RIDGEWOOD BOARD OF EDUCATION

REMEDIAL ACTION WORKPLAN

ORCHARD SCHOOL PORTION OF THE RIDGEWOOD ASH LANDFILL
PI ID #G000008572

FEBRUARY 07, 2020

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RIDGEWOOD BOARD OF EDUCATION

REPORT

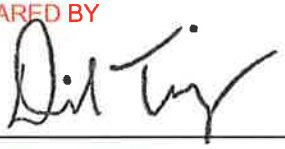
PROJECT NO.: 770817.RIDORS.00
DATE: FEBRUARY 2020

WSP
600 EAST CRESCENT AVENUE, SUITE 200
UPPER SADDLE RIVER, NJ 07458

PHONE: +1 201-818-0700
FAX: +1 201-818-0505
WSP.COM

SIGNATURES

PREPARED BY



David Terry, LSRP
Sr. Vice President

New Jersey Department of Environmental Protection
Site Remediation and Waste Management Program

AUTHORIZATION TO SUBMIT A REMEDIAL PHASE REPORT THROUGH NJDEP ONLINE

[Except Response Action Outcome (RAO)]

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Ridgewood Ash Landfill - Orchard School

Street Address: 230 Demarest Street

Municipality: Ridgewood (Township, Borough or City)

County: Bergen Zip Code: 07450

Program Interest (PI) Number(s): G000008572

SECTION B. STATEMENT OF AUTHORIZATION TO SUBMIT THE REMEDIAL PHASE REPORT

I authorize the Licensed Site Remediation Professional, retained for this site pursuant to the Brownfield and Contaminated Site Remediation Act at N.J.S.A. 58:10B-1.3b, and named below to submit, as applicable, the remedial phase report listed below, updated Receptor Evaluation Form, and CEA/Well Restriction Fact Sheet Form, for the Program Interest Number noted above. I understand that I am assuming full responsibility that the information provided in the remedial phase report is true, accurate, and complete.

Name and Date of Remedial Phase Report:

Remedial Action Workplan - 2/2020

Authorized Licensed Site Remediation Professional (LSRP)

First Name: David Last Name: Terry

LSRP License #: 575840

SECTION C. CERTIFICATION BY THE PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION

Full Name of Person Responsible for Conducting the Remediation: Village of Ridgewood Board of Education

Representative First Name: Antoinette Representative Last Name: Kelly

Mailing Address: 49 Cottage Place

Municipality: Ridgewood State: New Jersey Zip Code: 07451

Telephone Number: (201) 670-2700 Ext.: 10503 Fax:

Email Address: akelly@ridgewood.k12.nj.us

This certification shall be signed by the person responsible for conducting the remediation who is submitting this Authorization and Report in accordance with the Administrative Requirements for the Remediation of Contaminated Sites at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Antoinette Kelly Date: 2/10/2020

Name/Title: Antoinette Kelly/School Business Administrator

Completed form should be uploaded to NJDEP Online.

New Jersey Department of Environmental Protection
Site Remediation and Waste Management Program

ALTERNATIVE REMEDY / REMEDIAL ACTION PRE-APPROVAL FORM

FOR RESIDENCES, SCHOOLS, AND CHILD CARE CENTERS

Date Stamp
(For Department use only)

NOTE: This form shall be completed for any remediation initiated after May 7, 2010, by the person responsible for conducting the remediation, when new construction of, or a change in use to, a residence, a child care center or a school will occur, and an alternative remedy is proposed, or pre-approval of a remedial action is required.

This form may be submitted for a residence, child care center, or school when pre-approval from the NJDEP for the specific issues detailed below is desired but not required. See instructions for limitations.

SECTION A. SITE NAME AND LOCATION

Site Name: Ridgewood Ash Landfill

List all AKAs: Orchard School

Street Address: 230 Demarest Street

Municipality: Ridgewood (Township, Borough or City)

County: Bergen Zip Code: 07450

Program Interest (PI) Number(s): G000008572

Case Tracking Number(s): 97-8-15-0958-53

Date Remediation Initiated Pursuant to N.J.A.C. 7:2 6C-2.2 or 2.3(b): 08/15/1997

State Plane Coordinates for a central location at the site: Easting: 594560 Northing: 779620

Municipal Block(s) and Lot(s):

Block #	2313	Lot #	10	Block #		Lot #	
Block #		Lot #		Block #		Lot #	
Block #		Lot #		Block #		Lot #	
Block #		Lot #		Block #		Lot #	

SECTION B. REMEDIAL ACTION WORKPLAN

1. Is the remediation at a residence, school, or child care center? ☒ Yes ☐ No

   If "No" STOP ! DO NOT SUBMIT THIS FORM.

2. Is the remediation for new construction of, or a change in use to a residence, school, or child care center *and* was remediation initiated *after* May 7, 2010? ☐ Yes ☒ No

   If "Yes": Is the proposed remedial action required to be approved by the NJDEP? ☐ Yes ☐ No

   If "Yes," please indicate reason(s) below: *(check all that apply)*

   - ☐ Containment of free product
   - ☐ Unexploded Ordnance
   - ☐ Chlorinated Dioxins and Furans
   - ☐ Hexavalent Chromium
   - ☐ Landfills not prohibited by N.J.S.A. 58:10B-12(g)
   - ☐ Alternative Remedy – **(If checked complete Section C)**

   If "No": You are not required to submit this form. However, you may submit this form if you desire pre-approval from the NJDEP of your remedial action for **only** a residence, a school, or child care center for the **specific issues** listed below. **BE ADVISED:** Once you submit this form, you must comply with all Department's recommendations and modifications to your submittal.

   Are you requesting voluntary pre-approval of your proposed remedial action? ☒ Yes ☐ No

If "Yes," indicate the issue(s) to be reviewed: *(check all that apply)*

- ☐ Containment of free product
- ☐ Unexploded Ordnance
- ☐ Chlorinated Dioxins and Furans
- ☐ Hexavalent Chromium
- ☐ Landfills not prohibited by N.J.S.A. 58:10B-12(g)
- ☒ Alternative Remedy

SECTION C. ALTERNATIVE REMEDY *(complete only if submitting an alternative remedy)*

1. The alternative remedy is: *(Check one only)*

   ☒ Proposed because the presumptive remedy is impractical due to conditions at the site;
   OR
   ☐ Equally protective over time" as the applicable presumptive remedy.

2. Provide the page number in the RAW where the detailed description of the alternative remedy is located: _____.

SECTION D. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Village of Ridgewood Board of Education

Representative First Name: Antoinette Representative Last Name: Kelly

Title: Business Administrator

Phone Number: (201) 670-2700 Ext: 0503 Fax:

Mailing Address: 49 Cottage Place

City/Town: Ridgewood State: New Jersey Zip Code: 07450

Email Address: akelly@ridgewood.k12.nj.us

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Antoinette Kelly Date: 2/10/2020

Name/Title: Antoinette kelly/Business Administrator

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

SECTION E. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 575840

First Name: David Last Name: Terry

Phone Numbers: (201) 957-1272 Ext.: Fax:

Mailing Address: 600 East Crescent Avenue, Suite 200

Municipality: Upper Saddle River State: New Jersey Zip Code: 07458

Email Address: david.terry@wsp.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with N.J.S.A. 58:10C-14, and N.J.S.A. 58:10B-1.3b(1) and (2).

(1) I certify, as a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C-1 et seq. to conduct business in New Jersey, that for the remediation described in this submission, and all attachments included in this submission, I personally: Managed, supervised, or performed the remediation conducted at this site that is described in this submission, and all attachments included in this submission; and/or periodically reviewed and evaluated the work performed by other persons that forms the basis for the information in this submission; and/or completed the work of another site remediation professional, licensed or not, after having: (1) reviewed all available documentation on which I relied; (2) conducted a site visit and observed the then-current conditions and verified the status of as much of the work as was reasonably observable; and (3)concluded, in the exercise of my independent professional judgment, that there was sufficient information upon which to complete any additional phase of remediation and prepare workplans and reports related thereto.

(2) I certify:

- *That I have read this submission and all attachments to this submission;*
- *That in performing the professional services as the licensed site remediation professional for the entire site or each area of concern, I adhered to the professional conduct standards and requirements governing licensed site remediation professionals provided in N.J.S.A. 58:10C-16;*
- *That the remediation conducted at the entire site or each area of concern, that is described in this submission and all attachments to this submission, was conducted pursuant to and in compliance with the remediation requirements in N.J.S.A. 58:10C-14.c;*
- *That the remediation described in this submission, and all attachments to this submission, was conducted pursuant to and in compliance with the regulations of the Site Remediation Professional Licensing Board at N.J.A.C. 7:26I; and*
- *That the information contained in this submission and all attachments to this submission is true, accurate, and complete.*

(3) I certify, when this submission includes a response action outcome, that the entire site or each area of concern has been remediated in compliance with all applicable statutes, rules, and regulations and is protective of public health and safety and the environment.

(4) I certify that no other person is authorized or able to use any password, encryption method, or electronic signature that the Board or the Department have provided to me.

(5) I certify that I understand and acknowledge that:

- *If I knowingly make a false statement, representation, or certification in any document or information I submit to the Department I may be subject to civil and administrative enforcement pursuant to N.J.S.A. 58:10C-17.a.1(a)through (f) by the Board, including but not limited to license suspension, revocation, or denial of renewal; and*
- *If I purposely, knowingly, or recklessly make a false statement, representation, or certification in any application, form, record, document or other information submitted to the Department or required to be maintained pursuant to the Site Remediation Reform Act, I shall be guilty, upon conviction, of a crime of the third degree and shall, notwithstanding the provisions of subsection b. of N.J.S.2C:43-3, be subject to a fine of not less than $5,000 nor more than $75,000 per day of violation, or by imprisonment, or both.*

(6) I certify that I have read this certification prior to signing, certifying, and making this submission.

LSRP Signature: Date: 2/7/2020

LSRP Name: David Terry

Company Name: WSP USA

Case Name:

PI #: G000008572

IMPORTANT: *1) Do not delete or copy and paste across multiple columns because it can disrupt hidden equations.*
2) If pasting from a Word document, use the Paste option: ***Match Destination Formatting***
3) If the text turns ***red*** *you have exceeded the character limit for that column*

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	AOC Description	Confirmed Contamination	AOC Status	Status Date	Incident #	DEP AOC Number	Contaminated Media	Contaminants of Concern	Additional Contaminants of Concern	Additional Contaminants of Concern	Applicable Remediation Standard	Exposure Route	Additional Exposure Route	RA Type	Additional RA Type	Additional RA Type	Was an Order of Magnitude Evaluation Conducted?	Activity
1	Discharge and disposal area - Landfill	Ash fill material part of the former Ridgewood Ash Landfill.	Yes	RAR	10/1/2001	NA	1	Soil	Metals + PAHs			Remediation Standards	Ingestion/Dermal		Capping			No	Ash fill material covered with at least 18 inches of pre-existing overlying on-site soil and clean fill in select areas as approved by the NJDEP in August 1998. Remedial action was completed in 2000 with a Remedial Action Report submitted to the NJDEP in October 2001.
2	Discharge and disposal area - Historic fill material area/other fill area	Pre-existing ash fill cap determined to comprise historic fill.	Yes	RAW	2/7/2020	NA	2	Soil	Metals + PAHs			Remediation Standards	Ingestion/Dermal		Capping	Excavation		No	A screening survey investigation was conducted in 2007 of the non-ash cap fill covering the ash fill. Based on the soil sampling data, the ash fill cap was determined to be impacted by PAHs and minor amounts of lead traces of arsenic. The ash cap fill was determined to be historic fill with similar consitiuents identified in histroic fill identified across the State of New Jersey. This Remedial Action Workplan is being submitted to cap over both of the AOCs that are part of this case.

