Ohio Environmental Protection Agency
John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

October 4, 2012

RE: PORTAGE COUNTY
BRIMFIELD TWP.
PERMIT NO: 3GC05848
CONSTRUCTION STORM WATER
DISTRIBUTION WAREHOUSE FACILITY

Ed Gebauer and Mike Larson
InSite Real Estate Investment Properties LLC
1400 16th Street, Suite 300
Oak Brook, IL 60523

Jim Hampton
Exxcel Project Management LLC
328 Civic Center Dr.
Columbus, OH 43215

Don Sines
NC Contracting Services LLC
5840 Sterling Dr., Suite 410
Howell, MI 48843

Dear Mr. Gebauer, Mr. Larson, Mr. Hampton, and Mr. Sines:

As you are aware, Ohio EPA has been investigating a citizen complaint alleging sediment contamination of a drinking water well located at 180 Howe Road due to construction activities at the above referenced site. In conducting this investigation, the Division of Surface Water (DSW) has consulted with the Division of Drinking and Ground Water (DDGW) and the Portage County Health Department. On September 20, 2012, DSW received the attached memo from DDGW summarizing their findings. The memo recommends that the existing well at 180 Howe Road be properly abandoned and a new drinking water well be installed in its place. The memo goes on to state that Ohio EPA cannot conclude that the well at 180 Howe Road has been impacted solely by the recent construction activities at the Distribution Warehouse Facility; however, Ohio EPA cannot rule out the possibility of a hydrogeologic connection between the storm water management facilities at the Distribution Warehouse Facility and the aquifer that services the well at 180 Howe Road. As such, the report recommends that detention/water quality basins located on the Distribution Warehouse Facility be properly lined and maintained to eliminate any potential of impacting the underlying uppermost aquifer. I informed Mr. Larson of this recommendation via telephone on September 17, 2012, and Mr. Gebauer on October 2, 2012.

In response, InSite Real Estate requested a conference call to further discuss and understand this recommendation. As per the October 3, 2012, conference call, Ohio EPA requests the applicant submit for comment and concurrence a detention/water quality basin lining proposal. This submittal should summarize the detention/water quality basins proposed to be lined and the extent of lining. The proposal shall be based on, but not limited to, the following information: data from soil borings, the lateral extent of the shallow groundwater resource utilized by

residents of Howe Road, i.e., the Mercer Formation, depth to bedrock, type of bedrock, thickness of unconsolidated material, and potential to adversely impact shallow groundwater.

To address possible contamination of the shallow bedrock aquifer, please amend the Storm Water Pollution Prevention Plan (SWP3) to include impermeable liners for storm water management facilities that have the potential to adversely impact the shallow groundwater. Please include all pertinent logs, maps and data used to develop the plan with your submittal. To determine an appropriate liner, DSW consulted with the Division of Materials and Waste Management (DMWM). DMWM recommends that the liner be constructed per the specifications contained in Ohio Administrative Code (OAC) 3745-400-07(F)(5) (see attached). This rule applies to liners for waste placement cells at construction and demolition debris landfills, but DMWM believes this specification will be adequate to protect the underlying aquifer from contaminants contained in surface water runoff. Other specifications may be considered as long as they are protective of the ground water aquifer.

In addition to this matter, DSW has reviewed the response received from Mosyjowski & Associates on September 4, 2012, regarding my inspection letter dated August 16, 2012. The response was reviewed to determine if proposed amendments to the SWP3 comply with the requirements of the Ohio EPA General National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Associated with Construction Activities #3GC05848*AG.

Ohio EPA provides the following comments regarding the response and amended SWP3:

- **Pond at New Cul-de-Sac of Progress Boulevard.** A fourth permanent wet extended detention pond has been added to the SWP3 to address post-construction runoff control for the extension of Progress Blvd. The plan indicates that the pond will be modified to act as a sediment basin during construction. Mr. Mosyjowski did not provide the calculations and stage-storage data needed to determine compliance with the NPDES permit. Please provide the following information so that Ohio EPA can determine compliance with NPDES requirements:

  <u>During Construction (Sediment Basin):</u> A review of the detail drawing for the temporary modification shows that the skimmer is attached to the outlet structure at elevation 1121.00. Please provide:
  - The total drainage area, in acres, tributary to the basin during construction;
  - The maximum disturbed area, in acres, expected to be directed to the pond during the course of construction;
  - The storage volume provided in the basin below 1121.00, in cubic feet;
  - The storage volume provided in the basin above 1121.00, but below 1122.50, in cubic feet; If this volume is greater than the Dewatering Volume, please indicate the elevation at which the Dewatering Volume is achieved (see Section 6.1 of ***Rainwater and Land Development***, *Ohio's Standards for Stormwater Management, Land Development and Urban Stream Protection* [ODNR, 2006]); and
  - The calculation or worksheet that determined that a one-inch orifice in the skimmer head will draw the Dewatering Volume down in no faster than 48 hours.

Post-Construction (Wet Extended Detention Basin): Once construction is complete, the skimmer is removed and the permanent outlet structure is installed. The elevation of the orifice that controls discharge of the Water Quality Volume (WQv) is at elevation 1120.97. Please provide:

- The total drainage area, in acres, tributary to the basin after development is complete;
- The runoff coefficient or percent imperviousness of the area tributary to the basin;
- A calculation of the WQv;
- The storage volume provided in the basin below 1120.97, in cubic feet;
- The elevation at which 75% of the WQv, i.e., the EDv, is stored above 1120.97, in cubic feet; and
- The calculation or simulation that determined a 1-inch orifice will drain the EDv in 24 hours and no more than ½ the EDv in 8 hours when the brimful EDv is present.

- **Entrance at Progress Blvd.** Mr. Mosyjowski indicates that a sediment trap has been provided at the entrance at Progress Blvd, however, Picture 1 and 2 in his response does not show a sediment trap. My inspection of the site on August 30, 2012, confirmed that nothing more than a rip-rap channel has been provided here. Please see enclosure titled "Sediment Trap" from ***Rainwater and Land Development*** and construct a properly designed sediment trap to address runoff at this location.

- **Entrance off Crystal Parkway.** The SWP3 has been amended to provide a sediment basin within the road cut for the entrance off Crystal Parkway. It appears that this sediment basin is intended to address construction site runoff from the entrance road downslope of the East Basin, the adjacent slope to the north and runoff from the soil stockpile. Ohio EPA is concerned that this does not provide a feasible solution. First and foremost, runoff from the south side of the stockpile is not directed to the sediment basin. You must provide diversions to collect and convey runoff to the sediment trap as needed. It is not adequate to rely solely on silt fence to control the stockpile. Attempts to control this runoff with silt fence have failed to date. Further, installation of the roadway will need to be delayed until disturbed areas upslope of the proposed basin have been stabilized, the soil stockpile removed and the area where it was formerly stockpiled is stabilized. If this is not feasible, please amend the SWP3 to locate the sediment basin in a location that can remain functional throughout the construction process. Further, please provide design data (drainage areas, storage volumes, etc.) and calculations for the sediment basin so that Ohio EPA can determine compliance with NPDES requirements. Assess the sediment basin for its potential to impact the underlying aquifer and provide a liner, if needed, to protect the groundwater resource.

