

8.1 Precontact Predictive Model

Based on walkover survey, A&HC made several minor alterations to ADM's precontact probability zonation. Areas where surface inspection revealed concentrations of cobbles (APE Segments 6 and 14) were designated as precontact high probability zones because they could conceivably have served as sources of lithic raw material for precontact peoples. In addition, A&HC identified one area of microdrainage divides within the APE that had characteristics favorable for precontact settlement (APE Segment 28). A&HC designated this area also as having a high precontact probability. Finally, ADM's precontact high probability zones associated with several small 1st order drainages pinched out just downstream from the APE boundary (APE Segments 3, 8, and 28). A&HC extended these areas upstream along the drainageways where they crossed the APE.

8.2 Historic Predictive Model

Historic High Probability Zones: There are no extant historic structures within or near the alignment for Purple Section 1. As a consequence, probability designations for historic archaeological resources were based on historic maps and archival research. A&HC made several modifications to ADM's historic high probability areas. First, because correlations between historic and current maps can be inaccurate, A&HC felt it prudent to expand the size of the historic high probability areas from ADM's 140' radius to a 500' radius, the center of which was A&HC's best guess as to the actual original location of the structure in question. Second, ADM's historic high probability areas for non-extant structure locations appear to have been generated at least in part by separate correlations of historic maps, resulting in multiple nearby high probability locals for what was probably the same non-extant structure. A&HC corrected for this by correlating historic maps collectively, assuming that a structure shown one map was probably the same as one at "more or less" the same location on others. A&HC used streams, roads etc. to generate a "most likely" spot for a structure shown at slightly different locations on different historic maps, that could conceivably have been within the APE. This spot was used as the center of the 500' radius of the high probability area. While A&HC recognizes that buildings that appear to be at the same location on different historic maps may in fact in some cases have been different structures, it was felt that the relatively large size of the 500' radius high probability zones would be ample to include the locations of two nearby sequential buildings, if such had in fact been present. In this way, A&HC delineated six historic high probability zones that encompassed what appeared to be the locations of six former structures (Table 2).

As described above, archival research provided additional insights into the occupational and ownership histories of these six high probability locals/zones.

Historic Moderate Probability Zones: None of ADM's moderate probability zones for historic resources were within the Purple Section 1 APE, except along SR 1/US 13 at the northeastern terminus of the project. There, the moderate probability zone fell entirely within the area of previous disturbance associated with the two highways. This outcome was due to the fact that no

Table 2. Summary of Historic High Probability Areas

APE Segment Number	A&HC Name	Current Address	1849 (Rea and Price)	1868 (Beers)	1881 (Hopkins)	1893 (Baist)	1906 (USGS)	1937 (Aerial Photos)	1993 (USGS)
11	Houston/LeCompt	0 Boyds Corner Road	J. Houston	J. LeCompt	J. LeCompt	J. LeCompt	Not Shown	Not Shown	Not Shown
12	LeCompt No. 1	0 Ratledge Road	Not Shown	J. LeCompt	J. LeCompt	J. LeCompt	Shown	Not Shown	Not Shown
13	LeCompt No. 2	0 Ratledge Road	Not Shown	Shown, no name	J. LeCompt	J. LeCompt	Not Shown	Not Shown	Not Shown
18	Read/Elliott ¹	0 Jamison Corner Road	J. Read	A.S. Read	J. R. Elliott	J. R. Elliott	Shown	Shown	Not Shown
20	Bowman Tenant House	100 Scott Run	Not Shown	Shown, no name	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown
21	P./Mrs Bowman ²	100 Scott Run	P. Bowman	Mrs. Bowman	Mrs. Bowman	Mrs. Bowman	Shown	Shown	Not Shown

¹ A dwelling was present on the property by 1820 (Sharf 1888)

² A dwelling and other improvements were present on the property by 1788 (Public Sale 11/20/1788)

roads on Faden's 1778 map cross or abut the Purple Section 1 APE except for the predecessor of SR1/US13. As indicated above, however, three historic roads that are not shown on Faden's 1778 map do cross the APE, and predecessors of at least two of them, Boyds Corner Road and Hyetts Corner Road, were built by 1820, and could be substantially older than that. As evidence, archival research indicated that at least one residence within or near the APE, the primary residence in the P./Mrs. Bowman Historic High Probability Area, was built by 1788, and that the land on which it stood was probably warranted in 1683. In all likelihood, the house was accessed historically from a predecessor of Hyetts Corner Road, as it still was in 1937. Circumstantially, this suggested that Hyetts Corner Road existed in some form perhaps as early as the late seventeenth or early eighteenth century. For similar reasons, Boyds Corner Road may be considerably older than the 1820 map as well.