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NJDEP SUBMITTAL REQUIRED FORMS:

- **Authorization Form**
- **Alternative Remedy/Remedial Action Pre-Approval Form**
- **Case Inventory Document**

TABLES

FIGURES

1 INTRODUCTION

On behalf of the Ridgewood Board of Education (BOE), WSP USA has prepared this Remedial Action Workplan (RAW) for the remediation of historic fill at the Orchard School portion of the Ridgewood Ash Landfill in Ridgewood, Bergen County, New Jersey (the Site, Figure 1 and Figure 2). This Site is listed with Program Interest (PI)# G000008572 under the New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program (SRP) and as a Solid Waste Landfill with the NJDEP Bureau of Solid Waste under PI# U772.

The Orchard School is operated by the BOE as an elementary school with one main building surrounded by grounds of mixed use, including playgrounds, paved play surfaces, landscaped areas, paved and unpaved walkways, a paved parking lot, and a recreation field. The Orchard School was constructed in 1964 on filled land in a low-lying area adjacent to the Diamond Brook. Previous environmental investigations at the Orchard School site conducted in the 1980s and 1990s identified the presence of 'ash fill' material at the Site associated with the 'Ridgewood Ash Landfill' located on the Orchard School property and other adjacent properties. The 'ash fill' material was largely covered by 'non-ash' soils. Initial investigations were performed in the 1990s with a remedial action (RA) conducted in 2000 to ensure the ash fill remained buried below the ground surface. The 2000 remedial action involved the use of existing and imported fill materials to cover the ash to at least a depth of 18 inches below grade at select areas of the Site. Subsequent remedial investigation (RI) work in 2007 identified elevated polycyclic aromatic hydrocarbons (PAHs), as well as limited areas of lead and arsenic exceeding NJDEP's Residential Direct Contact Soil Cleanup Criteria (RDCSCC) in the ash fill cap. The chronology of the Site remediation activities is further summarized in the Background section of this report.

Since the Site is an existing school built in 1964, the use of a Presumptive Remedy is not required pursuant to NJSA 58:10B-12(g). Due to constraints associated with the Site (i.e., ash landfill across the entire property, proximity to wetlands, wooded areas, mapped flood zone, and prolonged disruption to the use of the school) excavation into the buried ash fill is not recommended. This RAW presents the proposed remedy for each of the functional areas of the Site.

2 BACKGROUND

The Property is located on Block 2313, Lot 10 at 230 Demarest Street (at the intersection of Demarest Street and Orchard Place in the Village of Ridgewood (VOR)), New Jersey (Figure 1). The Property is bounded to the north by VOR public tennis courts and the Bellair Condominium complex [(formerly a Public Service Electric and Gas Manufactured Gas Plant (PSE&G MGP)], to the east by private residences and Demarest Street, to the west by Diamond Brook, and to the south by wooded wetlands (Figure 2). The Property is 5.92 acres in area and contains a school building, a paved parking lot, two playgrounds, and a grass-covered recreation field. The Property topography is relatively flat with a slight slope toward the west.

The Site is located in the Piedmont physiographic province of New Jersey. The geology of the Site environs is the glaciated portion of the Triassic lowlands. The bedrock beneath the site is sandstone and mudstone comprising the sedimentary sequence of the Passaic Formation. The site is underlain by soils identified as "urban land" and "udorthents," and historic 'ash fill' material adjacent to the Diamond Brook, a tributary of the Passaic River. Local groundwater flow is anticipated to flow to the west and southwest toward the southward-flowing Diamond Brook.

The Bellair Condominium property, located to the north, was historically owned by the Ridgewood Gas Company which operated a MGP. This property has been investigated and found to contain contaminants associated with MGP operations and has been through various stages of investigation and remediation performed by PSE&G (the successor to Ridgewood Gas Company) under the oversight of the NJDEP.

The Bellair Park property (a municipally owned tennis court facility), to the north, has been identified as historically containing municipal ash waste, which was reportedly derived largely from domestic boilers in the VOR and identified by NJDEP as the Ridgewood Ash Landfill. The Ridgewood Ash Landfill extends onto neighboring properties, including several adjacent residential properties and the Orchard School. As described previously, the Orchard School is also listed as a Solid Waste Landfill with the NJDEP Bureau of Solid Waste under PI# U772.

Based on a review of aerial photographs, prior to development, the site area predominantly consisted of low-lying wooded marshlands associated with the Diamond Brook. In addition to the ash landfill operations conducted in the 1940s, 1950s and early 1960s, this area appears to have been filled in using a substantial amount of 'historic fill' to achieve its current grade at some point in the early to mid-1960s (prior to the construction of Orchard School in 1964).

The Site property had a series of three different owners prior its acquisition by the Ridgewood BOE in 1964. The original owner of the property was Jacob Debonte (from 1919 until 1949) followed by Jay and Marge Debonte (1949 to 1962). Victor and Marge Palace owned this land for the remaining years (1962 to 1964). Based upon review of a series of historic aerial photographs it is evident that filling activities were ongoing between the late 1940s and the late 1950s.

Currently, the Orchard School is operated by the BOE as an elementary school with one main building surrounded by grounds of mixed use, including playgrounds, paved play surfaces, landscaped areas, paved and unpaved walkways, a paved parking lot, and a recreation field.

As part of an investigation of the ash-fill materials completed by the NJDEP in 1992, six soil samples were collected from three borings completed at the Site. Based on the conditions encountered during the completion of the soil borings, it was determined that the coal-ash material was present beneath the Site, extending from 0.5 to 3 feet below grade (ft bg) in the investigated area. The collected soil samples were submitted for laboratory analyses for metals and base-neutral/acid extractables (BN/AEs). The results of these analyses indicated elevated levels of arsenic and lead, as well as several BN/AE compounds.

The BOE applied for a Memorandum of Agreement (MOA) with the NJDEP on August 12, 1997 for the purpose of conducting an RI and RA related to historic coal-ash fill identified at the Site by the NJDEP in 1992. The purpose of the RI was to characterize the extent of coal-ash fill ('ash fill') material below the surface at the Site and to evaluate appropriate remedial alternatives for the cleanup of the ash fill exposed at the surfacee. In 1997, LBG (currently WSP) completed an RI of the ash-fill material. Based on these findings, a RAW was prepared and approved by the NJDEP in August 1998. The RAW proposed regrading existing site soils in sufficient thickness to adequately cover the underlying coal ash fill material and add in clean fill where needed to supplement grading. Due to the location of the Site in the floodway of the Diamond Brook, changing the site elevation was not allowed. The approved RAW tasks were completed between August 2000 and August 2001. A RAR documenting the work was submitted to the NJDEP in October 2001 for review by the NJDEP.

A screening survey investigation was conducted in 2007 for the BOE of existing 'non-ash' related fill soils covering the ash-fill at the Site. This investigation determined that the property was widely underlain by materials which are categorized as 'historic fill' by the NJDEP and associated with a historical 'landfill' used to dispose of ash. These materials were found to contain concentrations of certain PAHs in addition to lead, which exceeded the NJDEP RDCSCC.

As described above, in October 2001, LBG (currently WSP) submitted a RAR to the NJDEP summarizing the RI/RA tasks completed at that time. A supplemental RI was submitted to the NJDEP in December 2007 summarizing the findings of the 2007 soil sampling investigation of the ash fill cap. no response was received by the NJDEP regarding the findings prior to enactment of the Site Remediation Reform Act (SRRA) in 2009. An additional RI/RA Report was submitted in April 2014 in connection with SRRA, which summarized the work previously conducted for the Site.

In summary, there are two Areas of Concern associated with the former ash landfill. AOC-1 is located approximately 18 inches below grade and is associated with the ash fill layer that was the area in which the original remedial action was focused in 2000. AOC-1 is buried by overlying soil historically brought in the conceal the ash fill. AOC-2 is the soil cap that covers the ash fill that was discovered later in 2007 to contain PAHs and low levels of lead and arsenic. The ash fill cap that covers the ash fill also needs to be remediated. The purpose of this RAW is to demonstrate the plan to cap both AOCs effectively enough to minimize exposure. The following report summarizes the proposed plan to complete the remediation.

3 PREVIOUS REMEDIAL INVESTIGATION/REMEDIAL ACTION

The NJDEP conducted an initial investigation of the 'ash fill' materials in 1992. Based on the results of the initial NJDEP investigation, the VOR proceeded to conduct a RI of the ash-fill material in August and September 1997 in accordance with the MOA between the VOR and the NJDEP to delineate the extent of the contamination and examine possible remedial alternatives.

A subsequent investigation was performed by LBG (currently WSP) in 2007 in connection with the 'non-ash' related fill soils covering the ash-fill at the Site. This investigation determined that the property was widely underlain by materials which are categorized as 'historic fill' by the NJDEP and associated with a historical 'landfill' used to dispose of ash. These materials were found to contain concentrations of certain PAHs in addition to lead, which exceeded the NJDEP RDCSCC.

This section below summarizes these investigations and the 2000/2001 remedial action.

3.1 ASH-FILL MATERIAL REMEDIAL INVESTIGATION, AUGUST/SEPTEMBER 1997

The initial RI was conducted by LBG (currently WSP) in August 1997, and included the completion of a total of forty-six soil borings using direct push Geoprobe at locations along a pre-established sampling grid (Figure 3). Samples of the 'ash-fill' material were collected from five of the borings and submitted to Accutest Laboratories for base neutral extractible (B/Ns), metals, pesticide and polychlorinated biphenyl (PCB) analyses. The selection of the samples for laboratory analysis was based on visual inspection by the on-site LBG hydrogeologist for evidence of ash (observed as 'gray' material).

In September 1997, four supplemental surface-soil samples were collected by LBG (currently WSP) from the playground areas of the Site and submitted to Accutest Laboratories for lead analysis. The samples were collected from immediately beneath the existing mulch layer, at locations coincident with the potential for high human exposure due to playground activities (e.g., under swings, at the base of slides).

During sampling, 'ash-fill' material was encountered between 0.5 and 3 ft bg. The encountered fill ranged in thickness from 0.25 to 2.5 feet, and consisted primarily of ash, cinder, and coal with occasional pieces of cement, brick, glass and rubber. Metals, pesticides and PCBs were not detected at concentrations in excess of NJDEP RDCSCC at the sampling locations. Five B/N compounds were detected above their respective NJDEP RDCSCC at specific locations. One sample exhibited elevated lead concentrations; however, results from additional shallow samples collected in that area and submitted for lead analysis were below the NJDEP RDCSCC.

Based on the volume of coal-ash material encountered at the Site, innovative technologies such as soil washing and in-situ extraction were deemed non-cost-effective. Excavation and off-site disposal were also deemed non-cost-effective and widespread excavation would result in a potential risk of atmospheric exposure due to disturbance of the stabilized coal-ash material. With regard to the 'ash fill' material an Interim Remedial Measure (IRM) consisted of the addition of extra mulch at the playground areas to increase the separation distance to the underling materials. The appropriate remedial alternative selected for the remainder of the Site was to allow the 'ash-fill' material impacted soil to remain stabilized in place and cover the shallow

occurring portions with a minimum of 18 inches (1.5 feet) of clean soil to prevent human contact. A RAW was submitted for this work in October 1997 and approved by the NJDEP on August 25, 1998.

3.2 ASH-FILL REMEDIAL ACTION, AUGUST/SEPTEMBER 2000 & AUGUST 2001

In August and September 2000, the BOE placed a 'cap' of clean fill across the Site separating the ground surface from shallow-lying 'ash-fill' material. The cap was defined as either at least 1.5 feet of separation from the ground surface to the top of the 'ash-fill' material or permanent cover (e.g., asphalt, concrete paver) over the affected area. As previously discussed with the Department Case Manager (at the time), limited portions of the floodway associated with the Diamond Brook occurred at the Site due to the location of the footbridge connecting the Site property with the west bank of the Diamond Brook. To avoid a floodway infringement, the BOE chose to excavate limited portions of the affected area rather than emplacing fill material within the floodway. The overlap of the floodway and the affected area requiring remediation was contained to the southern playground. As delineated in the RI, the top foot of material in the playground was clean and was used as topsoil on the athletic field.

