NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Remedial Bureau C
625 Broadway, 11th Floor, Albany, NY 12233-7014
P: (518) 402-9662 I F: (518) 402-9679
www.dec.ny.gov

July 13, 2020

Nicole Wireman, REM
Restoration Program Manager
NGB/A4VR
National Guard Bureau
3501 Fetchet Avenue
Joint Base Andrews, MD 20762-5157

Re: Draft Final Expanded Site Inspection Report
Stewart Air National Guard Base Site
NYSDEC Site No. 336089

Dear Ms. Wireman,

The New York State Department of Environmental Conservation (DEC) and the New York State Department of Health (NYSDOH) have reviewed the Draft Final Expanded Site Inspection (ESI) Report dated June 12, 2020 for the Stewart Air National Guard Base (SANGB) site. The following modifications and clarifications listed below are hereby requested:

Please note that several items listed below for the main body of the report also apply to the Executive Summary. Please be sure to revise the Executive Summary to reflect changes in the report, most notably Section 7.0, as appropriate.

1. **Section 1.0 Introduction, seventh paragraph:** The sentence "To-date soil samples have not exhibited elevated concentrations of PFAS" should be clarified or removed since it is not clear what standard of measurement is used to define “elevated”. When comparing soil data from the Site Inspection (SI) Report to the new perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) screening level (SL) of 0.13 mg/Kg for soil and sediment, several locations all exhibit exceedances and could therefore be considered “elevated” (e.g. 01SB01 has 0.52 mg/kg PFOS, 03SB03 has 0.22 mg/Kg PFOS, 06SB03 has 0.139 mg/Kg PFOS, and 11SB03 (field duplicate) has 0.158 mg/Kg PFOS).

2. **Section 2.5 Hydrogeology, first paragraph:** This section states that "the Normanskill Formation and underlying bedrock have very low permeability and yield low volumes of groundwater". However, the site geology description found in Section 2.3 does not contain any information regarding stratigraphic units that underlie the Normanskill Formation at the site. Furthermore, without a frame of reference, it is difficult to determine what constitutes “low” for permeability and groundwater yield. Therefore, please revise the sentence, or Section 2.3, and provide a supporting reference for what constitutes low permeability and low groundwater yield.

3. **Section 2.5 Hydrogeology, third paragraph:** The sentence "…the subsurface materials do not present a ready pathway for a groundwater plume" should be clarified or removed.

   There has been no site-wide evaluation of the bedrock, and without additional information about the bedrock migration pathway, any conclusions about subsurface materials and its ability to act as a preferential pathway for contamination is premature. Furthermore, as stated in Section 2.3, stream channels and other features that create preferential subsurface flow pathways may be buried beneath the disturbed areas that were replaced by fill material. Such features may provide a "ready pathway" and thus must be fully evaluated under the Remedial Investigation / Feasibility Study (RI/FS).

   Lastly, although glacial till may not present a "ready pathway" for a groundwater plume, that does not mean that one does not exist in the till. For example, the 0.547 µg/L (547 ppt) of PFOS and PFOA observed in RPMW-01 suggest that PFAS-impacted water has migrated downgradient from Recreation Pond and must therefore be further delineated.

4. **Section 3.4.2 Monitoring Well Development:** This section should state that monitoring well LWMW-04 was developed, not LWMW-01 as is currently written. Please revise.

5. **Section 4.2.5 Dry Weather Field Sampling and Expanded Inflow Investigations, first paragraph**: This section states "Areas for further inspection and sampling of [Per and Polyfluoroalkyl Substances] PFAS were prioritized based on historical stormwater sampling activities by the [Stewart International Airport] SIA and NYSDEC". Please provide the historical stormwater sampling activities conducted by both organizations as an appendix to this report.

6. **Section 4.2.5 Dry Weather Field Sampling and Expanded Inflow Investigations, third paragraph**: Please provide additional detail on the current and historical usage (e.g. roof drain, perimeter drain…etc.) of the 6-inch diameter plastic storm drain line located on the east side of the current fire station. The possibility that water exfiltrated from this line prior to reaching its expected outlet lends further credence to the recommendation that all piping present at the fire station undergo tightness testing, particularly given the concentrations of PFAS, most notably PFOS concentrations of up to 480 µg/L or 480,000 ppt, detected in building floor drains in 2017.

7. **Section 4.3.3 Storm Flow Sampling for PFAS and Select Pollutants:** Please describe how the "time of concentration" was computed for each outfall and what the input parameters were for the automated samplers (e.g. sampling interval, total length of sampling time, volume collected per sample…etc.).