- **Post-Construction for the Roadway Between the East Basin and Crystal Parkway.** There is no post-construction BMP indicated for the runoff from the entrance road off Crystal Parkway between Crystal Parkway and the East Basin. The proposed sediment basin is a temporary structure to address construction site runoff only. You must provide a post-construction BMP to treat the WQv associated with the drainage area downstream of the East Basin. Please amend the SWP3 accordingly. Assess the BMP for its potential to impact the underlying aquifer and ensure the design is protective of the groundwater resource.

- **Ground Water Recharge Basins (initially, Bioretention Cells).** Ohio EPA did not perform the initial review of the SWP3. This review was conducted by Portage Soil & Water Conservation District (SWCD). Portage SWCD indicates that the control practices preceding the West Basin were intended to be bioretention areas. Ohio EPA would ordinarily not be opposed to replacing bioretention with a practice that infiltrates runoff; however, as indicated in our conference call, contamination of the groundwater aquifer must be considered on this site. Bioretention cells can be designed with impermeable liners to prevent migration of pollutants to groundwater, yet provide treatment of storm water runoff through settling, plant uptake and filtration. A ground water recharge basin functions primarily through infiltration. Thus, it does not appear to be feasible to use recharge basins within areas of the site that have the potential to adversely impact groundwater. Please review the potential of each recharge basin to impact the underlying uppermost aquifer and amend the SWP3 as needed to address Ohio EPA post-construction water quality requirements, yet protect groundwater.

Please review these comments and amend the SWP3 as needed to address them. If no amendment will be provided in response to a comment, please provide an explanation why no change is required. Include all supporting documentation requested. Please provide your reply **no later than October 15, 2012**. Ohio EPA will reinspect the site the week of October 15, 2012, to ensure corrective measures have been implemented. This includes temporary stabilization of disturbed areas that remain idle for 21 days or longer and permanent stabilization of disturbed areas at final grade. The NPDES permit requires stabilization to be initiated within seven days of last disturbance or reaching final grade.

If you have any questions, please contact me at (330) 963-1145.

Sincerely,

Dan Bogoevski

Dan Bogoevski
District Engineer
Division of Surface Water

DB/cs

Cc: Ed Gebaur, Insite Real Estate Investment Properties LCC
Joseph Mosyjowski, Mosyjowski & Associates
Eric Long, Portage SWCD
Chip Porter, Portage County Health Department
Lloyd Groves, Portage County Health Department
Trustees, Brimfield Twp.

Ecc: Atiur Rahman, Ohio EPA, DDGW, NEDO
Jeff Rizzo, Ohio EPA, DDGW, NEDO
Annie van Blaricom, Legislative Liason, Ohio EPA, CO
Mike Settles, Public Interest Center, Ohio EPA, CO

Bcc: Preston Cutright

Interoffice Memo

Environmental Protection Agency

To: Dan Bogoevski, Environmental Specialist 3, DSW, NEDO
Atiur Rahman, Environmental Supervisor, DDAGW-GW, NEDO

CC: File GW-P-156

From: Conni McCambridge, Geologist 3, DDAGW-GW, NEDO CMC

Date: September 20, 2012

Property: 180 Howe Road, Brimfield Township, Kent, Portage County, Ohio

Subject: Well Contamination Issue

INTRODUCTION

The Division of Drinking and Ground Waters (DDAGW) has been requested to review the residential water well information for the 180 Howe Road property, Brimfield Township, Kent, OH. Information concerning the current condition of the well with respect to construction activities occurring south of the property has been submitted by Mr. Mike Larsen on the behalf of InSite Real Estate (site developer) and Mr. Preston Cutright as the property owner. These submittals were received by the Ohio EPA's Northeast District Office (NEDO) on August 20, 2012 and August 21, 2012, respectively.

Issue: Mr. Preston Cutright, the owner of the 180 Howe Road property, is complaining that his water well has been impacted by construction activities occurring at the property to the south of, and behind his house. This approximate 66-acre property is being developed as a warehouse complex by InSite Real Estate, based in Chicago, Illinois. Excessive turbidity is said to be the main issue with the water well.

Intent of this Review: The intent of this current review is to determine any deficiencies and/or inconsistencies in the Howe Road well, as well as the InSite construction activities that may result in the failure to protect public health and the environment. However, this is a cursory review of the submitted information as Ohio EPA, DDAGW does not have jurisdiction over residential water wells in the State of Ohio.

Recommendations: Ohio EPA, DDAGW, NEDO has reviewed all submitted information with the utmost care and consideration. DDAGW has also conducted additional research to further determine whether the 180 Howe Road well has been impacted by construction activities presently occurring behind the house.

Ohio EPA, DDAGW, NEDO cannot conclude that the 180 Howe Road well has been impacted solely by the recent InSite construction activities. This interpretation is based on the known hydrogeologic condition(s) at and/or around the well, current condition and design of the well, the presence of potential contaminant source(s) on and/or adjacent to the property (i.e., septic systems), pumping at what appears to be an excessive rate (i.e. 19 gallons per minute, gpm), and the distance between the well and retention pond on the construction property.

In order to be protective of human health and the environment, Ohio EPA, DDAGW, NEDO recommends two actions:

Protection of resident:

1. The current 180 Howe Road well be properly abandoned and a new well installed in its place, and

Protection of the shallow bedrock aquifer resource:

2. All detention/water quality basins located on the InSite construction site be properly lined and maintained to eliminate any potential of impacting the waters of the State of Ohio (i.e., underlying uppermost aquifer).

Ohio EPA, DDAGW, NEDO is providing detailed discussions below which lead to the two recommendations provided above.

DISCUSSION

OHIO EPA – DDAGW, NEDO INVESTIGATION

Background: The 180 Howe Road property totals approximately 1.08 acres and is located in Brimfield Township. Currently, the property contains one house (built in 1978), and one garage (built in 1979). The property is served by one well and one septic system. According to the current owner (Mr. Preston Cutright), the well is located approximately 35 feet south of the house, while the septic system is located in front of the house. The installation dates of the current well and septic system are unknown.

The 180 Howe Road property was purchased in the summer of 2012 by Mr. Cutright. The new owner did not request that the current condition of the well be inspected, and/or the associated water quality be tested prior to purchasing the property from the former owners, Don and Joan Freeman. An Ohio Department of Natural Resources (ODNR) well log could not be positively identified for the property.

InSite Real Estate Conference Call (August 16, 2012): Mr. Mike Larsen from InSite Real Estate (i.e., site developer) was contacted on August 16, 2012. Mr. Larsen explained that prior to the start of construction activities, approximately 35 soil borings were advanced throughout the property by ESC and Ridgeway Drilling, Inc. These borings range in depth from 10 to 25 feet. Weathered sandstone was encountered at approximately 21 to 24 feet throughout the property.

Mr. Larsen also explained that the owner of 180 Howe Road property is complaining that his water well has been impacted by construction activities occurring at the developmental property behind his house. The main well issue appears to be excessive turbidity in the well water. In order to determine whether construction activities were actually impacting the water well, Mr. Larsen described the investigation activities that had been performed to date:

- Well Sampling: The site developer hired a local environmental firm (Emerald Environmental, Kent, OH) to follow-up on this complaint. Mr. Bill Mello, Environmental Scientist from Emerald, collected water samples from the 180 Howe Road well on August 6, 2012 for analytical testing. The sample was analyzed for metals, total dissolved solids, total suspended solids and total coliform bacteria.