During the excavation of the playground area biodegraded woodchips were removed to a depth of approximately one foot below grade. The excavation revealed that little "ash" was present in the playground area and that the majority of the fill in this area of the property was scrap metal. Approximately 10 cubic yards of 'ash fill' was removed and large portions of scrap metal (anything from several inches to several feet in length) were manually separated and transported to a metal recycling facility for proper disposal (approximately 1,500 pounds). Additionally, a review of the grading plan indicated that a build-up of fill-material along the border of the existing playground would create a trip-hazard for the elementary students playing on the asphalt pavement. To eliminate this hazard, portions of the asphalt playground were extended to cover limited shallow occurrences of 'ash-fill' material.

The remainder of the affected area was remediated through capping with pre-existing soils. The top two inches of sod (and wood chips in the northern playground) were stripped, and grading stakes were placed in a 50-foot grid across the entire Site. The grading stakes were manually marked with the required fill depths. Pre-existing soils were placed across the Site in multiple 0.5 foot intervals and compacted with a "sheepsfoot" roller machine until the rough grade was achieved over the entire affected area. Low spots were filled with a front-end loader and bladed with a bulldozer. Then the entire affected area was brought to final grade with manual soil filling and vibratory plates. A total of approximately 480 cubic yards (720 tons) of material was utilized. The athletic field was finished with an irrigation system and sod, while the remaining disturbed areas were hydro-seeded.

3.3 NON-ASH MATERIAL REMEDIAL INVESTIGATION, AUGUST & OCTOBER/NOVEMBER 2007

Screening of the 'non-ash' material was performed in late 2007 under a sampling workplan reviewed by the NJDEP and approved on September 26, 2007. Sampling activities were intended to investigate soil quality at the Site and characterize the composition of the fill and historic fill occurring on the Orchard School property with respect to PAHs, metals and pesticides. The 2007 sampling effort included the collection of nine screening samples in August 2007. As a follow-up to the screening samples, fifty-eight samples were collected from forty-three locations in October 2007 with another seven follow-up samples collected in November 2007. The sample locations were selected using NJDEP guidelines (at New Jersey Administrative Code N.J.A.C. 7:26E) including: 1)

positive bias locations based on site history or visual indicators, 2) locations of likely exposure, and 3) a randomized grid approach for remaining locations. The samples were collected from the shallowest interval representing the highest opportunity for direct exposure (0 to 0.5-foot deep) interval. Samples were submitted to an NJDEP-certified laboratory. Sample results are summarized on Table 1.

Based upon the results obtained from the nine screening samples, the Site was divided into five areas based on the present use and the type of ground cover. Figure 2 presents the five delineated usage areas (investigation areas) and Figure 3 depicts the sample locations. Areas occupied by the building and pavement were excluded, as was the wooded area in the extreme southwest portion of the Site. The following table presents the investigation areas:

Orchard School - Investigation Areas		
Area Designation	Use/Ground Cover Description	Approximate Size (square feet)
Area 1 Recreation Field	This area is predominantly thick grass/turf cover, used as a recreation and soccer playing field.	77,258
Area 2 Northeast Area	Area 2 consists of patchy to healthy vegetative cover (grass/turf).	15,101
Area 3 Bellair Park Access Corridor	Variable ground cover can be found in this area, including cement sidewalks, grass, and mulched landscaped shrub gardens. This area is used for ingress/egress with several park benches.	7,821
Area 4 Playground	Area 4 is predominantly a playground area with 18 inches of wood chips as a play base.	25,570
Area 5 Front Access/Amphitheater Area	This area is primarily composed of sidewalks, brick pavers and small landscaped shrub gardens. There are also areas of patchy to healthy vegetative cover (grass/turf). The primary use of this area is for ingress/egress to the main entrances to the facility as well as the amphitheater, which serves as an outdoor classroom.	13,895

In October 2007, 58 samples were collected from forty-three locations, with seven additional follow-up samples collected in November 2007. These surficial samples were intended to characterize the 'non-ash' material at each of the five usage areas outlined above. In addition, several soil cores were advanced and logged in order to categorize the materials and, where applicable, to assess and verify the integrity of the cap materials which were placed to overlie the 'ash-fill' between 2000 and 2001.

Seven follow-up samples were collected in November 2007. Four of these samples were collected to further investigate a lead exceedance in a soil sample collected in Area 4 (4SS-4). Three other samples (wood chips PAH profile samples) were collected from center of one of the play areas to provide a vertical profile in the wood chip covered area of the playground, and to assess the PAH content of the wood chips and degraded wood chips in this area.

3.3.1 *SHALLOW SOIL SAMPLING & ANALYSIS*

Shallow soil samples (generally in the 0 to 0.5 ft bg interval) were collected from 34 locations over the unpaved portions of the Site. This depth interval was selected as representative of the highest opportunity for direct exposure. In some instances, particularly in Areas 4 and 5, the surficial soils were covered by wood chips or landscaping mulch. In these areas, shallow soil samples were collected from below the existing wood chip layer. In other instances, shallow samples were collected over a greater than six-inch depth interval due to the limited soil recovery. Each of the soil samples were mixed to generate a composite sample representative of the sample depth and with obvious large debris (coal, glass, rock) removed. Prior to compositing, each sample was screened using a photo-ionization detector (PID). A subset of the shallow soil samples (nine shallow samples) was also analyzed for 13 priority pollutant (PP) metals and pesticides and three herbicides.

3.3.2 *SUBSURFACE SOIL SAMPLING & ANALYSIS*

An additional nineteen subsurface sample locations were selected for deeper soil sample collection in the five investigation areas. A soil core (approximately 4 feet in length) was collected from each of these locations, logged for soil lithological characteristics, screened with a PID, and the soil corresponding to a depth of approximately 18 to 24 inches below grade was collected and composited as per above for analytical sampling.

As described previously, specific soil boring locations within Areas 1 and 4 were selected with the intention of intersecting the previously emplaced cap over the 'ash fill' material to assess and verify the integrity of the ash-landfill cap.

3.3.3 *SHALLOW & SUBSURFACE ANALYTICAL RESULTS*

Of the seventy soil samples that were analyzed for PAHs, forty-four samples were found to have a concentration of at least one PAH compound in excess of the corresponding NJDEP RDCSCC. In total, there were seven different PAH compounds that were detected above the NJDEP RDCSCC including: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene; dibenz(a,h)anthracene ; and indeno(1,2,3-cd)pyrene. In general, PAHs were considered widely distributed throughout the site soils with no discernable concentration trend, consistent with the known history of generalized site-wide filling activities over an extended period.

The nine screening samples collected in August 2007 and three of the shallow samples (4SS-1, 4SS-2, and 4SB-4A) collected in November 2007 were analyzed for PP pesticides. Eight different pesticide compounds (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, dieldrin, heptachlor, heptachlor epoxide, and methoxychlor) were detected in the analysis; however, at concentrations well below the respective RDCSCC and considered ubiquitous in soils in northern New Jersey. The nine screening samples were also analyzed for three herbicide compounds; 2,4-D, 2,4,5-TP, and 2,4,5-T, which were not detected.

Eighteen of the collected samples, including the nine screening samples, were analyzed for the suite of PP metals including: antimony, arsenic, beryllium, cadmium, chromium copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. The remainder of the samples, with the exception of the wood chip PAH profile

samples, were analyzed for lead concentration only. With the exception of arsenic and lead, metals were not detected above the RDCSCC.

Arsenic was detected in each of the eighteen samples at concentrations ranging between 2.4 and 20.5 milligrams per kilogram (mg/kg) with an average concentration of 5.7 mg/kg. Arsenic was detected in exceedance of the RDCSCC of 19 mg/kg in one sample (20.5 mg/kg at Sample 3SS-1).

Lead was detected in each sample submitted for analysis, but was detected in only four of these samples at concentrations exceeding the RDCSCC of 400 mg/kg. The average site wide lead concentration (based on the October samples) was 195 mg/kg. Lead exceedances occurred at Screening Sample #7 at 423 mg/kg, Screening Sample #5 at 516 mg/kg, 2SB-2B at 1,470 mg/kg, and 4SS-4 at 2,280 mg/kg. Sample 4SS-4 was collected from the surficial soil in Area 4 (playground). This area was further investigated in November 2007 with the collection of four additional samples from within a two-foot radius of Sample 4SS-4. These samples exhibited much lower lead concentrations (ranging from 130 to 220 mg/kg), and evidence of corroded metal debris was observed in the soil in this area. Elevated lead levels were attributed to buried debris occurring within the historic fill.

3.3.4 *ASH FILL DESCRIPTION*

Eight of the twenty-four soil borings that were advanced to a depth of at least four feet below grade encountered buried 'ash fill'. In general, the material that is described as 'ash fill' consisted of white to black fully to partially incinerated charcoal and coal particles.

The depth at which ash fill was encountered varied between 20-inches and four feet below grade, although only one boring (1SB-2, 20 inches to ash) encountered ash at less than three feet below grade. In most cases the thickness of the ash fill layer encountered was discernable and varied from very thin (less than one-inch) to one-foot in thickness. In some cases, the thickness of ash was not known because it was encountered near the bottom of the boring and extended beyond the total depth of the boring. Where ash fill material was found broken fragments of glass were also commonly found.

Four borings, 1SB-2, 1SB-6, 1SB-9, and 1SB-11 encountered what is believed the soil cap that was emplaced as part of the 2001 remediation effort. In general, the cap appeared intact with a clear discrete top and bottom (i.e., the underlying ash and glass were not intruding into the cap).

3.3.5 *HISTORIC FILL DESCRIPTION*

The majority of the samples collected from the Site were characterized as 'historic fill' based on the known history of the Site, the soil analytical results, and the nature of the material encountered. Historic fill material means non-indigenous material, deposited to raise the topographic elevation of the site, which was contaminated prior to emplacement, and is in no way connected with the operations at the location of emplacement and which includes, without limitation, construction debris, dredge spoils, incinerator residue, demolition debris, fly ash, or non-hazardous solid waste. Historic fill material does not include any material which is substantially chromate chemical production waste or any other chemical production waste or waste from processing of metal or mineral ores, residues, slag or tailings. In addition, historic fill material does not include a municipal solid waste landfill site.

This historic fill material at the Site was found to consist of sandy to silty sand matrix with gravel of various size forming a very well-graded and generally compacted soil blanket. This material ranged in thickness from 18-inches to greater than the typical boring depth of four feet and was commonly found to contain fragments of glass, brick, terra cotta, organic material (such as leaves and wood) and other non-native debris.

4 REMEDIAL ACTION WORKPLAN

Based on the above site description and the NJDEP Historic Fill Guidance, the ash fill cap (Historic Fill) must be either removed and replaced with clean fill or have a protective barrier emplaced over its surface since the PAH concentrations observed in this soil are above the NJDEP Residential Direct Contact Soil Remediation Standards. Since the Site is an existing school built in 1964 and is not new construction, the use of a Presumptive Remedy is not required. Due to constraints associated with the Site (i.e., ash landfill across the entire property, proximity to wetlands, wooded areas, mapped flood zone, and prolonged disruption to the use of the school) excavation into the buried ash fill is not recommended and an Alternative Remedy is being proposed. This RAW presents the proposed remedy for each of the functional areas of the Site.

