COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
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Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
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June 15, 2017

Mr. Robert Bisha
Dominion Virginia Power
5000 Dominion Boulevard
Glen Allen, Virginia 23060

RE: Atlantic Coast Pipeline - Review of June 1, 2017 Submittal in Response to Request for Information

Dear Mr. Bisha:

Attached please find the Department of Environmental Quality's comments regarding your responses to our May 19, 2017 Request for Information.

If you have any questions, please contact me at: 804-698-4038 or melanie.davenport@deq.virginia.gov.

Sincerely,

Melanie D. Davenport
Director, Water Permitting Division

Atlantic Coast Pipeline

DEQ Review Comments – Request for Additional Information

In accordance with Guidance Memo No. GM17-2003, Interstate Natural Gas Infrastructure Projects – Procedures for Evaluating and Developing Additional Conditions for Section 401 Water Quality Certification Pursuant to 33 USC Section 1341, on May 19, 2017 the Department of Environmental Quality (DEQ) requested information from Atlantic Coast Pipeline (ACP) in order to evaluate whether additional 401 water quality conditions are necessary to ensure the protection of water quality. On June 1, 2017 ACP submitted its response, dated May 2017 and prepared on behalf of ACP by ERM. In addition to reviewing the ERM document, DEQ also considered other available project information specifically the Federal Energy Regulatory Commission's (FERC) draft Environmental Impact Statement (EIS) and the Commonwealth of Virginia's comments on the draft EIS (dated April 6, 2017), submittals and regulatory requirements associated with the development of Annual Standards and Specifications and stormwater and erosion and sediment control plans as they relate to appropriate site specific best management practices and the US Army Corps of Engineers Nationwide Permit 12. Finally, on June 7-8, 2017 DEQ convened a two day meeting in Lexington, Virginia to discuss the ERM document. Attachment A to this document contains the agenda, attendee list and notes from this meeting.

Please provide responses and revised documents as appropriate to the following comments:

Section 2.0 - Project-related Upland Ground-disturbing Activities within 50 feet of Surface Waters

No additional information needed.

Section 3.0 – Identification of Perennial Surface Waters

1. A complete list of perennial water bodies that may be affected should be included rather than only a list of priority streams (see comment 3 in section 11.0).

Section 4.0 – Permanent Right-of-Way (ROW) Maintenance Measures

1. Include a description of any ROW maintenance and inspection measures to be used in areas of slopes greater than 30 percent.

Section 5.0 - Plan to Protect Water Quality from Acid Forming Materials (AFM)

1. The plan should include details on field testing procedures to be followed by environmental inspectors if warranted.
2. The plan references Section 6.6.8 of Resource Report 6. Relevant information from Report 6 should be incorporated into the plan.
3. Provide information regarding the source and appropriate composition of topsoil to be used in the event replacement topsoil used if different than FERC's Upland Erosion Control, Revegetation and Maintenance Plan.

Section 6.0 - Hydrostatic Testing and Dust Control Protection Measures

Surface water withdrawals for hydrostatic testing of water tight containers, pipelines, and vessels from non-tidal waters and tidal waters are excluded from VWP Permit regulations (9VAC25-210-310 A.6.b) regardless of the volume withdrawn. However, 9VAC25-210-310.B allows the Board to require a permit if the withdrawal is found to cause impairment, adversely affect beneficial uses, or violate water quality standards. To avoid an adverse effect or impairment, the withdrawals for hydrostatic testing should be managed so that:

- No more than 10% of the instantaneous flow rate from the channel is removed;
- The intake screens shall be designed so that screen openings are not larger than 1 millimeter and;
- The screen face intake velocities are not greater than 0.25 feet per second.

Provide a discussion of what steps the applicants and its contractors will take during the hydrostatic testing to meet these requirements. The plan should describe the screen type and pump used to meet these requirements.

1. Provide maps showing the location of each prefabricated water impoundment structure. Include the latitude and longitude of the impoundment and the intake placed in the stream channel from which the water will be withdrawn. Explain if the impoundments will also be used to store water withdrawals for HDD and dust control throughout the project or just for hydrostatic testing. Discuss the typical daily operation of pumps to withdraw water to fill the impoundments.
2. Provide a drawing showing the proposed location of discharge areas for hydrostatic testing water.
3. ACP states all hydrostatic test water discharges will be sheet flow in uplands. ACP should state that discharge monitoring will be in accordance with the 9VAC25-120-80 et. seq.

Water Withdrawal for Dust Control and Horizontal Directional Drilling (HDD)

4. Prior to construction, applicant should provide DEQ with FERC required documents related to the proposed or potential sources of water used for dust control and HDD, anticipated quantities of water to be appropriated from each source, and the measures that will be implemented to ensure water sources and aquatic biota are not adversely affected by the appropriation activity.
5. Surface water withdrawals for all purposes, including dust control and HDD, of less than 10,000 gallons per day from non-tidal waters and less than 2 million gallons from tidal waters per day are excluded from VWP Permit requirements (9VAC25-210-310.A.11).
6. 9VAC25-210-310.B allows the Board to require a permit if the withdrawal is found to, cause an impairment, adversely affect beneficial uses, or violate water quality standards. To avoid an adverse effect or impairment, the withdrawals for dust control and HDD should be managed so that:
    - No more than 10% of the instantaneous flow rate from the channel is removed;
    - The intake screens shall be designed so that screen openings are not larger than 1 millimeter and;
    - The screen face intake velocities are not greater than 0.25 feet per second.

Provide a discussion in the plan of what steps the applicants and its contractors will take during withdrawals for dust control or HDD to meet these requirements. The plan should identify the screen type and the pump used.

7. Describe the construction spreads, when different parts of the pipeline will be constructed, and where water will be obtained for each construction spread. Provide calculations for the estimated maximum daily amount of water that will be needed for dust control and HDD activities for each construction spread. Discuss if each construction spread can separately meet the VWP exclusions for surface water withdrawals under 9VAC25-210-310.A for HDD and dust control surface water withdrawals. In addition, include the location of withdrawals for each construction spread and distribution across separate stream reaches to meet withdrawal recommendations.
8. If daily withdrawals exceed 10,000 gallons per day from non-tidal waters and 2 million gallons from tidal waters per day, a VWP Permit in accordance with 9VAC25-210 et. seq. is required.

General comments to all types of water withdrawals

1. Include procedures in the plan to notify DEQ within 30 days prior to initiating a withdrawal for hydrostatic testing, dust control or HDD including when and where withdrawals are to occur. Withdrawals should avoid typically lowest flow periods for nearly all stream channels. DEQ recommends adjusting the location and timing of withdrawals where possible to coincide with higher streamflow periods and/or redirect withdrawals to larger flowing channels.
2. Provide plans and procedures that will be put in place to review nearby stream gauges and drought scenarios during water withdrawal activities to ensure that withdrawals are not occurring during low flow conditions that could cause impairment or affect other beneficial uses.
3. Discuss the impact of any water withdrawals on downstream water users, particularly during low flow periods.
4. Include plans to record and track the daily volumes of water withdrawn and where those records will be kept and reported to DEQ as needed.

Section 7.0 - Riparian Buffer Protection

1. Evaluate the ability to reduce the construction limit of disturbance (LOD) in upland areas approaching waterbody and wetland crossings from 125 feet to 75 feet and where possible this reduced LOD width should be extended 50 feet from each side of the stream or wetland crossing as an additional upland buffer.
2. Evaluate moving construction laydown/contractor yard area away from Hamilton Branch Creek.
3. Evaluate requiring a 100 foot buffer from of any perennial, intermittent, or ephemeral surface waters for fueling, maintenance, parking and hazardous material storage activities (ATWS).
4. ACP should state that removal of riparian buffers not directly associated with the project construction activities is prohibited. Disturbance and removal of riparian buffers from project-related upland ground disturbing activities that would occur within 50 feet of any perennial, intermittent, or ephemeral surface waters should be avoided where possible, and minimized if 50 feet is not possible. Removal of riparian buffers shall not be allowed where stream bank stability under normal flow conditions would be compromised.

