Appendix 10-3

Karst Mitigation Plan

KARST MITIGATION PLAN

THE AES CORPORATION

JULY 2021

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Attachments:

1. Introduction

The AES Corporation ("AES") has commissioned this Karst Mitigation Plan to address potential impacts and hazards related to local karst formations crossed by the proposed Project. The Plan outlines monitoring activities and the corrective measures that AES will implement if karst features are encountered during the various stages of project development, engineering, construction, and operation.

2. Background

Karst terrain is formed by the solution of carbonate rock (e.g., limestone, dolostone, and marble) by infiltrating surface water and groundwater along fractures, joints, and bedding planes. Karst terrain is characterized by features such as cavern openings, sinkhole, closed depressions, and gaining and losing streams. When rock dissolves, spaces and caverns develop underground. These types of formations are referred to as karst topography. The land over these caverns may stay intact until there is not enough support for the land above the open space. Eventually, a collapse of the land can occur, creating a sinkhole, which can vary greatly in size and shape. Human activities and development can also expedite cavity formation in more susceptible materials and trigger a collapse.

Sinkholes are naturally occurring phenomena in areas underlain by carbonate bedrock. Most sinkholes are triggered by external factors such as significant or prolonged rainfall, periods of drought, heavy groundwater pumping, or stormwater management practices; however, activity at remnant or dormant sinkholes may be triggered by uncontrolled construction practices. When sinkholes (and associated ground movement) occur on PV developments, they generally express themselves at the ground surface in two ways: the first, as a sudden collapse caused by exceeding the capacity of bridging support which exists above an air-filled void; and, the second, a longer-duration and gradual ground surface movement as surface and subsurface soils are washed into cavities and karst features by groundwater movement.

Where present, karst terrain can create engineering and environmental issues to photovoltaic (PV) developments due to subsidence, impacts to groundwater quality, operational losses, and stormwater flooding and control issues. A typical PV development consists of photovoltaic solar panels ground-mounted on a low-profile racking system that will be supported by small I-beam posts driven into the ground. In addition, supporting and accessory structures may include:

- Inverters (with transformers) placed on concrete pads throughout the Facility to convert DC electricity to AC electricity;
- Medium voltage cable collection system that will extend underground to aggregate the AC output from the inverters;
- A step-up transformer at the point of interconnect (POI);
- Project infrastructure, such as stone access roads (approximately 15 to 20 feet wide), grassed access corridors, and security fencing around Facility equipment; and,
- Temporary laydown areas for equipment and material staging during construction.

Karst is frequently a complex system impacted by groundwater flow direction, infiltration and precipitation, changes in landform and topography, as well as man-made development. A change in any of these conditions, such as re-grading and re-direction of quantity, drainage, and infiltration of stormwater, can result in a change in the risk profile for areas across the site. Off-site impacts, such as groundwater pumping or increased infiltration caused by storm events can also alter the groundwater flow direction which can modify subsurface conditions.

Risk associated with these factors can be minimized with proper planning and design. It should be noted that the majority of PV development tends to occur in agricultural fields and across large, undeveloped land areas. In absence of the PV development, if agricultural practices were continued without proper caution, the risk of sinkhole and hydrologic-related damage to the Project Site would continue to exist. Therefore, the intent of karst mitigation is generally toward avoidance of karst areas during initial planning and design by use of adequate buffer distances and focusing design toward non-karst areas. If karst features are unavoidable or not possible due to land boundaries, available project area, or other environmental or engineering constraint, then minimization and mitigation of karst-related risks would be implemented. This could include the use of survey markers or other monitoring and measuring device to evaluate the potential impact of ground subsidence, such as that described in Section 11.

Typically, sinkhole activity in New York has shown that the frequency of localized subsidence occurrences will be low, and the relative scale of related karst features would be small enough for standard mitigative measures. A 2014 New York State Hazard Mitigation Plan prepared by the New York State Division of Homeland Security & Emergency Services (NYS DHSES) discusses the concern for land subsidence and expansive soils across NY. As indicated in the Report[1], "*In NY, there is karst topography which is nicely developed in a narrow band along the Helderberg Escarpment in Schoharie and Albany counties. These areas are triggered by highly soluble Silurian and Devonian rocks including the upper part of the Rondout Formation and upward to the Onondaga Formation. However, the best expression of karst is in the intervening Coeymans and Manlius Formations*."