  Copies of the total coliform result were provided to Ohio EPA, DDAGW for review by Mr. Larsen and Mr. Cutright. The total coliform results reported greater than 200.5 per 100 ml. The August 2012 water sample was not tested individually for fecal coliform and/or *E-coli*, nor was a follow-up sample collected and analyzed. No other sampling results have been provided and reviewed.

- Well Evaluation: Frontz Drilling, from Wooster Ohio, was also hired to evaluate the current physical condition of Mr. Cutright's well. A down-hole video camera test was performed on August 7, 2012. It should be noted that Frontz Drilling is registered with the Ohio Department of Health (ODH) to perform this type of down-hole camera evaluation (OHD Registration Number 00120, Wayne County).

During the telephone conversation on August 16th, Mr. Larsen mentioned that video results indicated that the 180 Howe Road well is approximately 41 feet deep with 20 feet of casing. The static water level was encountered at approximately 33 feet below ground surface (bgs). Mr. Larsen indicated that the integrity of the well is questionable with grout and corrosion problems present based on the video survey.

Mr. Larsen also indicated that Mr. Cutright was pumping his well at *"...19 gallons per minute* [gpm]..." and produced silty water. The driller who was conducting the well evaluation turned down the well pump to approximately 6 gpm and *"...the well cleared."*

Mr. Larsen further indicated that Mr. Cutright insisted that the well pump be turned back up to 19 gpm. The driller did as Mr. Cutright requested and noted that the well water once again became silty.

Call to Mr. Preston Cutright, Owner (August 16, 2012): DDAGW contacted Mr. Preston Cutright (owner of 180 Howe Road, Brimfield Township) concerning his water well on August 16, 2012. Mr. Cutright explained that he had purchased the Howe Road property one to two months prior to this call. It is the owner's position that the construction activities, as well as the location of the new retention pond for a new warehouse, are causing problems (i.e., sediment, contamination, total coliform) in his water well. The new warehouse is located south of, and behind his current property.

He has been contacting the local authority/government officials for the past four weeks concerning these well problems. The location of the well in question is approximately 35 feet south of the residence.

The owner said that there was no well log for his property well and explained that the existing well is an *"undocumented well...that was installed in the 1970s."* He also said that the well was

installed by *"Dean Drilling."* The owner mentioned that his neighbor's well is not affected by the turbidity issue because the well is *"...80 feet deep."*

Mr. Cutright said that he did not have the water well inspected or the water tested prior to his purchase of the house. He said that he had been a developer in the Portage County area for over 40 years and had tasted the water prior to his purchase. He said that the water *"...tasted good..."* and based on his considerable experience/expertise, he did not feel that additional testing was necessary.

The owner also indicated that his septic system is located in front of the house. He explained that the system was recently inspected (i.e., before he bought the house) and the system was "*ok.*" He did not supply a copy of the *Septic System Evaluation Report* to Ohio EPA to document the septic system inspection findings.

Various County and State Agencies Contacted: Various agencies have been contacted by Ohio EPA, DDAGW to gather additional information.

- Portage County Health Department:

  DDAGW contacted Mr. Loyd Groves, Environmental Director, on August 21, 2012. Mr. Groves explained that Mr. Cutright had called and left a message, however, Mr. Cutright did not leave a call back number with his message. During the conference call, Mr. Groves checked on whether a well permit had been issued at the time of well installation for the 180 Howe Road property. It was determined that the 180 Howe Road well did not have a well permit with Portage County. Mr. Groves indicated that Ohio EPA, DDAGW should contact Mr. James Bierlair, District Coordinator at the Portage County Soil and Water Conservation District, concerning this matter.

- Portage County Soil and Water Conservation District:

  Mr. James Bierlair was contacted on August 21, 2012 at the suggestion of Mr. Groves from the Portage County Health Department on August 21, 2012. Mr. Cutright's complaint about his well water quality was discussed.

- Ohio Department of Health:

  A call was received on August 28, 2012 from Mr. Steven Schmidt, Registered Sanitarian from the Ohio Department of Health (Columbus, OH) concerning a call he received from Mr. Preston Cutright. Mr. Schmidt was contacted on August 29, 2012. During the discussion, Mr. Schmidt indicated that certain well conditions could exist based on the age of the well (i.e., installed in the 1970's). For example, steel casing used in the well could have pitting and corrosion which could impact the integrity of the well.

Property Visit (August 30, 2012): A property visit at 180 Howe Road was conducted by Ohio EPA on August 30, 2012. During the site visit, representatives from the Portage County Health Department and the Portage County Soil and Water Conservation District were also present. The following were present at the site:

Attendee	Agency/Office	Phone
Preston Cutright	Homeowner	330-677-3394
Eric Long	Storm Water Engineer Portage Soil and Water Conservation District	330-297-7633 ext. 120
DuWayne "Chip" Porter	Health Commissioner Portage County Health Department	330-296-9919
Loyd Groves	Environmental Director Portage County Health Department	330-296-9919
Dan Bogoevski	Environmental Specialist 2 Ohio EPA, Surface Water	330-963-1145
Atiur Rahman	Environmental Supervisor Ohio EPA, Drinking and Ground Waters	330-963-1158
Conni McCambridge	Geologist 3 Ohio EPA, Drinking and Ground Waters	330-963-1263

The well and septic system locations were viewed as well as construction activities with respect to the Howe Road property. It was noted that the current well cap listed the name/phone of *"Bob Dean and Sons, 296-9852."* The homeowner said that he had spoken recently with the son of Bob Dean (deceased) to get more information on his well. A well log could not be obtained due to recent company document destruction by the son. The well cap looked to be in good condition. A flower garden that formerly surrounded the well had been recently removed by the homeowner. New grass is growing around the well.

Portage County Health officials noted that the septic system on the 180 Howe Road property includes several tanks and trenches. This septic system is located on the north end of the house. No documentation was provided as to the current condition of the septic system.

Mr. Chip Porter, Health Commissioner, Portage County Health Department, indicated that Mr. Cutright should have his well disinfected. It was decided that the owner would personally disinfect his well over the Labor Day weekend. Portage County Health Department cautioned Mr. Cutright to properly document all his disinfection procedures and to calculate the correct amount of disinfectant to be used during this procedure. After well disinfection was completed, Mr. Cutright would be contacted by the Portage County Health Department on Tuesday (9/4/2012) or Wednesday (9/5/2012) to collect another water sample. This sample will be collected and analyzed for total coliform, fecal coliform, and E. coli by the Portage County Health Department at no charge to the owner. Mr. Cutright agreed to these terms.

Construction Site Visit (August 30, 2012): A visit to the construction site was conducted by Ohio EPA on August 30, 2012 immediately following the 180 Howe Road property visit. The storm water retention pond locations were viewed as well as construction activities with respect to the Howe Road property.

The following people attended the site visit:

Attendee	Agency/Office	Phone
Eric Long	Storm Water Engineer Portage Soil and Water Conservation District	330-297-7633 ext. 120
Jim Hampton	Senior Site Manager Excel Project Management	614-621-4500
Dan Bogoevski	Environmental Specialist 2 Ohio EPA, Surface Water	330-963-1145
Atiur Rahman	Environmental Supervisor Ohio EPA, Drinking and Ground Waters	330-963-1158
Conni McCambridge	Geologist 3 Ohio EPA, Drinking and Ground Waters	330-963-1263

During this visit, it appeared that the retention pond is 300-500 feet away from the 180 Howe Road well. Land surface around the well is elevated as much as 25-30 feet above the water level at the retention pond.