Section 8.0 - Spill Prevention Control and Countermeasure (SPCC) Plan

1. The SPCC Plan prepared by ERM dated July 18, 2016 in response to the 401 Request for Information does not appear to have been revised to include DEQ comments provided on the DEIS by letter dated April 6, 2017. Relevant comments from the DEQ April 6, 2017 letter are provided in comments 2 through 4 below.
2. SPCC Plan p.2 – Section 4.0.A. See text below. The statutory requirements for making notifications in the event of an oil spill are "immediately upon learning of the discharge". The language below suggests a process that may result in a delay in reporting.
3. Section 5.0.A.1.j., page 4 - This should state immediate reporting to DEQ, EPA and others. The language below suggests a process that may result in a delay in reporting.
4. Section 7.C.3.a and b., page 8. These oil spill reporting requirements do not specify a timeframe for reporting. These reporting requirements should clearly indicate that spills should be reported "immediately upon learning of the discharge". The cited sections of Virginia water control law specify that spillers must notify the *"director or coordinator of emergency services....for the political subdivision in which the discharge occurs and any other political subdivision reasonably expected to the affected by the discharge, and the appropriate federal authorities..."*. This is not addressed in the spill reporting section of the plan.

Section 9.0 - Specific Engineering and Best Management Practices to be used in areas of Steep Slopes and Slide Prone Areas

1. The plan should include notification to DEQ prior to initiating construction activity in areas with greater than 30 percent slopes. The notice should include at a minimum, the anticipated start date, location and duration of activity.
2. Include procedures and notifications to be implemented in the event a slide results in an impact to state waters.

Section 10.0 - Blasting Plan

1. Confirm the reference to Karst Monitoring and Mitigation Plan on page 8, Section 8.0 of the Blasting Plan prepared by ERM dated November 1, 2016 is referencing the blasting procedures in the Karst Terrain Assessment, Construction, Monitoring and Mitigation Plan (Appendix E) prepared by GeoConcepts dated January 2017.

Section 11.0 – Water Quality Monitoring Plan

1. The narrative states that 8 sites were selected, but Table 3.0-1 (Appendix D, page 5) only lists 6 sites. Also, only 6 sites are depicted in the maps in WQM Plan, Appendix A. Please provide info on the 2 additional stations. See comments below for DEQ's recommended station locations.
2. Actual proposed monitoring sites were not included on the provided maps. It is therefore difficult to determine if the sites are appropriately located. Lat/long coordinates of the above-, adjacent-to- and below-construction sites along each selected reach should be provided as soon as possible. An estimate of the distances from monitoring sites to activity areas would be beneficial for evaluating the overall study design.

3. A complete list of perennial water bodies that may be affected should be included in section 3.0, rather than only a list of priority streams. Specifically, it appears that the proposed plan does not identify several Class VI wild trout waters that may be impacted by upland construction. These waters are important not only for the trout populations themselves, but because they exhibit sufficiently high water quality and ecological integrity necessary to support wild trout. The agency asks that the following Class VI streams be evaluated for potential impacts due to upland construction. If confirmed, these streams should be identified in section 3.0 (Table 3.0-1).
    - Vicinity of MP85.4: There appears to be upland construction activity near Lick Run and Townsend Draft, both designated as Class VI "Good" Wild Trout stream. Please confirm.
    - Vicinity of MP86.9: Erwin Draft is included in the Plan, but the plan does not note that this stream is designated as a Class VI Wild Trout Water ("good"). Please confirm.
    - Vicinity of MP87.9: There appears to be upland construction activity near Back Creek X-Trib which is designated as Class VI "Good" Wild Trout stream. Please confirm.
    - Vicinity of MP94.1: There appears to be upland construction activity near Laurel Run which is designated as Class VI "Good" Wild Trout stream. Please confirm.
    - Vicinity of MP113.5 and 114.1: Upland construction appears to impact Ramsey's Draft, which is designated as Class VI "Exploited" Wild Trout stream. Please confirm.
4. If confirmed that upland construction will occur within 50 feet of these Class VI streams (identified above), the agency requests that the monitoring plan include at least one monitoring station to evaluate impacts to Class VI trout waters, preferably on Erwin Draft (near MP86.9, and identified as a water of concern in Table 3.0-1).
5. The station(s) cited to evaluate impacts to wild trout streams should include a method to check wild trout populations before, during and after construction.
6. 3 of 6 sites in table 3.0-1 include threatened or endangered species. The monitoring plan should include a method to check threatened or endangered species populations before, during and after construction.
7. There are two public water supply intakes on Jennings Branch and Middle River (MP 129.2 & 130.4) that appear to be in the vicinity of upland construction. Monitoring before/after construction is needed to ensure that no contamination reaches these public water supply intakes
8. The plan does not provide Standard Operating Procedures or Quality Assurance Project Plan that covers the parameters to be monitored. For example, how will the field probes be calibrated and what standards will be used? The offered "according to manufacturer instructions" is insufficient detail on how staff will perform operation and calibration of equipment. Please provide an SOP and QAPP.
9. The plan does not include the name of the laboratory which will perform macroinvertebrate identifications. The name of the laboratory and documentation that it can perform the VSCI protocol, such as a DEQ approved QAPP, is needed.
10. The proposed monitoring frequency for chemical parameters is far less than normally relied on to make water quality determinations. One reading for DO, pH, conductivity, and turbidity done before, during, and after construction is insufficient to determine if there is an actual water quality impairment. To make such determinations, the agency prefers continuous monitoring of these parameters for a duration of one month to occur before, during, and after construction. However, DEQ requests that, at a minimum, three grab samples be collected at each site before, during, and after construction (total of nine samples per site). The grab samples should be collected at least one week apart.

11. There is no detail on how far apart benthic monitoring will occur during the project. For benthic parameters, changes to the community will happen over time. DEQ recommends that benthic sampling be conducted one month before, immediately after, and at least a month after actual construction.
12. The document specifies that duplicate chemical/physical sampling via two staff collecting samples at the same time and location will occur. Does this mean every sample will be collected in this manner? If not, please specify the frequency of duplicate sampling.
13. DEQ requests that the agency be notified to enable observation of at least one sampling event to document performance of the sampling teams. In addition, DEQ requests that the contracted laboratory provide two randomly selected samples, as selected by DEQ, including all identified organisms and material from which they were sorted, in order to verify identification accuracy and sorting efficiency. This is a routine procedure when the agency evaluates submitted data.
14. DEQ staff can provide guidance on adherence to Standard Operating Procedures for all aspects of the proposed monitoring, as requested by the contractors.
15. DEQ requests that all raw data be provided in electronic form (the plan implies that benthic data may only be provided on laboratory bench sheets).

Section 12.0 - Karst Mitigation Plan

1. Submit the Karst Survey Report filed with FERC on February 24, 2017 as part of the response to DEQ's May 19, 2017 Request for Information.
2. Submit Resource Report 2, Section 2.1.6 Groundwater Construction Related Impacts and Mitigation as part of the response to DEQ's May 19, 2017 Request for Information.
3. All field surveys for identification of karst features and associated documentation shall be completed and submitted to DEQ at least 14 days prior to initiation of land disturbance activities in those areas.
4. Provide clarification regarding field investigation procedures occurring between tree clearing and initiation of construction activity.
5. The plan should include notification to DEQ prior to initiating construction activity in areas with karst terrain. The notice should include at a minimum, the anticipated start date, location and duration of activity.
6. To further evaluate flow paths for significant karst features in the vicinity of the project, ACP shall develop a Karst Dye Tracing Plan to be submitted and approved prior to initiation of land disturbance activities in karst terrain. See Attachment B.

Section 13.0 - Description of Onsite Environmental Monitoring and Inspection Measures to be Implemented During Construction

1. The plan should state that the environmental inspectors will ensure the requirements required under ESC Inspection Requirements 9VAC25-840-60, § 62.1-44.15:58) and SWM Inspection Requirements (9VAC25-870-114, § 62.1-44.15:37) will be followed.

Attachment A

AGENDA

Department of Environmental Quality 401 Conference – June 7th and 8th, 2017 to be held at

Virginia Military Institute in Lexington VA - Marshall Hall

Shenandoah Room – attire business casual

Wednesday June 7th

DEQ , ACP and MVP

9:00am to 5:00pm

- On-site environmental monitoring and inspection measures
- SPCC Plan
- Riparian Buffers
- Hydrostatic testing and dust control
- Acid forming materials
- Right-of-way maintenance measures
- Water quality monitoring plan

Thursday June 8th

DEQ, DCR, DMME, WVA Department of Environmental Protection and staff from ACP and MVP

9:00am to 5:00pm

- Engineering and bmps in areas of steep slopes
- Blasting plan
- Karst plan
- Wrap-up next steps

Below is a link to the VMI Post map showing Marshall Hall and Marshall Parking:

http://www.vmi.edu/media/content-assets/documents/VMI_Post_Map_small.pdf

Attendee List

June 7, 2017			
Name	**Organization**	**Phone**	**Email**
Bob Bisha	Dominion	804-273-3010	robert.bisha@dominionenergy.com
Brenda Winn	DEQ	804-698-4516	brenda.winn@deq.virginia.gov

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Melanie Davenport	DEQ	804-698-4038	melanie.davenport@deq.virginia.gov
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Rick Linker	Dominion	804-819-2863	rick.linker@dominionenergy.com
Rick Weeks	Dominion Energy-ACP	804-771-3623	richard.f.weeks@dom.com
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Steve Hardwick	DEQ	804-698-	steven.hardwick@deq.virginia.gov
Tony Cario	DEQ	804-698-4089	anthony.cario@deq.virginia.gov

June 8, 2017			
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Wil Orndorff	VDCR	540-230-5960	wil.orndorff@dcr.virginia.gov

Meeting Notes

June 7th, Start - 9:00

Hydrostatic testing and dust control:

- Water source(s) need to be identified for hydrostatic testing activities and dust control.
- Water discharge from hydrostatic testing will occur in uplands for both projects. Water quality testing of discharge water will be required.