According to the referenced Report, the potential for caverns or voids is also limited, and more likely due to man-made developments such as mining. Per the Report, "*According to NYSGS staff, land subsidence, better known as sink holes, have a tendency to occur more often than not due to man-made influences(i.e., mining). These occurrences are found more commonly underground made from evaporate rock. Evaporated rock is soluble in water, and can potentially cause large cavity formations to occur. Sink holes occur when underground holes are created either naturally or artificially, and collapse due to induced force. Carbonate rock (limestone and dolomite) are also prone to void formation, but are less soluble and therefore take much more time, to form all things remaining constant.".* Further, as indicated in the Report, "*Collapses are relatively rare in NYS where regions of karst topography are found. The last reported occurrence was roughly fifteen years ago [1989] in the Cobleskill area*". Therefore, while the potential for karst may exist across project areas, the potential for catastrophic or sudden damage to a PV development is anticipated to be very low.

[1] http://www.dhses.ny.gov/recovery/mitigation/documents/2014-shmp/Section-3-13-Land-Subs-Expansive-Soil.pdf

3. Potential Karst Risks Associated with Photovoltaic Developments

Ground-mounted PV developments often span several geologic formations due to the nature of their size. Projects may range from 100 to 1,000 acres in size, or greater, depending on the development goals of the specific project. When karst terrain is identified, these formations have the ability to impact both the short-term and long-term, including:

1. Differential settlement across panels, causing damage to modules and hardware;
2. Additional loads and stresses on structural elements such as purlins, racking, and posts;
3. Change in drainage patterns across the site, modification to on-site and off-site hydrology and run-off;
4. Development of topographic depressions which may hold water; and,
5. On-going maintenance such as re-setting modules, posts, and purlins, shimming or underpinning foundations, compensation or jet grouting to stabilize or arrest the active development of high-risk caverns.
6. Damage to a portion or all of site facilities, and ability to generate power.

In general, a PV development maintains the general topography and site cover to the extent possible. Construction of a PV development typically consists of the project area being cleared and/or lightly graded for the Project, with the exception of culturally and biologically sensitive areas. Following clearing and light grading, the solar arrays would likely be supported by steel piles which are typically driven into ground with an embedment ranging between 6 to 12 feet. On-site sedimentation basins, if necessary, would be shallow and, to the extent feasible, utilize the existing terrain without requiring extensive earthmoving. The PV panels would then be connected with underground wiring placed in excavated trenches and backfilled with Project Site native soil.

4. Measures to Identify and Investigation Karst Features

Prior to development of the site, AES or its consultant typically conduct desktop and field engineering studies to understand the subsurface conditions present across the project site. These studies not only help identify the presence/absence and potential impact of karst on the development, but also help in the engineering design and constructability evaluation for the project. Likewise, these studies recommend karst avoidance areas using engineering judgement and experience based on the results of the field survey and subsurface exploration. By this method, identified karst features and caves would be avoided for the construction of the Project Site.

Typically, subsurface and geologic conditions for each project site are evaluated in several phases, as described below. The phases described above are generally completed in series; however, they can be completed in parallel or re-ordered based on project needs.

1. *Desktop Evaluation:*
    a. A review of publicly-available information, such as review of historic aerial photography, conversations with local landowners and resident, State Geological Survey publications, mapping, and circulars, as well as United States Geologic Survey (USGS) literature and mapping.
2. *Preliminary Field Reconnaissance:*
    a. A site walk-through, fly-over, or review of aerial imagery to help identify if any near-surface karst features such as depressions, disappearing streams, or exposed rock outcrops exist. This task may be conducted in-parallel with other environmental or engineering studies, such as wetland delineations, cultural resources, surveying, or site visit. The field reconnaissance also entail walking the Project Site in a systematic manner to locate and delineate visible surface karst features (e.g., sinkholes and subsidence, closed depressions, and sinking and losing streams)
3. *Traditional Geotechnical Investigation:*
    a. A subsurface investigation consisting of trial pit excavations (test pits), soil borings, and/or rock coring to determine the geologic profile across the project area. Where karst is positively identified prior to the start of investigation, air-track probing may also be conducted to identify the presence of caverns or other features.
4. *Geotechnical Analyses:*
    a. An evaluation of the soil and/or rock samples collected during the traditional geotechnical investigation, including laboratory testing to evaluate the engineering properties of the material. The analyses may also include a determination of the type of geologic formation, the risk potential for karst terrain, and recommended buffer distances from potential or actual karst features based on engineering judgement, experience, and technical evaluation.
5. *Geophysical Investigation:*
    a. A non-invasive investigation using multi-channel analysis of surface waves (MASW) or electrical resistivity tomography/imaging (ERT/ERI) methods to characterize subsurface soils and bedrock in an area expected to exhibit signs of karst. Geophysical methods are intended to rapidly profile large areas to evaluate if characteristic karst markers such as potential air-filled or soil-filled zones, pinnacled rock, or shallow rock exist across investigated areas of the project site. Geophysical investigations will often be conducted at or near soil boring or test pit locations, or the known location of karst features, to calibrate the results for additional reliability.
6. *Additional Geotechnical Investigation and Analyses, as required:*
    a. Additional subsurface investigation techniques, geophysical investigations, or geotechnical analyses will be completed based on the findings from initial and subsequent phases of investigation and evaluation.