To remediate the historic ash cap fill, the soil will be covered with a demarcation layer (orange delineation non-woven geotextile material) and buried with one foot of clean fill (6 inch barrier and 6 inch buffer). In areas where the elevation cannot be raised due to stream encroachment, wetland and flood hazard area concerns, the historic ash cap fill will be excavated to a depth of one foot, and replaced in kind with an overlying demarcation layer (orange delineation non-woven geotextile material) and buried with one foot of clean fill (6 inch barrier and 6 inch buffer). Areas with existing asphalt pavement and cement or paver walkways will remain undisturbed. Areas with existing mulch layers will be checked to ensure that at least 18 inches of mulch thickness is in place. Existing large trees will be addressed using a root crown cover consisting of the demarcation layer underlying cobble sized stones. The wetland area and the adjacent Diamond Brook will be fenced off and outfitted with warning/no trespassing signs to prevent access to these areas from the Site. All clean fill brought into the Site will be such that it can support the cultivation of suitable turfgrass.

Figure 4 shows a typical cross-sectional detail of the existing sub-surface historic fill materials followed by the proposed capping or excavation/capping of the historic fill.

Figure 5 shows the location where the proposed capping or excavation/capping will occur at the Site. Areas where only soil capping will occur are shown in dark-green shading while areas that require excavation and clean soil replacement are shown in light-green. The approximate quantities for the soil capping and excavation/replacement are summarized in Table 2. Excavated soil will be disposed of off-site at an NJDEP-approved soil recycling facility. Proper manifests and bills of lading will be prepared and submitted to the proper entities.

Figure 6 shows the areas at the Site that have existing impervious cover or have mulch cover over grade.

Large trees at the Site will be left undisturbed while smaller ornamental trees and shrubbery will be removed from the areas requiring work (mostly on side and at the front of the school building). The roots of large trees will have the demarcation barrier placed in a three-foot wide circumference around the tree followed by a one foot thick cover of cobble sized river rock placed over the demarcation and root area as shown on Figure 4.

Based on Site reconnaissance, there are 9 large trees in the area separating the athletic field (Area 1) and the front portion of the school (Area 4 and 5) and 9 trees in the back and western side of the Site building (Area 3) that will receive river rock cover.

Below is a more detailed description of the areas where soil capping and excavation/replacement will occur.

4.1 CAPPING

Areas requiring a one foot cap (6 inch barrier and 6 inch buffer) and demarcation layer over grade are shown in dark-green shading presented on Figure 5 and include the following locations:

- Area 1 – Athletic Playing field (Section 1)- The area will be capped with one foot of clean soil.
- Area 2 – Grassy area to north of the Site building (Section 4) – This area will be capped with one foot of clean soil.
- Area 3 – Flower bed adjacent to the western Site building (section 5) and the western side of the sidewalk (Section 6) - This area will be capped with 18 inches of mulch placed inside a timber box.
- Area 4 – Grassy area just south of the main playground area (Section 7) – This area receive 18 inches of mulch placed inside a timber box.
- Area 5 – Front entrance area (Sections 13, 15 and 16)- Most of the area will be capped with one foot of clean soil placed inside timber boxes constructed around the foot-print of the area to be covered.

Areas which have previously been capped with brick pavers, cement walkways or asphalt paving will not be disturbed as shown on Figure 6. These surfaces are impervious, are at least four inches thick with approximately 6 inches of sub-base and do not allow exposure to the underlying soil. Areas with existing mulch will be checked to determine that at least 18 inches of mulch are located over the surface of the area and include a demarcation layer and will be reconstructed where necessary to achieve these standards. The aforementioned areas include:

- Paved areas east of the Site building (between Area 2 and Area 5)
- Paved areas associated with the basketball court (Area 4)
- Paved areas associated with the parking lot (Area 5)
- Sidewalk and access ways with pavers and cement (Area 3 and 5)
- Mulched areas including the playground (Area 4)

Approximately 4,050 tons of clean soil is projected to be used in connection with capping. Clean soil will be 'virgin' material consisting of a soil loam suitable for vegetative regrowth meeting the definition of clean fill pursuant to N.J.A.C. 7:26E-1.8, and clean fill certifications will be provided. In addition, the BOE will collect samples for verification. Based on the anticipated volume of clean fill to be used and figuring double the required samples, approximately 36 verification samples will be collected. The samples will be submitted to an NJDEP certified laboratory for analysis for full Target Analyte List/Target Compound List (TAL/TCL) plus 30 and Extractable Petroleum Hydrocarbons (EPH).

4.2 EXCAVATION

Areas requiring one foot of excavation of the historic fill cap and replacement with clean fill (6 inch barrier and 6 inch buffer) over a demarcation layer are shown in light-green shading on Figure 5 and include the following locations:

- Area 1 – Athletic Playing field (Section 2)- Will require topographic adjustments for the southwest corner due the flood spillway and at locations to perimeter of the playing field areas to match curbing and higher topographic areas.
- Area 2 – Grassy area to north of the Site building (Section 3) – Will require topographic adjustments due to the area adjacent to the street and along the rear of the building.
- Area 3– Bellaire Park Access Area (Section 5) - Will require excavation in the area due to the grading of the property boundary and along the rear of the Site building.

- Area 5 – Front Entrance Area (Sections 8, 9, 10, 11, 12 and 14) - Will need to be excavated and replaced with clean fill due to the proximity of the existing grade next to the front of the building and along curbing.

Approximately 1,900 tons of soil will be excavated from the above referenced areas using excavators and by hand digging, and clean soil will be brought in to replace the excavated soil. Excavated soil will be disposed of at a NJDEP-approved recycling facility. Proper manifests and bills of lading will be provided in the Remedial Action Report (RAR) to be submitted to the NJDEP following the this remedial action work.

Approximately 1,900 tons of clean fill will be brought in to replace the removed soil. Similar to the capping areas, the demarcation layer will be laid down over the excavated area prior to placement of the clean fill.

4.3 ALTERNATIVE REMEDY DISCUSSION

Although a Presumptive Remedy or an Alternative Remedy analysis is not required for this site, an evaluation of the Alternative Remedy scenario is discussed below in this section voluntarily for review and approval by the NJDEP.

As discussed previously, due to constraints associated with the Site, excavation into the buried ash fill is not recommended. The constraints include the following:

- The site was a former ash fill dump site with a layer of ash fill that has been encountered at a depth of about 18 inches below grade across the site.
- The site is bordered by the Diamond Brook, wetlands (see wetland map, Appendix A), wooded areas and a mapped flood zone associated with the Diamond Brook which limit the amount of soil excavation and capping that can be conducted.
- As per the Federal Emergency Management Agency (FEMA) August 2019 Flood Insurance Rate Map (FIRM), a portion of the Site is located in a 100-year floodplain and the grade cannot be substantially changed (see floodway map, Appendix A). Additionally, there are constraints to soil remediation including non-disturbance of underlying ash. Since grade cannot be substantially changed, the BOE is proposing a one-foot cap in areas amenable to capping and to excavation/capping in areas where the grade cannot be substantially changed.
- The existing impervious surfaces (existing asphalt parking lot, cement and paver sidewalks, and mulched areas) already prevent exposure to the underlying soil. Removing and replacing the existing impervious infrastructure to make it a Presumptive Remedy by adding a demarcation layer would be unnecessary.
- The remediation work at the school will need to be conducted over the summer months while the students are away. As such, extended disruption to the school is not feasible.

Although the thicknesses of the proposed barrier/buffer zones are less than those presented in Table 5.1 of the Presumptive Remedy Guidance Document, the remedy proposed in this RAW would be equally protective over time. Additional components included in this RAW to offset the reduced thickness of the cap are:

- Installation of a soil isolation geotextile fabric that limits intermixing of the underlying soils, as well as serving as demarcation layer (see cut sheet in Appendix B).
- Increase in the inspection frequency each year for all areas to quarterly.

The PAHs in the underlying soil are immobile contaminants and the remedies are suitable for the activities and use of the exterior areas at the school. All the areas requiring the placement of clean soil will have turfgrass cover to help keep the soil in place. The grassed areas will be properly maintained and inspected as part of the routine quarterly inspections and maintenance regimen. The aforementioned existing impervious surfaces provide an acceptable barrier substantially equivalent to the Presumptive Remedy standard. The mulched areas will have a continuous layer of new material added on an as needed basis, based on routine inspection, to ensure that the thickness of at least 18 inches is maintained in these areas. Photographs of typical existing impervious and mulched surfaces are included in Appendix C.

Figure 7 shows the combined areas to be remediated (capped or excavated and capped) with the areas that have an existing impervious surface. The entire extent of the school grounds will be provided with a barrier which will prevent exposure to the underlying soil coupled with fencing along the entire western and southern border of the property that will ensure the operation of the school is protective of human health and safety.

4.4 REMEDIATION STANDARD

Through the use of capping with a foot of clean soil or using 18 inches of mulch, and the existing impervious surfaces and mulched areas, the Residential Direct Contact Soil Remediation Standard will be achieved at the functional areas across the Site. Other areas which are not amendable to capping will be fenced off (i.e., the wetland area of the property) to prevent access from the school property.

4.5 SITE PREPARATION, COORDINATION & RESTORATION

Prior to site activities, the affected areas will be fenced to keep unauthorized people from entering the work area. Silt fencing will also be placed around specific work areas to prevent soil erosion.

As part of site activities, the existing parking lot area at the school will be utilized for staging materials and loading trucks. It is estimate that approximately 80 truck loads of historic fill will be removed from the Site and approximately 275 truck loads of clean soil will be brought in. Trucks will enter the Site using Maple Avenue to Ackerman Avenue to Doremus Avenue to Orchard Place, and the reverse to exit the Site.

Following the site activities, areas intended for grass will be seeded and other areas landscaped accordingly. Mulched areas will be checked for adequate cover.

4.6 ANTICIPATED SCHEDULE

Appendix D shows the anticipated schedule from pre-construction through the construction phase of the work. The site work is anticipated to take approximately 45 days to complete and will be performed during the summer months while school is not in session. The anticipated start date is June 25, 2020 with a completion date prior to the September 2020 school start. The work will be completed prior to, and in time for completion and submittal of a Remedial Action Report prior to the required regulatory timeframe of February 6, 2021.

4.7 SITE-SPECIFIC HEALTH & SAFETY PLAN

A Site-Specific Health and Safety Plan (SSHASP) will be prepared in connection with the proposed RAW activities. As described previously, the construction areas will be fenced off and dust control measures will be implemented during the work.

A perimeter air monitoring and action plan will be prepared as part of the SSHASP. Dust monitoring instruments will be utilized at two downwind locations (one at the perimeter of the Site) and compared with two upwind locations. Dust levels detected over 5 milligrams per cubic meter (mg/m^3), the Occupational Safety and Health Administration Permissible Exposure Level (OSHA PEL) will stop work for additional dust suppression and/or re-evaluation of site conditions.

4.8 REQUIRED PERMITS

The NJDEP Division of Land Use requires a General Permit (GP4) in connection with activities in freshwater wetlands, transition areas, and State open waters undertaken by the Department or expressly approved pursuant to the Administrative Requirements for the Remediation of Contaminated Site (ARRCS), N.J.A.C. 7:26C, for the investigation, cleanup, removal or remediation of:

1. Hazardous substances as defined in the Department's rules governing hazardous substances at N.J.A.C. 7:1E, Appendix A; or
2. Pollutants, as defined in the New Jersey Water Pollution Control Act implementing rules at N.J.A.C. 7:14A.

As described previously, the Site is within a deciduous wooded wetlands and will require an inspection by the NJDEP and a Letter of Interpretation (LOI) in connection with the GP4.

Mitigation must be performed for all disturbances of freshwater wetlands or State open waters caused by a cleanup authorized under a general permit, except that mitigation is not required to compensate for disturbance of wetlands of State open waters that have formed as a direct result of the remediation activities. This includes the area at the far southwestern portion of the Site where historic fill will be excavated and clean fill emplaced.

Other local and county permits will also be acquired including a Bergen County Soil Conservation District Permit application for the soil erosion and sediment control for the work.