Water quality monitoring plan:

- Wild trout water locations need to be specifically identified.
- Verify that Class VI waters were evaluated. DEQ will provide a Class VI GIS layer.
- Applicants need to continue working with consulting agencies regarding T&E.
- Monitoring plan should include: lat/long coordinates of the sample locations; DO, pH, conductivity, and turbidity (minimum of 3 times before, during, and after construction at one week intervals; benthic parameter sampling before and after construction.
- All raw data provided in electronic form.

Acid forming materials:

- How much topsoil is needed to provide an adequate cap?
- Provide any pre-construction surveying and sampling that is planned.
- Need contingency plan if AFM encountered unexpectedly.

Specific engineering and BMPs to be used in areas of steep slopes and slide prone areas:

- Is there an industry standard for construction in steep slopes/slide prone areas? If so, provide it. What is mileage and locations of steep slopes?
- Notify DEQ prior to work in previously identified steep slope/slide prone areas.
- Need a contingency plan and notification to DEQ if unexpectedly encountered.
- Notify DEQ when working in Giles Seismic Zone.
- Blasting Plan should detail measures used to protect water quality when blasting.

Riparian Buffers:

- DEQ still evaluating buffer requirements between limits of disturbance and stream.

Permanent R/W maintenance measures to minimize erosion or other water quality impacts:

- Verified FERC requirement to maintain corridor in riparian areas and clear once every 3 years. FERC buffer width is mean high water mark to25 feet wide. FERC doesn't allow corridor mowing.
- Signage needed to protect riparian areas that should not be mowed/maintained.
- Need consistent descriptions of R/W widths.
- Follow FERC-required set-backs in wetland/stream areas.

June 8th, Start - 9:00am

- WVDEP desires to work with Virginia as much as possible on the states' authorizations.
- Meeting goals are
    - ensuring companies have not overlooked karst features,
    - what verification processes are needed if any,
    - ensuring best management practices and monitoring plans are adequate,
    - ensuring mitigation measures are identified,
    - determining what potential conditions may apply to VA certification
- DCR - Overall, karst features along the alignments have been documented and the data is good.
- Karst information is being shared among agencies and among the pipeline companies.
- Some spots may include sensitive receptors and more data may be required .
- Goal is to look at areas where data gaps exist to find where potential discharges may go if spill control measures fail.

Water flow in karst

- Trench depth is in epi-karst zone that does not typically include spring/well flows that would be used for drinking/human use supply.
- Trench depth (10') is too shallow to affect subsurface water supply flows in karst.
- Blasting is limited such that rock is fractured at a depth no more than 10-12 feet, just enough to allow mechanical equipment to remove material.
- Any localized disruption to shallow spring systems will most likely come from sediment, and can be identified and mitigated.
- Porous bedding in trench allows perpendicular underground water flow to pass through.
- Trench breakers prevent inadvertent water flow along the pipe trench – includes a drain outlet to release water in a controlled manner.

Dye Trace Studies

- Dye trace studies needed in certain places such as limestone dominant area - dye trace to determine where sinking streams exit and interaction of springs/karst/sink holes.
- Objective of dye study is to better understand where inadvertent release may end up in order to mitigate efficiently.
- Dye tracer tests would be helpful for public water supply system identification.

- Where short flow times in karst occurs, important to have contingency plans ready to implement.
- Include schedule in dye trace plan for review and approval time – summer may be OK while winter provides more water and faster results.
- Include mechanisms to communicate releases if they occur.
- Potential VA condition: submit dye tracing/study plan prior to land disturbing activities in areas identified with sensitive features - as suggested by VDCR and VDEQ - in order to inform remediation efforts. Implement testing when property access is available.

Karst Plan Comments

- Leaks from equipment are a potential but are readily controlled and prevented –such measures are already in the plans.
- MVP karst mitigation plan incorporated and adjustments made to avoid sensitive karst features.
- No caves on MVP alignment.
- All MVP VA parcels have been viewed in the field.
- MVP karst inspectors will be used during tree clearing and through construction.
- MVP has contacted public water suppliers for coordination of water supply for project needs and prevention of issues to supplies.
- ACPs plan describes dye study methodology such as remote sensing, desktop analysis, etc.
- ACP made route adjustments within FERC-approved corridor due to cave presence and conservation areas.
- ACP is working to adjust the route to avoid known areas with a high concentrations of karst features, based on data review.
- Recommend moving construction laydown/contractor yard areas away from spring areas.

Peter's Mountain:

- There is no aquifer on/in Peter's Mountain – there is surface drainage down the mountain that becomes subsurface flow at the sandstone/karst interface and flow through a boulder pathway (not technically springs, rather discharge of surface flow that is under such rock cover).

Attachment B

Dominion Atlantic Coast Pipeline Dye Tracing Recommendations

June 14, 2017 Revision

Wil Orndorff
Karst Protection Coordinator
Division of Natural Heritage
Virginia Department of Conservation and Recreation

Once a route has been selected and approved by FERC for the Dominion Atlantic Coast Pipeline project, DCR recommends performance of dye trace studies to determine hydrological connections and relationships associated with sensitive karst features at risk from construction and operation of the pipeline. These include any such features in the construction right-of-way and all other disturbed areas, including access roads and staging areas, as identified during the karst survey performed by the project's consultants, Geoconcepts Engineering. Such studies will greatly aid in spill response and recovery in the unlikely event of a discharge of sediment or chemical contaminants to a sensitive karst feature.

The following is brief description of recommended dye traces by project areas.

Part 1 – Ridge and Valley Section

The Ridge and Valley karst is characterized by karst formed in linear belts of exposed limestone along the flanks of ridges and in some valleys. Much of the flow is above the water table in the vadose zone, and residence time of water underground is typically on the order of a few days to a few weeks. Locally, deeper circulation occurs in places like the Warm Springs Valley or the Bolar area of Little Valley. However, with the possible exception of the western end of Little Valley, Rev12 does not cross such areas. Dye tracing in the Ridge and Valley is straightforward and generally produced consistent, reliable results.

1) Hightown Valley – Additional dye tracing recommended

The Rev12 alignment has sufficient existing dye trace information based on dye trace studies performed by VA-DCR in conjunction with the Highland County Cave Survey in the early 2000s. Geoconcepts has the results of these traces. However, the karst along Rev12 near Valley Center was deemed so sensitive by Geoconcepts that an alternative route to the southwest, named Alternative Q11, is under consideration. While the Q11 reroute avoids an area of intense karst just east of Valley Center, it still crosses a belt of well developed karst that includes sinking streams, caves, and sinkholes. The Q11 alternative is shown in Figure 1 There are several features proximal to the Q11 alignment that are of concern, and their resurgences (i.e. springshed identity) should be determined for the purposes of emergency response. This would require 2 to 4 injections total along either side of the Q11 reroute. The Lightner Meadow Cave injection shown in Figure 1, if it ever occurred, was never recovered. Currently

we do not know whether Apple Jack Spring, Campbell Spring, or both receive drainage from the proposed alignment.

