Conowingo Pond, and a proven track record of completing work on time and within budget. Both vendors will contract directly with Exelon in order to avoid any additional charges by having Normandeau subcontracted to Gomez and Sullivan. Both vendors have been vetted by our procurement team and meet our requirements concerning safety.

Below is a table showing tasks and estimated costs broken out by reporting and project management, field work, and laboratory services.

Cost Estimate to Complete Conowingo Chlorophyll-a Monitoring 2022-2024 - Eight Sites, 2X/Month

Task No.	Task Description	Reporting and PM	Field Component	Laboratory Services	TOTAL COST
1	Chlorophyll-a Monitoring 2022	$10,414	$25,277	$1,630	$37,321
1.1	Planning, Mobilization, and Safety Training	$1,638			$1,638
1.2	Field Sampling - 8 sites, 10 events	$730	$25,277		$26,007
1.3	Data Analysis and Compilation (includes lab costs)	$1,799		$1,630	$3,429
1.4	Reporting and Project Management	$6,246			$6,246
2	Chlorophyll-a Monitoring 2023	$10,722	$26,035	$1,720	$38,477
2.1	Planning, Mobilization, and Safety Training	$1,689			$1,689
2.2	Field Sampling - 8 sites, 10 events	$730	$26,035		$26,765
2.3	Data Analysis and Compilation (includes lab costs)	$1,858		$1,720	$3,578
2.4	Reporting and Project Management	$6,444			$6,444
3	Chlorophyll-a Monitoring 2024	$11,030	$26,816	$1,800	$39,646
3.1	Planning, Mobilization, and Safety Training	$1,740			$1,740
3.2	Field Sampling - 8 sites, 10 events	$730	$26,816		$27,546
3.3	Data Analysis and Compilation (includes lab costs)	$1,918		$1,800	$3,718
3.4	Reporting and Project Management	$6,642			$6,642
4	Final Report (Due 2025)	$11,863	$0	$0	$11,863
	TOTAL	**$44,028**	**$78,128**	**$5,150**	**$127,306**

The estimated cost to complete the work that Exelon committed to in the Offer of Settlement meets the requirement of the settlement in that we are not expending more than a maximum of $40,000 per year and we are implementing a plan that will provide statistical confidence regarding chlorophyll-A levels relative to MDE water quality standards. Costs in the table above have been escalated with a cost of living adjustment and do not reflect any contingency, which we normally assume 10% in order to account for delays due to weather or mechanical issues with a boat, etc.

In Year 1, Exelon estimates that the cost to perform the study and prepare the annual report will cost $37,321; Year 2 a cost of $38,477; and Year 3 a cost of $39,646. Costs to prepare the final report in 2025 are estimated at about $12,000. Given our experience with Normandeau and their proximity to the

Conowingo Project and lack of additional charges for travel and mobilization and the expertise provided by Gomez and Sullivan, Exelon is not bidding this work. In addition, we do not believe additional language is required in the plan concerning the budget agreed to by both MDE and Exelon as specified in the Offer of Settlement. Due to how close the costs are to the $40,000 cap, especially in Year 2 and Year 3, Exelon does not recommend any additional sampling sites or sampling events in any of the years as that will result in an increase in the budget that was agreed to.

Proposals and invoices are business confidential. However, if MDE would like to see a summary of annual invoices to verify that we have not exceeded the $40,000 budget specified in the Offer of Settlement, we will need to work through confidentiality requirements to ensure that such information is kept confidential.

We respectfully request that MDE approve the plan that we submitted on August 31, 2021 with changes submitted on October 4, 2021, and that MDE indicate that we have satisfactorily addressed the comments in your September 20, 2021 letter.

Sincerely Yours,

Andrea Danucalov
FERC License Compliance Manager
Exelon Generation
Conowingo Hydroelectric Dam
2569 Shures Landing Road
Darlington, MD 21034

cc: David Seaborn, MDE

From: David Seaborn -MDE- <david.seaborn@maryland.gov>
Sent: Tuesday, November 2, 2021 2:40 PM
To: Jason George
Cc: Danucalov, Andrea; Heather Nelson; David Frazier
Subject: Re: Exelon's Chlorophyll-A Monitoring Plan for Conowingo

Jason,

We would be fine with a sampling window of 8-5. That sounds reasonable.

Dave

On Mon, Nov 1, 2021 at 4:15 PM Jason George <jgeorge@gomezandsullivan.com> wrote:

> Hi Dave,
>
> The chlorophyll sampling plan initially specified the 9 am to 3 pm sampling window. However, after talking with the field sampling crew and further refining the work plan and budget, we felt the sampling window was too narrow for a few reasons:
>
> - Our intent is to complete sampling at all 8 sites within one day, so the 9 am start time may be too late, especially in the spring/fall months when darkness sets in earlier.
> - We agreed to collect vertical profile data along with the chlorophyll sampling. With the boat travel time between sites on the reservoir, and potential for stronger winds in the afternoon hours, we have assumed that each site would take about one hour to complete.
> - The chlorophyll samples need to be filtered within 24 hours of collection. The later start time may affect this should the crew run into any issues on the water.
> - A wider window of say 8 am to 5 pm will allow for more time for contingencies if unforeseen issues arise in the field.
>
> Therefore, we suggest that the sampling window be from 8 am to 5 pm. Our intention is not to start at dawn and be off the water by mid-morning. We simply wanted to make sure we had enough time to complete the sampling tasks at all sites within one day.
>
> Please let us know if you have any concerns or if you would like to have a quick call to come to an agreement on this.

