DECISION MEMORANDUM

DATE: June 14, 2024

FROM: Sharon Eckard

TO: BF Assessment File

RE: Chapel Hill Police Property
828 Martin Luther King Jr Blvd
Chapel Hill, Orange County
BF Project No. **23022-19-068**

Based on the following information, it has been determined that the above referenced site, whose intended use is for no uses other than municipal service center, office, retail, recreational, associated parking uses, and with prior written approval from DEQ, other commercial uses, can be made suitable for such uses.

Introduction:
The Prospective Developer (PD) is the Town of Chapel Hill (Town), 405 Martin Luther King Jr. Blvd, Chapel Hill, Orange County. The Town is led by the Mayor and an eight-member town council. The Town Manager is Christopher C. Blue. The Brownfields contact person is John Richardson, Community Resilience Officer, Town of Chapel Hill.

The Brownfields Property is a 10.24-acre parcel, assigned tax ID 9789413949, which is currently occupied by the Town's Police Station and associated parking lots. There is an elevated portion of the Brownfields Property on which the police station was constructed and a lower portion along an urban stream, Bolin Creek, that includes a portion of the Bolin Creek Trail. There is a steep embankment to the south that separates these two areas. Bolin Creek forms the southern boundary of the Brownfields Property.

Bolin Creek is classified as a Class WS-V, Nutrient Sensitive Waters (NSW) surface water body, and is part of the Cape Fear River Basin. Bolin Creek eventually discharges to Little Creek, which discharges to Jordan Lake, a drinking water and recreational reservoir, about six to eight miles downgradient of the Brownfields Property.

The site is currently zoned R-2 Residential 2 (4 units/acre) as is the adjacent property except for as noted below. The Brownfields Property lies within a mixed commercial and residential area of Chapel Hill. Properties to the southwest and southeast are zoned as R-4 medium density residential (10 units/acre) and properties to the south are zoned as NC Neighborhood Commercial. Commercial properties to the south that border Bolin Creek include a gasoline station site (Mobil/Run-In-Jim's convenience store) and an automotive repair facility (Lloyd Tire & Alignment).

The Town maintains a website dedicated to information about the redevelopment of the Brownfields Property, including historical environmental assessment, risk assessment,

and interim remedial measures (IRM) documents. Those documents can be found at the following link: Municipal Services Center Project | Town of Chapel Hill, NC

Redevelopment Plans:
The Town initially evaluated a combined municipal service center with retail and high density residential with a portion as affordable housing for this site. The Town has since decided to forgo residential use in favor of redeveloping the Brownfields Property with a municipal service center to replace the current police station that is situated on the Brownfields Property and continued recreational use. The land use restrictions in the brownfields agreement will reflect the Town's chosen land uses.

Only conceptual redevelopment plans are available at this time; engineering design documents are not yet available but will be necessary prior to redevelopment as a component of the land use restrictions in the agreement.

Site History:
The Brownfields Property was originally a borrow pit in the 1950s to early 1960s. Reportedly, the pit was filled by the individual owner/operator of the borrow site (Richard W. Sparrow) from the mid-1960s through the mid-1970s with fill material including construction and demolition debris (concrete, wood, metals), and fill soil with coal combustion products (CCP) as structural fill. The understanding is that the CCP originated from the UNC-Chapel Hill's power generation facilities. The Town of Chapel Hill purchased the Brownfields Property in 1980 and constructed the existing police station facility shortly thereafter.

Regulatory History:
The Town has conducted multiple environmental assessments, including risk assessment and screening ecological risk assessments at the Brownfields Property since 2013. Prior to 2019, the Town was conducting work under the jurisdiction of the NC DEQ Inactive Hazardous Sites Branch (IHSB) under ID NONCD0001486. At that time, IHSB's analysis had indicated that the environmental risks associated with the coal ash structural fill were not commensurate with risks associated with a site that would be placed on the Federal Superfund National Priorities List (NPL) nor would be considered an NPL-caliber site.

The Town's stated desire to safely redevelop the Brownfields Property led the Town to apply to the NC Brownfields Program (now, the Brownfields Redevelopment Section (BRS)). The Chapel Hill Police Property site was made eligible for continued evaluation of a brownfields agreement on October 1, 2019 under the standard brownfields option. The first priority for the Town was to evaluate and conduct interim remedial measures (IRMs) in 2019 through 2020 to remove CCP material that was encroaching on the Bolin Creek Trail, which was performed under a DEQ-approved Environmental Management Plan (EMP).

Once the IRMs had been completed, the Town performed additional environmental assessment of the Brownfields Property to fill Brownfields-identified assessment data

gaps under guidance from the Brownfields Program. The report on these additional assessment activities was provided in late 2022. Information about the assessments conducted at the Brownfields Property and a discussion of the environmental risks posed by contaminants in various media at the Brownfields Property is provided below.

Work on the Brownfields Agreement (BFA) documents started shortly after assessment was deemed complete in 2023 and the Town had determined that they would focus only on non-residential uses at the Brownfields Property. BFA document production continued into 2024. Over the course of this project, DEQ management, Brownfields, and State Superfund DEQ representatives have been in contact with U.S. Environmental Protection Agency (EPA) staff over this Brownfields Property due to the concerns raised by community groups in the area, particularly with respect to the Town's initial plan for residential use at the Brownfields Property.

The Town conducted IRM maintenance activities at the Brownfields Property in April 2024. This included regrading drainage at the top of the slope, excavating and relocating CCP material to another area of the site, adding silt fencing, pruning of vegetation, and hydroseeding.

Public Engagement:
The Brownfields Redevelopment Section has engaged with the public regarding the Chapel Hill Police Property in advance of the Brownfields statutory 30-day public comment period. Persons and groups, including Town Council member, Mr. Adam Searing; Friends of Bolin Creek (FOBC) represented by Ms. Julie McClintock and Mr. Nick Torrey (also of Southern Environmental Law Center (SELC)); and local university personnel have expressed concern over the coal ash particularly if the redevelopment contained a residential component. Other residents living near the Brownfields Property expressed support for its redevelopment as long as it was done safely. Information from these residents has come in the form of emails, letters, and shared presentations.

In May 2022, Sharon Eckard, Eastern Branch Head with the BRS, participated in a virtual meeting with representatives of FOBC, and in a virtual presentation hosted by the Town to discuss the Brownfields process and communicate the status of the work on the Chapel Hill Police Property BFA. DEQ later provided responses to the Town to address specific additional questions not covered during the meeting due to time constraints.

In January 2024 (letter states 2023 in error), SELC sent a letter to the newly elected Town of Chapel Hill Mayor Jessica Anderson and Sharon Eckard highlighting two draft (at that time) technical documents related to their claims about the environmental risks posed by the coal ash fill at this Brownfields Property. The first document listed below has now been published in a red-lined, final version. Those two documents are:

1) U.S. EPA, *Risk Assessment of Coal Combustion Residuals: Legacy Impoundments and CCR Management Units, October 2023, Draft.* Available at:
https://www.regulations.gov/document/EPA-HQ-OLEM-2020-0107-0887

2) U.S. EPA, *Draft Integrated Risk Information System (IRIS) Toxicological Review of Inorganic Arsenic,* Available at https://regulations.gov/document/EPA-HQ_ORD-2012-0830-0056

DEQ staff have reviewed these two draft documents, and the final, red-lined version of the October 2023 Risk Assessment draft that was finalized in April 2024. A brief discussion of these risk documents is provided below in this document.

In October 2023, after discussing the site and our respective programs with Mr. Bill Hunneke, Section Chief for State Superfund Section and Sharon Eckard separately, Mr. W. Perrin de Jong with the Center for Biological Diversity, Asheville, NC, filed a CERCLA petition ("Petition") with the EPA requesting that the federal agency conduct a Preliminary Assessment (PA) at this Brownfields Property for its possible inclusion on the National Priorities List (NPL) under CERCLA. Shortly after being made aware of the existence of the two draft EPA documents that SELC shared in their letter of January 2024, the Center for Biological Diversity requested that EPA incorporate these documents into the Petition that had been filed the prior October.

The EPA conducted the PA over the last several months. In their response letter to the CERCLA petition entitled *Abbreviated Preliminary Assessment Letter Report* (U.S. EPA, Region 4, May 1, 2024), EPA concluded the following:

> *"The Town of Chapel Hill and the NCBP [North Carolina Brownfields Program] are negotiating a BFA. In addition to the assessment and IRM activities already conducted, the BFA will outline the need for additional assessment and remediation, if any, based on the intended future reuse/redevelopment plans, which does not include residential use. The Town of Chapel Hill anticipates that a draft of the agreement will be available for public comment in Spring 2024. As a result, the EPA recommends that future activities at the site be conducted under the purview of the NCBP."*

Environmental Assessment History:

The reports that were reviewed for the evaluation of the Brownfields Property data are listed in the Brownfields Agreement. Technical reports were primarily prepared on behalf of the Town by Falcon Engineering, Inc. and Hart & Hickman, PC. A preliminary human health and ecological risk assessment for the site was performed by Duncklee & Dunham (now Synterra) and Dr. Ken Rudo of Rudo Toxicological Consultants; they focused primarily on recreational use along the Bolin Creek Trail and Bolin Creek. Synterra and Rudo Toxicological Consultants identified data gaps and suggested additional assessment with respect to ecological risk, which was conducted by Hart & Hickman. Some key points from the various technical reports are presented below:

Falcon Engineering, Inc.