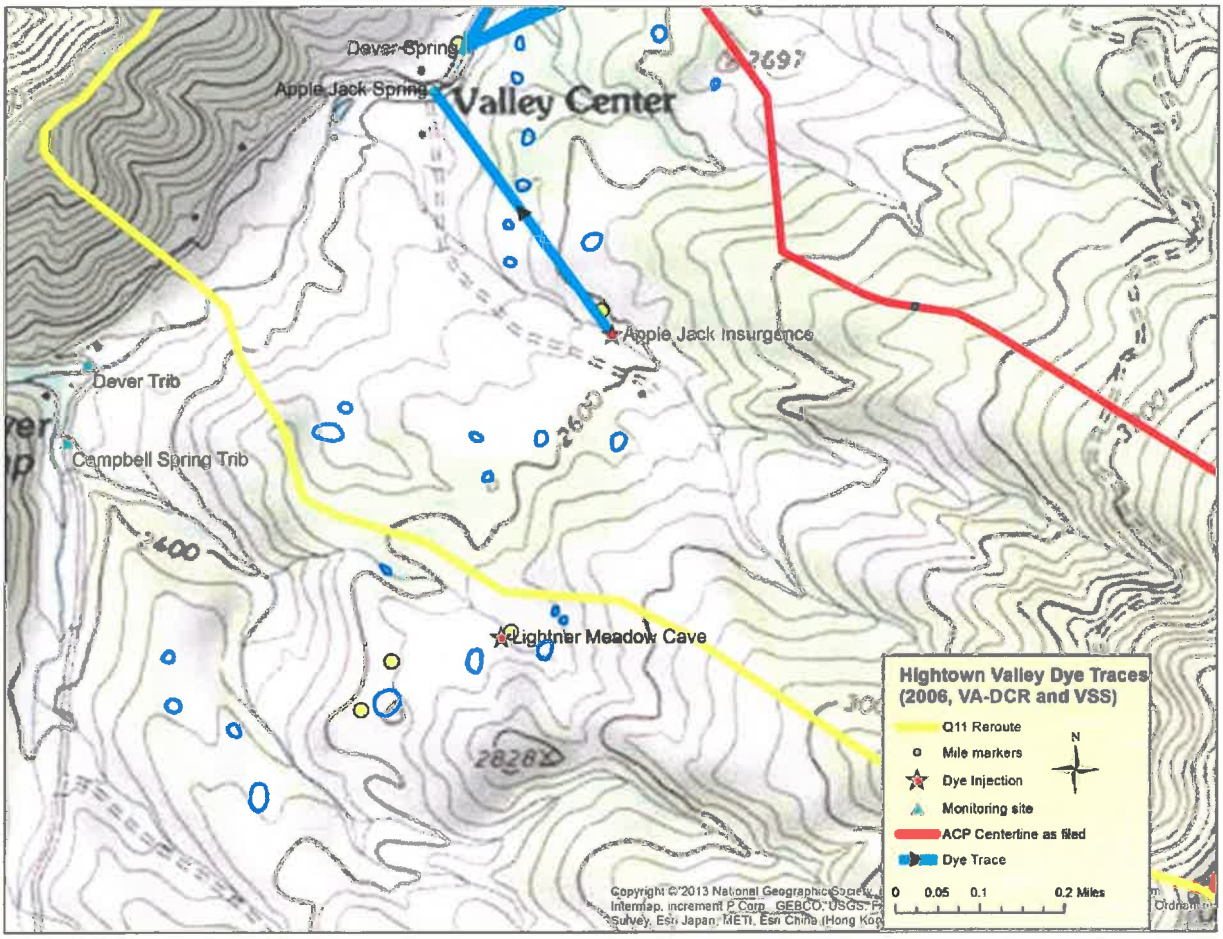

Figure 1. Valley Center-Dever Gap Karst (Q11)

2) Little Mountain West – MP 92 – 92.3: Dye tracing may be needed.

No boots on ground yet. Hubbard has two sinks mapped here (see Figure 2.) If no sensitive karst features are identified by Geoconcepts, no dye tracing is recommended.

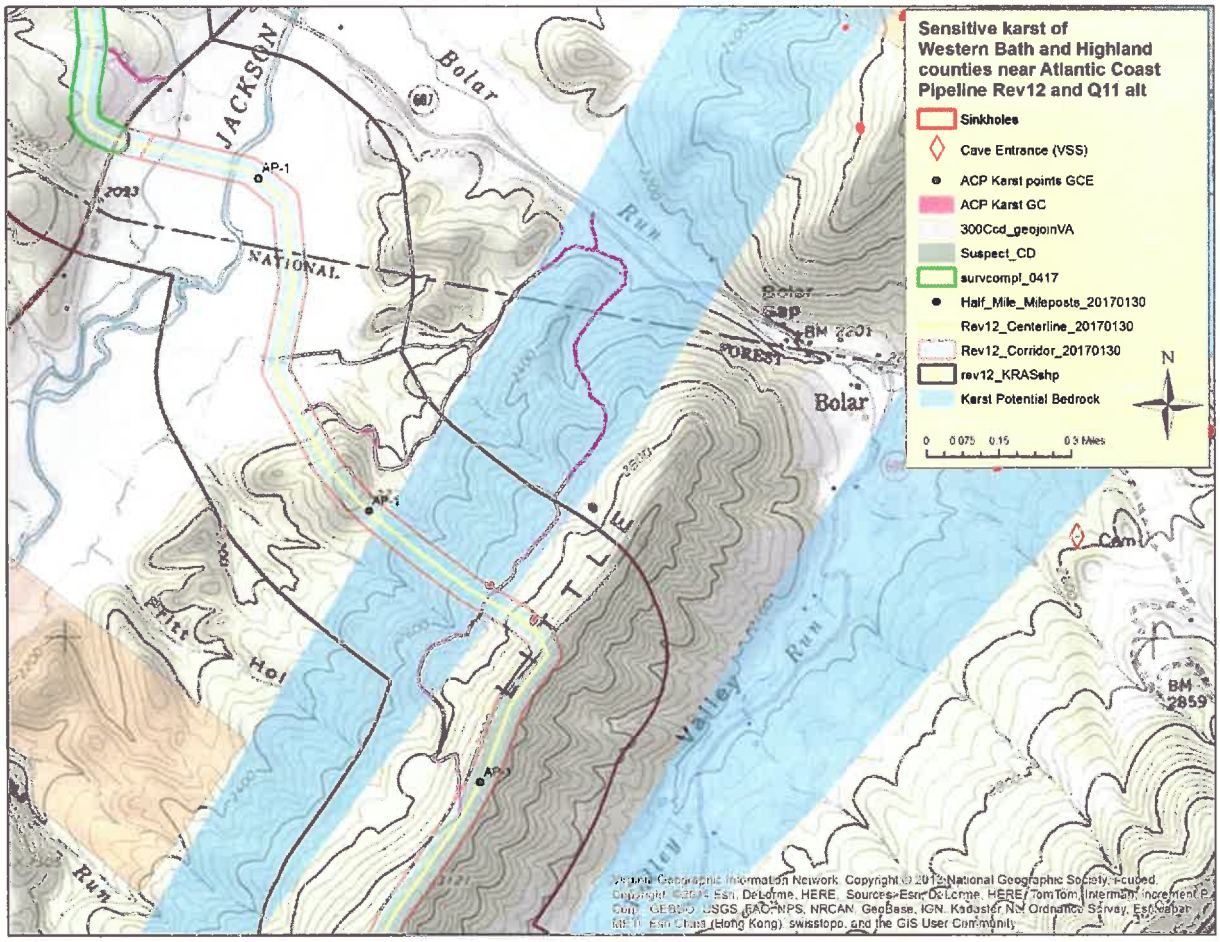

Figure 2. Little Mountain West Karst Area

3) Little Valley/North side of Jack Mountain – Possible dye tracing

Property owner reports multiple small sinks within Rev12 corridor near valley floor at southwestern end of carbonate rock outcrop belt (see Figure 3.) Report corroborated by Geoconcepts Engineering field staff, which just received access to the property week of May 29. There is very low likelihood of significant caves, but potential exists for aquifer contamination resulting from release to a karst feature. While the massive limestone is more or less as shown in Figure 3, reconnaissance by VA-DCR on June 7 suggests significant karst hydrological development within limestone bearing portions of the strata west and south of the area depicted as limestone in Figure 3. It is likely that aquifers within these limestone are for the most part isolated from the deeper limestone exposed in the core of the valley to the northeast.