5. Avoidance, Minimization, and Mitigation Measures

Avoidance of karst features is generally the primary mitigation measure during planning, design, and construction of the proposed project. During the various stages of project development, review of publicly-available data along with site-specific geotechnical investigation results help determine the presence or absence of sinkholes for the Project. Once the potential for karst has been determined, development and site layout can consider these features into planning, construction, and operation.

In general, the karst avoidance areas are set to maintain a 50-foot buffer from the edge of a closed depression, subsidence feature, disappearing stream, or other karst sign. In cases where observations indicated sinkholes with open throats, apparent more recent subsidence shallow bedrock, and voids encountered by drilling, the buffer distance is typically increased to 100 feet.

6. Best Management Practices and Construction Housekeeping

Naturally occurring karst terrain provides a subsurface drainage system for overburden soil overlaying carbonate bedrock. However, concentrations of post-development stormwater runoff from construction activities can destabilize the natural karst hydrogeologic system and lead to potential sinkhole development, sinkhole flooding, or groundwater impacts if unmanaged.

The principal approach to avoid aggravating dormant caverns or possible areas of subsidence and karst activity is to maintain rates of recharge and discharge in the subsurface at the desired natural levels. In this context, desired natural levels refer to the pre-development recharge and discharge rates. Therefore, during construction and in areas where mapped and verified karst terrain exists, in addition to the standard erosion control Best Management Practices as defined in the project Stormwater Pollution Prevention Plan (SWPPP), double layers of silt fencing may be implemented, as well as hay bales or core logs along the periphery of the standard workspace area to prevent outward migration of silt and reduce runoff velocity. This will help control the flow of water into underlying karst areas, which meets the intent of maintaining rates of subsurface recharge and discharge to pre-development conditions.

Stormwater control measures in areas of known and verified karst terrain will typically be enhanced to include detention, diversion, or containerization to prevent construction-influenced stormwater from flowing to the karst feature drainage point. Furthermore, these drainage points will not be utilized for the discharge or storage of run-off.

7. Maintaining Buffer Areas and Other Construction Considerations

It is understood that buffers around karst features generally aim to maintain vegetation, structural integrity, or drainage of the existing karst feature within the buffer area. The use of buffers also helps minimize exposure to sinkhole subsidence and sinkhole flooding, if project features or components be proposed near or adjacent to these buffer areas. Buffers related to certain activities within karst areas are recommended as follows:

Earthmoving:

During conventional installation of posts, slabs, and other accessory features, AES or its contractor will conduct earthmoving activities in a manner that will minimize altering the existing grade and hydrology of existing surficial karst features. Where a known and delineated karst feature exists, earthmoving including permanent filling within 100 feet of the feature will be avoided to the extent possible, or minimized.

During routine trenching and utility/cabling installation adjacent to karst features, spoils will be placed on the upgradient side of the excavation such that, if any erosion was to occur, the stockpiled soil would return into the excavation and not to the downgradient to the karst features.

Removal of Rock:

The Natural Resources Conservation Service (NRCS) defines shallow depth to bedrock as being within 5 feet of the ground surface. Should blasting be deemed necessary, it may be removed using one of the following techniques, typically in the order listed below:

a. Conventional excavation with a backhoe.
b. Hammering with a pointed backhoe attachment or a pneumatic rock hammer, followed by backhoe excavation.
c. Ripping with a bulldozer.
d. Blasting followed by backhoe excavation.

The rock removal technique will depend on rock properties, such as relative hardness, fracture susceptibility, expected volume, and location. Areas of shallow depth to bedrock crossed by the Project will be determined by review and analysis of published soil survey data from the National Resources Conservation Service (NRCS) Web Soil Survey, published geologic mapping, and site-specific investigations conducted across the project area.