Earlier in the assessment phase, from 2013 through 2016, the site was characterized by Falcon Engineering through scopes of work discussed in six separate reports. Initial

groundwater monitoring attempts were hampered by high turbidity readings in some of the wells (MW-1, MW-3, and MW-4); these wells were subsequently replaced with wells MW-1A (H&H) and MW-3A/MW-4A (Falcon). Wells MW-3 and MW-4 were abandoned. Falcon analyzed soil, CCP (referred to as sediment in early reports), surface water, and groundwater for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), and metals.

Hart & Hickman, PC
Hart & Hickman, PC (H&H) began assessment activities at the Brownfields Property in 2016. Relevant information from the environmental reports is provided below:

Phase II (H&H August 2017)

- Evaluated shallow soil for presence of CCPs (47 shallow soil borings on approx. 50 ft grid– embankment, 6 borings upper level, 4 borings – lower level)
- Analysis of shallow soil in upper level
- CCP sample leachate analysis
- Evaluated chromium (Cr) detections in shallow soil
- Collected background soil samples (5 borings)
- Installed additional wells (3)
    - MW-5 actually offsite background across Bolinwood Drive in bedrock
    - MW-6 – hollow stem auger (HSA) to 17.5 ft below ground surface (bgs); perched water at 10 ft
    - MW-7 – bedrock at 15 ft bgs and well installed to 69.5 ft bgs
- Collected Bolin Creek surface water and stream sediments (5 locations)
- Aquifer slug tests (6 MWs) that measured an average hydraulic conductivity (K) at 0.2 ft/day
- Underlying bedrock identified as meta-granitic rock
- Later revised the CSM based on further lithologic information

Results Data Gap Sampling (H&H, May 2019)

- Background soil data
- Stream sediment and surface water data
- GW data
- Radon (Rn) – five samples collected in existing police station; Rn not detected (ND) in 3 of 5 samples, and was at the detection limit of 0.4 picoCuries per liter (pCi/L) in 2 of 5 samples, one-tenth below the EPA radon action level of 4 pCi/L.

Data gap assessment (H&H 2020)

- Drainage pathway soil and soil/CCP sampling – some of the data in this report reflects soil that has now been removed from the BF Property.
- Installation of wells MW-1A (near MW-1 installed by Falcon and for which no boring log was available/elevated turbidity), MW-8 (near GP-6 to verify location of CCPs relative to the water table), MW-9 (near GP-2/GP-3 to verify location of CCPs relative to water table), and temp well TMW-10 near GP-11 to verify location of CCPs relative to the water table (September 2019):

    - Roto-sonic drilling within the fill areas
    - Perched water zones noted
    - MW-11D installed in Feb 2020 to evaluate perched water conditions & groundwater data in bedrock below fill
        - HSA/air rotary drilling – 6-inch casing to 45 ft bgs; well installed to 56 ft bgs
        - Adjacent to MW-9
        - Grout inspections performed by Orange Co Health Dept
    - Investigation-derived waste (IDW) containerized onsite & transported to A&D Env Service permitted facility
    - Analysis – metals; gw from MW-9 (reducing) and MW-11D (oxidizing/higher pH & SC than MW-9) in Feb 2020 analyzed for alkalinity, Na, Ca, Mg, and K for geochemical purposes between perched and bedrock water.
- Provides updated cross-section in Figure 4 and transect location map Fig 3 – different conceptual model for CCP occurrences based on additional data (pdf pgs 29 and 30/159)
- Geochem parameters different between MW-9 and MW-11D

Fill Area: > 70 samples over assessment period
Based on observations during assessment, the fill material was found to consist of construction and demolition debris with fill soil intermixed with zones of CCP:

- Fill material identified to depths of about 40 ft bgs
- CCP zones from 1-3 ft thick with some zones up to 10 ft thick
- CCP was observed in MW-1 as deep as 29 ft bgs
- In upper level, CCPs capped with clayey silt (<1 to 10ft thick); mostly >2 ft cap
- CCP exposed during assessment on the eastern and central areas embankment
- CCPs in western portion soil <2 ft thick
- Erosion of this layer resulted in deposition along Bolin Creek Trail; this was what was removed during the IRMs discussed below

The IRMs (IRM Report, H&H, April 19, 2021) included the following:

- Excavation and off-site disposal of soil and exposed CCP (1,004 tons) along Bolin Creek Trail – Areas G & H – North of Trail; Area I – south of Trail; and Area F
    - Included erosion & sediment control measures
    - Removed brush and 57 smaller trees
    - Air knife vacuum excavation performed “soft digging” around mature trees in Areas H&I; CCPs embedded into root matrix
    - Soil/CCP composite samples from Areas G, H & I - TCLP, RCRA metals, sulfur, sulfate, and pH for off-site waste characterization – deemed nonhazardous and disposed of at Republic’s Uwharrie Environ Landfill
    - Geotechnically unsuitable soil deemed non-hazardous and disposed of at Upper Piedmont Env Landfill
    - Air monitoring upwind and downwind and ambient in work area for elevated dust levels

    - CCPs excavated to depths of 1.5 ft bgs and up to 3 ft bgs in Areas F & H
        - Soil represented by prior samples HH-7, SS-1, SS-2, SS-3, SS-3A, SED-16, SED-17 (Area H), HH-6, SS-4, SS-5, SS-6, SED-11, SED-14, SED-15 (Area I), and HH-5 (storm diversion channel) excavated from property; therefore, these sample results are not used for Exhibit 2 nor in the DEQ risk calculations.
- Stabilization and cover of exposed CCP along the embankment – Area F – eastern and Area D - central
- 725 tons of quarry fill and 145 cubic yards (cy) of topsoil imported to backfill excavations
- Temporary measures to address stormwater and erosion control along the embankment, and restrict access:
    - Installation of super silt fencing (350 linear ft (lf)-LM3000) and hydroseeding including a biodegradable growth medium along the embankment for erosion resistance; standard silt fence (30 lf) and super silt fence (150 lf) installed downgradient of the SE corner of Area F along the southern portion of the chain link fence
    - Installation of a new stormwater diversion channel along the top of the slope
    - Installation of fencing and signage notifying trail users not to cross the fencing and that this was a coal ash remediation area.
    - Maintenance – periodic fertilization, inspections, removal and disposal of accumulated CCPs, Park Maintenance Superintendent with Town in accordance with guidance in Erosion and Sediment Control Planning and Design Manual (DEQ, May 2013)
- Noted that permanent measures would be instituted with the redevelopment of the Brownfields Property
- CCPs, drainage pathway soil, and shallow soil contaminants of concern (COCs) – arsenic (As), barium (Ba), manganese (Mn), mercury (Hg), and selenium (Se)
- An additional 1,120.1 tons of soil from outside the Areas G, H & I generated during excavation of new portions of the trail transported offsite for disposal at Republic's Upper Piedmont Landfill (no CCPs present)
- Post-excavation soil sampling – 0-1 ft bgs before fill placement (G-1, H-1-H-7, I-1 – I-3) – composited with grabs for VOCs and SVOCs; areas were backfilled after confirmation data received.
- Import fill material from Wake Stone Knightdale Quarry – 725 tons and 145 cy virgin topsoil from Sand & Soils a landscape supply com in Durham/Town's risk assessor provided approval in 2020 for use at site.
- Stormwater management – installed stormwater controls to divert surface water runoff towards an existing outfall channel east of the parking lot on the upper level
    - Lined with polypropylene turf reinforcement matting and seeded
    - Enhancement of existing outfall channel with riprap, #57 stone, and a filter weave geotextile fabric
    - Approved by Town's Stormwater Management Div, September 2020
    - Installed October to November 2020

- 12 cy of CCPs were removed and disposed of at Republic's Uwharrie Landfill (included in the 1,004.27 ton figure above)
- Stormwater as-builts were approved by the Town in Appendix D.

The conclusion of the Human Health and Ecological Risk Assessment (HHERA) (Synterra, May 2021) with respect to human health was that the greenway trail was safe for users following the 2020 IRMs. The conclusion of the HHERA with respect to ecological risk was that eco-risk was likely minimal but recommended additional evaluation and further study in this regard. In response to that conclusion, H&H performed additional risk assessment activities in 2021 that covered the entirety of the Brownfields Property. Some of their conclusions related to risk are addressed below.