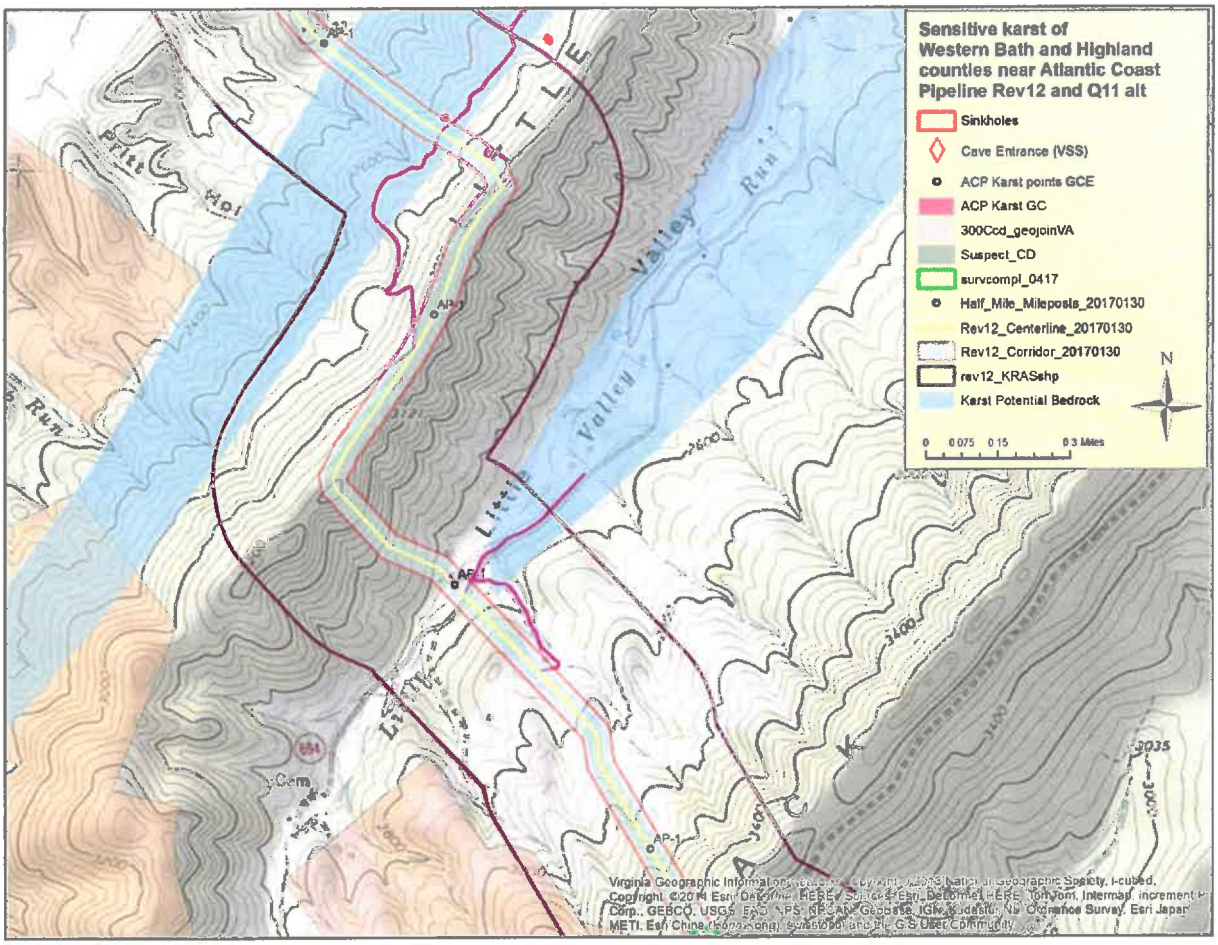

Figure 3. Little Valley Karst

4) Burnsville divide – Dye tracing may be needed pending karst survey

The Rev12 corridor nicks the headwaters of the Chestnut Ridge Cave System (Aqua Spring Recharge Area) as well as a portion of the Cathedral Spring Recharge Area. Both springs lie about 5 miles northeast of the corridor in the Bullpasture River gorge (see Figure 4.) The existing dye trace information was used to delineate the Burnsville Cove Conservation Site, a globally significant conservation site associated with rare cave invertebrate species as well as several federally endangered bat species. If high risk features are identified by Geoconcepts Engineering during their karst surveys once property access is resolved, then those features should be dye traced unless they lie clearly within a well-delineated spring basin.

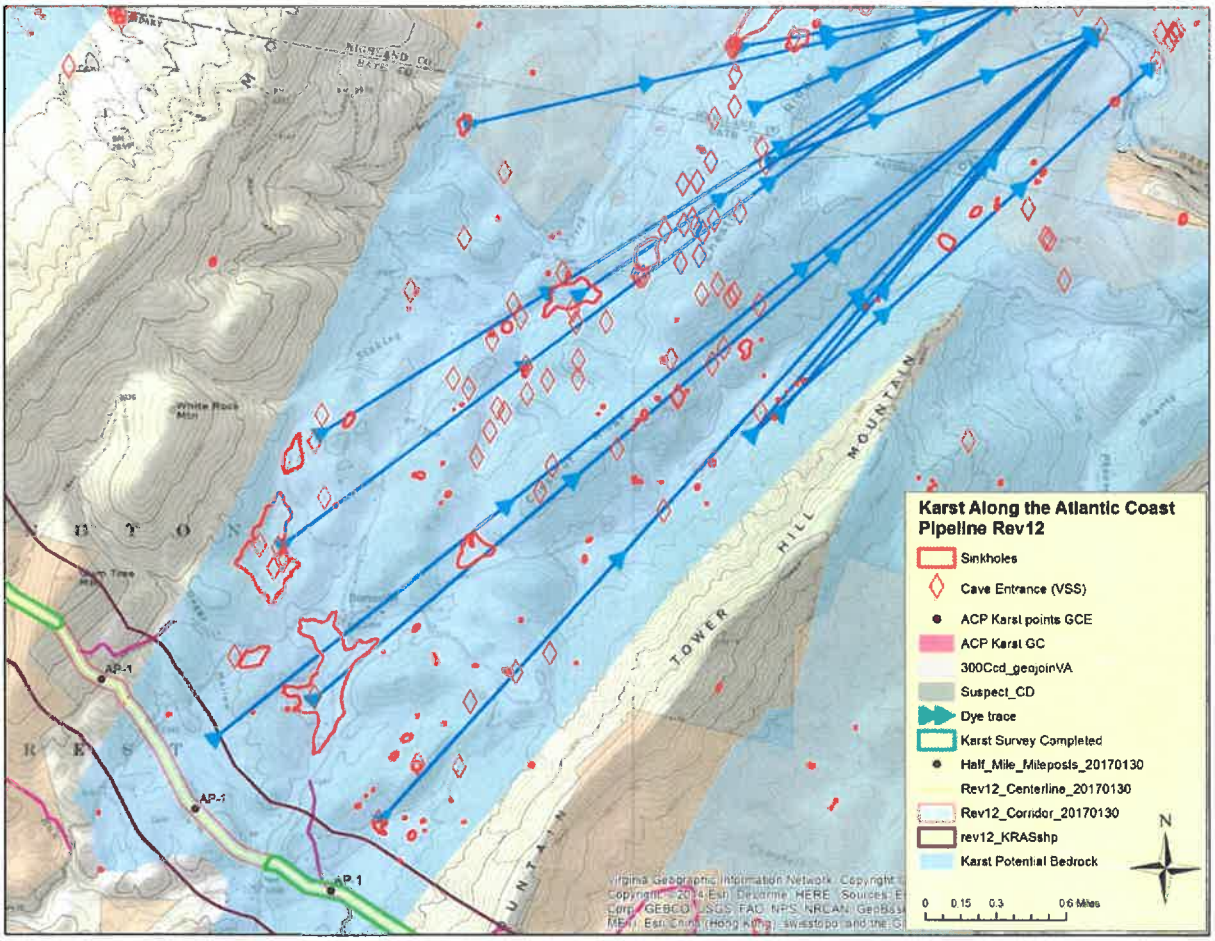

Figure 4. Burnsville Cove Karst Hydro, ACP vicinity

5) Fort Lewis Karst (south side of Tower Hill Mountain) – Dye traces likely needed pending karst survey

Geoconcepts Engineering has not yet had access to this property. Reconnaissance by VA-DCR showed sinkholes present in the vicinity of the Fort Lewis trail and along the southeastern slope of Tower Hill Mountain, and there is one small cave (Jewell Box Cave) along the ridge within 100 – 200 ' of the corridor (see Figure 5.) Please note that karst features extend beyond the boundary of "Karst Potential Bedrock" as depicted in Figure 5. Any sinkholes identified as high or medium risk once property has been surveyed by Geoconcepts staff should be delineated to determine the resurgences. A spring at the base of Tower Hill Mountain along the Cowpasture is the likely destination for any water entering karst features in this section of the pipeline, but dye trace studies should verify this.