4.9 PROPOSED AND TOTAL COSTS

The previous RA completed in 2000/2001 incurred approximately $187,000, which included soil capping and athletic field construction costs of $145,000, consulting costs of $22,000 and permitting and construction management costs of $20,000.

The current RA effort is anticipated to incur approximately $600,000 which will include soil capping and excavation costs of $400,000, consulting costs of $150,000 and permitting and construction management costs of $50,000.

4.10 DEED NOTICE AND REMEDIAL ACTION PERMIT FOR SOILS

Following site activities, a Deed Notice will be filed with Bergen County detailing the restriction in place at the Site as per N.J.A.C. 7:26C-7.2. Once filed, a Soils Remedial Action Permit (RAP) will be submitted to the Department for the continued monitoring activities required in connection with the capping of the Site. Upon approval, a Restricted Use Response Action Outcome (RAO) will be filed.

4.11 ENGINEERING CONTROLS AND BIENNIAL CERTIFICATIONS

The integrity of the capped areas (seeded soil areas, mulched areas, asphalt, cement and pavers) will be monitored on a quarterly basis each year by field inspections under the Soil RAP. Any necessary maintenance to the various caps will also be conducted on a quarterly basis.

Biennial certifications documenting the quarterly inspections and maintenance activities will be submitted to the NJDEP under the Soils RAP on a biennial basis as per N.J.A.C. 7:26C-7.8.

4.12 CLASSIFICATION EXCEPTION AREA

As per N.J.A.C. 7:26C-7.3(h), a Classification Exception Area (CEA) will be established for the Site assuming that groundwater is impacted. The extent of the CEA will be based on the property boundary and the CEA will be indeterminate as the historic fill material will remain in place.

5 REFERENCES

Fill Material Guidance for SRP Sites, NJDEP, April 2015

Technical Guidance on the Capping of Sites Undergoing Remediation, NJDEP, July 14, 2014

Presumptive and Alternative Remedy Guidance, NJDEP, February 2018

TABLES

TABLE 1

ORCHARD SCHOOL PORTION OF THE
RIDGEWOOD ASH LANDFILL
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY

Soil Sampling Results by Area for PAHs, Arsenic and Lead Exceeding RDCSRS

Sample ID	Area	Depth		Benzo(a)anthracene		Benzo(a)pyrene		Benzo(b)fluoranthene		Dibenz(a,h)anthracene		Indeno(1,2,3-cd)pyrene		Arsenic		Lead	
		NJDEP RDCSRS [1]		***5***		***0.5***		***5***		***0.5***		***5***		***19***		***400***	
Area 1																	
1	1	1-6"		1.53		**1.74**		2.11		0.189		0.459		3.5		130	
2	1	1-6"		0.3	J[2]	0.457		0.014	U	0.238	J	0.41		2.5		74.6	
3	1	1-6"		2.59		**2.69**		3.18		0.212	J	0.545		2.4		124	
4	1	1-6"		2.28		**2.53**		3.14		0.186	J	0.49		3.5		114	
5	1	1-6"		1.41		**1.62**		2.25		0.182		0.403		5.4		**516**	
1SB-1	1	18-24"		**10.6**		**10.3**		**7.25**		**2.07**		**5.15**		-		383	
1SB-10A	1	3-9"		0.296		0.399		0.304		0.0096	U	0.257		2.5		25.7	
1SB-10B	1	20-26"		0.0076	U[3]	0.018	U	0.016	U	0.0094	U	0.034	U	-		10.4	
1SB-11A	1	4-10"		**5.36**		**5.32**		3.45		**0.974**		2.64		-		150	
1SB-11B	1	18-24"		0.186		0.173		0.133		0.0396	J	0.0973		-		10.4	
1SB-2	1	18-24"		0.961		**1.00**		0.772		0.211		0.543		-		84.6	
1SB-2 CAP	1	12-20"		0.163		0.164		0.114		0.0345	J	0.0919		-		12.4	
1SB-3	1	18-24"		2.51		**2.48**		1.65		**0.529**		1.36		-		268	
1SB-4	1	18-24"		0.337		0.331		0.235		0.0788		0.206		-		54.9	
1SB-5	1	18-24"		0.0833		0.101		0.0753		0.0091	U	0.0615	J	-		30.8	
1SB-6A	1	3-9"		3.55		**3.62**		2.49		**0.685**		1.75		-		139	
1SB-6B	1	18-24"		1.46		**1.41**		1.06		0.301		0.757		-		29.6	
1SB-7	1	18-24"		**6.87**		**7.09**		4.92		**1.67**		3.55		-		323	
1SB-8	1	18-24"		**16.8**		**17.9**		**11.9**		**0.588**		1.18		-		265	
1SB-9	1	22-28"		1.57		**1.32**		0.813		0.269		0.669		-		120	
1SS-1	1	1-7"		**7.83**		**7.23**		**5.98**		**0.867**		3.5		-		311	
1SS-2	1	4-10"		3.36		**3.09**		3.08		**0.762**		2.6		-		111	
1SS-3	1	0-6"		2.46		**2.5**		3.42		**0.677**		2.17		-		131	
1SS-4	1	2-8"		2.49		**2.69**		2.15		0.406		2.27		-		133	
1SS-5	1	1-5"		2.61		**2.68**		2.2		**0.823**		2.33		-		160	
1SS-6	1	2-6"		0.296		0.35		0.273		0.009	U	0.309		-		94.4	
1SS-7	1	4-10"		3.19		**3.07**		2.14		**0.626**		2.54		-		208	
1SS-8	1	2-7"		4.19		**3.63**		3.33		**0.868**		3.02		-		116	
Area 2																	
7	2	1-6"		**6.73**		**9.22**		**11.6**		0.237	J	1.25		14.8		**423**	
2SB-1A	2	0-6"		0.444		0.489		0.449		0.0895		0.182		-		87.1	
2SB-1B	2	18-24"		0.0075	U	0.018	U	0.012	U	0.0094	U	0.034	U	-		4.4	
2SB-2A	2	2-8"		0.362		0.42		0.51		0.0644	J	0.18		-		99.6	
2SB-2B	2	18-24"		1.16		**1.32**		1.54		0.126		0.296		-		**1470**	
2SB-3	2	18-24"		0.81		**0.906**		0.947		0.118		0.33		-		60.7	
2SB-4A	2	1-7"		1.31		**1.32**		1.55		0.15		0.413		-		141	
2SB-4B	2	18-24"		0.366		0.401		0.386		0.054	J	0.135		-		59.5	
2SS-1	2	0-6"		0.532		**0.638**		0.572		0.188		0.408		4.0		121	
2SS-2	2	1-7"		1.21		**1.21**		1.17		0.313		0.73		-		164	
2SS-3	2	0-5"		0.512		**0.555**		0.525		0.161		0.347		3.8		131	
2SS-4	2	2-7"		0.245		0.289		0.278		0.0836		0.184		-		53.9	
4SB-4A	4A	22-28"		0.735		**0.716**		0.697		0.134		0.325		5.6		151	
4SB-4B	4A	31-37"		0.278		0.269		0.228		0.0483	J	0.109		-		146	
Area 3																	
8	3	1-6"		0.775		**0.78**		0.892		0.147	J	0.335		3.6		145	
3SB-1A	3	0-6"		1.66		**1.56**		1.7		0.221		0.552		-		178	
3SB-2A	3	0-6"		1.93		**2.13**		2.67		0.237		0.594		-		299	
3SB-2B	3	18-24"		1.21		**1.14**		1.13		0.141		0.366		-		230	
3SS-1	3	1-7"		2.31		**2.88**		3.01		**0.814**		2		**20.5**		155	
4SB-3B	3	18-24"		0.301		0.285		0.203		0.0606	J	0.123		-		36	
Area 4																	
4SB-1A	4	8-12"		3.32		**3.26**		3.29		0.438		1.09		-		283	
4SB-1B	4	20-24"		**9.07**		**9.22**		**7.82**		**0.791**		1.53		-		378	
4SB-2A	4	0-6"		2.43		**2.42**		2.86		0.368		0.746		-		85.9	
4SB-2B	4	18-24"		1.3		**1.37**		1.45		0.231		0.607		-		26.2	
4SS-1	4	6-12"		**5.81**		**6.03**		**5.66**		**0.897**		2.43		12.8		221	
4SS-2	4	18-24"		1.76		**1.83**		1.43		0.385		1		2.9		152	
4SS-3	4	11-15"		1.15		**1.16**		1.16		0.247		0.69		-		348	
4SS-4	4	7-10"		1.17		**1.14**		0.975		0.307		0.654		-		**2280**	
4SS-4A	4	7-10"		-		-		-		-		-		-		135	
4SS-4B	4	7-10"		-		-		-		-		-		-		130	
4SS-4C	4	7-10"		-		-		-		-		-		-		233	
4SS-4D	4	7-10"		-		-		-		-		-		-		192	
4SS-5A	4	6-8"		0.161		0.17		0.211		0.0738	U	0.0837		-		-	
4SS-5B	4	10-13"		0.291		0.368		0.451		0.292	U	0.221	J	-		-	
4SS-5CHIPS	4	0-1"		0.315		0.4		0.541		0.39	U	0.364	U	-		-	
Area 5																	
6	5	1-6"		0.567		**0.63**		0.619		0.014	U	0.334		2.4		58.2	
9	5	1-6"		0.934		**0.877**		1.5		0.164	J	0.309		2.8		27.9	
5SB-1A	5	3-9"		0.156		0.192		0.202		0.0276	J	0.066	J	-		19	
5SB-1B	5	18-24"		0.226		0.251		0.204		0.0504	J	0.0737		-		34	
5SB-2A	5	2-8"		1.27		**1.36**		1.55		0.145		0.347		-		155	
5SB-2B	5	18-24"		0.276		0.27		0.171		0.0662	J	0.152		-		69.9	
5SS-1	5	14-16"		2.76		**2.61**		2.58		**0.748**		1.55		-		190	
5SS-2	5	2-8"		1.3		**1.45**		1.45		0.404		0.876		5.1		120	
5SS-3	5	12-16"		0.342		0.465		0.491		0.141		0.319		4.5		44.4	
5SB-3A	5A	3-9"		1.16		**1.24**		1.07		0.299		0.787		-		77.7	
5SB-3B	5A	22-28"		0.0772		0.0877		0.0621	J	0.0094	U	0.0588	J	-		39.1	

Notes:
1. Concentrations in bold exceed the NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS).
2. J - Estimated value.
3. U - Not detected above the method detection limit (MDL).