Should blasting be required, a Blasting Plan will be prepared by AES with the intent to identify blasting operations, including safety, use, storage, and transportation of explosives, that are consistent with minimum safety requirements, as defined by applicable federal, state, and local regulations (e.g., Title 27 Code of Federal Regulations[CFR] 181 - Commerce in Explosives; Title 49 CFR 177 - Carriage by Public Highway; Title 29 CFR 1926.900 et seq. Subpart U - Safety and Health Regulations for Construction - Blasting and Use of Explosives; Title 29 CFR 1910.109 - Explosives and Blasting Agents; 29 CFR 1926.900 - General Provisions and Standards Nos. 901, 902, and 904-912).

Notwithstanding the above, blasting in proximity to known and verified karst areas will be conducted in a manner so as not to comprise the structural integrity of pre-existing karst features or to alter subsurface hydrology through karst areas. If it is deemed that rock removal using blasting or hammering techniques is required in a karst-prone area, the area will be carefully inspected evaluate if any voids, opening, or other identifying features typical of solution activity are present. If the proposed rock removal is expected to intersect a karst feature such as sinkhole throat/void, cavern, or conduit, work in the area will be stopped until a location-specific assessment can be made by a qualified geotechnical engineer familiar with the project and with experience in karst terrain mitigation.

Following inspection of the area and guidance, as warranted, by the geotechnical engineer to allow blasting activities near any identified karst features, the use of all explosives will be limited to low-force charges designed to transfer a maximum charge of 2 inches per second ground acceleration and minimize propagation outside of blast area. If the percussive drill used to install blast holes encounters a single subsurface void greater than 6 inches or a group of voids greater than a combined 12 inches, explosives will not be used, and a subsurface exploration to determine if the voids have connectivity with a deeper structure will be conducted. It is anticipated that such investigation would consist of additional percussive probes, electrical resistivity, or other techniques capable of resolving open voids in the underlying bedrock. All open holes created by investigative activities will be grouted shut after the completion of the investigation to prevent the migration of surface water into deeper and previously unexposed karst.

Construction Near Wells, Springs, and Karst Surface Expressions:

Buffers of 100 feet around documented karst surface expressions and wells and springs recharging karst hydrology are recommended to be maintained between all work areas and the karst-related features. Surface water control measures including, but not limited to, diversion, detention, or collection and transportation will be implemented to minimize construction- influenced surface water from entering into the karst-related features. At no time will the karst features be used for the disposal or extraction of construction water.

8. Equipment Storage, Fueling, and Maintenance Considerations

During construction activities, in addition to following the project-specific Stormwater Pollution Prevention Plan (SWPPP), AES and its contractor will implement best management practices to minimize the potential impact of spills related to equipment storage, fueling, and maintenance within proximity to karst areas and sensitive resources.

In general, refueling of vehicles will not occur within 200 feet of any karst feature open to the surface. Additionally, equipment refueling will not be performed within flagged or marked buffer areas of streambeds, sinkholes, fissures, or areas draining into these or other karst features, except by hand-carried cans (five-gallon maximum capacity) and when deemed necessary. For equipment servicing and maintenance activities, areas will be sited outside of flagged or marked buffer areas of streambeds, sinkholes, fissures, or areas draining into these or other karst features. AES will instruct its contractor to avoid runoff created by equipment washing to directly enter any karst feature by locating these features outside the buffer areas listed in Section 7.

To the extent practical, no equipment or material will be stored within proximity of exposed karst features. Where storage is necessary near known karst areas, any construction equipment vehicles, materials, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products will not be parked, stored, or serviced within 300 feet of any karst feature. Should equipment require storage within this buffer area, the equipment will be checked daily for leaks by a construction inspector familiar with operation and maintenance of the specific equipment. Any damaged, defective, or leaky equipment will be removed and replaced.

9. Construction-Phase Karst Inspections

Prior to and throughout construction, on sites where karst has been positively identified, AES or its contractor will conduct awareness training for karst-like features such as portals, voids, or sinkholes. The training will include the Contractor's field supervisory personnel and supervisory personnel. These personnel will be trained on potential unanticipated karst features (i.e. features not identified through previous geophysical mapping and historic records) that could be discovered during trenching operations. The training will also provide the appropriate protocol for work stoppage if a karst feature is discovered in the immediate area and a communication plan to alert the appropriate AES and Contractor Supervisors of such discovery to allow the feature and potential impacts to be evaluated by an experience geotechnical engineer.