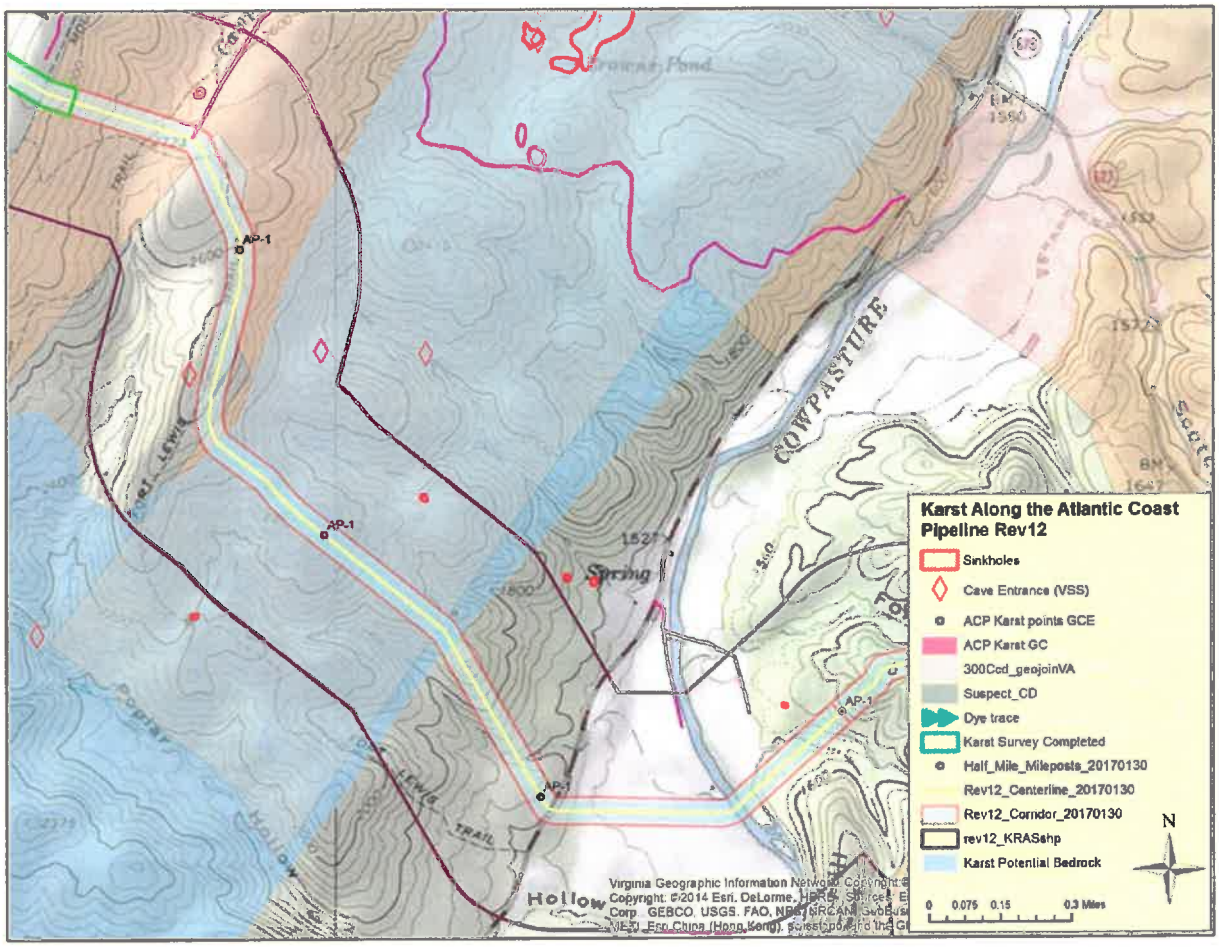

Figure 5. Fort Lewis Karst

6) Brushy Ridge/Walker Mountain, ~ 105.5 – 109 – Dye trace any high risk features.

This bumps up against Deerfield Spring trace (item 7.) From 105.2 to 105.8 are numerous documented karst features (see Figure 6.) 4 of the features in this stretch are documented as high risk, while 7 are documented as moderate risk by Geoconcepts staff.

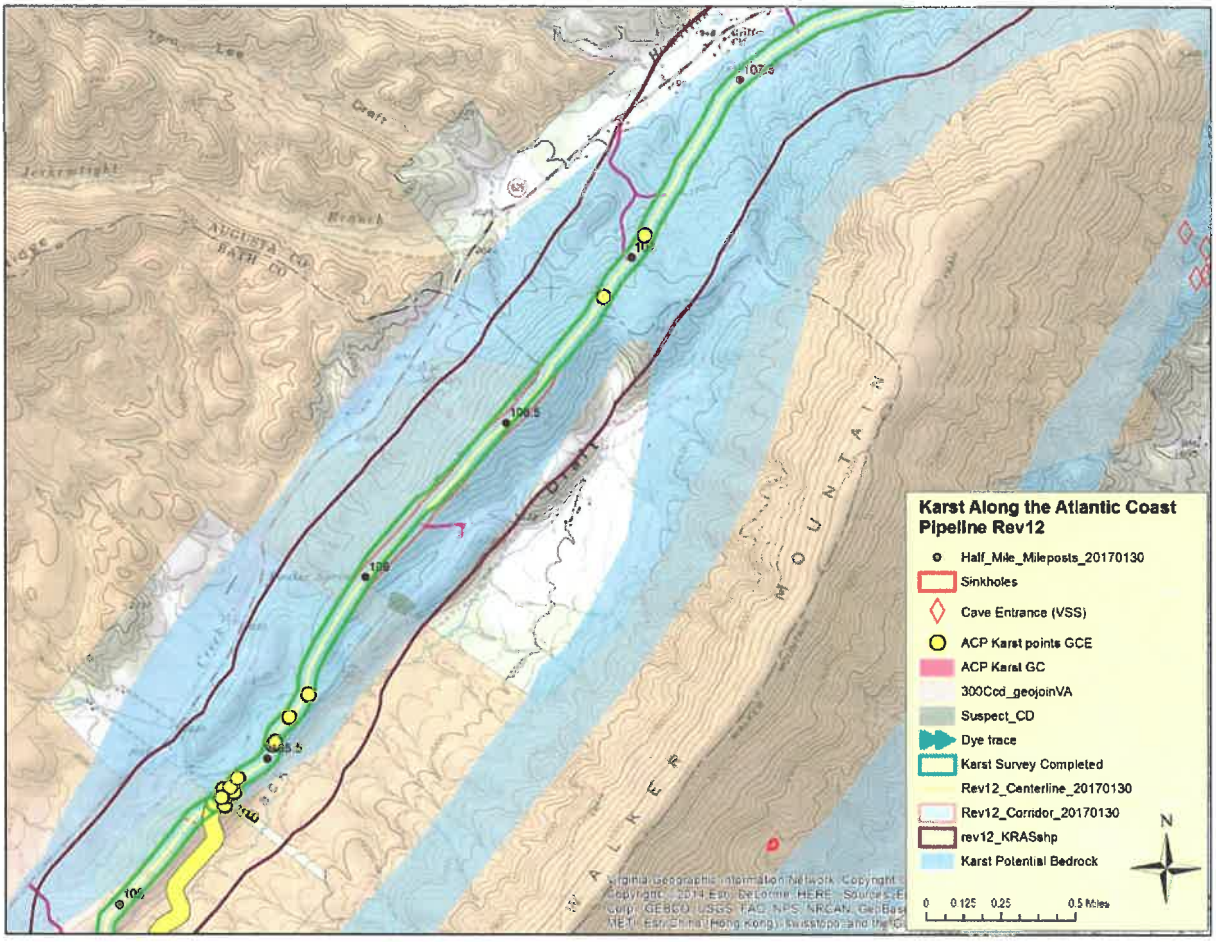

Figure 6. Karst along Brush Ridge and Walker Mountain, vicinity of ACP

7) Deerfield Spring trace.

Preliminary evidence suggests that the Deerfield Spring, a public water supply, receives a significant percentage of its flow from Hamilton Branch, which sinks into limestone underlying alluvial deposits just west of the spring (see Figure 7.) This connection should be confirmed, and if proven may indicate that proposed layout yard near Deerfield needs to be relocated.

Investigations in this area should be performed in coordination with Joel Maynard of the Virginia Department of Environmental Quality.