In order to address remaining data gaps, H&H performed additional assessment activities in 2022 at the Brownfields Property, in accordance with a Brownfields Assessment Work Plan, which was approved on August 30, 2022. The scope of work consisted of performing a Brownfields Receptor Survey, and collecting additional data on soil, groundwater, sub-slab vapor, and exterior soil gas. The report from that assessment scope of work is presented in *Brownfields Assessment Report* (Hart & Hickman, December 13, 2022):

- A potential private well was identified at 3 Mt. Bolus Road, about 500 ft north of the Brownfields Property; however, this location is connected to public water and sewer; it is unknown if this well is in use for irrigation or other purposes.
- Bolin Creek is identified as a Water Supply (WS-V) water body and a Nutrient Sensitive Water (NSW); there are recreational trail users that use the paved recreational Bolin Creek Trail that passes by the Brownfields Property.
- Additional soil assessment was performed in the proposed stormwater pond area and the existing diesel fuel above-ground storage tank (AST) area.
- Groundwater data collected from within the structural fill was consistent with prior sampling events in which elevated concentrations of metals are associated with CCP in the structural fill; groundwater data collected from below the structural fill in bedrock do not suggest impact from the structural fill material
- VOCs and SVOCs are not detected above method detection limits in the onsite monitoring wells.
- Vapor intrusion risk was evaluated through exterior soil gas and sub-slab vapor samples in the existing police building. No VOCs were detected that exceeded non-residential VISLs; however, TCE was detected in exterior soil gas samples in excess of its residential VISL. Mercury was not detected in the vapor samples. Methane concentrations and static pressures did not indicate a concern regarding methane at the Brownfields Property.

<u>Potential Receptors:</u>
Potential receptors are construction workers, on-site workers, visitors, recreators, trespassers, and Bolin Creek.

Health Risk Assessments

As mentioned above, human health risk assessments were conducted at the Brownfields Property by Synterra Corporation and Rudo Toxicological Consultants, LLC in 2019, pre-IRM, and in 2021 after the IRMs were completed. These risk assessments were performed to address concerns about the recreational use of the Bolin Creek Trail in the vicinity of the structural fill site, and by H&H in 2021 as a follow-up to the original health risk assessment. Information about those risk assessments follows:

<u>Synterra's HHERA (May 2021)</u>

- Two assessments:
  - Preliminary risk eval 2019 for IRMs would be protective of trail users
  - Post-IRM risk assessment update
  - Used 2018 version DEQ risk calculator for HH risk assessment which was current at that time
  - Discusses hazard identification process and exposure assessment processes
  - Used max values for COCs
  - Used 2014 and 2016 as baseline conditions for the site
  - Evaluated two completed exposure scenarios: Human recreators and construction workers
  - Default parameters provided in Appendix A
  - Assumptions about age of child only to 6 yrs
  - Assumed Cr+6 unless speciated
  - Used max concentrations in 2019 without consideration of background conc
  - "Background COI concentrations contribute to the risk of persons exposed on the Site and should be considered in the risk management and risk communication."
  - For post-IRM assessment, used January 2021 DEQ risk calculator that was available at the time:
    - Exposure duration – 0.5 hr
    - 195 day/yr exposure
    - For construction worker post-IRM concentrations used (max)
    - Excluded thallium from SW as not detected/not representative
  - Screening Level Ecological Risk Assessment (SLERA) performed as part of post-IRM
    - Surface Water (Bolin Creek) – no COCs
    - Sediment – Ba, Cr
    - Soil – As, Pb, Hg, Sr, Tl, V, Zn
    - Excluded data collected from below 4 ft and under impervious surfaces
  - Conclusions:
    - IRM effective in reducing risk to trail users
    - "Ecological risk is minimal"; final remedy design should include ecological risk assessment

- Town needs to continue to monitor Site conditions until final remedy in place
- If new areas of CCP exposure noted, additional data collection should occur
- Update HH risk calcs
- Construction activities – site worker training, use of PPE, additional sampling with change in site conditions or exposure, for example, based on the nature of the construction activities
- Potential unacceptable risk: future construction worker (As & Mn, and recreational user (As) – implement PPE and other safety measures – in Site Construction Plan

Human Health Risk Assessment (H&H, 2021)
H&H used exposure unit designations of EU #1 (Upper Level), EU#2 (Lower Level, i.e., Bolin Creek & Trail area), EU#3 (Embankment), and potential for erosion on the embankment to transport CCP into the trail area on which to generate a series of risk calculations for the site, some of which varied from the DEQ risk calculations presented above.

To develop exposure point concentrations for the risk screening, H&H used the following approach:

- Soil samples excavated during 2020 IRMs were excluded as they are no longer located on the Brownfields Property
- Only used most recent sample for those media sampled more than once
- Soil samples collected at depths of 2 ft or less used for residential, nonresidential works, & greenway users
- Soil samples collected at depths of 10 ft or less used for construction workers
- If impacted soil or CCP at deeper depths are exposed during site redevelopment, additional risk evaluation should be performed
- BRS would require confirmatory sampling and risk evaluation of areas where impacted soil or CCP not covered by impervious surfaces or at least 2 ft of clean fill
- Surface water – used only those collected in 2016 and 2019
- Stream sediment – used only the 2019 data as representative of current conditions
- Used maximum concentrations based on the datasets above
- After initial risk calculations, removed metals at concentrations below site-specific background soil values (BSVs).
- BSVs: 95% UTL with 95% coverage for background soil and the lower of 2x the mean or the maximum detected concentration for background surface water and sediment (Appendix C)
- Default exposure parameters for residential, non-residential work, construction worker – reasonable maximum exposure (RME) – within 90th to 99th percentiles
- Greenway users – used polling data collected by the Town, i.e. used values equal to or more conservative than the 98th percentile of responses – worst-case
- List of exposures on p 25/294 of Risk Assessment Report (RAR) & in Appendix C - used 6 yrs child and 20 yrs adult

- Toxicity factors – default in risk calculator (includes possible effects for pregnant women)

For Ecological Risk Assessment – H&H (2021)

- Initial screening
- Compare to ESV (Region 4)
- not a full SLERA
- EU#1 -wooded area surrounding the facility; surface soil exposure
- EU#2 -highest likelihood of potential ecological receptors to surface soil, sediment, and surface water
- EU#3 – moderate potential; surface soil exposure
- Need permanent measures to stabilize embankment
- Results:
    - EU#1 – conc above ESVs and BSV in S-4 (Cd, Co, Cu, Mn, Ni) and MW-7 (outlier Cu conc)
    - EU#2 – only in SED-13 above ESV & BSV (Ba, Se, Sr)
    - EU#3 – above ESV and BSV in all four samples (S-7, H-9, H-10, and H-11) for As, Ba, Be, Hg, Se, and Sr – remediation recommended to address exposed CCPs in this area (performed in concert with final remedial actions and site redevelopment)
- Stream sediment:
    - Exceedances of ESVs for Ba and Cr are less than BSVs and similar to upstream samples
    - Also used EPA Region 4 Refinement Screening Values (RSVs) for sediment – less conservative ecological effects data – used as a second-tier screening where ESVs exceeded; RSVs not exceeded.
- Surface water:
    - No concentration exceeded EPA Region 4 Acute and Chronic Surface Water ESVs, NC 2B Surface Water Standards, or In-Stream Target Values

H&H conclusions from this risk assessment include:

- If developed for residential use, H&H recommends remediation or other actions (excavation, impervious cover, resampling) to address impacts in the area of S-4
- Reference to the EMP for construction worker safety; however, important to clarify that an EMP can inform construction workers, but it does not take the place of the contractor's H&S Plan and occupational safety requirements
- LUR preventing groundwater use

Regarding the risk assessments, Brownfields conferred with Dr. Frances Nilsen, Ph.D. Environmental Toxicologist for DEQ, who specializes in metals toxicology, among other areas. The HHERA studies and other site data were shared with Dr. Nilsen. Based on the analysis conducted over the years and the mitigation steps that had been taken at the site, Dr. Nilsen stated that the Town had taken appropriate measures to prohibit access to areas impacted by coal ash material, that the CCP presents less of a risk for non-residential purposes under consideration than for residential uses. Further, Dr. Nilsen indicated that based on collected onsite stream data, that the concentrations detected in

the stream do not seem to be having an impact on the ecosystem at the site. Dr. Nilsen further indicated that if the forested area of the site is to remain as-is, with barriers in place to prevent human exposure and environmental disturbance, combined with the required monitoring of the site to ensure the receptor pathway remains disconnected, that an ecological risk assessment would not be necessary. Therefore, we do not anticipate requiring any further work with respect to ecological risk assessment unless an unforeseen change of conditions poses a threat to Bolin Creek.

Interim Remedial Measures Maintenance Activities (Spring 2024)
The Town recently completed interim remedial measures maintenance activities under an approved Environmental Management Plan to further stabilize the slope and protect against access to the CCP until the final remedy is implemented. These activities included modifying the drainage at the top of the slope, adding silt fencing, removing trees that could de-stabilize the material, and hydroseeding.

Contaminated Media:
DEQ has evaluated data collected from the following media at the subject property: groundwater, soil, CCP, exterior soil gas, sub-slab vapor, drainage pathway sediment, Bolin Creek surface water, and Bolin Creek sediment. DEQ relies on the data from these media to base its conclusions regarding the subject property and its suitability for its intended reuse. Please see the Brownfield Agreement's Exhibit 2 and the assessment reports for specific sample locations, dates, and COCs.