8. **Section 4.4.4 SWMM Calibration, second paragraph:** This section states "The final calibrated values were validated against what would be considered a reasonable range for the specific parameter before finalizing the calibration". Please provide additional information on the "reasonable range" for a specific parameter and why it may be considered reasonable.

9. **Section 6.2 Stormwater Monitoring Results** and **Figure 8:** Please clarify which of the Figure 8 series should apply to a specific portion of the text. Figure 8-1 through 8-6 each show something different, yet the text only references "Figure 8".

10. **Section 6.2.2 Stormwater Sampling for PFAS:** There appears to be significant variation for the PFOS and PFOA Event Mean Concentration at each outfall. For instance, the 0.53-in rainfall event (lasting 19.5 hours) on Oct 3, 2019 produced a PFOS and PFOA mean concentration of 0.141 µg/L but a similar rainfall event on Dec 9, 2019 (lasting 48 hours) that produced 0.54 inches had a markedly higher PFOS and PFOA concentration of 0.896 µg/L. Is there a leading hypothesis as to why these variations occur?

11. **Section 6.2.3.3 Discussion, first paragraph**: Since this section states that the "potential PFOS/PFOA contribution from sediment is orders of magnitude lower than the stormwater contribution of PFOS/PFOA into Recreation Pond", it would be beneficial to state in this section what the stormwater contribution of PFOS/PFOA into Recreation Pond is in grams/day. Please revise.

12. **Section 6.2.3.3 Discussion, fourth paragraph**: There is a brief discussion of capping or removal of Recreation Pond sediments found in this section. Please consider removing this mention since it represents an evaluation of a mitigation alternative and would therefore be more appropriately discussed as part of a feasibility study.

13. **Section 6.3 Stormwater Modeling, Figure 11,** and **Table 9:** Please clarify which of the Figure 11 series and the Table 9 series applies to each specific section of text.

14. **Section 6.3.2 SWMM Calibration:** This section states that “while the calibrated model shows a good alignment with 03 October 2019 observed storm data for both the hydrologic and water quality parameters, when the calibrated model was compared to the 16 October 2019 rainfall event, reproduced model results were within approximately +/- 30% for the peak flow and volume with the exception of Outfall A” and “the PFOS and PFOA concentration compared to the observed 16 October 2019 sampling results event also were outside of +/- 15% from the observed values.” The Figure 13 series only displays the “good alignment” of the calibrated stormwater management model to the October 3, 2019 rainfall event and not those from October 16, 2019 rainfall event with which did not compare as well. Since there are only two rainfall events in which the model was applied to with an alignment variance between approximately 15% to 30%, it may be inadvertently misleading to only show the results from one rainfall event and not the other. Therefore, please add figures from the other rainfall event as an appendix. It would be beneficial to frame this new appendix as the steps used to calibrate the model.

15. **Section 6.3.2 SWMM Calibration, second paragraph:** The sentences “…with the exception of Outfall A. The only exception was Outfall 17K…” is awkward since it isn’t clear which Outfall is the exception. Please revise.

16. **Section 6.3.2 SWMM Calibration, second paragraph:** This section states "Below are additional recommendations for each outfall to refine the model’s calibration". However,

recommendations are only provided for Outfall A and 17K. Please add in the missing recommendations for Outfall 002 and 003.

17. **Section 6.3.3 Recreation Pond Storm Flow Scenarios, first paragraph**: This section states that the dry weather PFOS concentrations from the November 7, 2019 rainfall event were used as input. However, Figures 13-5 through 13-9 show October 3rd through the 6th, 2019 as the x-axis for the PFOS graphs. Please reconcile.

18. **Section 6.3.3 Recreation Pond Storm Flow Scenarios, second paragraph**: The 2-year stormwater flows are shown in gallons per minute (gpm) but the 100-year stormwater flows are shown in cubic feet per second (cfs). Please revise to use consistent units for the flow ranges provided and clarify if the values are indeed in cfs or gpm. Figure 13-5 through 13-9 show the same values listed in this section but all in gpm.

19. **Section 6.3.3 Recreation Pond Storm Flow Scenarios, second paragraph**: Figures 13-5 through 13-9 show the mean PFOS concentrations increase at Outfalls A and 002 from a 2-year storm to a 5-year storm with a correspondingly higher flow rate. This appears contrary to the field observations of higher concentrations occurring during lower flow rates (as stated in section 7.0). Please clarify and include additional discussion on the stormwater flow and PFOS/PFOA modeling results shown in Figure 13-5 through 13-9.