180 Howe Road Resampling: The 180 Howe Road well was resampled on Tuesday, September 4, 2012. Results indicate that the total coliform results were again reported as greater than 200.5 per 100 mL, and E. coli was listed as positive with a 1.0 per 100 mL result. These results were provided to Ohio EPA by Mr. Loyd Groves from the Portage County Health Department.

HYDROGEOLOGIC INFORMATION

Stratigraphy: Throughout the property and surrounding area, the uppermost unconsolidated stratum consists of approximately 11 inches of topsoil, successively underlain by one to three feet of clayey silt, and 15 to 18 feet of silty sand to a depth of 22 feet bgs (ECS Boring Log B-3, located 30 to 40 feet south of the 180 Howe Road property). In ECS Boring Log B-3, sandstone bedrock was encountered at approximately 22 feet bgs, with auger refusal at 24 feet bgs.

According to Winslow and White (1966), several stratigraphic units are present in the 180 Howe Road area: The Mercer Formation/Member (youngest), the Connoquenessing Member (present nomenclature identifies this unit as the Massillon Sandstone), the Sharon Shale and the Sharon Conglomerate of the Pottsville Formation (Pennsylvanian-age).

- The Mercer Formation consists of silty to carbonaceous shale bedrock inter-bedded with thin sandstones, coal seams, clays and siltstones (Angle, 1990).

- The Massillon Sandstone consists of coarse to medium-grained sandstone which may include minor shale and conglomerate lenses. The Massillon Sandstone may occur in two units separated by approximately 40 to 50 feet of shale. The upper sandstone unit can range from 15 to 35 feet in thickness, while the lower unit can range in thickness from 10 to 65 feet (Winslow and White, 1966).

- The Sharon Shale consists of gray black, sandy to silty shale with minor siltstones and coal seams (Angle, 1990).

- The Sharon Conglomerate consists of coarse to medium-grained, light colored sandstone and may contain conglomeratic zones (Angle, 1990).

Unconformities exist between each of the units described above. These unconformities may be partially responsible for the variability in thickness of each unit, both locally and regionally.

Available ODNR Well Information to Support Stratigraphic Interpretation: The ODNR website was searched for well logs located in the immediate vicinity of 180 Howe Road. No well log was found that matches the depth and year of installation for the 180 Howe Road property. However, other well logs in the area provided detailed information to determine the underlying stratigraphy in the Howe Road area. For example, two wells that appear to be located at/near the property are located at 185 Howe Road *(ODNR #567542 and ODNR #567543)*. Both wells were drilled to approximately 80 feet bgs and had casing lengths of 30 feet. Both well logs indicate the following stratigraphy: Sand & gravel from the ground surface to 22 feet bgs; soft shale from 22 to 30 feet bgs, sandstone from 30 to 35 feet bgs; and shale from 35 to 80 feet bgs. This stratigraphy noted in these two well logs is similar to that described by Winslow and White in *"Geology and Ground Water Resources of Portage County, Ohio" (1966)*.

Mr. Jeff Rizzo, Hydrogeologist/Geologist 3 with Ohio EPA, DDAGW, NEDO provided a detailed review of the stratigraphy in this area. Mr. Rizzo provided a detailed west to east cross-section of this area (attached). Based on his interpretation, unconsolidated sediments can be encountered from the ground surface to approximately 20 feet bgs. These sediments are subsequently underlain by the Mercer Formation (youngest), the Massillon Sandstone, the Sharon Shale, the Sharon Conglomerate and the Cuyahoga Formation (oldest).

Ground Water: A significant ground water zone was not encountered in the upper 22 feet of the unconsolidated materials. However, it should be noted that the permeable and highly fractured units within the Mercer Formation are considered a "local" ground water resource for Portage County residences located on the uplands and underlain by this unit. This unit underlies the unconsolidated materials in the Howe Road area.

Through a review of ODNR water well logs along Howe Road in Portage and Summit Counties, a lower (regional) aquifer is present within the underlying sandstone bedrock. In the surrounding area, ground water is regionally obtained from Massillon Sandstone and the Sharon Conglomerate (sandstone) [*ODNR Ground Water Resources of Summit County, 1979*]. The Massillon Sandstone unit is encountered at depths of less than 75 feet bgs, while the approximate depth of the top of the Sharon Conglomerate is between 140 and 160 feet bgs. Due to higher clay mineral content, the Massillon Sandstone is generally regarded as a less productive aquifer when compared to the Sharon Conglomerate. Drinking water wells within this unit generally produce sustained yield as much as 50 gpm.

Down-Hole Camera Video Review: A copy of the August 6, 2012 down-hole camera test for the 180 Howe Road property was received by Ohio EPA, NEDO on August 31, 2012. This video was reviewed by Atiur Rahman, Environmental Supervisor, Jeff Rizzo, Hydrogeologist/Geologist 3, and Conni McCambridge, Geologist 3 of Ohio EPA, DDAGW, NEDO.

The video contained two tests, Title 1 was (25.33 minutes length) and Title 2 (47.34 minutes length). Both tests were produced in color and examined the entire length of the well to a depth of 40.6 feet where the well terminated. The following information and depths were evident in various chapters from the Title 2 video. The times (in minutes) from this survey are given in parentheses.

Casing joints were observed at 6.4 feet (00.28) and 16.6 feet bgs (1:05). Evidence of mineral/scale/iron encrustation appears to be present along the sides of the borehole from 22.8 feet to at least 27 feet bgs (01:31 to 03:25). The static water level was encountered at 26.5 feet bgs (03:25). Silt, rust and scale were noted in the water column. The well casing appears to end at approximately 27 feet bgs (27:27), and borehole is open to the well's termination depth at approximately 40.6 feet bgs (28:49). The integrity of the casing seal where it meets the open borehole could not be determined.

Two bedrock units were identified [Mercer shale at 28.8 (11:47) to approximately 31.5 feet bgs (28:14) and Massillon sandstone at 32 feet bgs (28.14)]. Horizontal and vertical fracturing was prevalent near the contact between the shale and underlying sandstone bedrock from approximately 28 to 34 feet bgs. It should be noted that a large void/fracture was noted from approximately 31.7 to 33.1 feet bgs and appears to be the contact between the two lithologic units (28.14).

Large bubbles can also be seen as the camera focuses in on the various voids. This is indicative of water flowing into and out of the open borehole of the well itself (28:10, 28:33, 31:05).

ADDITIONAL DISCUSSION

Well Depth and Well Design: Based on well log information from the surrounding area, unconsolidated sand and gravel appears to extend to about 22 feet bgs. Down-hole video showed horizontal and vertical fracturing near the contact between the soft shale and underlying sandstone bedrock from approximately 28 to 35 feet bgs. If this is the case, the 27-foot well casing, as noted in the down-hole video, is not anchored into competent bedrock. It also appears that the water table within the 180 Howe Road well occurs at the same level as the base of the casing (static water level at approximately 26.6 feet bgs). Given seasonal fluctuations in the static water level, the existing casing may/may not extend into saturated zone.

The current well design does not appear to offer any protection from shallow level ground water flowing toward the well from adjacent areas in response to the cone of influence pumping (i.e., 19 gpm rate). This interpretation is based on the following evidence: The unconfined nature of

the aquifer, dominantly sandy lithology of the unsaturated zone, fractured bedrock, relatively shallow depth of the well compared to others in the neighboring areas, and a short casing length.