Soil and CCP – Due to the past history of the Brownfields Property, the site is underlain by soil and CCP, intermixed in areas, and construction debris. Several risk calculators were generated to address constituents that were detected in site soil (excluding data that represents soil that has been removed from the property during the IRMs) across the site, and in the drainage pathway, the planned stormwater pond area, and the AST area, and the CCP samples across the site (excluding the CCP removed from the property during the IRMs).

Groundwater - Groundwater at the Brownfields Property occurs in the existing monitoring wells in the fill area at depths of 30-40 bgs; additional information about groundwater and how the data from each zone was used in the risk calculators is provided below:

- Zones of perched water appear within the fill area, an effect that may be, at least in part, created by the pozzolanic reaction between the CCP and the soil, which would tend to form layers of relatively impermeable material in the subsurface in addition to the uncontrolled formation of layers of different permeabilities during initial placement, such as sand and gravel vs demolition debris vs clay/silty layers of soil.
- Groundwater wells are completed in the following units; data from these units was used to evaluate environmental risk in a corresponding risk calculator:
    - MW-5 (background well located across Bolinwood from the Brownfields Property) - screened in bedrock

    - MW-1, MW-1A, MW-2, MW-8, MW-9 – perched groundwater zones in fill area
    - MW-3, MW-3A, MW-4, MW-4A, MW-6 – lower elevation outside of the fill area
    - MW-7 – immediately east of the stormwater pond area in bedrock
    - MW-11D – constructed within the fill area, but screened below the fill into bedrock
- Data suggest that the contaminated groundwater plume is generally stable within the fill material with most COCs either decreasing in concentration or remaining stable over the time monitoring has been conducted.

Risk Calculations:

Risk calculations were performed using the February 2024 DEQ Risk Calculator https://deq.nc.gov/permits-rules/risk-based-remediation/risk-evaluation-resources. The DEQ Risk Calculator is an Excel-based, menu-driven program. The risk evaluation procedures, equations, and default parameters used to create the calculator follow current U.S. EPA risk assessment guidance. It incorporates a database that contains toxicity values and other chemical-specific parameters obtained directly from the USEPA Regional Screening Level (RSL) tables and is updated when U.S. EPA updates the RSL tables. Additional information on use of the DEQ Risk Calculator can be found at the link noted above.

For the purposes of looking at the site spatially, the site was divided into multiple risk calculators by different types of media and using the maximum concentrations site-wide. The following risk calculators were developed by Brownfields staff using the data noted:

1. Soil Samples – max concentrations of contaminants (excluding soil removed during IRMs)
2. CCP Samples – max concentrations of contaminants (excluding CCP removed during IRMs)
3. Drainage Pathway soil samples
4. Stormwater Pond Area soil samples – 2022
5. AST Area soil samples – 2022
6. Leachate samples collected by H&H in 2016
7. Background groundwater – well MW-5 (max concentrations)
8. Groundwater samples from within the fill material - 2022
9. Groundwater samples from below the fill in bedrock well MW-11D - 2022
10. Groundwater samples downgradient of the fill - 2022
11. Bolin Creek stream sediment and surface water (max concentrations, 2013-2019)
12. Exterior soil gas samples - 2022
13. Police Building sub-slab vapor samples – 2022
14. Site-Wide using historical maximum concentrations in groundwater, CCP/soil, and exterior soil gas samples

The calculated HI risk results based on the DEQ risk calculators for various site media are compared in the summary tables below. Additional information about the data and the risk calculator output for each media type are presented in the pages following these summary tables.

Soil and Fill/CCP Various Locations (Risk Calculators (RC) Nos. 1, 2, 3, 4, & 5):

Type of Media	Residential – Direct Contact		Non-Residential-Direct Contact		Construction Worker Direct Contact		Recreator/ Trespasser Direct Contact	
	CR	HI	CR	HI	CR	HI	CR	HI
Soil (RC No. 1)	1.8E-05	**3.3**	3.4E-06	0.22	1.4E-06	**7.9**	9.8E-06	**1.8**
Fill/CCP (RC No. 2)	**1.5E-04**	**6.2**	3.2E-05	0.43	6.9E-06	**12**	8.4E-05	**3.4**
Drainage Pathway Soil (RC No. 3)	2.3E-05	**2.1**	4.9E-06	0.15	1.3E-06	**7.9**	1.3E-05	1.2
Stormwater Pond Soil (RC No. 4)	4.7E-06	0.65	7.5E-07	0.044	3.7E-07	**2.0**	2.6E-06	0.36
AST Area Soil (RC No. 5)	4.3E-06	0.84	6.2E-07	0.057	6.3E-07	**1.1**	2.4E-06	0.47

Bold – Exceeds CR of 1E-04 or HI of 1
CR – Cancer risk
HI – Non-cancer hazard index

Leachate Samples Derived from Surface Soil (Risk Calculator No. 6):

Type of Media	Residential-Direct Use		Non-Residential-Direct Use	
	CR	HI	CR	HI
Leachate Samples	**3.5E-04**	**7.3**	7.0E-05	**1.1**

Bold – Exceeds CR of 1E-04 or HI of 1
CR – Cancer risk
HI – Non-cancer hazard index

Groundwater Screened in the Following Media (Risk Calculators Nos. 7, 8, 9 & 10):

Type of Media	Residential -Direct GW Use		Non-Residential-Direct GW Use	
	CR	HI	CR	HI
Background-MW-5 (RC No. 7)	4.8E-06	**1.8**	9.7E-07	0.3
Fill/CCP (RC No. 8)	**7.2E-04**	**22**	**1.4E-04**	**3.7**
Bedrock-MW11D (RC No. 9)	1.1E-05	**1.7**	2.1E-06	0.25
Downgradient Fill-MW-3A, MW-4A, MW-6 (RC No. 10)	7.4E-06	**4.4**	1.5E-06	0.75

Bold – Exceeds CR of 1E-04 or HI of 1
CR – Cancer risk; HI – Non-cancer hazard index
GW – Groundwater
Note: Groundwater is not used as a source of water to the Brownfields Property and direct groundwater use is prohibited under the Brownfields Agreement.

Bolin Creek Stream Sediment & Surface Water (Risk Calculator No. 11):

Type of Media	Recreator/Trespasser	
	CR	HI
Sediment (RC No. 11)	3.2E-06	0.58
Surface Water (RC No. 11)	1.7E-06	0.13

Bold – Exceeds CR of 1E-04 or HI of 1
CR – Cancer risk
HI – Non-cancer hazard index

Exterior Soil Gas and Sub-slab Vapor Samples (Risk Calculators Nos. 12 and 13):

Type of Media	Residential Soil Gas to Indoor Air		Non- Residential Soil Gas to Indoor Air	
	CR	HI	CR	HI
Exterior Soil Gas (No. 12)	2.1E-05	**1.2**	1.5E-06	0.094
Sub-Slab Vapor – Police Station (No. 13)	2.9E-07	0.096	2.2E-08	0.0076

Bold – Exceeds CR of 1E-04 or HI of 1
CR – Cancer risk
HI – Non-cancer hazard index

Risks Calculated based on Site-Wide Maximum Concentrations by DEQ Compared to H&H Risk Calculations performed in 2021 based on H&H EU Designations (Risk Calculator No. 14)

Type of Exposure	DEQ Site-Wide	H&H EU#1	H&H EU#2	H&H EU#3	DEQ Site-Wide	H&H EU#1	H&H EU#2	H&H EU#3
	CR				HI			
Residential – Soil/CCP	**1.6E-04**	2.4E-06	NC	9.4E-05	**8.3**	**3.6**	NC	**3.1**
Residential – GW	**3.6E-03**	NC	NC	NC	**83**	NC	NC	NC
Residential – GW to Indoor Air	0.0	NC	NC	NC	0.0	NC	NC	NC
Residential – Soil Gas to Indoor Air	2.15E-05	NC	NC	NC	**1.2**	NC	NC	NC
Non-Residential Soil/CCP	3.3E-05	4.8E-06	NC	2.0E-05	0.57	0.24	NC	0.22
Non-Residential Groundwater	**6.3E-04**	NC	NC	NC	**12**	NC	NC	NC
Non-Residential GW to Indoor Air	0.0	NC	NC	NC	0.0	NC	NC	NC
Non-Residential Soil Gas to Indoor Air	1.5E-06	NC	NC	NC	0.094	NC	NC	NC
Construction Worker Soil	7.7E-06	7.0E-06	1.4E-06	4.4E-06	**11**	**11**	**3.6**	**8.8**
Recreator/Trespasser – Soil	8.9E-05	NC	8.4E-06	3.4E-06	**4.6**	NC	0.41	0.46

Bold – Exceeds CR of 1E-04 or HI of 1
CR – Cancer Risk
EU – Exposure Unit
HI – Hazard Index
GW – Groundwater
NC – Not calculated

Relevant conclusions from the BRS's review of these environmental reports, a discussion of calculated environmental risk values summarized in the above tables, and the risk drivers based on these data for these various site media are provided below.