TABLE 2

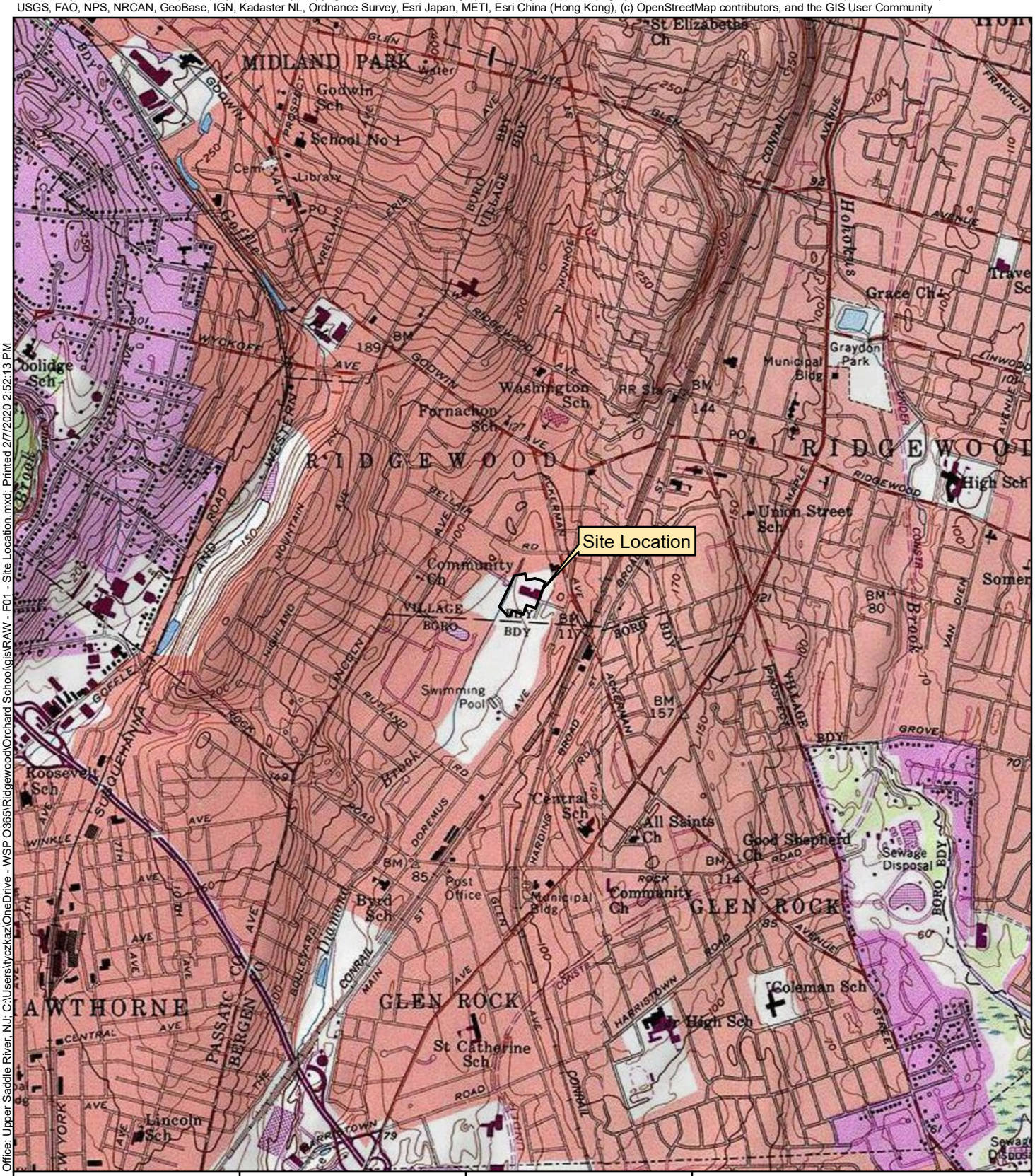
ORCHARD ELEMENTARY SCHOOL
230 DEMAREST STREET, RIDGEWOOD, NEW JERSEY

Summary of Remediation Area/Volume Calculations

Site Location	Section ID	Area (square feet)	Soil Volume (cubic yards)	Soil Volume (tons)	Remediation Type
Area 1	1	56,981	2,110	3,166	Cap
	2	20,010	741	1,112	Excavate/Cap
Total		76,991	2,852	4,277	
Area 2	3	7,115	264	395	Excavate/Cap
	4	8,680	321	482	Cap
Total		15,795	585	878	
Area 3	5	4,782	177	266	Excavate/Cap
	6	2,192	81	122	Cap
Total		6,974	258	387	
Area 4	7	1,620	60	90	Cap
Area 5	8	349	13	19	Excavate/Cap
	9	623	23	35	Excavate/Cap
	10	159	6	9	Excavate/Cap
	11	112	4	6	Excavate/Cap
	12	844	31	47	Excavate/Cap
	13	1,611	60	90	Cap
	14	462	17	26	Excavate/Cap
	15	1,466	54	81	Cap
	16	341	13	19	Cap
Total		5,967	221	11,506	

	Area (square feet)	Volume (cubic yards)	Volume (tons)
Cap Total	72,891	2,700	4,050
Excavate/Cap Total	34,456	1,276	1,914
Total	107,347	3,976	5,964

FIGURES



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wsp

Drawn: ZT 2/7/2020

Approved: MA 2/7/2020

Project #: 31402200.000

Map Location

N

0 2,000

Feet

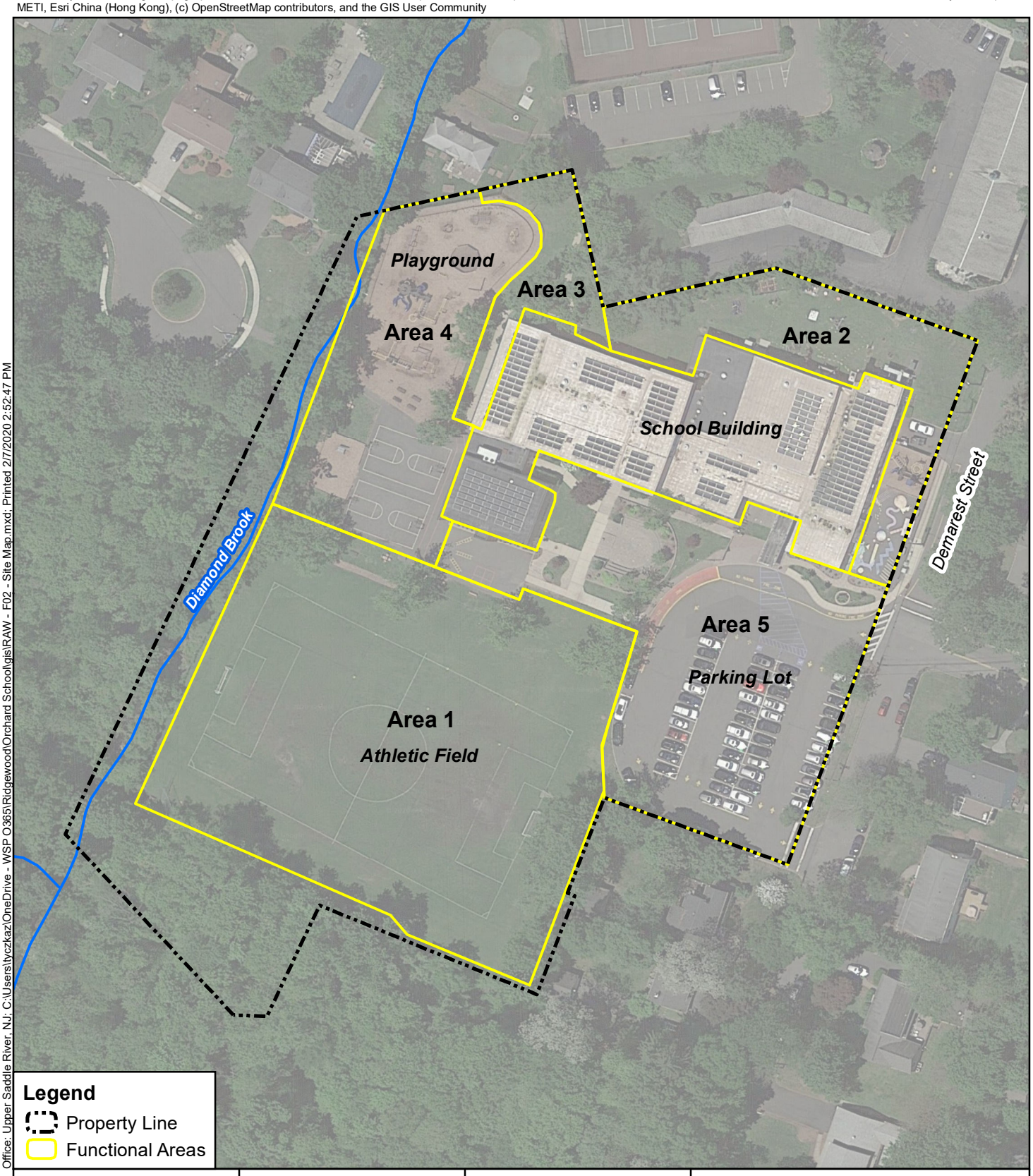
NAD 1983 2011 StatePlane New Jersey FIPS 2900 Ft US

FIGURE 1

SITE LOCATION

RIDGEWOOD ORCHARD SCHOOL
BLOCK 2313, LOT 10
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY 07450

Service Layer Credits: Big: , Topographic: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



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Legend

- Property Line
- Functional Areas

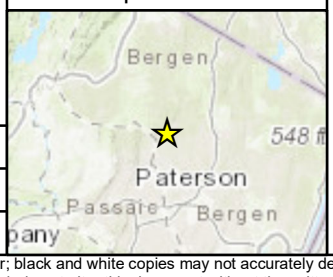
wsp

Drawn: ZT 2/7/2020

Approved: MA 2/7/2020

Project #: 31402200.000

Map Location



N

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Feet

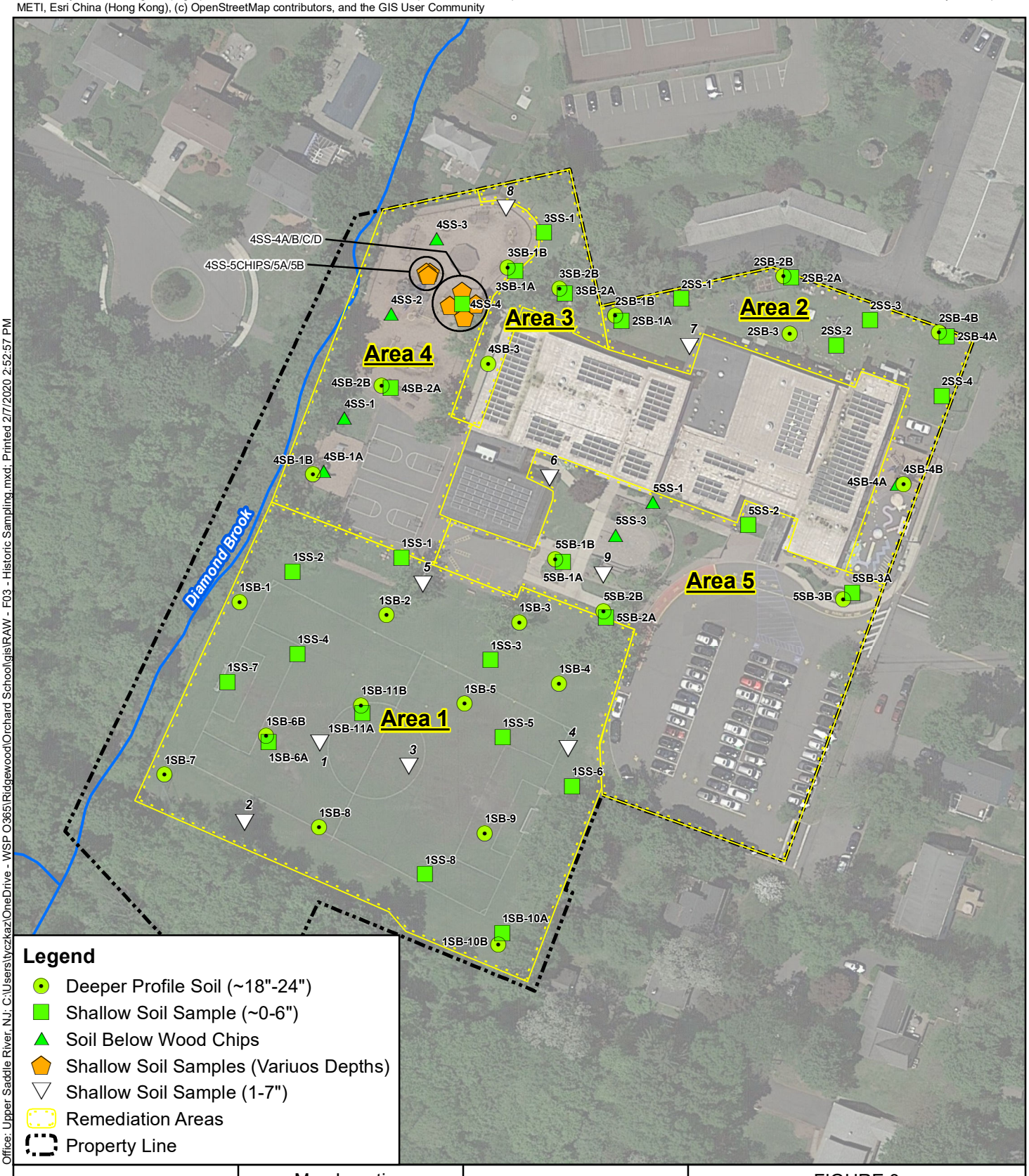
NAD 1983 2011 StatePlane New Jersey
FIPS 2900 Ft US