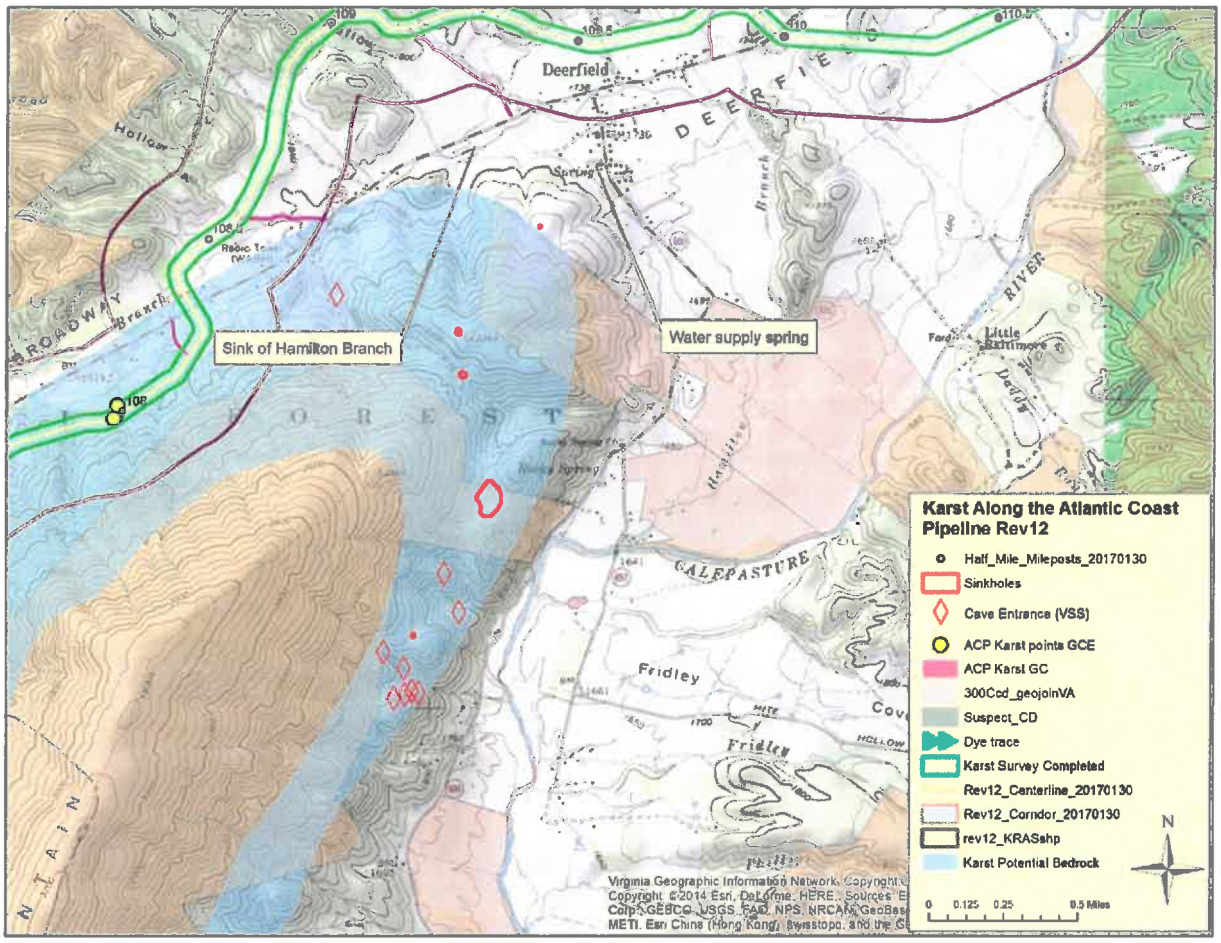

Figure 7. Karst Hydro Setting of Deerfield Spring

Part 2. The Great Valley Section – MP 123 through 140.5 and 142-154.5

The ACP Rev 12 crosses nearly 30 miles of karst topography in the Shenandoah Valley. Unlike the Ridge and Valley section (Part 1), the karst of the Shenandoah Valley is relatively low relief and is broadly characterized by relatively shallow water tables that reside at the top of aquifers that circulate to considerable depth with residence times ranging from days to years.

Dye tracing in the Shenandoah Valley is more difficult to do than in the Ridge and Valley. Dye is sometimes never recovered, presumably due to deep circulation, long residency, and dilution.

Geoconcepts has identified 15 high-risk features and 24 moderate-risk features in the Shenandoah Valley Section, and overview of which is shown in Figure 8. Five of the high-risk and seven of the moderate-risk features have been address by the work performed to date in the Cochrans Cave Conservation site.

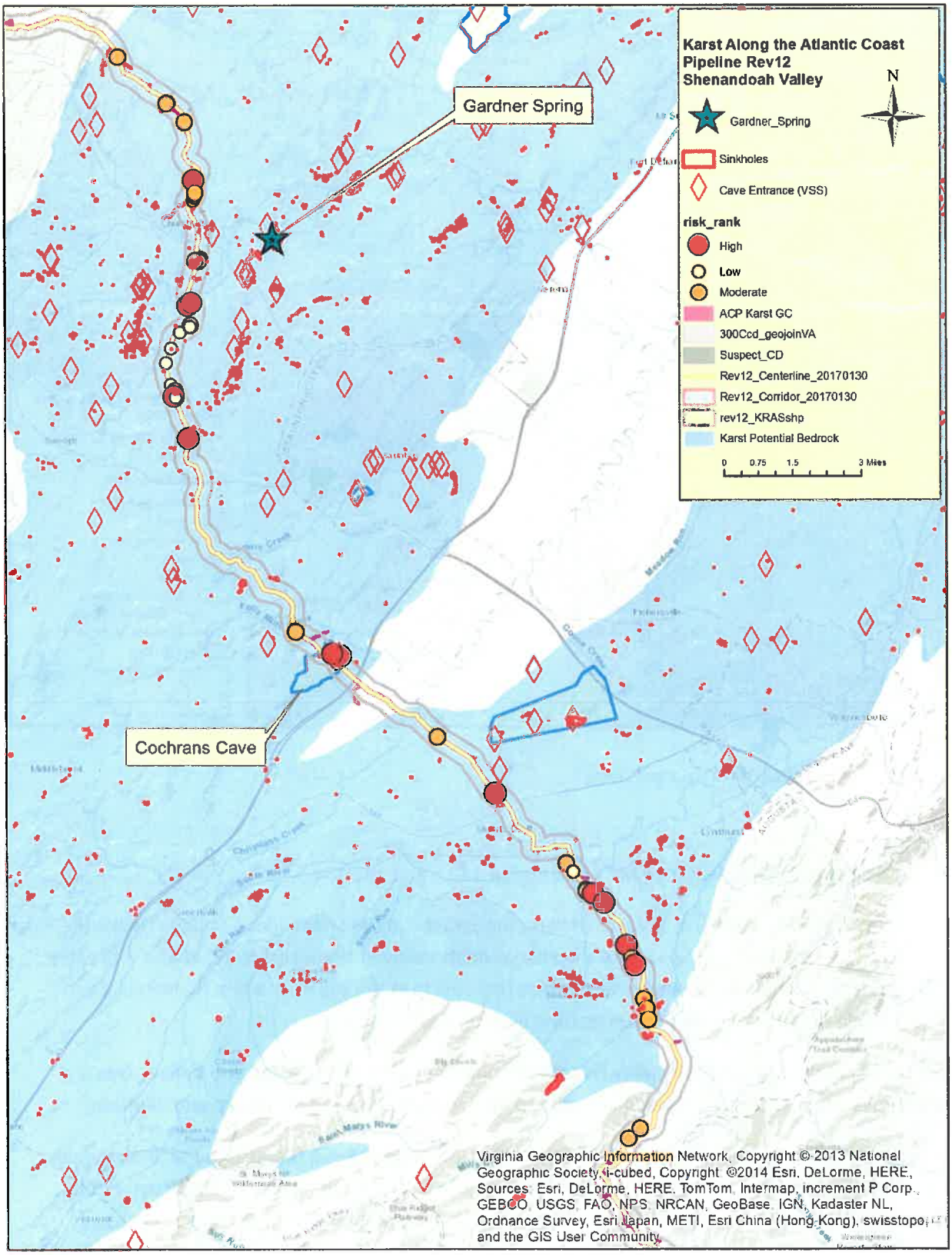

Figure 8. Shenandoah Valley Karst and ACP

8) Gardner Spring

The area of land disturbance for the ACP passes within approximately 1.5 miles of Gardner Spring, a significant public water supply in Augusta County. As shown in figure 9, the Rev12 corridor skirts the western edge of the source water protection area for Gardner Spring as delineated by Emery and Garrett Groundwater, Inc for the Augusta County Public Service Authority. Geoconcepts has mapped 5 high risk and 8 moderate risk features in this area. Dye tracing should be used as an attempt to determine if and how closely the mapped features are connected to Gardner Spring. If no positive recovery of dye is made, is should be assumed these features may be connected to Gardner Spring for purposes of spill response. Three to six dye injections may be necessary for adequate determination of potential connectedness of features on the Rev12 ROW to Gardner Spring. Investigations in this area should be performed in coordination with Joel Maynard of the Virginia Department of Environmental Quality.