Risk Calculator 1 – Soil Samples:

- Based on physical description and an evaluation of constituents, particularly metals, CCP is confirmed to occur as structural fill reportedly mixed in with construction and demolition debris in the elevated portion of the site.
- Metals that exceed Residential Preliminary Soil Remedial Goals (PSRGs) in site soil are: arsenic (As), hexavalent chromium (Cr+6), cobalt (Co), manganese (Mn), thallium (Tl), and vanadium (V); however, residential use of the site is not contemplated at this time.
- Only one metal in site soil, As, exceeds its Industrial/Commercial PSRG, though the concentrations that do are generally single digit values and are consistent with site-specific and literature background concentrations for NC soil. One metal detected at its Industrial PSRG is thallium in soil collected from well MW-5; it should be noted that well MW-5 is not located on the Brownfields Property, but is located just off-site and serves as a background well screened in bedrock.
- Based on maximum values of constituents in soil samples characterized as soil that was not identified as being mixed with CCP, the calculated noncancer HI values for direct residential exposure to soil (3.3), direct construction worker exposure to soil (7.9), and direct exposure for a recreator/trespasser (1.8) exceed the noncancer threshold hazard index (HI) of 1. None of the calculated risk values for these exposures exceed the acceptable cancer risk (CR) maximum of 1E-04.
- The calculated CR and HI for non-residential worker exposure does not exceed the acceptable CR risk range nor the threshold HI of 1.0.
- The risk drivers for residential exposure to soil are thallium (Tl), cobalt (Co), Mn, and As. The risk drivers for construction worker exposure to soil are Mn, Co, Ni, and As. The risk drivers for recreator/trespasser scenarios are Tl, Co, and Mn.

See the risk calculator output for maximum concentrations of contaminants in site soil below; the maximum concentrations in soil used in the risk calculator represent soil that was obtained from the depths of 0 to 3 feet bgs.

Risk for Individual Pathways				Output Form 1A
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Soil				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	1.8E-05	3.3E+00	YES
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	3.4E-06	2.2E-01	NO
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	1.4E-06	7.9E+00	YES
Recreator/Trespasser	Soil	9.8E-06	1.8E+00	YES
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 2: Coal Combustion Product (CCP) – includes samples that are mixed soil and CCP

- CCP has been exposed at the surface, particularly in very steep areas. During the IRMs, the Town stabilized the slopes where these exposures occurred and is required to monitor routinely and abate any daylighted areas caused by storm or other events to minimize exposure risk prior to the implementation of a final remedy.
- Metals that exceed Residential PSRGs in CCP or mixed CCP and soil are: aluminum (Al), As, Ba, cadmium (Cd), hexavalent chromium (Cr+6), Co, iron (Fe), Mn, and Hg.
- Similar to the soil samples profile discussed above, primarily As exceeds its Industrial/Commercial PSRG, although there is one detection of Hg that exceeds its Industrial/Commercial PSRG. The concentrations of As in CCP samples ranges from 3.37 milligrams per kilogram (mg/kg) to as high as 95.9 mg/kg. One analysis of Al in this material from 2013 was at the I/C PSRG of 23,000 mg/kg.
- Direct contact calculated risk values for CCP indicate an exceedance of an acceptable cancer risk of 1E-04 (1.5E-04) and an exceedance of the noncancer hazard index threshold of 1.0 (6.2) for direct residential exposure; and a HI of 12 for construction worker and 3.4 for recreator/trespasser by ingestion and inhalation.
- Calculated risk values for direct exposure to soil (CCP) under a non-residential worker scenario do not exceed either the regulatory acceptable CR nor the noncancer HI of 1.
- The risk drivers for direct contact to soil (in this case CCP) for residential scenarios are As, Co, Hg, Mn, Al, Ba, and Cd by ingestion, dermal contact, and/or inhalation. The risk drivers for construction workers are Mn, As, Hg, Al, Co, and Ba by ingestion and inhalation. The risk drivers for recreator/trespasser scenarios are As, Co, Hg, and Mn by ingestion.

See the risk calculator output for maximum concentration in CCP samples below; the maximum concentrations in CCP used in the risk calculator are obtained primarily from the depths of 0 to 4 ft, but includes certain samples collected to a depth of 12 or 15 feet bgs.

Risk for Individual Pathways				Output Form 1A
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Coal Combustion Product (CCP) Samples				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	1.5E-04	6.2E+00	YES
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	3.2E-05	4.3E-01	NO
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	6.9E-06	1.2E+01	YES
Recreator/Trespasser	Soil	8.4E-05	3.4E+00	YES
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 3: Drainage Pathway Soil

- The results for the drainage pathway soil indicate that Residential PSRGs are exceeded by concentrations of As, Cr+6, Co, and Mn; however, no residential use is planned for this Brownfields Property.
- Only arsenic concentrations ranging from 3.97 mg/kg to 14.5 mg/kg exceeds its Industrial/Commercial PSRG.
- The calculated risk values from the drainage pathway soil samples, collected from the upper six inches along drainages at the Brownfields Property, do not exceed an acceptable CR for any exposure pathway, but do exceed the noncancer HI of 1 for direct residential exposure (2.1), for direct construction worker exposure (7.9), and for the recreator/trespasser scenario (1.2). The threshold HI of 1 is not exceeded for the non-residential worker exposure pathway.
- The risk drivers for direct residential exposure to soil are principally from the Co, As, and Mn concentrations through ingestion routes. The construction worker exposure is principally from Mn, Ni, and As through the inhalation route. The recreator exposure route risk drivers are Mn, Co, and As.

See the risk calculator output below for the drainage pathway soil samples collected from the upper six inches of soil; maximum concentrations were obtained from samples HH-2, HH-3, HH-4, HH-12, SED-9, and SED-13.

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Drainage Pathway Soil				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	2.3E-05	2.1E+00	YES
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	4.9E-06	1.5E-01	NO
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	1.3E-06	7.9E+00	YES
Recreator/Trespasser	Soil	1.3E-05	1.2E+00	YES
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 4: Stormwater Pond Area Soil

- The shallow soil samples collected from the upper 2 ft within the area of the planned redevelopment stormwater pond indicates that only As concentrations in two of the three samples (HH-13 and HH-14) exceed the Residential PSRG for As; the Industrial Commercial PSRG for As is not exceeded.
- The risk calculator output for these soil samples indicates that an acceptable CR and the threshold HI are not exceeded for any exposure scenario except direct contact for a construction worker with a HI of 2.0.
- The risk driver for the construction worker scenario is principally Mn through inhalation.

See the risk calculator output below for the stormwater pond soil samples collected from the upper two feet of soil (HH-13 & HH-14).

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Stormwater Pond Soil September 2022				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	4.7E-06	6.5E-01	NO
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	7.5E-07	4.4E-02	NO
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	3.7E-07	2.0E+00	YES
Recreator/Trespasser	Soil	2.6E-06	3.6E-01	NO
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 5: AST Area Soil

- The AST Area soil was assessed through one boring, HH-12, in 2022 from a depth of 4-5 ft bgs. The results from the analysis conducted on the sample from HH-12 indicate that the concentrations of As, Cr+6, and Co exceed their respective Residential PSRGs, but there are no exceedances of Industrial/Commercial PSRGs.
- There were very low values of VOCs detected below the reporting limits, i.e., estimated (J) values of chlorobenzene, ethylbenzene, and toluene, and one detection of total xylenes.
- The calculated risk values for the AST area soil indicate no exceedances of an acceptable CR nor the threshold HI of 1 for any exposure scenario, except for the construction worker pathway. The risk drivers for this pathway are Mn and Ni.

See the risk calculator output below for the AST Area soil sample collected from the depth of 4-5 ft bgs.

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: AST Area, HH-12				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	4.3E-06	8.4E-01	NO
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	6.2E-07	5.7E-02	NO
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	6.3E-07	1.1E+00	YES
Recreator/Trespasser	Soil	2.4E-06	4.7E-01	NO
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 6: Leaching Potential from CCP (2016 Samples)
Several samples of CCP material from the upper eight feet of ground surface in 2016 were subjected to leaching potential testing using the Synthetic Precipitation Leaching Procedure (SPLP) to evaluate whether leachate generated from groundwater percolating through the CCP could impact groundwater in such a way as to exceed NC 2L groundwater standards. The maximum concentrations used in the risk calculator originated from samples HH-1 through HH-3.

- The results indicate that leachate samples from the collected CCP samples exceeded the respective NC 2L groundwater standard for the following COCs: antimony (Sb), As, Ba, Co, lead (Pb), Mn, Se, strontium (Sr), and vanadium (V).
- SPLP leachate from the CCP samples resulted in a direct contact groundwater CR of 3.5E-04 and HI of 7.3, both exceeding acceptable regulatory risk thresholds for direct residential exposures (drinking, bathing), but just exceeds an acceptable HI of 1.0, with the calculated HI of 1.1 for nonresidential direct exposures.
- The risk drivers for the exceedance of direct residential exposure to leachate for CR is the ingestion of arsenic. The risk drivers for the noncancer HI are As, Se, Co, Mn, Ba, V, and Sr.

See the risk calculator output below for the leachate samples collected from the upper eight feet of soil.