20. **Section 6.3.3 Recreation Pond Storm Flow Scenarios, third paragraph**: This section states that “further inspection and calibration of the PCSWMM model is recommended in the remedial investigation phase to develop a higher level of confidence in these results.” Please consider developing a clear definition or a specific metric that defines what a "higher level of confidence" would be. As it is currently written, it is not clear what a higher confidence level means or what the current confidence level is.

21. **Section 6.4.1 Silver Stream PFAS Loads into Lake Washington, second paragraph**: This section concludes by stating "to form any conclusions regarding dilution of the PFOS and PFOA concentrations would require further inspections that include additional upstream sampling prior to the confluence with the Outfall 010 inflows." The original SI report does contain surface water sampling results along the Recreation Pond tributary beginning at Recreation Pond/Outfall 10, at silver stream upstream and downstream of the sampling point from this investigation, as well as a point upstream prior to the confluence with Outfall 10 flows. Consistent with **Section 6.6.1 Silver Stream PFAS Loads into Lake Washington** of the Expanded SI Work Plan, dated June 9, 2019, this existing dataset should be utilized along with the stream discharge curve presented in this section to help form conclusions regarding Silver Stream PFAS Loads into Lake Washington.

22. **Section 6.4.3 Recreation Pond Tributary, second paragraph**: It is understood that repeat sampling of the Recreation Pond Tributary has shown that the RPTSW-01 sample taken October 19, 2017 was anomalously high compared to samples taken upstream and downstream, and at a similar location during subsequent sampling events. However, the explanation provided indicates that, at one time, there was standing water downstream of Recreation Pond with field conditions that resulted in 15.17 µg/L (15,170 ppt) combined

PFOS and PFOA, and 56.5 µg/L (56,500 ppt) sum of all six PFAS. Standing water that may contain similar field conditions, and thus potentially similar PFAS concentrations, should be evaluated during the RI/FS to see if they exist elsewhere in this area.

23. **Section 6.4.5 Groundwater Elevation Results:** Please state whether Figure 9 represents groundwater within the overburden aquifer, bedrock aquifer, or a combination. Most wells appear to be screened within the overburden but bedrock wells MW-07 and MW-14 are shown (albeit without elevations) and it is not clear whether they should be included given the absence of other bedrock wells. Furthermore, if this figure only details groundwater elevations for the overburden aquifer, please provide additional analysis on groundwater flow direction and elevation for the bedrock aquifer.

24. **Section 7.0 Conclusions/Recommendations, first bullet** and **Executive Summary:** The former base landfill and wastewater retention ponds both contain SL exceedances in groundwater, not just Recreation pond. Please revise.

25. **Section 7.0 Conclusions/Recommendations, first bullet** and **Executive Summary:** The sentence "A groundwater PFAS plume does not appear to be migrating to or impacting Lake Washington" should be removed as there is insufficient data to support this conclusion. There are eight bedrock wells, seven set within the weathered shale (MW-5, MW-7, MW-9, MW-11, MW-16, MW-18, MW-19) and one within the competent shale (MW-14), that are located around the former SANGB landfill, on the eastern property boundary of the base, that have combined PFOS and PFOA concentrations ranging from 0.00332 µ/L (3.32 ppt) at MW-14 to 1.83 µg/L (1,830 ppt) at MW-18. The latter values are particularly concerning since they are significantly higher than the United States Environmental Protection Agency (USEPA) Lifetime Health Advisory (LHA) of 70 ppt and the New York State Drinking Water Quality Council Recommended Maximum Contaminant Level (RMCL) of 10 ppt for PFOS and PFOA. There are no monitoring wells screened across the weathered bedrock downgradient of the landfill and thus, there are no points providing any delineation of bedrock contamination between the SANGB and Lake Washington. Furthermore, there has been no comprehensive evaluation of the bedrock at Recreation Pond or the wastewater retention basins, both areas having been identified in the SI and ESI as having considerable concentrations of PFAS in overburden groundwater at each location, nor has there been any evaluation of the bedrock anywhere else on-site.

    In terms of the overburden aquifer, the PFOS and PFOA concentrations detailed in this report from MW-113 (22.3 µg/L or 22,300 ppt) and RPMW-01 (0.547 µg/L or 547 ppt) have only a limited number of side or downgradient monitoring wells that may provide any delineation of groundwater contamination observed within the overburden aquifer.