The absence of Hyetts Corner Road and Boyds Corner Road on historic maps predating 1820 may be due to the scale of the maps, or perhaps to the unimproved condition of the roads themselves. Baublitz et al. (2006) relate an anecdote that suggests that there were a sufficient number of minimally improved cart ways crisscrossing early Delaware that it was entirely possible to follow the wrong one by mistake.

Based on these considerations, A&HC concluded that like the roads shown on Faden's 1778 map, Hyetts Corner Road and Boyds Corner Road had the potential to be old enough to be predictors of early historic sites and thus to justify delineating moderate probability zones for early historic archaeological resources based on their locations. As per ADM's model, A&HC delineated these moderate probability zones as extending 500' to either side of the roads.

What is now Jamison Corner Road does not appear on the 1820 map, and no evidence of its existence prior to 1849 was found. The residence in the Read/Elliott Historic High Probability Area was accessed from what is now Jamison Corner Road from 1868 until 1937, but could have been accessed from what is now Hyetts Corner Road prior to construction of Jamison Corner Road. Nearby Ratledge Road was not built until sometime between 1849 and 1868, so the local road network was still developing as late as the mid-nineteenth century. Based on these considerations, and the lack of evidence of its existence prior to 1849, areas along what is now Jamison Corner Road were not considered to have a moderate probability for historic resources.

Archival research led to the delineation of one other area of moderate probability for historic resources within the project's APE. As indicated above (see Section 6.4), deeds indicated that the Bird/Houston Farm once contained a dwelling, but no structure on historic maps representing that dwelling could be found. As a consequence, the entirety of the APE within the limits of what had once been this farm was assigned a moderate probability for historic resources.

8.3 Testing Strategy

Segmentation of APE: A&HC segmented the APE into subsections, each with a specific probability designation. Sections were numbered sequentially from southwest to northeast from 1 to 31. Details of the segmentation of the APE and associated probability designations are presented in Table 3 and on detailed maps of the APE (Appendix 1).

Table 3. Testing Strategy

APE Segment	Probability¹	Disturbed	Vegetation	Survey Methods²
1	PL/HL	N	crops	P\D\SS
2	PM/HL	N	crops	P\D\SS
3	PH/HL	N	woods	ST\Geomorph
4	PM/HL	N	crops	P\D\SS
5	PL/HM	N	crops	P\D\SS
6	PH/HL	some at stream	crops/woods	P\D\SS\ST\Geomorph
7	PM/HM	N	crops	P\D\SS
8	PH/HM	N	crops/woodline	P\D\SS\ST\Geomorph
9	PM/HM	N	crops/woods	P\D\SS
10	PL/HL	N	crops/woods	no further survey
11	PL/HH	N	crops	P\D\SS
12	PL/PM/HH	N	crops/thick brush	ST
13	PL/HH	N	crops/thick brush	ST
14	PH/HL	N	crops/woods	P\D\SS\ST
15	PL/HL	N	crops/woods	no further survey
16	PM/HL	N	crops	P\D\SS
17	PL/HL	N	crops	P\D\SS
18	PL/PM/HH	N	crops	P\D\SS
19 (Ramps 2 and 3)	PL/HL	N	crops	no further survey
19 (Ramp 4)	PL/HL	N	crops	P\D\SS
20	PL/HH	N	crops	P\D\SS
21	PL/PM/HH	modern barn	crops/lawn	P\D\SS\ST
22	PL/HL	N	crops	P\D\SS
23	PM/HL	Y-north side	crops	P\D\SS
24	PH/HH	sewer line	crops/woods	ST\Geomorph
25	PM/HM	N	crops	P\D\SS
26	NIL	sewer, gas, road	crops/paved	no further survey
27	PL/PM/HM	N	crops	P\D\SS
28	PH/HL	N	crops/brush	P\D\SS\ST\Geomorph
29	PL/HL	N	crops	no further survey
30	PM/HL	N	crops	P\D\SS
31	NiIL	Y	paved/graded	no further survey

¹ PH = Precontact High, HH = Historic High, PM = Precontact Moderate, HM = Historic Moderate, PL = Precontact Low

² P\D\SS = Plow, Disk, and Surface Survey; ST = Shovel Test; Geomorph = Geomorphological Survey and Possible Test Unit Excavation