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Leachate Samples H&H 2016				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	NC	NC	NC
	Groundwater Use*	3.5E-04	7.3E+00	YES
Non-Residential Worker	Soil	NC	NC	NC
	Groundwater Use*	7.0E-05	1.1E+00	YES
Construction Worker	Soil	NC	NC	NC
Recreator/Trespasser	Soil	NC	NC	NC
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 7: Off-site Upgradient (Background) Groundwater (MW-5)

- The off-site upgradient (background) groundwater well, MW-5, has had detections of the following COCs above their respective NC 2L groundwater standard: manganese (Mn) and selenium (Se). Lithium (Li) and Molybdenum (Mo) were also detected in this well, but there are not NC 2L groundwater standards established for Li and Mo.
- The risk calculations indicate that acceptable CR and HI are not exceeded based on the background bedrock groundwater results in MW-5 except for direct residential use with an HI of 1.8. This groundwater is not used for water supply
- The calculated groundwater to indoor air risk values for both residential and non-residential scenarios was zero as no volatile compounds have been detected in this background bedrock well.

See the risk calculator output below for the August 2022 groundwater sample collected from the bedrock interval in background bedrock well MW-5.

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: MW-5 Background Bedrock Well				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	NC	NC	NC
	Groundwater Use*	4.8E-06	1.8E+00	YES
Non-Residential Worker	Soil	NC	NC	NC
	Groundwater Use*	9.7E-07	3.0E-01	NO
Construction Worker	Soil	NC	NC	NC
Recreator/Trespasser	Soil	NC	NC	NC
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 8: Groundwater within the Fill (Perched GW) (Wells MW-1, MW-1A, MW-2, MW-3, MW-4, MW-8, & MW-9)

- Groundwater concentrations of the following constituents are detected in wells constructed within the fill in excess of NC 2L groundwater standards: Sb, As, Ba, beryllium (Be), total Cr, Co, copper (Cu), Fe, Pb, Mn, Hg, Se, Sr, sulfate, Tl, V, and zinc (Zn).
- The calculated risk values based on maximum concentrations of contaminants in Aug 2022 groundwater samples within the fill exceeds both the regulatory acceptable range for cancer risk and the threshold HI of 1 with respect to direct groundwater use in residential scenarios at 7.2E-04 and 23 respectively, and nonresidential direct groundwater use at 1.4E-04 and 3.7, respectively.
- The risk drivers for these values in groundwater for direct residential use are Mn, As, Li, Co, Ba, Hg, and Sr by ingestion, dermal, and/or inhalation routes. The risk drivers in groundwater for direct non-residential use are Mn, As, and Li by ingestion and dermal routes.
- No VOCs nor SVOCs were detected in groundwater collected from within the fill material. Therefore, the calculated groundwater to indoor air risk values indicate no exceedances of the regulatory risk threshold values for CR nor HI for both residential and nonresidential scenarios.

See the risk calculator output below for the maximum concentrations of contaminants in the most recent (August 2022) groundwater sample event (from wells MW-1A, MW-8, and MW-9) collected from the wells located within the CCP/structural fill (Perched GW):

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Max Concentrations GW in CCP Aug 2022				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	NC	NC	NC
	Groundwater Use*	7.2E-04	2.2E+01	YES
Non-Residential Worker	Soil	NC	NC	NC
	Groundwater Use*	1.4E-04	3.7E+00	YES
Construction Worker	Soil	NC	NC	NC
Recreator/Trespasser	Soil	NC	NC	NC
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 9: Groundwater below the Fill in Bedrock (MW-11D)

- No COCs are detected in MW-11D in excess of established NC 2L groundwater standards; the Li and Mo concentrations detected in MW-11D are included on Exhibit 2 as there are no established NC 2L standards for Li or Mo.
- No VOCs nor SVOCs are detected above method detection limits in any monitoring well; COCs were only metal constituents.
- Groundwater concentrations in the last round of sampling were consistent with previous results; additional parameters were included in the most recent analytical program (for example, Li and Boron (B). Boron, though detected, was not found at a concentration that exceeds its NC 2L groundwater standard, and as noted above Li does not have an established NC 2L groundwater standard.
- The risk calculations based on the recent data for well MW-11D indicate an exceedance of acceptable CR and noncancer HI thresholds only for the HI for direct residential use of groundwater at 1.7. However, groundwater at the Brownfields Property shall not be used for water supply and its use is prohibited in the Brownfields Agreement.
- The risk driver for the direct residential use of groundwater in MW-11D is Li by ingestion.
- Groundwater wells MW-5 (background), MW-7, and MW-11D are all completed in bedrock, with MW-11D completed in bedrock below the structural fill material containing debris and CCP. Compounds identified in MW-5 are primarily Ba, Mn, Se, Sr, chloride, fluoride, and sulfate with J values of As, Co, Li, Mo, and V. Well MW-7, located east of the structural fill, has similar compounds, but generally at lower concentrations than MW-5. MW-11D is also similar in the type of compounds detected, but has generally lower concentrations than MW-5, with the exception of B, Mo, and Sr. However, none of the metals detected in groundwater from well MW-11D are at concentrations that exceed their NC 2L standard, if one has been established.

See the risk calculator output below for the August 2022 groundwater sample collected from the bedrock interval screened below the CCP in well MW-11D.

Risk for Individual Pathways				Output Form 1A
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: MW-11D, Onsite Bedrock Well				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	NC	NC	NC
	Groundwater Use*	1.1E-05	1.7E+00	YES
Non-Residential Worker	Soil	NC	NC	NC
	Groundwater Use*	2.1E-06	2.5E-01	NO
nstruction Worker	Soil	NC	NC	NC
Recreator/Trespasser	Soil	NC	NC	NC
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 10: Groundwater downgradient of the CCP/Structural fill (MW-3A, MW-4A, MW-6)

- Contaminants that have been detected in excess of NC 2L groundwater standards in the groundwater wells downgradient of the structural fill material are As, Ba, Cr+6, total Cr, Pb, Li, Mn, Mo, Se, Sr, sulfate, and Tl.
- The data for the most recent sample event conducted in August 2022 for wells MW-3A, MW-4A, and MW-6 were used in the risk calculator to evaluate the risk posed by groundwater downgradient of the structural fill area after the IRMs had been conducted in this area.
- The calculated risk values for the August 2022 groundwater in this area indicates that acceptable CR and HI threshold values are not exceeded except for direct residential groundwater use HI of 4.4. The risk drivers for direct residential use are Li and Mn. Groundwater will not be used for water supply at this Brownfields Property.

See the risk calculator output below for the August 2022 groundwater sample collected from the groundwater wells downgradient of the structural fill (MW-3A, -4A, & 6).

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: GW downgradient of Structural Fill (MW-3A, -4A, -6)				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	NC	NC	NC
	Groundwater Use*	7.4E-06	4.4E+00	YES
Non-Residential Worker	Soil	NC	NC	NC
	Groundwater Use*	1.5E-06	7.5E-01	NO
Construction Worker	Soil	NC	NC	NC
Recreator/Trespasser	Soil	NC	NC	NC
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 11: Bolin Creek Samples - Surface Water

- Collected in 2013, 2014, 2016, and 2019
- 3 – upstream location; 3 locations adjacent; and 3 downstream (Note:interpret SW sample 5, noted as being downgradient in reports, as onsite and therefore not interpreting for the sake of risk calculations that this sample is downstream).
- Surface water samples collected adjacent to and downstream of the Brownfields Property do not appear to be appreciably different in metals concentrations in samples collected between 2014 and 2019.
- In some cases, NC 2B standards do not exist for certain contaminants. In that case, the EPA National Recommended Water Quality Criteria for Aquatic Life & Human Health, or the NC In-Stream Target Values for Surface Waters are used for comparison purposes.
- Of the surface water samples, no constituents analyzed for in the surface water of Bolin Creek were detected at a concentration that exceeded its specific NC 2B surface water standard; only manganese at 100 ug/L (an outlier) exceeds the EPA National Recommended Water Quality Criteria for Aquatic Life & Human Health. It should be noted however, that due to high natural occurrence of manganese in NC surface waters, the EPA approved the removal of NC human health standards as part of the 2007-2016 Triennial review for Mn.
- These risk calculations indicate that there is no human health risk concerns from exposure to the surface water of Bolin Creek at the Brownfields Property.

Risk Calculator 11: Bolin Creek Sediment

- Collected in 2016 and 2019
- 2 upstream locations; 3 adjacent; 2 downstream (assuming sample SED-5 is interpreted to be onsite and not a downstream sample). Note Exhibit 2 only contains the sample results for the locations that are within the Brownfields Property's boundaries.
- Stream sediment in three samples (SED-3, SED-4, and SED-5) had concentrations that exceeded their respective Residential PRSGs: As, Cr+6, Co, and Mn; however, none of these concentrations exceeded the Industrial/Commercial PSRGs for these COCs.
- These risk calculations indicate that there is no human health risk concerns from exposure to the sediment of Bolin Creek at the Brownfields Property.

The risk calculator output indicates that there are no exceedances of an acceptable CR nor HI for the maximum concentrations of contaminants in the Bolin Creek sediment or surface water based on a recreator/trespasser exposure to creek sediment or surface water.