It is Ohio EPA's recommendation that the current well should be properly abandoned and a new well installed. The new well should be advanced deep enough to draw water from the underlying Sharon Conglomerate unit (approximately 130 feet bgs in this area).

Excessive Pump Rate and Contaminant Source Within the Property: Sedimentation problems in well water can also be associated with over-pumping. Although the owner indicated that the well can sustain pumping at the 19 gpm rate, it cannot be ruled out that at this level of pumping, along with the shortness of casing and the fractured nature of the underlying bedrock may be partially responsible for the sedimentation issue within the well. The observation by Frontz Drilling that lowering of pump rate (i.e., 6 gpm) cleared the well water seems to point to this possibility. It is unknown what pump rate was initially recommended at the existing well at the 180 Howe Road property.

According to the American Water Works Association, the average daily household water use (including outdoor) is 350 gallons. At 19 gpm pump rate, it is expected to take 18-19 minutes to pump this amount of water. If the cone of influence created by the increased pumping of the 180 Howe Road well were to continue, the possibility exists that bacterial contamination from the adjacent septic systems may affect the well.

Ohio EPA, DDAGW, NEDO believes part of the observed problems may be attributable to over-pumping and recommends adjusting the pump rate based on a recommendation from a professional well driller.

InSite Development Property - Retention Basins: Currently, three detention/water quality basins (i.e., storm water management ponds) are located in the eastern, western and southwestern portion of the development property. All three basins are unlined at the development property.

It was noted that sandstone bedrock (i.e., possibly the Mercer Formation/Massillon Sandstone) was likely fractured during the installation/construction of the eastern basin *(Ohio EPA, Division of Surface Water, Letter, Bogoevski, August 16, 2012).* It is unclear whether the other two basins were excavated to bedrock as well during installation/construction. While no clear link has been established between the unlined basins and the 180 Howe Road well, the potential could exist for surficial contamination to impact the underlying Mercer Formation "local" ground water zone due to the construction techniques used on the basins themselves. If this is the case, then the potential also exists that fractured Mercer bedrock could possibly interconnect with those local wells installed into the Mercer.

In order to protect the waters of the State of Ohio and the shallow ground water resource within the Mercer Formation utilized by numerous households along Howe Road, Ohio EPA, DDAGW, NEDO recommends that all detention/water quality basins at the development property be properly lined and that those linings be maintained throughout the life of the property.

CONCLUSIONS

Ohio EPA, DDAGW, NEDO has reviewed all submitted information with the utmost care and consideration concerning whether the 180 Howe Road well has been impacted by construction activities presently occurring behind the house. Based on the submitted information and review, it is unclear whether the 180 Howe Road well has been impacted solely by the InSite construction activities.

In order to be protective of human health and the environment, Ohio EPA, DDAGW, NEDO recommends two actions:

Protection of resident:

1. The current 180 Howe Road well be properly abandoned and a new well installed in its place; and

Protection of the shallow bedrock aquifer resource:

2. All detention/water quality basins located on the InSite construction site be properly lined and maintained to eliminate any potential of impacting the waters of the State of Ohio (i.e., underlying uppermost aquifer).

Reviewed by: Atiur Rahman, Environmental Supervisor, DDAGW-GW, NEDO.

cmc:dms

Attachments: References; West to East Cross-Section Map of Howe Road Area

ec: Kurt Princic, District Chief, Ohio EPA, NEDO
Lindsay Taliaferro III, Environmental Manager, Ohio EPA, DDAGW-GW, CO
Eric Adams, Environmental Manager, Ohio EPA, DDAGW-GW, NEDO
Atiur Rahman, Environmental Supervisor, Ohio EPA, DDAGW-GW, NEDO
Dan Bogoevski, Environmental Specialist 3, Ohio EPA, DSW, NEDO
Jeff Rizzo, Geologist 3, Ohio EPA, DDAGW-GW, NEDO

Work ID No. 6666681674

References

Angle, M.P., 1990, *"Ground Water Pollution Potential of Portage County, Ohio,"* ODNR, Division of Water, Ground Water Resources Section, Ground Water Pollution Potential Report No. 22, 71 pgs.

Winslow, J.D., and G.W. White, 1966, *"Geology and Ground water Resources of Portage County, Ohio,"* ODNR, Division of Water, Geological Survey Professional Paper No. 511, 80 pgs.

Information provided to Ohio EPA for review:

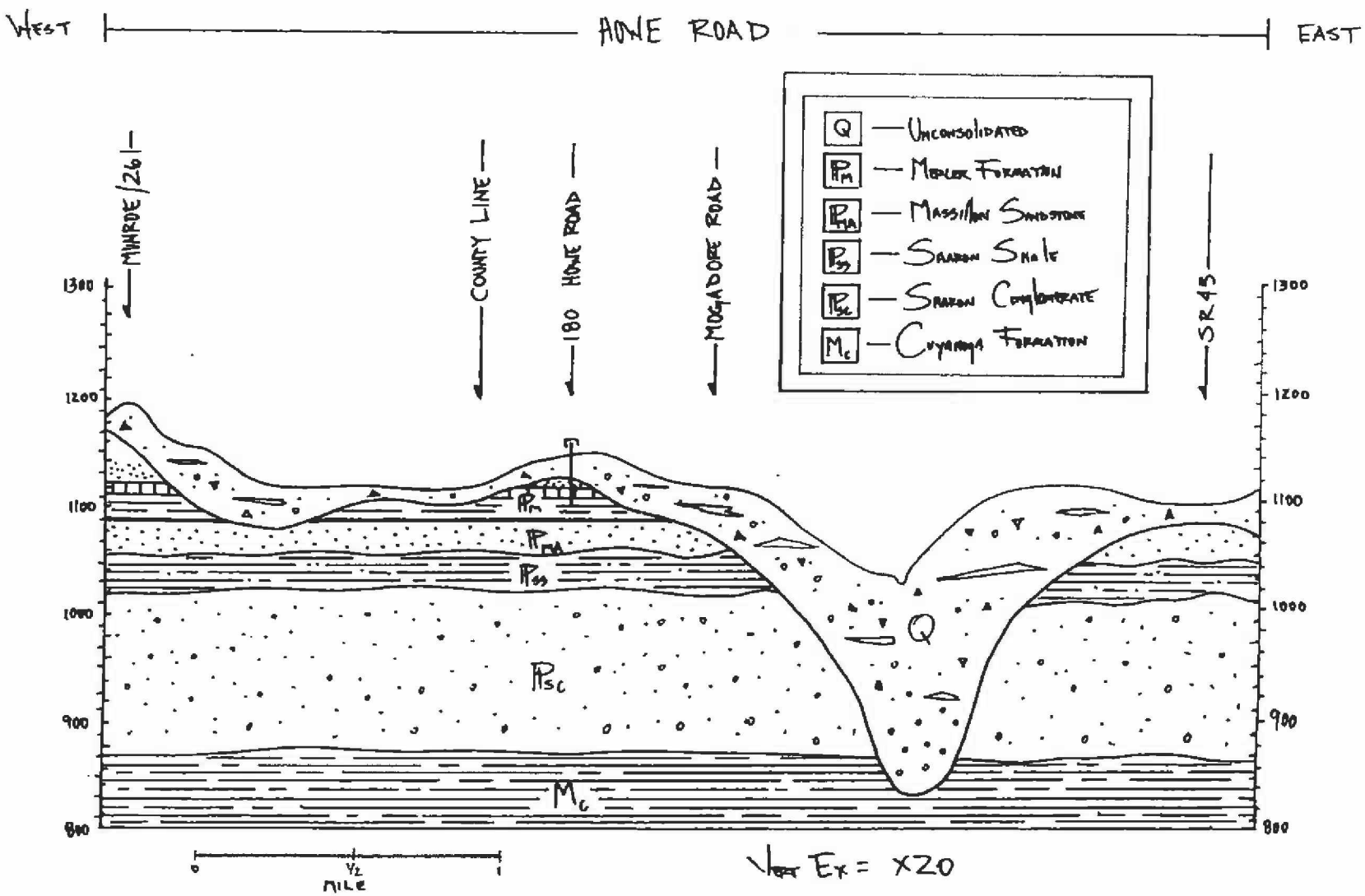
InSite Real Estate:

- *Civil engineering plans (2012)*
- *Soil boring logs (2012)*
- *Aerials photos (July 2012 – includes construction activities)*
- *Frontz Drilling August 6, 2012 Down-Hole Camera Survey*
- *Correspondence with Mr. Preston Cutright*
  - *Well testing summary (Emerald Environmental, August 9, 2012)*
  - *Water quality summary (Total Coliform Result, August 9, 2012)*

Mr. Preston Cutright, owner of 180 Howe Road:

- *Water quality summary (Total Coliform Result, August 9, 2012)*

West to East Cross-Section of Howe Road Area, Brimfield Township, Ohio
by Jeff Rizzo, Hydrogeologist/Geologist 3, Ohio EPA-NEDO-DDAGW (9/17/2012)



(a) Existing topography, for informational purposes only.

(b) The top of the uppermost aquifer system, if the owner or operator meets the criteria of paragraph (C)(1)(a) of this rule or is pursuing compliance with the provisions of paragraph (F)(5)(a) of this rule. The demonstration of the thickness and hydraulic conductivity of the *in situ* geologic material shall be based on the borings used for the site hydrogeology investigation required by paragraph (C)(5) of rule 3745-400-09 of the Administrative Code, shall be shown on the cross sections, and shall include the following:

(i) Logs of the applicable borings showing the stratigraphic units from the ground surface to ten feet below the bottom of the facility.

(ii) The thickness and hydraulic conductivity measurements made of the stratigraphic units.

(iii) The thickness of any geologic material added to establish the isolation distances cited in rule 3745-400-09 of the Administrative Code.

(c) The horizontal and vertical limits of excavation, for informational purposes only.

(d) The bottom limits of the liner system, if required.

(e) The bottom limits of the leachate collection system.

(f) The horizontal limits and top and bottom elevations of debris placement.

(g) Final grade including cap system.

(5) Detail drawings. The following detail drawings shall be on plan drawings numbered consecutively 5a, 5b, 5c, etc.

(a) The recompacted soil liner, if required. The recompacted soil liner shall, at a minimum include the following:

(i) Be constructed and compacted to a thickness of twenty-four inches using loose lifts eight inches thick or less.

(ii) Achieve a maximum permeability of 1×10^{-6} cm/sec for each lift of the recompacted soil liner.

6.2 Sediment Trap

Description

A sediment trap is a temporary settling pond formed by construction of an embankment and/or excavated basin and having a simple outlet structure that is typically stabilized with geotextile and rip-rap. Sediment traps are constructed to detain sediment-laden runoff from small, disturbed areas for a sufficient period of time to allow the majority of the sediment to settle out. They are established early in the construction process using natural drainage patterns and favorable topography where possible to minimize grading.

Conditions Where Practice Applies

Sediment traps are used:

1. At the outlets of diversions, channels, slope drains, or other runoff conveyances that discharge sediment–laden water.
2. Below disturbed areas where the total contributing drainage area is **5 acres or less**. If the contributing drainage area is greater than 5 acres, the use of a Sediment Basin is recommended.
3. Where access can be maintained for removal and proper disposal of sediment.
4. In drainage swales or areas, where sediment control is needed upstream of a drainage pattern leading to a storm drain inlet.
5. Where the required life of the structure will be 18 months or less.

6. Where failure of the structure will not result in loss of life; or cause damage to buildings, roads, utilities, or other properties.

Note: Sediment traps, that have the entire capacity achieved through excavation, may have larger drainage areas without compromising the stability of the sediment trap.

Planning Considerations

Timing – Sediment traps shall be constructed as a first step in any land-disturbing activity, and shall be made functional before upslope land disturbance takes place. Sediment traps are temporary measures with a typical design life of 6 months to 18 months. One or more traps are often built early in the construction process to capture sediment, prior to construction of a larger structure (e.g., sediment basin or modified detention basin) is constructed. Sediment traps are to be functional during the entire construction process, both before and after new drainage systems are constructed.

Location – Sediment traps usually are placed near the edges of construction sites so to be out of the way of major construction activities.

Diverting Runoff – Temporary diversions at the perimeter of sites are used to direct runoff to sediment traps (see Temporary Diversion Specifications).

Storm-Sewer Diversions – Storm drains may be temporarily redirected through sediment traps during construction. After construction, the temporary pipes are removed and runoff is allowed to flow through the permanent storm drain as originally intended.

Utilities – Give special consideration to sediment trap location and possible interference with construction of proposed drainage ways, utilities and storm drains.

Trapping Efficiency – Improved sediment trapping efficiencies can be achieved by including both a "wet" storage volume and a drawdown or "dry" storage volume that enhances settling and prevents excessive sediment losses during large storm events. In order to maintain effectiveness, sediment must be periodically removed from the trap to maintain the required design volume. Frequent inspection and appropriate maintenance should be provided until the construction site is permanently protected against erosion.

Design Criteria

Capacity - The minimum total design volume for the sediment trap shall consist of two components, the dewatering zone and the sediment storage zone. These zones are shown schematically in Figure 6.2.1. The volume of the dewatering zone shall be calculated for the entire drainage area by the method shown below. The drainage area includes the entire area contributing runoff to the sediment basin, offsite as well as on. The sediment storage volume may be in the form of a permanent pool or wet storage to provide a stable-settling medium, while the dewatered volume shall be in the form of a draw down or dry storage of at least 67 cubic yards per acre which will provide extended settling time during less frequent, larger storm events.

a) Dewatering Zone Volume –

The volume of the dewatering zone shall be a minimum of 1800 cubic feet per acre of drainage (67 yd3/acre) or the minimum stated in the current NPDES construction general permit. The total volume of the dewatering zone shall be measured from the base of the stone outlet structure to the crest of the stone outlet structure.

b) Sediment Storage Zone Volume –

The volume of the sediment storage zone shall be calculated by one of the following methods. The sediment storage zone shall be measured below the elevation of the base of the stone outlet structure.

Method 1: The volume of the sediment storage zone shall be 1000 cu. ft. per disturbed acre within the watershed of the basin; OR

Method 2: The volume of the sediment storage zone shall be the volume necessary to store the sediment yield as calculated with RUSLE or a similar generally accepted erosion prediction model. While the sediment storage volume may extend to the expected time period of the construction project, the minimum estimated time between cleanouts shall be six months.

Sediment shall be removed when it has accumulated to the top of the sediment storage or wet storage zone. This elevation shall be signified by the top of a stake near the center of the trap.