FIGURE 2

SITE MAP

RIDGEWOOD ORCHARD SCHOOL
BLOCK 2313, LOT 10
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY 07450

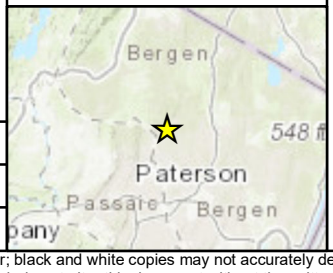
Service Layer Credits: Big: , Topographic: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



Legend

- Deeper Profile Soil (~18"-24")
- Shallow Soil Sample (~0-6")
- Soil Below Wood Chips
- Shallow Soil Samples (Variuos Depths)
- Shallow Soil Sample (1-7")
- Remediation Areas
- Property Line

Map Location



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Feet

NAD 1983 2011 StatePlane New Jersey FIPS 2900 Ft US

Drawn: ZT 2/7/2020

Approved: MA 2/7/2020

Project #: 31402200.000

FIGURE 3

HISTORICAL SOIL SAMPLING WITH INVESTIGATION AREAS

RIDGEWOOD ORCHARD SCHOOL
BLOCK 2313, LOT 10
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY 07450

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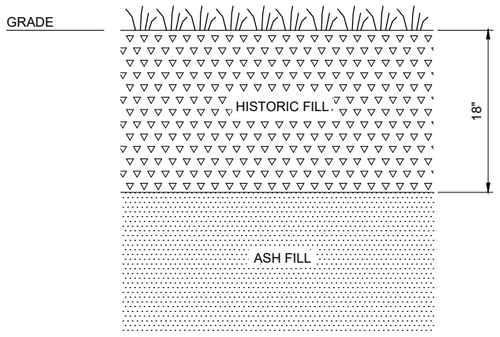
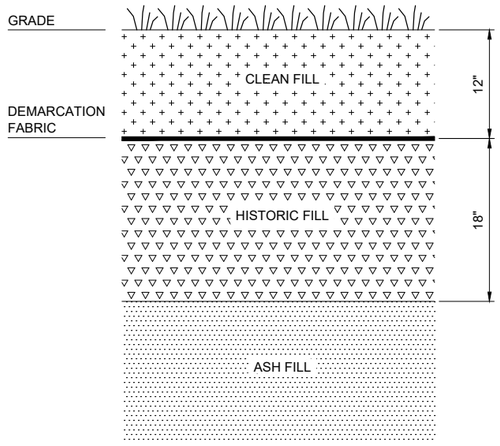
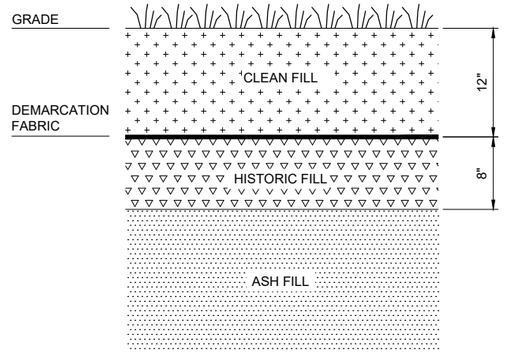
HISTORIC SOIL PROFILE



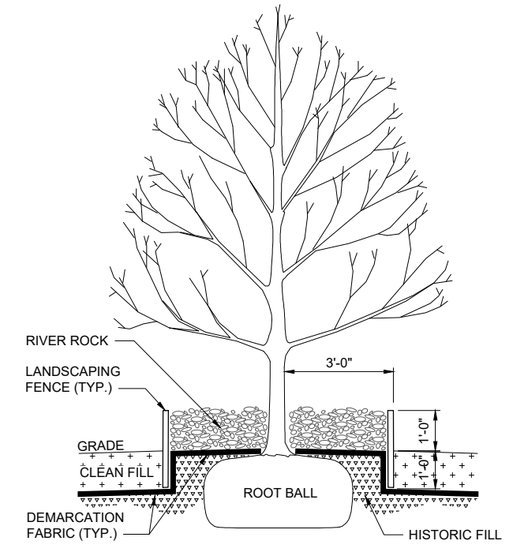
SOIL CAP BURIAL



SOIL EXCAVATION / CLEAN-FILL REPLACEMENT



CAP AROUND TREE



ORCHARD STREET SCHOOL
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY

SOIL PROFILES AND DETAILS

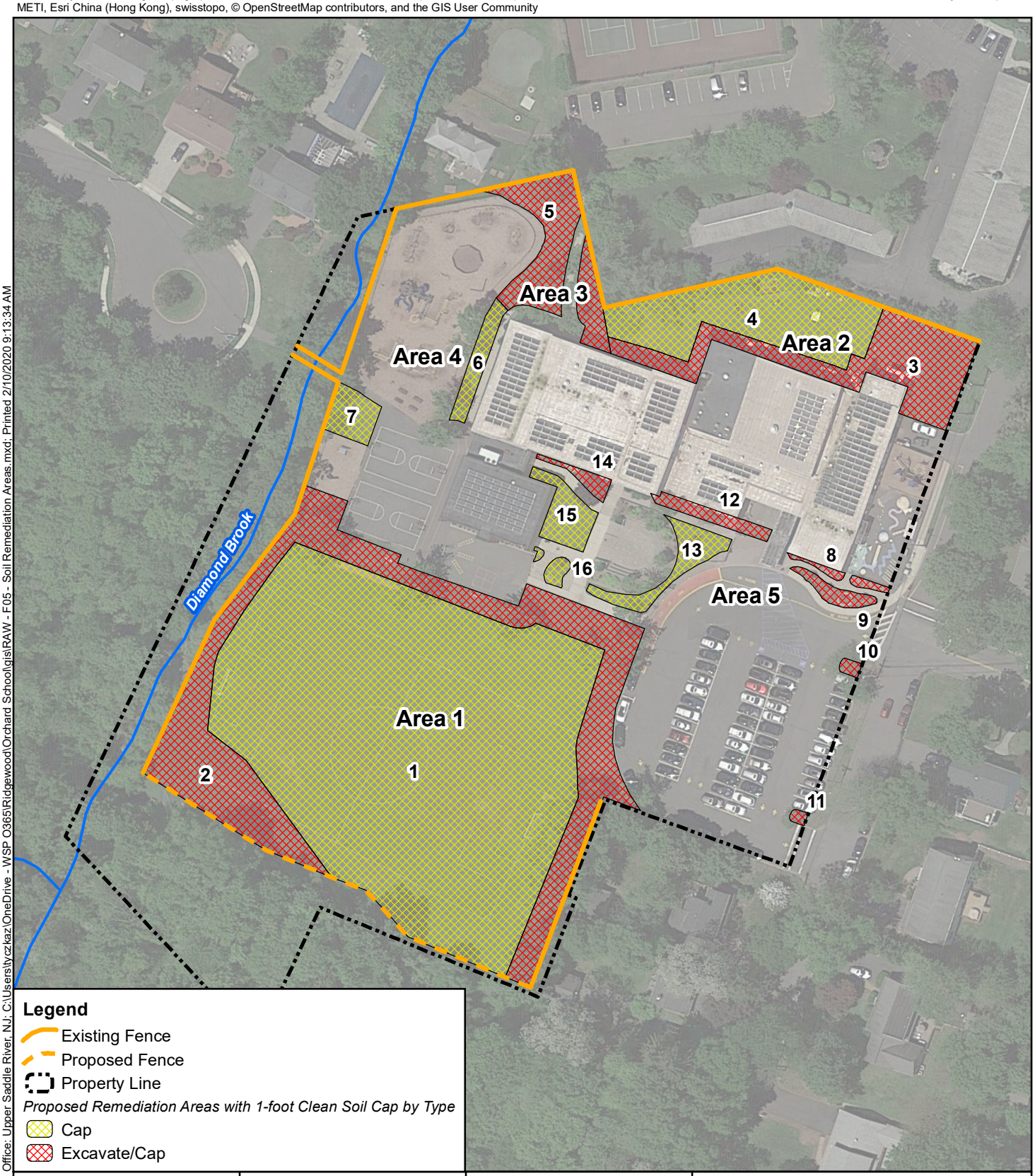
WSP USA
600 East Crescent Avenue, Suite 200
Upper Saddle River, New Jersey 07458
(201) 818-0700 www.wsp.com

DATE: 01/29/20

FILE: B:\Ridgewood Village\Ridgewood Orchard School\gis\ | DRAWN BY: AM | CHECKED BY: MA | FIGURE: 4

P:\CAD & MICRO\Soil Cap Burial_1-21-2020.dwg Tue, 21 Jan 2020 - 2:16pm lacChekA

Service Layer Credits: Big: , Topographic: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community



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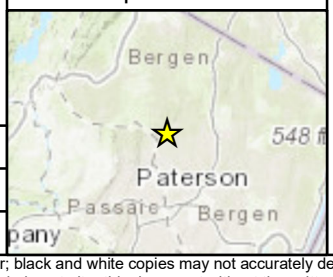
Legend

- Existing Fence
- Proposed Fence
- Property Line

Proposed Remediation Areas with 1-foot Clean Soil Cap by Type

- Cap
- Excavate/Cap

Map Location



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Feet

NAD 1983 2011 StatePlane New Jersey FIPS 2900 Ft US

Drawn: ZT 2/10/2020

Approved: MA 2/10/2020

Project #: 31402200.000

FIGURE 5

SOIL REMEDIATION AREAS

RIDGEWOOD ORCHARD SCHOOL
BLOCK 2313, LOT 10
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY 07450

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Legend

- Property Line
- Existing Cap by Asphalt, Mulch, Building, or Hardscape

wsp

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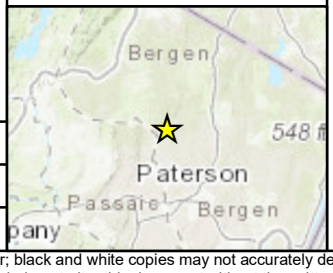
Approved: MA 2/10/2020

Project #: 31402200.000

Map Location



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Feet

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FIGURE 6

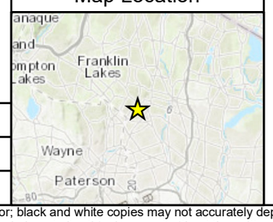
EXISTING SOIL CAP AREAS

RIDGEWOOD ORCHARD SCHOOL
BLOCK 2313, LOT 10
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY 07450

wsp

Drawn: ZT 2/10/2020	
Approved: MA 2/10/2020	
Project #: 31402200.000	

Map Location



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Feet

NAD 1983 2011 StatePlane New Jersey FIPS 2900 Ft US

Legend

- Existing Fence
- Proposed Fence
- Property Line
- Existing Cap by Asphalt, Mulch, Building, or Hardscape

Proposed Remediation Areas with 1-foot Clean Soil Cap by Type

- Cap
- Excavate/Cap

FIGURE 7

EXISTING AND PROPOSED REMEDIES

RIDGEWOOD ORCHARD SCHOOL
BLOCK 2313, LOT 10
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY 07450