10. Mitigation Measurements for Karst Encountered During Construction

If an unanticipated karst feature is discovered during trenching or other construction activities, work in the immediate area will be immediately stopped and AES and the Contractor's supervisors will be notified. Additional erosion and sedimentation controls will be installed as necessary to minimize the potential for surface water runoff intrusion into the karst feature. A geotechnical engineer or technical professional familiar with the project and with experience in karst terrain will be contacted and directed to the feature to conduct a detailed evaluation. If necessary, the geotechnical engineer will develop a specific design and mitigation measures depending on the site conditions and nature of the karst feature.

If new sinkhole throats develop within the construction area while work is commencing, work in the area will be halted and the sinkhole area will be isolated and cordoned off to an area extending 100 feet radially from the feature. The sinkhole will be inspected by a geotechnical engineer and remedial measures such as filling of the sinkhole using inverted filter approach or field-adjustment of the site developments may be implemented. The inverted filter approach is often used for sinkhole repair, especially when the sinkhole is not located near structures. The sinkhole area is excavated to expose either bedrock or the throat of the sinkhole. A course of rock large enough to bridge the throat of the sinkhole is placed at the bottom of the excavation. Courses of progressively finer rock and gravel are compacted above the base course. A geotextile fabric may be placed above the finest gravel course to prevent excessive loss of the uppermost course, which may consist of sand and/or soil. The inverted filter method provides filtration treatment of storm water and allows controlled storm water infiltration and groundwater recharge.

If an existing subsurface void is intersected within the work area, work will similarly be halted and cordoned off for further evaluation by a qualified geotechnical engineer. As indicated earlier, the principal approach to maintain rates of recharge and discharge at pre- development conditions, a filter fabric secured over the void may be implemented in addition to an inverted filter.

Commonly-accepted methods to mitigate sinkhole collapses and similar subsurface voids which have been developed by state agencies such as the United States Geologic Survey (USGS), US Department of Agriculture Natural Resources Conservation Service (USDA NRCS), and Pennsylvania Department of Environmental Protection's (PADEP) are provided as Attachment 1 through 4 with this Plan. These typical details may be implemented depending on the karst feature encountered. The mitigation methods provided with this Plan would provide enhanced stability to the void and increase the long-term stability. Final grading of contours and any necessary permanent erosion and sediment controls will be designed to prevent runoff from accumulating in the area of the void.

11. Long-term Monitoring and Maintenance

In addition to an offset buffer from potential karst risk zones, when developments are built within areas of known or confirmed karst, it is recommended that a monitoring program is implemented to identify, understand, and mitigate/remediate during long-term operation of the development. The intent of the monitoring program is to evaluate larger-scale, ground-level movement attributable to karst, such as the gradual "bowl-like" movement which gradually occurs as a sinkhole feature develops over time. The monitoring program is intended to determine topographic variations over time, which would result in bending, tilting, and added stress to racking, modules, and structural components. This type of monitoring can be accomplished by installing survey monuments on fixed points, such as rigid steel markers at the end of panel rows/strings and installing a fixed survey marker/nail on top of concrete inverter and substation slabs. A separate survey monument, such as a sole steel post driven specifically for the purpose of monitoring each "area", may also be installed to allow for rapid evaluation. It is recommended that, at minimum, one monument be installed for each one-half acre of developed area.

If a monitoring program is implemented as a karst mitigation strategy, following installation of monitoring points, AES would conduct at least annual surveys of the monitoring points and compare the year-over-year movement between points. If individual monitoring points are not possible, annual LiDAR or drone surveying may be possible to rapidly evaluate the entire project area. If monitoring points show a change in individual elevation, or differential movement compared to nearby reference points, a detailed evaluation would be undertaken. This would include engaging a geotechnical engineer to conduct geophysical investigations (electrical resistivity tomography or other recognized method) to evaluate the potential development of detrimental karst activity. In addition, re-setting of panels, racking, or other structural elements may become necessary if movement is shown from monitoring to prevent flexure of sensitive PV modules, cracking of glass, or added stress and/or shearing of connection pins, bolts, and other hardware.