Survey Methods: Prior to initiating Phase Ib archaeological survey, A&HC will perform a systematic geomorphological reconnaissance to evaluate the nature and extent of sedimentation in drainageways within the Purple Section 1 APE. Geomorphological reconnaissance will involve placing hand driven auger probes at sampling locations to be determined by the project soils scientist. Soil profiles of each probe will be described using standard field parameters (Munsell color, texture, structure, rock fragment content, redoximorphic features, etc.). Particular attention will be paid to those characteristics pertinent to the potential for buried archaeological resources (e.g., presence of buried stable surfaces, relative age of the sediments, depositional dynamics, etc.). Evidence of prior disturbance from development activities will also be recorded. The resulting information will guide the placement of test units, which will be used to sample areas that have the potential to contain buried precontact or historic period archaeological sites. The geomorphological survey results will also supplement the delineation of areas that have been previously disturbed, and have no archaeological potential.

A&HC proposes to survey 100% of each APE segment selected for Phase Ib field survey. Additionally, A&HC will employ a high probability testing strategy throughout all segments selected for Phase Ib survey, regardless of probability designation. Where feasible, the survey methodology will consist of plowing, disking, and pedestrian surface survey. During pedestrian surface survey, crew members will walk parallel transects at arms length, covering the entirety of the APE within the survey segment being covered. Areas designated for surface survey will be examined in this fashion with two passes. Artifact find spots will be recorded using GPS, and the artifacts will be recovered and bagged by find spot. A&HC anticipates that approximately 153 acres of the APE will be subjected to pedestrian surface survey (Table 4).

On vegetated uplands unsuitable for plowing and disking, A&HC will excavate shovel tests at a 15 m interval throughout the APE. Shovel tests will measure 50 cm in diameter, and will extend approximately 10 cm into subsoil or to a depth of 60 cm, whichever is less. A&HC anticipates that approximately 24 acres of APE will be covered by shovel testing.

When precontact artifacts are found during shovel testing, A&HC will place additional “radial” shovel tests at 7.5 m intervals from the initial find spot to distinguish isolated finds from more substantial sites. In the event that an artifact is found in a radial shovel test, additional radials will be excavated until no more artifacts are found. Similarly, if historic period artifacts are found during shovel testing, A&HC will decrease the shovel test interval to 7.5 m throughout the extent of the artifact scatter to increase the sample of artifacts and the likelihood of “rare” finds, such as unusually early chronological diagnostics or cultural features. In addition to shovel testing in vegetated areas, A&HC will place shovel tests opportunistically throughout the areas subjected to pedestrian surface survey to confirm soil stratigraphy and the context of discovered sites. It is estimated that on average, approximately two shovel tests per acre will be placed in areas of pedestrian surface survey. In all, A&HC estimates that approximately 750 shovel tests will need to be excavated (Table 4).

A&HC will employ special measures to increase the likelihood of discovering early and potentially ephemeral historic archaeological sites. A&HC will provide its US 301 Phase Ib field crew with special training in the recognition and field identification of historic ceramics

Table 4. Estimate of Overall Survey Effort

APE Segment	Probability	No. STs	No. TUs	Acres P/D/SS
3	PH	30	4	-
6	PH	50	4	4.5
8	PH	8	4	2.4
14	PH	16	2	8.1
24	PH	16	4	-
28	PH	16	2	10.7
Subtotal PH		136	20	25.7
11	HH	8	1	4.1
12	HH	120	1	-
13	HH	120	1	-
18	HH	16	1	8.2
20	HH	20	1	9.6
21	HH	48	1	7.8
Subtotal HH		332	6	29.7
2	PM	6	-	2.9
4	PM	10	-	5.3
16	PM	12	-	5.6
23	PM	14	-	6.6
30	PM	14	-	7.3
Subtotal PM		56	0	27.7
5	HM	30	1	15.4
7	HM	20	1	10.1
9	HM	18	1	8.5
25	HM	4	1	1.7
27	HM	8	1	3.6
Subtotal HM		80	5	39.3
1	PL	8	-	4.0
17	PL	20	-	10.4
19 (Ramp 4)	PL	24	-	15.1
22	PL	2	-	1.0
Subtotal PL		54	0	30.5
Additional ¹		100		
Totals		758	31	152.9

¹ Additional STs for Radials, etc.

diagnostic of early settlement in Delaware. Additionally, A&HC's archaeological laboratory will continuously monitor the types of artifacts recovered during fieldwork. A&HC field crews normally work on ten day rotations during field survey, and at the end of each such rotation all artifacts recovered will be returned to A&HC's laboratory for immediate processing. Laboratory personnel will alert A&HC's project Principal Investigator if any early historic artifacts were recovered but not recognized as such in the field. The field crew will then be instructed to implement more intensive survey procedures at the location of the find, such as additional and more intensive surface inspection, shovel testing at a tighter interval, or test unit excavation.