    It is encouraging that sampling events in January 2019 and October 2019 have shown PFOS and PFOA concentrations at one or both side-gradient monitoring wells SLMW-20D and SLMW-21S below either the USEPA LHA or RMCL, and the Lake Washington groundwater table wells (LWMW-01, LWMW-02, and LWMW-04) have PFOS and PFOA concentrations below the RMCLs. However, any conclusion about groundwater impacts to the Lake Washington can only be made once all data gaps have been addressed

and the full nature and extent of contamination delineated. Additional wells should be installed in-between the SANGB and Lake Washington at a variety of screened intervals that cover deeper portions of the overburden as well as bedrock to ensure comprehensive coverage of both aquifers as well as completely delineating the contamination currently observed along the SANGB property boundary. Monitoring well placement should consider the possibility of radial flow outwards from SANGB source areas, the structure and composition of the bedrock, buried or former stream channels, and any other pertinent subsurface information that would influence contaminant migration.

26. **Section 7.0 Conclusions/Recommendations, fifth bullet** and **Executive Summary:** This statement implies that Lake Washington is the only exposure pathway to receptors in the area. However, there are other receptors such as downgradient surface water bodies, private drinking water supply wells, and some regulated public drinking water supply wells in the area that have been impacted by PFAS. Please revise.

27. **Section 7.0 Conclusions/Recommendations, eleventh bullet** and **Executive Summary:** The conclusion that the volume of stormwater "discharging from Recreation Pond likely exceeds the ability to treat it all using conventional filtration media" and that "Recreation Pond will likely require a treatment capacity so large, that it may not be feasible given the observed site conditions" should be clarified to say that a single treatment system may not be able to treat all stormwater given the spatial limitations at Recreation Pond and the size of the treatment system required. However, a treatment system when implemented in conjunction with other stormwater mitigation options (e.g. additional stormwater storage, flow reduction/re-routing) may be feasible.

    It is important to note that any formal declaration of what is feasible or not should come as a result of a Feasibility Study or Focused Feasibility Study, where a variety of mitigation options are closely examined in accordance with 40 CFR § 300.430 and NYSDEC DER-10 guidance. Given new information gained from the ESI and the shortcomings with the current treatment system at Recreation Pond, DEC strongly recommends that such a study is undertaken as soon possible.

28. **Section 7.0 Conclusions/Recommendations** and **Executive Summary:** An RI requires delineation of all on-site and off-site contamination, yet nothing is mentioned in this section regarding additional off-site work while the recommended on-site work is described only in general terms (e.g. "Collecting samples throughout the study area..." – fourteenth bullet). A detailed, comprehensive list of RI objectives should be developed and listed here. At a minimum, they should include an evaluation of the contaminant pathway to off-site PFAS-impacted private drinking water supply wells and regulated public drinking water supply wells as mentioned in **Comment 26**, delineation of the full extent of PFAS in the overburden and bedrock aquifers both on and off-site as mentioned in **Comment 25**, continued investigation and delineation of potential source areas, additional rounds of site-wide groundwater sampling to determine variation in both PFAS concentrations and flow directions, as well as those continued evaluations of on-site drainage infrastructure already mentioned in this section.

In terms of laboratory analysis, the scope of the RI must not be arbitrarily limited to the six PFAS on the UCMR3 list. Instead, it is recommended that each media sample be analyzed for the DEC-recommended list of 21 PFAS or more. A sub-set of samples taken from Recreation Pond and other potential source areas should undergo Total Oxidizable Precursor (TOP) Assay to better quantify potential PFAS loads from precursor compounds which have been demonstrated to oxidize into PFOS and PFOA via biological and abiotic processes and thus could provide a lingering source of PFAS in soil, groundwater, surface water, and sediment. Synthetic Precipitation Leaching Procedure (SPLP) testing in accordance with EPA guidance should also be performed in soils and sediments to fully evaluate what affect PFAS-impacted soils have upon the groundwater.

Lastly, although it is understood that the targeted objectives of these investigations are concentrated on PFAS, the documented usage of hazardous compounds on-site, as referenced in the Final Site Investigation (SI) Report for the SANGB dated November 16, 2018 (revised in June 2020) and noted in both the DEC responses to the Draft Final SI Report dated August 13, 2018 and the Draft-Final ESI Work Plan dated June 19, 2019, warrants the analysis for the full Target Compound List/Target Analyte List (TCL/TAL) as part of the RI. As mentioned in the DEC response to the March 28, 2017 SI Work Plan, this is consistent with the USEPA Guidance, which requires characterization of "all hazardous substances, pollutants, or contaminants and wastes", and DEC's requirements for conducting Site Characterizations at State Superfund sites, which requires all initial investigations to analyze and report full target compound lists.