12. References

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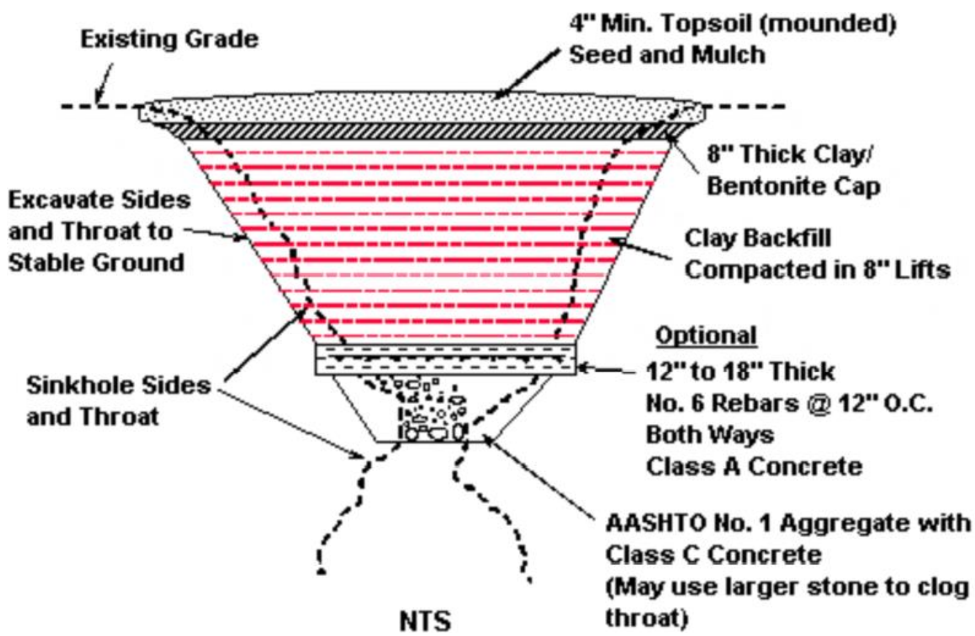
8. Pennsylvania Department of Environmental Protection, March 2012, Erosion and Sediment Pollution Control Program Manual, Technical Guidance Number 363-2134-008. Accessed June 1, 2015

9. USEPA, 1989. Groundwater Monitoring in Karst Terranes, Recommended Protocols & Implicit Assumptions, EPA 600/X-89/050, February.

10. U.S. Geologic Survey (USGS). 2005. Mineral Resources Data System. Last Revised January 2012. Available at: http://mrdata.usgs.gov/mrds/.

Attachment 1

Sinkhole Repair with Bentonite Cap Detail



Source: Adapted from PADEP[2]

Notes:

1. Loose material shall be excavated from the sinkhole and expose solution void(s) if possible. Enlarge sinkhole if necessary to allow for installation of filter materials. Occupational Safety and Health Administration (OSHA) regulations must be followed at all times during excavation.

2. Stones used for the "bridge" and filters shall have a moderately hard rock strength and be resistant to abrasion and degradation. Shale and similar soft and/or non-durable rock are not acceptable.

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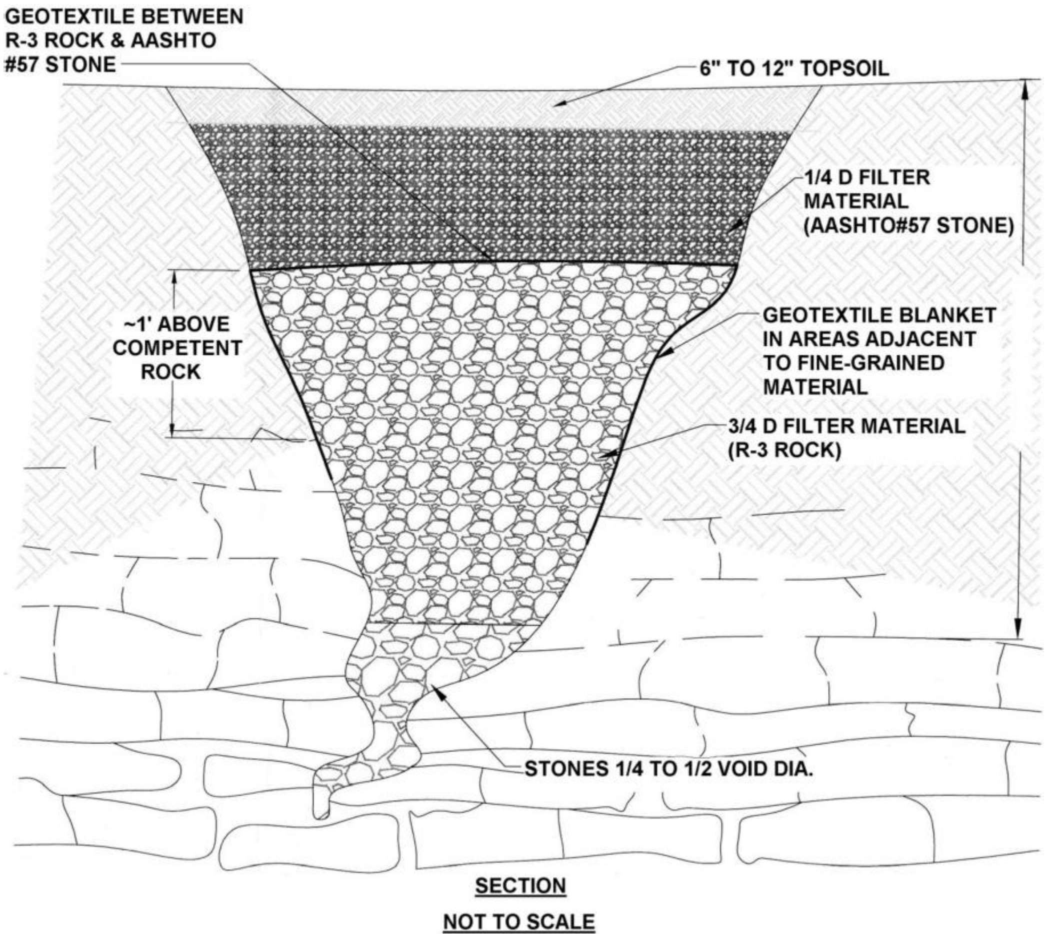
[2] Pennsylvania Department of Environmental Protection, March 2012, Erosion and Sediment Pollution Control Program Manual, Technical Guidance Number 363-2134-008. Accessed June 1, 2015