APPENDICES

APPENDIX A

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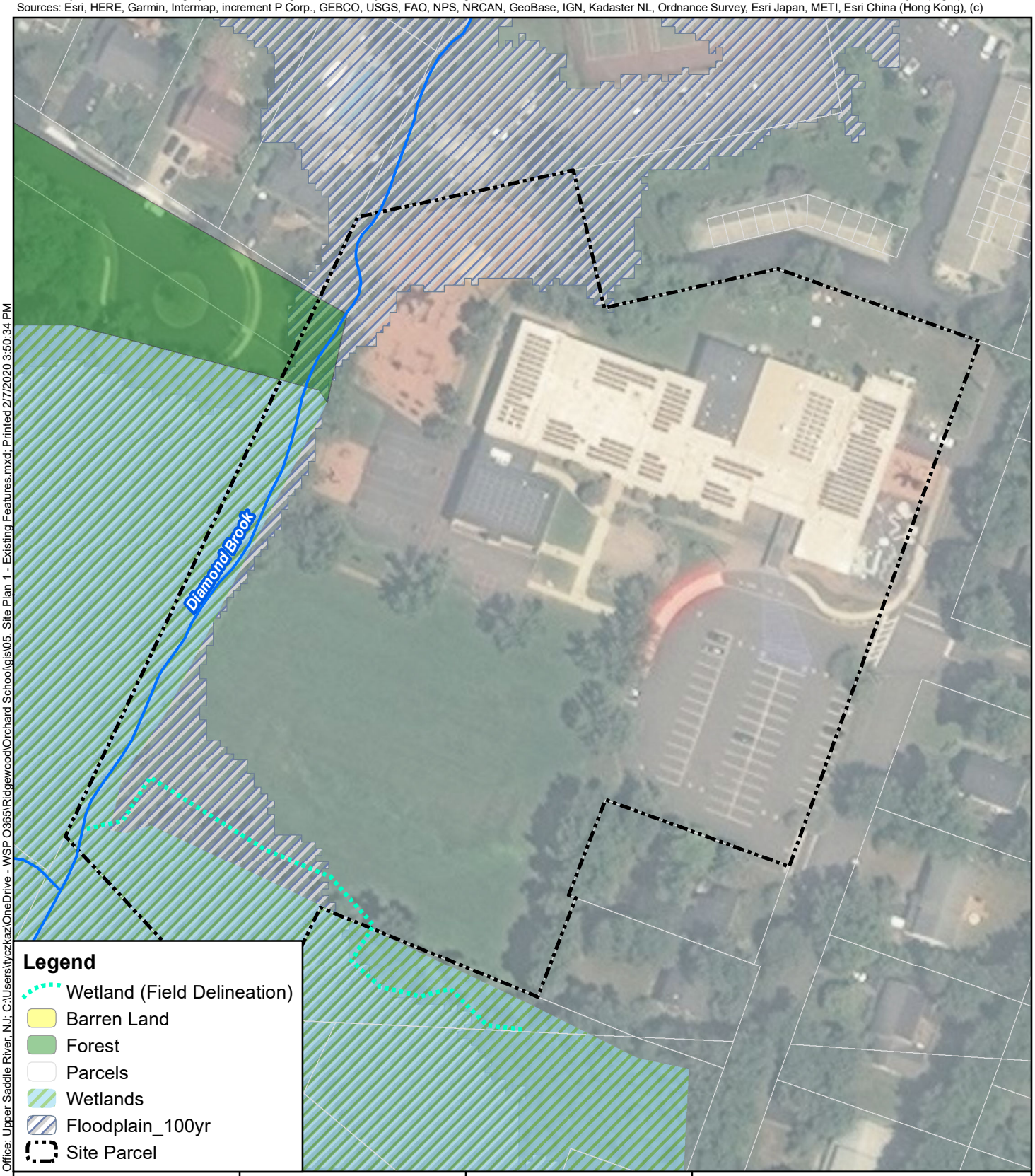

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wsp

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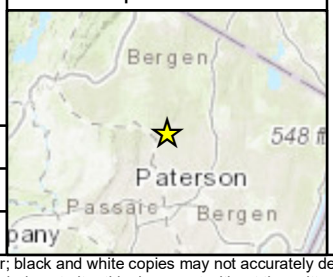
Approved: MA 2/7/2020

Project #: 31402200.000

Map Location



N

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Feet

NAD 1983 2011 StatePlane New Jersey
FIPS 2900 Ft US

FIGURE 1

SITE MAP
EXISTING FEATURES

RIDGEWOOD ORCHARD SCHOOL
BLOCK 2313, LOT 10
230 DEMAREST STREET
RIDGEWOOD, NEW JERSEY 07450

APPENDIX B

TENCATE
Mirafi®

Mirafi® Orange Delineation Nonwoven Geotextile

for Visual Barrier, Soil Separation and Drainage

Mirafi® Orange Delineation Geotextiles

TenCate™ develops and produces materials that function to increase performance, reduce costs and deliver measurable results by working with our customers to provide advanced solutions.

The Difference Mirafi® Orange Nonwoven Geotextiles Make:

- Utility Alert. Mirafi® delineation geotextiles are a visual dig barrier designed to be placed above underground utilities.
- Contaminated Soils. Mirafi® delineation geotextiles separate contaminated soils from clean soils.
- Archeological Sites. Mirafi® delineation geotextiles assist in the long-term protection of historical sites.

APPLICATIONS

Mirafi® nonwoven geotextiles are used in a wide variety of applications in the environmental and general civil markets. These include separation, filtration and protection applications.

Mirafi® delineation geotextiles are is used in many critical subsurface systems. The use of this orange delineation fabric allows for safe excavations where utilities or other sensitive structures may be buried. The highly visible orange nonwoven geotextile serves as a warning to construction workers when the excavation reaches a buried structure.

Excavation near all utilities, (gas, electric, water, Cable TV and telephone) is always a sensitive operation. The use of Mirafi® delineation geotextile is a low cost-effective method of protection. In addition, lining trench's with a geotextile keeps the selected and costly backfill material separated from the native subgrade.

Construction in areas where contaminated soils exist poses risks when trenches or deep footings need to be excavated. These risks are minimized when the Mirafi® delineation geotextile is placed on the contaminated soils before the capping of these areas occurs. The geotextile limits particle movement between the clean new soil and the contaminated substrate. The Mirafi® delineation geotextile offers a visual barrier to future excavations of the contaminated hazard below.

Federal and State laws require that archeological sites must be protected from adverse impacts caused by engineering projects. Many archeological sites throughout the world are left in place to protect them. In some cases, after discovery, they are buried. Sites can be protected through burial below an engineered cover, if the engineering project does not require excavation. The installation of Mirafi® delineation geotextile before the new soil is placed will aide in the long term protection of these archeological sites.

* These guidelines serve as a general basis for installation. Detailed instructions are available from your TenCate™ representative.

Protective & Outdoor Fabrics
Aerospace Composites
Armour Composites
Geosynthetics
Industrial Fabrics
Synthetic Grass

TENCATE
materials that make a difference

TENCATE
Mirafi®

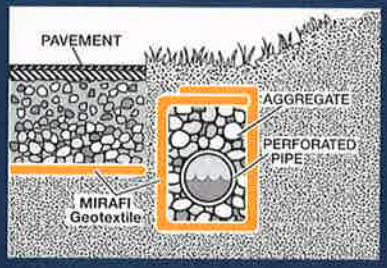
Mirafi® Orange Delineation Nonwoven Geotextiles

for Visual Barrier, Soil Separation and Drainage

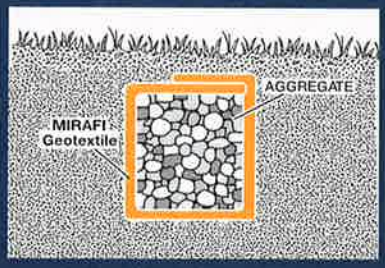
Property / Test Method	Units	140NL	160N	180N
MECHANICAL PROPERTIES				
Grab Tensile Strength ASTM D4632				
Strength @ Ultimate	lbs (N)	100 (445)	175 (779)	240 (1068)
Elongation @ Ultimate	%	75	75	70
Trapezoidal Tear Strength	lbs	50	85	90
ASTM D4533	(N)	(223)	(378)	(400)
CBR Puncture Strength	lbs	310	480	630
ASTM D6241	(N)	(1380)	(2136)	(2802)
UV Resistance after 500 hrs. ASTM D4355	% strength	70	80	80
HYDRAULIC PROPERTIES				
Apparent Opening Size (AOS)	US Sieve	70	100	100
ASTM D4751	mm	0.212	0.15	0.15
Permittivity	sec^{-1}	2.4	1.5	1.5
ASTM D4491				
Flow Rate ASTM D4491	gal/min/ft^2 (l/min/m^2)	175 (7130)	105 (4278)	95 (3870)
Packaging				
Roll Width	ft (m)	15.0 (4.5)	15.0 (4.5)	15.0 (4.5)
Roll Length	ft (m)	360 (110)	300 (91)	300 (91)
Est. Gross Weight	lbs (kg)	143 (165)	215 (97)	265 (120)
Area	yd^2 (m^2)	600 (502)	500 (418)	500 (418)

*NOTE: Mechanical Properties and Hydraulic Properties shown are Typical Value. Apparent Opening Size (AOS) properties shown are Maximum Average Roll Values. (Values and methods could change without notice)

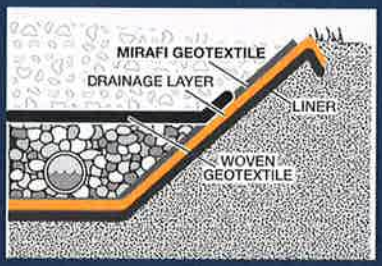
Mirafi® Orange Delineation Geotextiles



Cut-off/Inceptor Drain Along a Roadway Or Another Critical Struction



French Drain Without Pipe



Liner Protection Within a Landfill

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APPENDIX C

Photograph 1: View looking west showing the existing impervious surfaces (asphalt parking lot, cement and paver sidewalks, and the building).

Photograph 2: View looking west showing the existing impervious surfaces at the eastern portion of the building (macadam play area, cement sidewalk, mulch area and the building).

Photograph 3: View looking east showing the existing impervious surfaces (paver block) at the front of the building - amphitheater area.

Photograph 4: View looking east showing the mulched playground area at the western portion of the building.

APPENDIX D

Orchard School Site Remediation Plan

ID	Task Name	Start	Finish
1			
2	**Pre Construction**	**2/18/2020**	**5/29/2020**
3	Draft Design & Permit Application Forms for Signature	2/18/2020	
4	Final Design	2/28/2020	
5	**NJDEP LURP GP#4 Permit Submission**	**2/28/2020**	**5/29/2020**
6	NJDEP Review and Approval	2/28/2020	5/29/2020
7	**Bergen Soil Conservation District SESC Permit Application**	**2/28/2020**	**3/29/2020**
8	BSCD Review and approval	2/28/2020	3/29/2020
9	**Ridgewood Soil Permit Application**	**2/28/2020**	**3/29/2020**
10	Ridgewood Review and Approval	2/28/2020	3/29/2020
11	**Bid & Construction Phase**	**3/30/2020**	**8/28/2020**
12	**Bid Phase**	**3/30/2020**	**6/1/2020**
13	Bid Solicitation	3/30/2020	5/18/2020
14	Bid Evaluation & Award	5/18/2020	6/1/2020
15	Contractor NTP	6/1/2020	
16	**Construction**	**6/1/2020**	**8/28/2020**
17	Shop Drawings and Plans	6/1/2020	6/25/2020
18	Site NTP	6/25/2020	
19	Construction	6/25/2020	8/14/2020
20	Substantial Completion	8/14/2020	
21	Final Completion	8/14/2020	8/28/2020