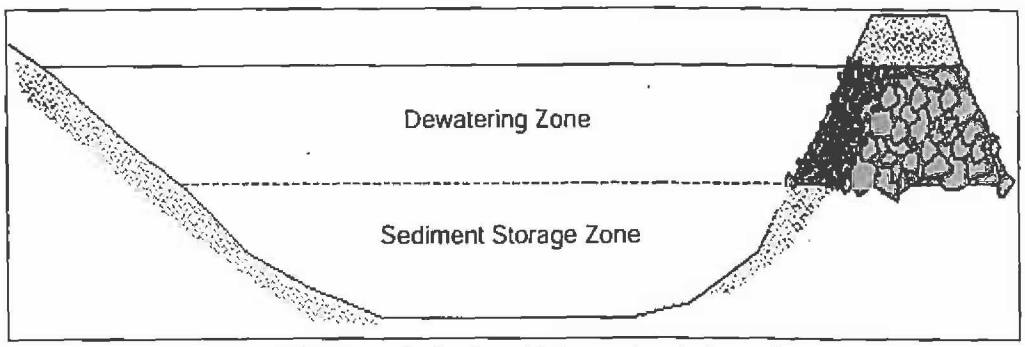


Figure 6.2.1 Capacity of a sediment trap is distributed between dewatering and sediment storage zones.

Embankment – Ensure that embankments for temporary sediment traps do not exceed 5 feet in height measured at the centerline from the original ground surface to the top of the embankment. Construct embankments with a minimum 4 foot top width and 2:1 (H:V) or flatter side slopes.

The design height of the embankment shall be increased by 5% to allow for settlement of the finished embankment. The original ground under the embankment shall be stripped of vegetation and scarified to a depth of 6 inches or more before placement of the fill material. Fill material should be made of clay, free of roots, large rocks, and organic material. Place fill in layers 6 inches thick and then compact using appropriate equipment. Fill material shall not be placed on frozen ground.

The completed embankment shall be seeded in accordance with temporary or permanent vegetation as found in this manual (Temporary Seeding or Permanent Seeding).

Excavation – Where sediment pools are formed or enlarged by excavation, keep side slopes at 2:1 (H: V) or flatter for safety. The maximum depth of excavation within the wet storage area (sediment storage zone) should be 4 feet to facilitate clean out and for site safety considerations.

Outlet Section – Construct the sediment trap outlet using a stone section of embankment located at the low point in the basin. The stone section serves two purposes: 1) the top section serves as a non-erosive spillway outlet for flood flow, and 2) the bottom section provides a means to de-watering the basin between runoff events. A combination of coarse aggregate and riprap shall be used to provide for filtering/detention as well as outlet stability.

Construct the outlet using well-graded stones with a d50 size larger than 6 inches (ODOT Type D). A 1 foot layer of AASHTO # 57 aggregate should be placed on the inside face to reduce drainage flow rate. Geotextile that meets the minimum requirements of ODOT Construction and Material Specification 712.09, Geotextile Fabric Type B, shall be placed at the stone-soil interface to act as a separation and to prevent piping. The geotextile shall be buried or keyed in at the upstream end a minimum of 6 inches. The crest of the stone outlet must be at least 1.5 feet below the top of the embankment to ensure that the flow will travel over the stone and not the embankment. The outlet shall be configured as noted in figure 2.

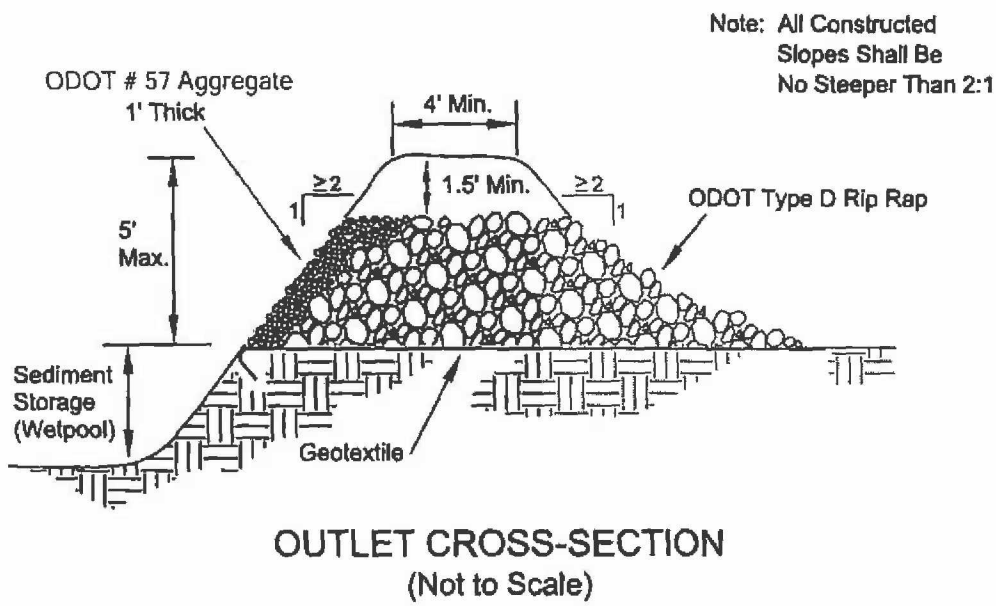


Figure 6.2.2 Outlet configuration

The spillway weir shall be at least 4 feet long and sized to pass the peak discharge of the 10-year, 24-hour storm without failure, overtopping of the basin or significant erosion. A maximum flow depth of 1 foot, a minimum freeboard of 0.5 foot, and maximum side slopes of 2:1 are required. See Table 6.2.1 for weir length associated with drainage area.

Table 6.2.1 Sediment Trap weir length.

Drainage Area (acres)	Weir Length (feet)
1	4.0
2	6.0
3	8.0
4	10.0
5	12.0

Note: alternatively use $Q_{weir} = CLH^{3/2}$
Where C = Weir coefficient
L = Weir Length (feet)
H = Head of 1 foot

Direct spillway discharges to natural, stable areas. Locate outlets so that flow will not damage the embankment. Discharges must be conveyed to a natural waterway via a channel of adequate capacity and stability. Where the channel enters a natural waterway, the discharge shall be less than 1 ½ feet per second or otherwise less than the velocity that will initiate erosion or scour within the receiving waterway. When traps discharge to storm water facilities, the facility must have adequate capacity to receive the discharge from the sediment trap.

Where an emergency spillway is utilized, the primary rock spillway crest should be at least 1.5 feet below the settled top of the embankment with the emergency spillway crest being 0.5 foot below the top of the embankment.

The plans and specifications should show the following requirements:

1. Location of the sediment traps.
2. Size of sediment trap including width, length and depth.
3. Minimum cross section of embankment.
4. Typical cross section through the spillway with geotextile fabric details and rock placement.
5. Location of emergency spillway, if used.
6. Gradation and quality of rock.
7. Plans shall detail how excavated sediment is to be disposed of, such as placement on areas where it will be stabilized or removal to an approved off-site location.

All plans should include the installation and maintenance schedules with the responsible party identified.

Install warning signs, barricades, perimeter fence and other measures around sediment traps as necessary to protect workers, children, equipment, etc.