Jason George

Gomez and Sullivan Engineers

PO Box 2179

Henniker, NH 03242

Direct: (716) 402-6791

Cell: (603) 340-7666

From: David Seaborn -MDE- <david.seaborn@maryland.gov>
Sent: Wednesday, October 27, 2021 2:43 PM
To: Danucalov, Andrea <Andrea.Danucalov@exeloncorp.com>; Heather Nelson <hnelson@mde.state.md.us>
Cc: Jason George <jgeorge@gomezandsullivan.com>; David Frazier <dfrazier@gomezandsullivan.com>
Subject: Re: [EXTERNAL]Re: Exelon's Chlorophyll-A Monitoring Plan for Conowingo

Andrea,

Thank you for the reply. I'm glad to hear you don't see the addition of this 'time of day sampling' language as a problem.

Dave

On Wed, Oct 27, 2021 at 2:32 PM Danucalov, Andrea H:(Exelon Power) <Andrea.Danucalov@exeloncorp.com> wrote:

> Hi Dave,
>
> We will take a look – I don’t see this as a problem. We will work on the language and get back to you.

Thanks,

Andrea

From: David Seaborn -MDE- <david.seaborn@maryland.gov>
Sent: Wednesday, October 27, 2021 8:41 AM
To: Jason George <jgeorge@gomezandsullivan.com>
Cc: Danucalov, Andrea H:(Exelon Power) <Andrea.Danucalov@exeloncorp.com>; David Frazier <dfrazier@gomezandsullivan.com>
Subject: [EXTERNAL]Re: Exelon's Chlorophyll-A Monitoring Plan for Conowingo

Jason/Andrea,

Thank you for the opportunity to read over the Revised Chlorophyll-A Monitoring Plan. We have one last item to discuss, and I assure you this is the last one. We would like to see some language as to the sampling time for this monitoring. We would like to see the samples collected around a window of something like 9-3. Since Chlorophyll-A can exhibit diurnal patterns, we just want to make certain all the samples are not collected from sunrise to 9:00 AM. Could you please add language to better define the sampling window each day?

Thank you,

Dave Seaborn

From:	Joseph Petre
To:	David Seaborn. MDE
Cc:	Danucalov, Andrea H:(Constellation Power); David Frazier; Vines, Gregg A:(Constellation Power - TSA)
Subject:	RE: Conowingo Chlorophyll-a Monitoring Program - Revised Monitoring Plan for MDE Review
Date:	Monday, May 15, 2023 3:52:00 PM
Attachments:	image001.png image002.png

Hello David,

As requested, here is a new link to the revised Conowingo Chlorophyll-a Monitoring Plan.

Conowingo Chlorophyll-a_Monitoring_Plan_2023_update_MDE_draft.docx

Please let me know if I can assist with anything else,

Joe

Joseph Petre
Environmental Scientist
Gomez and Sullivan Engineers, DPC
1961 Wehrle Dr, Ste 12 | Williamsville, NY 14221
O: (716) 250-4960 | D: (716) 402-6809
jpetre@gomezandsullivan.com

30th GOMEZ AND SULLIVAN ESTABLISHED 1993

From: Joseph Petre
Sent: Monday, March 27, 2023 12:08 PM
To: David Seaborn. MDE <david.seaborn@maryland.gov>
Cc: Danucalov, Andrea H:(Constellation Power) <u000ahd@constellation.com>; David Frazier <dfrazier@gomezandsullivan.com>; Vines, Gregg A:(Constellation Power - TSA) <Gregg.Vines@constellation.com>
Subject: Conowingo Chlorophyll-a Monitoring Program - Revised Monitoring Plan for MDE Review

Hello,

On behalf of Constellation, the following link contains a draft of the revised Conowingo Chlorophyll-a Monitoring Plan for MDE review.

Conowingo Chlorophyll-a_Monitoring_Plan_2023_update_MDE_draft.docx

As you are aware, during the first season of chlorophyll-a monitoring (between May 1 and

September 30, 2022) the analytical methodology to determine chlorophyll-a deviated from what was specified in the plan. As requested during the December 16, 2022, conference call, Constellation has revised the monitoring plan to retain consistency through the remainder of the three-year monitoring program. In addition to the change in methodology, the plan has been updated to reflect the name change from Exelon to Constellation that occurred following the plan being finalized in November 2021. All changes to the document are provided in track-changes for your review.

Constellation is requesting comments by April 26, 2023 (30 days). Please send all comments to Andrea Danucalov and me.

Sincerely,

Joe

Joseph Petre
Environmental Scientist
Gomez and Sullivan Engineers, DPC
1961 Wehrle Dr, Ste 12 | Williamsville, NY 14221
O: (716) 250-4960 | D: (716) 402-6809
jpetre@gomezandsullivan.com