Where the geomorphological reconnaissance indicates there is a potential for buried archaeological resources, A&HC proposes to excavate 1 m x 1 m test units at 30 m intervals. Test units will be excavated in 10 cm levels within natural strata, and will extend to the depth of pre-Holocene soils, as determined during geomorphological reconnaissance. A&HC's project soils scientist will examine selected test unit profiles to further interpret depositional contexts and to confirm depths of testing.

A&HC will also excavate test units in upland settings as appropriate to further elucidate the context of discovered archaeological sites, increase artifact samples, examine potential feature locations, and the like. For estimating purposes, A&HC proposes to excavate multiple test units in drainageways with the potential for buried resources, as well as one unit on average in every upland APE segment with a high or moderate probability for historic sites. The actual locations of test units in upland areas will be determined during Phase Ib field survey. With these assumptions, approximately 30 test units will be completed (Table 4).

If unmarked human interments are found during Phase Ib field survey, proper protocols will be followed. Fieldwork will cease and DelDOT will be notified immediately so they may notify the SHPO and the Advisory Council within 24 hours of the discovery. A&HC will assist DelDOT in its compliance with the Delaware Unmarked Human Remains Act (Delaware Code Title 7, Chapter 54). Any further activities, under guidance from the SHPO and DelDOT, will comply with 36 CFR Part 800 and the Native American Graves Protection and Repatriation Act of 1990 (PL 101-601) with regard to disposition of the remains and/or associated funerary objects.

Sampling: A&HC proposes to survey 100% of precontact and historic high and moderate probability areas. Since historic moderate and high probability areas are situated principally in areas of low probability for precontact resources, this will result in coverage of portions of these latter areas as well, providing a partial test of the precontact predictive model. Additionally, A&HC selected a sample of low probability areas for precontact archaeological resources that are not within moderate and high historic probability areas, and will survey them at a high probability level of intensity. Since all of these latter areas by definition have a low probability for historic resources, this procedure will provide a test of the historic predictive model as well as a further test of the precontact predictive model.

Including areas of low probability covered by moderate and high probability areas, the following overall coverages were achieved by the selected sample of APE segments:

- 100 % of precontact high and moderate probability areas
- 100 % of historic high and moderate probability areas
- 63% of precontact low probability areas
- 65% of historic low probability areas

In all, approximately 68% of the area within the Purple Section 1 APE will be subjected to survey.

To generate the proposed sample A&HC selected a subset of the numbered survey segments described above, and will survey the entirety of each selected segment. An alternative to this strategy might, for example, involve selecting a sample of smaller survey blocks of consistent size from within individual survey segments, in such a manner as to provide the targeted percentages of the portions of the APE to be sampled. The advantages of the approach used here are principally logistical. Surveying entire segments of the APE rather than a larger number of smaller survey blocks within the those segments will reduce the mobilization/ demobilization costs of plowing and disking as well as survey area delineation by the field crew.

The selection of the specific APE segments to be covered by Phase Ib field survey was to some extent intentional (purposive) rather than random. There is a long history in the archaeological literature of debate regarding the benefits and disadvantages of various sampling strategies for archaeological survey. While a review of this debate is beyond the scope of this study, suffice it to say here that while simple random samples or stratified random samples have the advantage of potentially being able to support statistical measures of significance, archaeological data rarely meet the requirements for such analyses for many reasons other than sampling design. Additionally, random samples and stratified random samples rarely meet other, non-scientific goals of archaeological projects. In this study one reason not to use a purely probabilistic sampling design was the desire to maximize the inclusion of cultivated areas in the sample to be surveyed to increase survey efficiency. Thus the proposed sample of APE segments for survey was not selected entirely randomly, but was instead intended to maximize inclusion of cultivatable, undisturbed areas while incorporating representative topographic and pedologic variability along the full length of the project corridor. The selected sample is documented in the testing strategy table (Table 3) and on detailed maps of the APE (Appendix 1). The various rationales for the elimination of APE segments for further survey are presented in Table 5, and estimates of survey effort in Table 4.

Table 5. Sampling Rationale, APE Segments Selected for No Survey

APE SEGMENT	Probability	Rational for Selection
10	PL	Vegetation Cover (Woods)
15	PL	Random
19 (Ramps 2 and 3)	PL	Random
29	PL	Random
31	PL	Disturbed