29. **Figure, General:** The spider diagram figures that show sampling results each have inconsistent date formats. Figures 10, 14, and 16 show the date format as YY-MMM-DD, Figures 8 and 15 show the date format as DD-MMM-YY, and Figure 7 contains results boxes with both formats. For example, on Figure 7, MW-112 is shown as being sampled on 01-Dec-17 while RPMW-01 is shown as being sampled on 19-Oct-08. Please revise.

30. **Figure 4**: There are “unanticipated” storm drains shown as being connected to Outfall 002 and not to Outfall A, the latter having known SIA drainage infrastructure connections. This connection is shown on several figures as well as factoring into stormwater modeling. Please confirm whether this is accurate and clarify as needed.

31. **Figure 8-3, and 8-4:** There are 16 “PFOS + PFOA” data points on these graphs, but **Section 4.3.3 Storm Flow Sampling for PFAS and Select Pollutants** states that 19 grab samples were selected for laboratory analysis. Please reconcile.

32. **Figure 8-5**: The legend states that the turquoise line is “July-Dec”, but this line clearly represents rainfall amounts. Please revise.

33. **Figure 11-3**: There is a flow path that appears to enter, or trend in close proximity to, Recreation Pond from the northeast and appears to correspond to drainage from Outfall 006. What level of flow is present here during dry and wet weather conditions?

34. **Figure 11-5, 11-6, 11-7, 11-8, and 11-9:** The pipe diameter coloring scheme on each legend is inconsistent across each figure. For example, an 8-inch diameter pipe is shown via purple on Figure 11-5, dark yellow on Figure 11-6, and turquoise on Figure 11-7. Please revise with a standard color scheme across each figure and with a color gradation that corresponds to pipe diameter. For instance, a smaller diameter pipe would be shown as dark blue and as the diameter rises, the color transitions to red along the RGB color wheel. This approach would allow for easier readability and comparison across each figure. As it currently stands, the reader can see that pipe diameters varying substantially across the site, but the random color scheme makes tracking pipe diameter changes difficult.

35. **Figure 11-8 and 11-9**: The Outfall 17k culvert appears to be shown as a 24-inch diameter stormwater pipe. It is DECs understanding from base personnel and an existing utility plan dated January 2013, as well as the stormwater video survey logs in Appendix J, that this is a 48-inch diameter reinforced concrete pipe. Please confirm pipe diameter and revise as needed.

36. **Table 1**: The sampling of MW-113 for PFAS and Glycol does not appear to be listed or accounted for on Table 1. Please revise or provide clarification on its apparent absence.

37. **Table 9-2**: The diameter/height for "Outfall_17K" is listed as 2 ft. As mentioned in **Comment 35**, this pipe was understood to be 4 ft. Please clarify.

38. **Table 9-1, 9-2, and 9-3:** It would be beneficial to provide accompanying figures or appendices that detail the physical location of each sub-catchment, junctions, and conduits listed on these tables.

39. **Appendix K Recreation Pond Sediment PFAS Contribution Calculations:** Please include the range of flux values (q) used in the calculation of Equation 3.

Please provide a response to each of the comments listed above and please be sure to update the Executive Summary section of the report as needed. DEC and NYSDOH look forward to seeing the final version of the ESI Report and progressing forward to the next phase of the investigation. Please call me at 518-402-9662 if you have any questions.

Sincerely,

Justin C. Starr, P.G.
Assistant Geologist, Remedial Bureau C
Division of Environmental Remediation

ec: M. Brand
M. Ryan
G. Heitzman
J. Brown
A. Omorogbe
J. Starr
A. Guglielmi
K. McCarthy
D. Bendell – NYSDEC Region 3
M. Schuck/W. Kuehner, DOH
N. Wireman, ANG - nicole.wireman.civ@mail.mil
J. Bass, DOT - Jonathan.Bass@dot.ny.gov
J. Donat, City of Newburgh - jdonat@cityofnewburgh-ny.gov
J. Morris, City of Newburgh - JMorris@cityofnewburgh-ny.gov
E. Roth, SWFNY - ERoth@swfny.com
D2