Risk for Individual Pathways				Output Form 1A
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Bolin Creek Stream Sediment & Surface Water				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	NC	NC	NC
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	NC	NC	NC
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	NC	NC	NC
Recreator/Trespasser	Soil	3.2E-06	5.8E-01	NO
	Surface Water*	1.7E-06	1.3E-01	NO
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

Risk Calculator 12: Exterior Soil Gas

- Exterior soil gas samples were collected across the elevated portion of the Brownfields Property in 2022. The contaminants in exterior soil gas samples that exceeded their respective Residential Vapor Intrusion Screening Levels (VISLs) were bromodichloromethane, chloroform, 1,2-dichloroethane (1,2-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), ethyl acetate, and trichloroethylene (TCE). The compounds 4-ethyltoluene, and trichlorofluoromethane do not have established VISLs. For those contaminants that have established VISLs, no contaminant concentration exceeded its respective Non-Residential VISL.
- The only exceedance was in the calculated residential soil gas to indoor air HI of 1.2 as there were some detections of VOCs in exterior soil gas, including TCE. The HI for nonresidential exposures was much less, at 0.094.
- The risk drivers for the soil gas to indoor air HI exceedance are principally TCE with cis-1,2-dichloroethylene (cis-1,2-DCE) and ethyl acetate.
- Based on these values, the BRS would recommend VI mitigation for any residential uses at the property, should such use be contemplated in the future. Based on the calculated HI for non-residential worker exposure pathways, we would not recommend a VI mitigation for non-residential uses of the Brownfields Property.

The risk calculator output below indicates that there is one exceedance – the HI of 1.2 for the soil gas to indoor air calculation for residential uses, which are not contemplated at this time.

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Exterior Soil Gas				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	NC	NC	NC
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	NC	NC	NC
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	NC	NC	NC
Recreator/Trespasser	Soil	NC	NC	NC
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	2.1E-05	1.2E+00	YES
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	1.5E-06	9.4E-02	NO
	Indoor Air	NC	NC	NC

Risk Calculator 13: Sub-Slab Vapor – Police Station
There were two sub-slab vapor samples collected from the existing police station building in 2022. There were low detections of several VOCs in these samples; however, there were no compounds for which their concentrations exceeded Residential nor Nonresidential Vapor Intrusion Screening Levels (VISLs).

The calculated risk values for CR and HI based on the sub-slab vapor samples from the police building did not indicate an unacceptable CR or noncancer risk from vapor intrusion for neither a residential nor a non-residential exposure pathway.

Risk for Individual Pathways				**Output Form 1A**
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Sub-Slab Vapor - Police Station Building				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	NC	NC	NC
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	NC	NC	NC
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	NC	NC	NC
Recreator/Trespasser	Soil	NC	NC	NC
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	2.9E-07	9.6E-02	NO
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	2.2E-08	7.6E-03	NO
	Indoor Air	NC	NC	NC

Risk Calculator 14: Site Wide GW, CCP/Soil, Ext Soil Gas
When comparing the maximum concentrations of COCs in site-wide groundwater, CCP/soil, and exterior soil gas, direct exposure to CCP/soil and groundwater for all scenarios exceeds either one or both the acceptable CR or HI values, except for non-residential worker direct soil exposures, which don't exceed acceptable values for CR nor HI.

It is important to note that although this risk analysis uses the maximum concentrations of site contaminants, that the engineering controls put in place by the Town during the implementation of the IRMs largely prevent exposure to the areas of contamination for users of the Brownfields Property. The final remedy is necessary to minimize exposure to the extent possible for users of the Brownfields Property.

Regarding VI risk, the HI for residential exposures based on exterior soil gas sample results exceeds an HI of 1, but the HIs for non-residential exposure pathways is 0.094 for

the soil gas to indoor air value. Based on this HI, vapor intrusion mitigation would not be recommended nor required for non-residential uses at the Brownfields Property.

Risk for Individual Pathways				Output Form 1A
Version Date: February 2024				
Basis: November 2023 EPA RSL Table				
Site ID: 23022-019-068				
Exposure Unit ID: Site Wide: Max Conc: GW, CCP/soil, Ext Soil Gas				
DIRECT CONTACT SOIL AND WATER CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Soil	1.6E-04	8.3E+00	YES
	Groundwater Use*	3.6E-03	8.3E+01	YES
Non-Residential Worker	Soil	3.3E-05	5.7E-01	NO
	Groundwater Use*	6.3E-04	1.2E+01	YES
Construction Worker	Soil	7.7E-06	1.1E+01	YES
Recreator/Trespasser	Soil	8.9E-05	4.6E+00	YES
	Surface Water*	NC	NC	NC
VAPOR INTRUSION CALCULATORS				
Receptor	**Pathway**	**Carcinogenic Risk**	**Hazard Index**	**Risk exceeded?**
Resident	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	2.1E-05	1.2E+00	YES
	Indoor Air	NC	NC	NC
Non-Residential Worker	Groundwater to Indoor Air	0.0E+00	0.0E+00	NO
	Soil Gas to Indoor Air	1.5E-06	9.4E-02	NO
	Indoor Air	NC	NC	NC

Indoor Air

Based on the lack of exceedances of VOC constituents in the sub-slab vapor sampling conducted at the existing police station building against non-residential VISLs paired with the knowledge that this building will be demolished in the future, and either not replaced with an enclosed building or one that would be solely for non-residential uses at this time, indoor air sampling was not conducted other than the radon testing discussed below.

Radon Testing

Radon testing was conducted in 2019 in the existing police station building to evaluate for the presence at the surface of the natural decay of radium in subsurface materials. Radon was either not detected or was detected only at the detection limit of 0.4 pCi/L, indicating that the risk from radon is negligible.

Methane Gas Screening

Out of an abundance of caution, methane gas screening was conducted within the footprint of the proposed redevelopment activities in accordance with the Brownfields Program methane protocol. There was only one detection of methane, which was in exterior soil gas monitoring point SG-3, centrally located in the parking lot south of the existing police station building. Methane detections at SG-3 were 0.1% and 0.2% by volume, which were within the accuracy range of the monitoring instrument. Methane was not detected in any other sample; static pressure measured at these points was below the accuracy limits of the field instrumentation and is therefore considered negligible.

These methane screening results suggest the site is not a methane risk and would meet the threshold criteria for methane site development for both residential or non-residential uses.

Toxicity and Exposure Pathway Review

The toxicity of COCs is taken into account in the risk assessment process by entering site-specific chemical data into the DEQ Risk Calculator. The toxicological data is derived directly from the U.S. EPA RSL database as noted above. The results quantify the environmental risk in terms of carcinogenic risk and noncancer hazard index. These values are compared to acceptable regulatory risk values, which are a maximum of 1E-04 for CR and a threshold value of 1.0 for HI. If site COCs cause exceedances of these risk values then appropriate actions are to be taken to make the site safe for its reuse. These calculations have been performed and are discussed above in the Risk Calculations section of this document.

The next step is to then evaluate the various exposure pathways to known contamination and identify if they are complete. A completed exposure pathway is the way in which human exposure to COCs can occur. An incomplete exposure pathway means that human exposure is not possible because one of the following is true: 1) COCs are not present at concentrations that are deemed harmful; 2) receptors are not present, or 3) COCs are not accessible to receptors.

Discussion of U.S. EPA Risk Assessment Documents:

1. U.S. EPA, *Risk Assessment of Coal Combustion Residuals: Legacy Impoundments and CCR Management Units, October 2023, Draft.* Available at: https://www.regulations.gov/document/EPA-HQ-OLEM-2020-0107-0887

Note: EPA finalized this document in April 2024, and published a red-lined final version along with the announcement of the publication of the final rule entitled *Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Legacy CCR Surface Impoundments* (Federal Register, Vol. 89, No. 90, May 8, 2024/Rules and Regulations). The red-line, final version of the risk assessment document, which EPA revised to include additional information and to address public comments, is available in the Docket Documents tab at this link and directly at Regulations.gov or athttps://www.regulations.gov/document/EPA-HQ-OLEM-2020-0107-1064. Section and page references for this document below refer to the red-lined final version.

This document is a report of a comprehensive risk assessment modeling effort to evaluate the environmental risks from other types of coal ash sites that are not specifically related to the federal rules that were established in 2015 for management of coal combustion residuals (CCR) generated at coal-fired electric utilities, known as the CCR Rule. As U.S. EPA states on page 1-1,

> "*This rule established minimum national standards under Subtitle D of RCRA for the design, operation, and closure of landfills and surface*

impoundments that accept CCR after the effective date of the rule on October 19, 2015."

The purpose of this risk assessment modeling effort is to evaluate the potential for risk from placement of CCR in legacy impoundments and Coal Combustion Residual Management Units (CCRMUs) that fell outside the scope of the 2014 Risk Assessment. EPA notes that they started from the same methodology and data sources as in the 2014 Risk Assessment for selecting appropriate data and characterizing facility environmental setting, CCR waste properties, contaminant transport, and receptor exposure; however, EPA notes that they adjusted the methodology as necessary to better reflect an updated conceptual model for smaller CCRMUs placed for purposes other than disposal and to incorporate more recent data. EPA also considered the potential for additional, non-groundwater exposures specific to smaller CCRMUs.