9) Cochran's

Dye tracing in this area performed to date by Geoconcepts in sufficient to delineate the hydrology of the identified sensitive karst features.

10) Stuarts Draft Feature.

The high risk karst feature at MP 145 (Figure 10) should be investigated for potential dye tracing. It appears to be on the northern slope of a bedrock ridge.

Sinks from MP 148.5 through 154.5 are largely developed in alluvial material overlying buried limestone and dolostone of the Waynesboro Formation. Dye tracing method are unlikely to work well in this area for delineation of spill movement due to the hybrid alluvial-karst nature of the aquifer. Dye tracing is not recommended for these features.

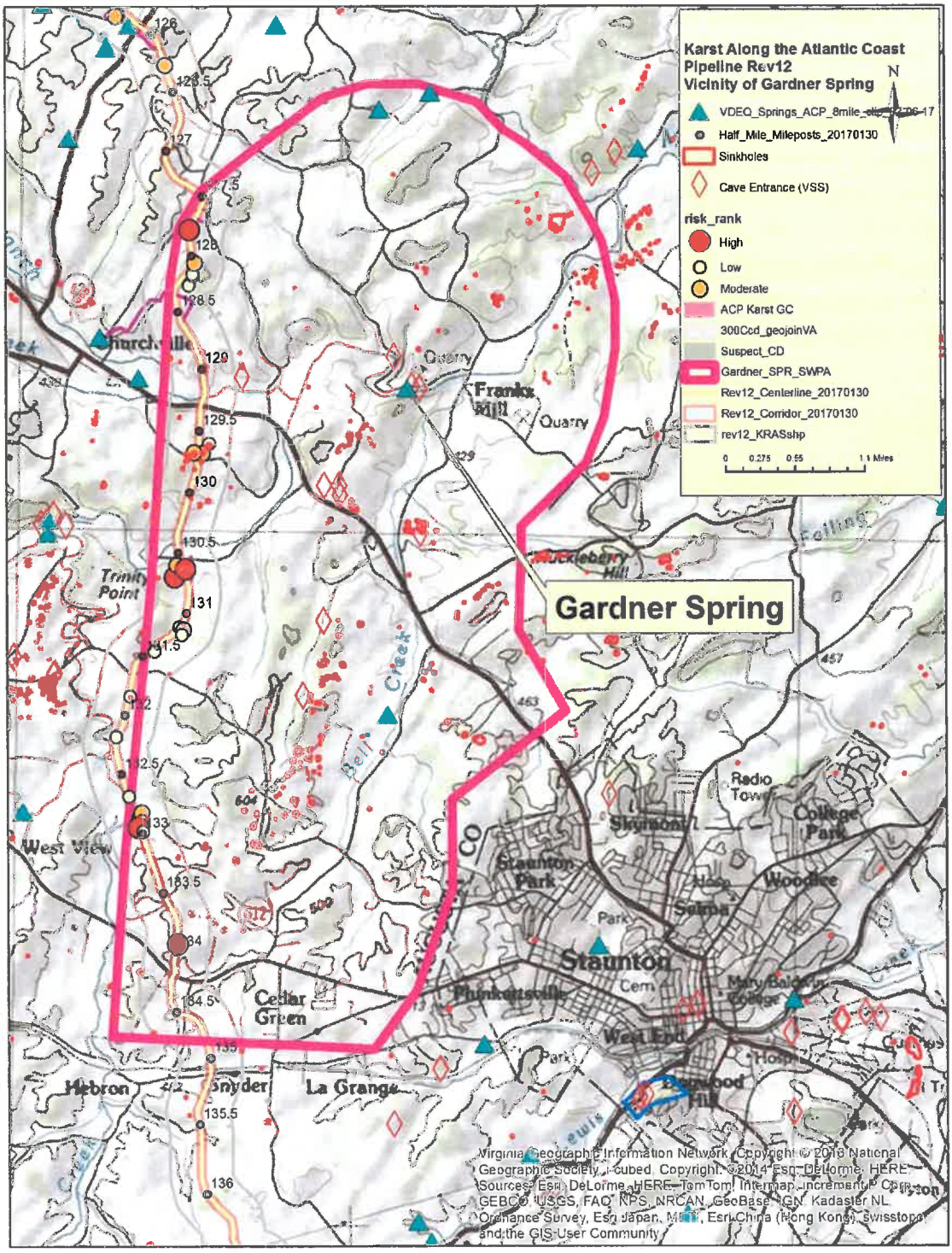

Figure 9. Gardner Spring and ACP Karst

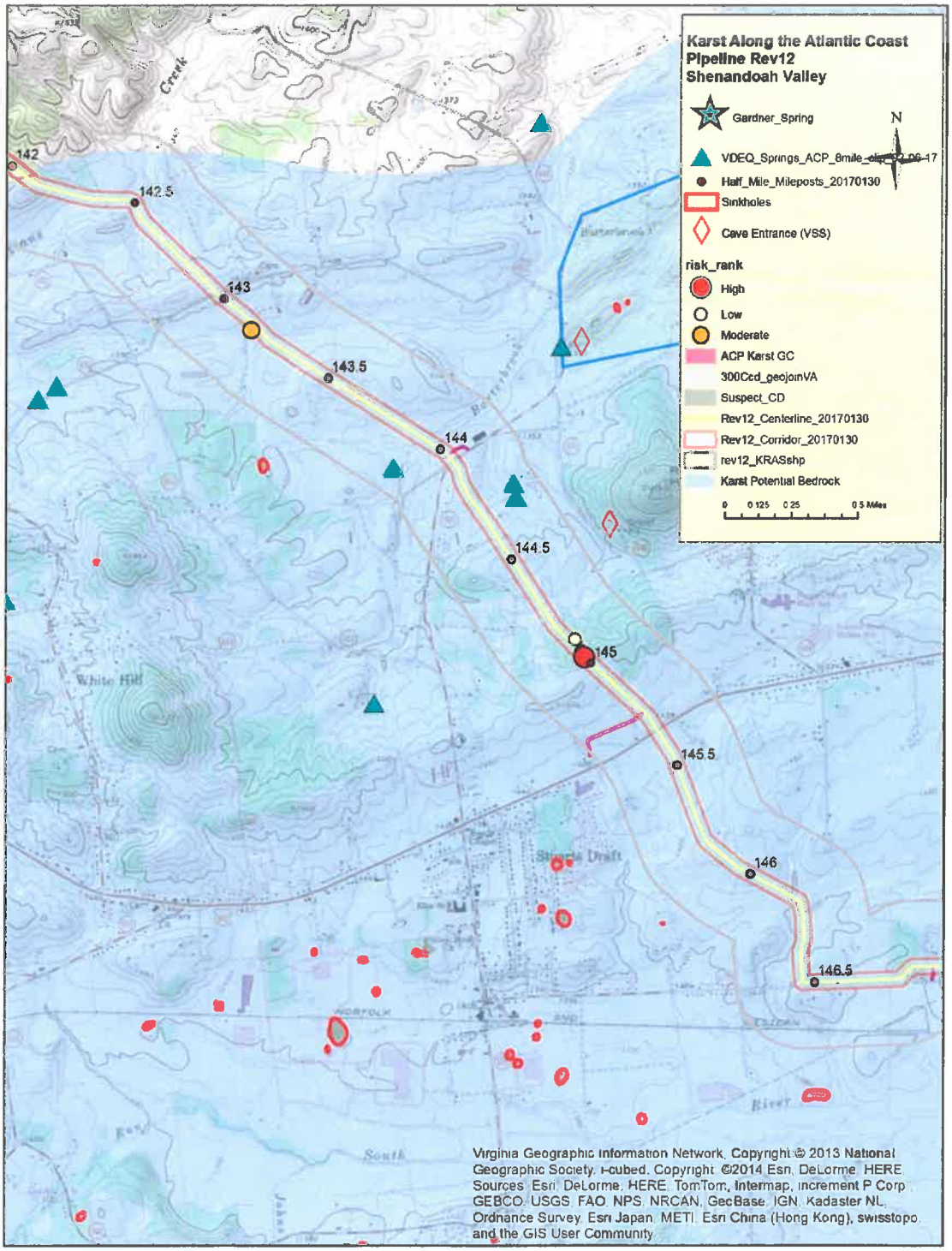

Figure 10. High risk karst feature near Stuarts Draft