5.0 METHODS

The archaeological field investigations at the Blackbird Creek site (7NC-J-195D) were conducted in two phases—site evaluation (Phase II) and data recovery (Phase III)—consistent with conventional Cultural Resource Management practices in the State of Delaware (Figure 5-1). CR Divisions historians conducted research at numerous repositories in Delaware and the District of Columbia. Specific archival research methods and the location of pertinent records examined are detailed below. The CR Division developed appropriate, site-specific field methods, including shovel testing, unit excavation, and mechanical stripping, through continual monitoring and consultation with DelDOT and DE SHPO. A field laboratory was established at a DelDOT facility in Little Heaven, Delaware to aid in preliminary artifact processing, assessment, and development of electronic databases. More thorough artifact analysis and processing was conducted at the archaeological laboratories in Fairfax and Springfield, Virginia. Prehistoric stone tools and ceramics underwent special artifact analysis. Upon final completion of artifact analysis and cataloguing, three-dimensional computer mapping software aided interpretation of site activities.

5.1 Field Methods

A variety of field techniques were employed during the evaluation and data recovery investigations at the Blackbird Creek site. The field and laboratory methods used were chosen to address specific research questions. Methods utilized during the site evaluation
Archaeological Investigations at the Blackbird Creek Site

included close interval shovel testing, test unit excavation, and mechanical removal of the plow zone. Shovel testing aimed to accurately delineate site boundaries and locate artifact concentrations indicative of discrete activity areas. Upon reaching these goals, test unit excavation served to identify subsurface deposits, clarify site stratigraphy, and locate in situ cultural features. Mechanical stripping of the plow zone, via backhoe, was conducted to expose subsurface features truncated by plowing. Collectively, the site evaluation field and laboratory methods were crafted in order to address the four NRHP eligibility criterion and seven elements of integrity. Data recovery investigations focused exclusively on wide-area exposure through mechanical stripping in order to identify additional features and elucidate their horizontal patterning. The excavation methods utilized during the evaluation and data recovery investigations at the Blackbird Creek site are summarized in Table 5-1.

<table>
<thead>
<tr>
<th>Excavation Method</th>
<th>Evaluation</th>
<th>Data Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shovel Tests</td>
<td>193</td>
<td>--</td>
</tr>
<tr>
<td>Test Unit (1 m²)</td>
<td>85</td>
<td>--</td>
</tr>
<tr>
<td>Mechanical Stripping</td>
<td>418 (linear m)</td>
<td>5,250 (m²)</td>
</tr>
</tbody>
</table>

The site itself was centered on a small bluff overlooking Blackbird Creek. A natural springhead was located in a swale in the northwest portion of the site. A metric grid was established to encompass the site area utilizing the then-proposed roadway’s surveyed centerline as a baseline in order to accurately locate and electronically map the site. Shovel tests were excavated at 10-m intervals across the site area. Horizontal provenience data recorded for all shovel tests and subsequent 1-x-1 m test units included: site, transect, and grid coordinates (northing and easting). Shovel test data were used to generate artifact distribution maps that aided in the redefinition of site boundaries. Delineation of these boundaries resulted from analysis of a combination of localized topographic conditions and artifact frequencies: i.e., two consecutive negative shovel tests within a grid transect formed a boundary.

Each shovel test measured ca. 50 cm in diameter and was excavated at least 10 cm into culturally sterile subsoil. Shovel tests were excavated by natural stratigraphic levels (i.e., by soil color/texture change), and depths were measured relative to ground surface. All sediments were screened through quarter-inch mesh hardware cloth to ensure uniform recovery of cultural materials. Stratigraphic profiles were recorded on standard forms, listing soil texture, color (using Munsell Soil Color Chart notation, 1990 Edition), and inclusions.

Based on the results of shovel testing, test units measuring 1-x-1 m each, were placed in locations selected on the basis of high artifact frequency and potentially intact sub-plow zone contexts. The plow zone deposit was excavated as a single vertical context. Below the plow zone, excavation was conducted in 10-cm arbitrary levels within natural stratigraphy. Vertical controls for test units and for later feature excavation within the stripped areas were maintained by a series of intermediate datum points tied into the known elevations of the centerline stakes. All sediments excavated from test units also were screened through quarter-inch mesh hardware cloth. Profile sections were recorded for each test unit on standard forms, listing data similar to that recorded for shovel test excavations: soil
consistency and color, and natural and cultural inclusions. Sections were also drawn to scale and documented photographically. Features identified below the plow zone were bisected and sampled to determine their morphology, contents, and if possible their cultural affiliation and function. Features were drawn and photo-documented in plan view and profile section. All unit excavations were continued until culturally sterile subsoil was reached.