Attachment 2

Sinkhole Repair with Pervious Cover Detail



Source: Adapted from USDA NRCS

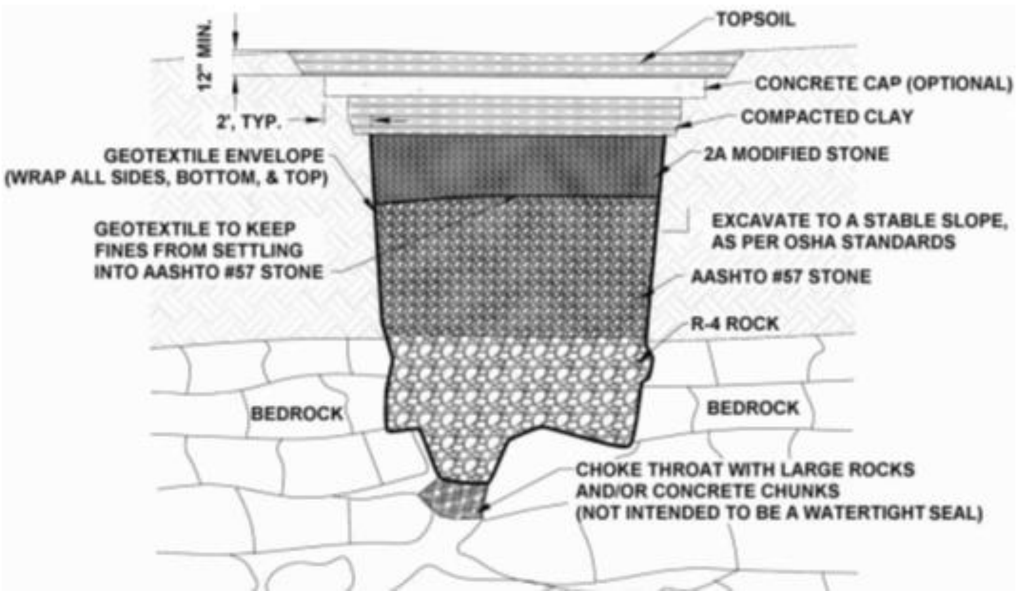
Notes

1. Loose material shall be excavated from the sinkhole and expose solution void(s) if possible. Enlarge sinkhole if necessary to allow for installation of filter materials. OSHA regulations must be followed at all times during excavation.

2. Stones used for the “bridge” and filters shall have a moderately hard rock strength and be resistant to abrasion and degradation. Shale and similar soft and/or non-durable rock are not acceptable.

Attachment 3

Sinkhole Repair with Impervious Cover Detail



Source: Adapted from USDA NRCS

Notes:

1. Loose material shall be excavated from the sinkhole and expose solution void(s) if possible. Enlarge sinkhole if necessary to allow for installation of filter materials. OSHA regulations must be followed at all times during excavation.