Operation and Maintenance

1. The capacity and function of the sediment trap shall be maintained by inspecting on a weekly basis and after each runoff event, and by performing the necessary activities shown below.
2. Establish vegetative cover and fertilize as necessary to maintain a vigorous cover around the sediment trap.
3. Inspect the pool area, embankment and spillway area for burrowing rodents, slope failure, seepage, excess settlement, and displaced stone. The area should be inspected for structural soundness and repaired as needed.
4. Regularly inspect water discharged from trap for excess suspended sediments. Identify and perform necessary repairs to improve water quality. Excessive suspended sediments may require design modifications or treatment with flocculants.
5. Remove woody vegetated growth on the embankment and spillway areas.
6. Remove trash and debris that accumulate in the pond and have potential to block spillways.
7. Dewatering outlets shall be regularly checked to ensure that performance is maintained. Filter stone choked with sediment shall be removed and replaced to restore its flow capacity.
8. Remove sediment and restore the sediment trap to its original dimensions when sediment has accumulated to the top of the sediment storage or wet storage zone. This elevation shall be signified by the top of a stake near the center of the trap. Removing sediment by hand may be necessary adjacent to the outlet section of the embankment to prevent equipment damage. Place the removed sediment and stabilize with vegetation in a designated area where it will not easily erode again. Restore trap to its original dimensions and replace stone as needed on the outlet.
9. After the entire construction project is completed, temporary sediment traps should be dewatered and regraded so as to conform to the contours of the area. All temporary structures should be removed and the area seeded, mulched and stabilized as necessary.

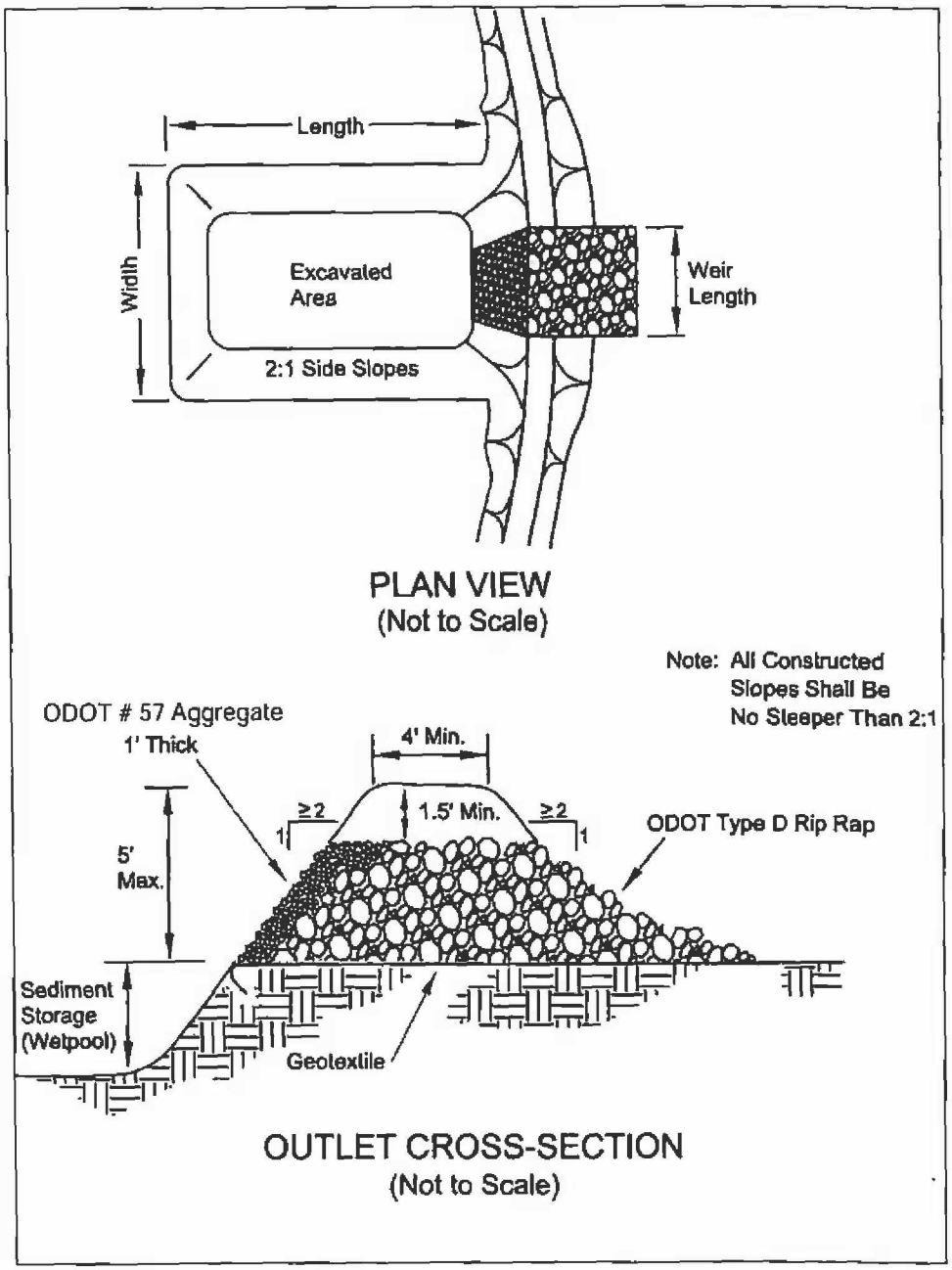
Common Problems/Concerns

Utilizing sediment traps on large drainage areas (greater than 5 acres) where Sediment Basins (see page 2 of this chapter) are appropriate will increase sediment discharged during construction.

Failure to removed trapped sediment will reduce the effectiveness of this practice in capturing sediment.

Specifications
for

Sediment Trap



Specifications
for

Sediment Traps

1. Work shall consist of the installation, maintenance and removal of all sediment traps at the locations designated on the drawings.
2. Sediment traps shall be constructed to the dimensions specified on the drawings and operational prior to upslope land disturbance.
3. The area beneath the embankment shall be cleared, grubbed and stripped of vegetation to a minimum depth of six (6) inches. The pool shall be cleared as needed to facilitate sediment cleanout.
4. Fill used for the embankment shall be evaluated to assure its suitability and it must be free of roots or other woody vegetation, large rocks, organics or other objectionable materials. Fill material shall be placed in six (6) inch lifts and shall be compacted by traversing with a sheepsfoot or other approved compaction equipment. Fill height shall be increased five (5) percent to allow for structure/foundation settlement. Construction shall not be permitted if either the earthfill or compaction surface is frozen.
5. The maximum height of embankment shall be five (5) feet. All cut and fill slopes shall be 2:1 (H:V) or flatter.
6. A minimum storage volume below the crest of the outlet of 67 yd^3. for every acre of contributing drainage area shall be achieved at each location noted on the drawings with additional sediment storage volume provided below this elevation.
7. Temporary seeding shall be established and maintained over the useful life of the practice.
8. The outlet for the sediment trap structure shall be constructed to the dimensions shown on the drawings.
9. The outlet shall be constructed using the materials specified on the drawings. Where geotextile is used, all overlaps shall be a minimum of two (2) feet or as specified by the manufacturer, whichever is greater. All overlaps shall be made with the upper most layer placed last. Geotextile shall be keyed in at least 6" on the upstream side of the outlet.
10. Warning signs and safety fence shall be placed around the traps and maintained over the life of the practice.
11. After all sediment-producing areas have been permanently stabilized, the structure and all associated sediment shall be removed. Stabile earth materials shall be placed in the sediment trap area and compacted. The area shall be graded to blend in with adjoining land surfaces and have positive drainage. The area shall be immediately seeded.