Based on the site characteristics of the Brownfields Property, the onsite coal ash structural fill seems to resemble most clearly the description of the CCRMU Fill used in the risk assessment document. The risk evaluation for this model type is presented in Section 4, CCRMU Fill Groundwater Risk (pg 4-1 through 4-19), and Section 5, CCRMU Fill Soil Risk (pg 5-1 through 5-8) of this document. However, it's important to understand that the risk management decisions made on the Brownfields Property are based on actual site data collected over a decade of time and are not based on estimates of site parameters that are used in the EPA models.

Section 4, CCRMU Fill Groundwater Risk – EPA's modeling efforts were focused on whether exposures may result if contaminated groundwater is used as a source of drinking water by future residents stemming from the placement of CCR in a smaller area than that of a large facility disposal area or landfill. EPA assumed that a hypothetical site would be redeveloped in the future for residential use and that as part of that redevelopment any engineering controls have been disturbed. EPA further assumed that there will be some type of soil or other cover placed over the CCR so that it is not exposed to the open air.

This conceptual model does not contemplate a scenario in which protective measures, other than soil cover, would be required through institutional controls and stewardship such as an executed Brownfields Agreement, which would be put in place on this Brownfields Property to mitigate the environmental risk associated with the coal ash.

For their modeling efforts, EPA used what is thought to be the best available data from a range of site-based, regional, and national datasets based on a combination of government sources and peer-reviewed journal articles, many of which were used in the 2014 Risk Assessment. The result of the model run as described in Section 4 indicates that there could be long-lasting impact to groundwater from arsenic concentrations in CCR within the range considered for regulation.

In contrast to the EPA modeled results, while we do see arsenic in groundwater at the Brownfields Property, site-specific data from groundwater samples collected at the

Brownfields Property indicate that maximum concentrations of arsenic in groundwater within the CCR fill area itself ranged up to 140 µg/L; however, the most recent arsenic concentrations collected from wells screened within the CCR fill area are in the range of 22.9 µg/L to 37 µg/L, and that recent concentrations of arsenic in groundwater wells located downgradient of the CCR are less than the arsenic NC 2L groundwater standard of 10 µg/L. Furthermore, groundwater concentrations in on-site bedrock wells below the CCR do not exhibit arsenic concentrations in excess of its NC 2L standard of 10 µg/L Additionally, the land use restrictions proposed in the Brownfields Agreement, and which would run with the land once the Brownfields Agreement was fully executed and recorded, prohibit groundwater use for any purpose.

Section 5, CCRMU Fill Soil Risk
EPA conducted modeling to estimate the exposure to radiation that may result from residing on a home built on or around a CCRMU fill site. The evaluation considered the potential for exposure to gamma radiation and radon gas from CCR placement within the soil of a residential site. EPA did not model direct ingestion or inhalation of CCR or uptake of contaminants to crops and livestock, nor separate leaching to groundwater; however, EPA states that the contributions from these additional pathways to overall exposures is expected to be low compared to those that are modeled in the risk assessment.

With respect to their results in Section 5, EPA concluded the following on page 5-8:

> "*Available data indicate the potential for radon emanation and associated risk from CCR is not distinguishable from that of background soils. Therefore, this exposure route was not retained for further consideration. The remaining modeled risks from gamma radiation for future residential receptors were modeled with the EPA PRG Calculator under the assumption that some level of cover separates the CCR and the receptor. Modeled high-end risks ranged from 4x10-6 at a cover thickness of 60 cm to 1x10-4 at a cover thickness of 20 cm."*

and

> *"The parameter with the greatest influence on risk is the amount of cover soil separating the CCR and the receptor. This is because the soil serves as a shield and limits exposure to gamma radiation*."

An engineered cap including a minimum of two (2) feet of demonstrably clean fill soil in addition to an earth retention system is a requirement of this Brownfields Agreement if the CCR remains in place. Such a thickness of clean fill soil is consistent with the 60 cm (60 cm is about 24 inches) of soil cover that EPA used in its modeling run that equated to EPA's modeled risk of $4x10^{-6}$ for residential reuse. Such a risk value is within the acceptable regulatory cancer risk range of up to $1x10^{-4}$, and is therefore protective with respect to gamma radiation. Further, the risk values would be lower for non-residential scenarios not modeled by EPA, but that are intended for the Brownfields Property.

As we noted above with respect to radon, the radon testing performed within the police station on the Brownfields Property did not indicate the presence of radon gas in indoor air; hence, this exposure pathway is incomplete at the Brownfields Property.

Section 6, Uncertainty and Sensitivity Analyses
In Section 6, EPA discusses the uncertainty and sensitivity analyses for the model runs that they conducted. With respect to post-closure exposures, EPA further states on pages 6-22 and 6-23:

> "*The main model and sensitivity analyses identified potential risks resulting from gamma radiation and radon gas if CCRMU fills are disturbed…In the absence of residential receptors, a reasonably maximally exposed receptor under a future land use scenario might be an individual who uses the open area for recreation*."

Further EPA noted that with respect to gamma radiation in a recreational setting, the worst case scenario equivalent identified a cancer risk attributed to gamma radiation of around $3x10^{-6}$, which is within the acceptable cancer risk range of $1x10^{-6}$ to $1x10^{-4}$. EPA further notes that this scenario is expected to overestimate risk for multiple reasons.

EPA's final conclusion in Section 6 (page 6-24) states:

> "*The results of all these analyses reinforce the conclusions from previous modeling that disposal in historical and inactive landfills and surface impoundments, as well as placement in CCRMU fills, have the potential to result in risk to future receptors that warrant regulatory action*."

One such regulatory action is the use of the State Brownfields process to identify the site-specific risks and put in place the institutional controls necessary to render the site safe for its reuse. As part of that process, the Brownfields statute allows the use of land use restrictions, including as in the case restrictions against disturbance of soil and CCR at the site and the design and implementation of an engineered cap and earth retention system if material is left in place, as part of a site remedy to render incomplete an otherwise completed exposure pathway, thereby ensuring full protection of public health and the environment and to enable the long-term stewardship of a brownfields property.

2. *Notice, Availability of the Draft IRIS Toxicological Review of Inorganic Arsenic, U.S. Environmental Protection Agency, Federal Register, October 16, 2023* *http://www.regulations.gov,* Docket ID No. EPA–HQ–ORD–2012–0830

This Notice states:

> "*This draft assessment is not final as described in EPA's information quality guidelines, and it does not represent, and should not be construed to represent Agency policy or views*."

The draft of this document clearly indicates a warning in the footer that one should not reference this document, i.e.,"*DRAFT-DO NOT CITE OR QUOTE*". Therefore, we are not opining on this particular document at this time.

Based on known concentrations at this Brownfields Property and current toxicological input and risk equations, arsenic is accounted for in the risk calculations and is already considered a risk driver for environmental risk management decisions at the site. Final remedy designs will already have mitigation of exposure to the contaminants in the CCP and impacted soil as a primary objective. Should EPA modify any of the toxicological parameters associated with arsenic, that would be taken into account in the final remedial designs for the Brownfields Property through an updated risk calculator.

Land Use Restrictions:
For all the risk exceedances noted above in the risk analyses will be mitigated or eliminated through the land use restrictions that would be set forth through the recordation of the Notice of Brownfields Property at the Orange County Register of Deeds. Such land use restrictions would run with the land in perpetuity.

The land use restrictions (LURs) for this Brownfields Property will include site-specific LURs related to requirements for a final remedy design and implementation prior to construction, excavation or utility installation; design and construction of an engineered cap and slope stabilization of impacted soil/CCP if remaining at the Brownfields Property. The Notice of Brownfields Property shall also set forth LURs pertaining to land use limitations, including prohibitions on use of the property for childcare centers, adult care centers, schools, or residential use; prohibitions on all groundwater use; prohibitions on soil disturbances without approval; requirements for Environmental Management Plans, final grade sampling to confirm surface soil quality, demolition, and redevelopment summary report(s); prohibitions on community gardens, ground-contact sports, kennels, agriculture; and further requirements for property access; abandonment of monitoring wells except for certain key sentinel wells to be monitored, addressing construction damage to wells, deed notification upon transfers of property, separating old from new contamination, and the annual Land Use Restriction Update that certifies compliance with land use restrictions; and.

Based on the site-specific data provided to the Brownfield program, the site reuse is suitable for the site as long as the agreed upon land use restrictions in the BFA are abided by, and the final remedy for the CCP area is designed, implemented, and maintained so that the site can be made safe for this proposed reuse.

Issues For Continued Property Management
The design of the final remedy for the site's CCP will need to be reviewed as well as a final grade sampling workplan and report(s). A vapor intrusion issue has not been identified at this site and therefore no vapor intrusion mitigation system is planned at this time for non-residential uses at the Brownfields Property.

Monitoring wells MW-3A, -4A, and -6A are to be maintained as sentinel wells to evaluate trends in groundwater downgradient from the structural fill as per a written plan and schedule prepared to DEQ's prior written satisfaction.