2. Geotextile shall be non-woven with a burst strength between 100 and 200 psi.

3. Select field stone(s) about 1.5 times larger than solution void(s) to form “bridge.” Place rock(s) so no large openings exist along the sides. Stones used for the “bridge” and filters shall have a moderately hard rock strength and be resistant to abrasion and degradation. Shale and similar soft and/or non-durable rock are not acceptable.

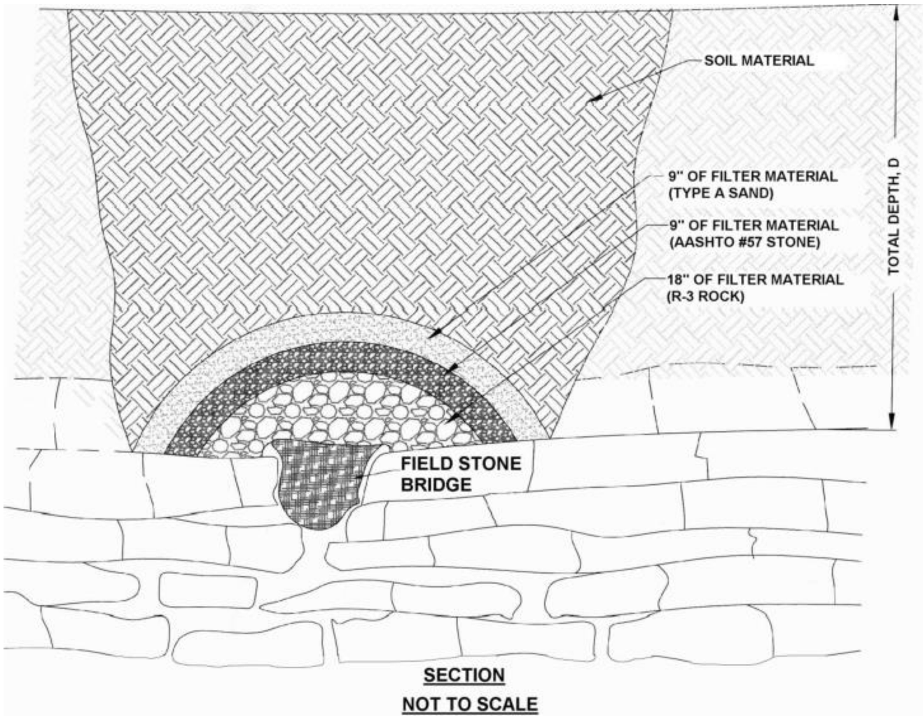
4. Minimum thickness of R-4 rock is 18.” AASHTO #57 stone thickness shall be ¼ to ½ that of the R-4 rock. Minimum thickness of 2A modified crushed stone shall be 9” AASHTO #57 stone and 2A modified crushed stone shall be compacted after each placement.

5. Compacted clay seal shall be a minimum of 12” thick. Clay shall be placed in 6” to 9” lifts and thoroughly compacted. Concrete cap, which is optional, shall be a minimum of 8” thick. Use 4,000 psi concrete with 6” X 6” - 6 gauge welded wire fabric, or # 3 rebar on 18” O.C. both ways.

6. Topsoil shall be a minimum of 12” thick. Grade for drainage away from sinkhole area.

Attachment 4

USDA NRCS Sinkhole Repair with Soil Cover Detail



Source: Adapted from USDA NRCS

Notes:

1. Loose material shall be excavated from the sinkhole and expose solution void(s) if possible. Enlarge sinkhole if necessary to allow for installation of filter materials. OSHA regulations must be followed at all times during excavation.

2. Select field stone(s) about 1.5 times larger than solution void(s) to form "bridge." Place rock(s) so no large openings exist along the sides. Stones used for the "bridge" and filters shall have a moderately hard rock strength and be resistant to abrasion and degradation. Shale and similar soft and/or non-durable rock are not acceptable.

3. Minimum thickness of R-3 rock is 18" AASHTO #57 stone thickness shall be a minimum of 9" thick. Minimum thickness of type A sand shall be 9". NOTE: A non-woven geotextile with a burst strength between 100 and 200 psi may be substituted for the AASHTO#57 stone and type A sand.

4. Soil shall be mineral soil with at least 12% fines and overfilled by 5% to allow for settlement. Suitable soil from the excavation may be used. Any available topsoil shall be placed on top surface.