Artifacts were separated by stratum and level and placed in resealable polyethylene bags labeled, in indelible marker, with complete horizontal and vertical provenience information. A bag inventory form recorded provenience information and general contents for each artifact bag.

Mechanical stripping of the plow zone exposed sub-plow zone features. Excavation consisted of controlled removal of the uppermost horizon with a backhoe, outfitted with a smooth (toothless) bucket attachment. Smooth bucket excavation results in a smooth excavation surface allowing greater visibility of potential features. Upon excavation, the glossy sheen created by the backhoe was removed with flat-headed shovels and trowels to better expose potential cultural features for identification and mapping purposes.

Test unit and mechanical excavations revealed numerous cultural features. The majority of these features were excavated to determine function and recover in situ cultural material (Figure 5-2). Prior to excavation, features were mapped in plan view then bisected. After mapping, one half of the feature was excavated according to internal feature stratigraphy, when present, and by 10 cm arbitrary levels within strata. The remaining feature half was left unexcavated and feature profiles drawn.

Feature matrices were screened through quarter-inch hardware cloth. Artifacts were bagged according to horizontal and vertical provenience in labeled 4-mil resealable bags. Additionally, a two-liter sample was retained from each feature for the purpose of macrobotanical study and radiometric dating. Samples consisted of unscreened feature soils recovered from feature bases or level bases, in the case of stratified features.

### 5.2 Laboratory Methods

#### 5.2.1 Field Lab Procedures

Artifacts recovered during both phases of the archaeological investigation were inventoried at the Field Lab, located in Little Heaven, Delaware. Artifacts were classified by general category (prehistoric; historical) and specific type (thermally altered stone, flaking debris, nail, brick, etc.), and tallied by horizontal and vertical provenience.

The inventories produced in the Field Lab were entered into a preliminary database and used to generate a series of artifact distribution maps by means of commercially available mapping software. The distribution maps were continuously updated to provide feedback that aided in the direction of test unit and backhoe excavation throughout the evaluation and data recovery investigations.
Figure 5-2. Feature Excavation.
5.2.2 Fairfax/Springfield Laboratory Procedures

Artifacts were cleaned in plain water, and bagged by material and artifact type in 4-mil polyethylene zip-lock bags. Diagnostic artifacts were labeled with the Provenience/Catalogue Control Number, which was 99/50 for all of the Blackbird Creek site artifacts recovered during the evaluation and data recovery investigations, as well as the bag number using acryloid B-72 sealant and black or white pigment ink. Catalog numbers and provenience information were written in indelible ink on the outside of the bags, and an acid-free tag with the same information was placed in the bags. Artifacts were stored in acid-free trays within 20” x 20” x 3” corrugated polypropylene flat boxes. Photographic images, stored in archival slide and print sleeves, and written field records were organized and stored with the collection.

In addition to the artifacts, samples including unmodified cobbles, charcoal, and soil were collected and the following details which samples were retained for curation. All unmodified lithic cobbles collected as part of the local gravel resources study were discarded after analysis. All unprocessed charcoal samples (n=191) were retained and stored with the collection. The charcoal samples are listed in Appendix I. A total of twelve 2-liter soil samples were analyzed for ethnobotanical remains and the heavy and light fractions of the floated samples were curated with the collection to allow for future study. Due to the significance of the features at the Blackbird Creek site and the fact that chemical and sedimentological analyses of the soil were not part of the current project, several one-pint (0.47-liter) soil column profile samples also were retained for curation. Curated samples include the full columns from Feature 52 (11 samples), Feature 95 (17 samples), Feature 96 (2 samples), and Feature 156 (5 samples). The samples selected from Feature 95 also include control samples taken from subsoil adjacent to the feature. All soil samples were thoroughly air-dried and stored in 4-mil polyethylene bags. The total of 35 curated soil samples are listed individually in Appendix I.

5.2.3 Analytical Methods

A full artifact inventory was compiled using database management software for analyses and for integration with Geographic Information Systems (GIS) (Appendix D). In addition to provenience information, coding for database entry included the general group, raw material type, morphological type, segment, presence or absence of cortex, color, indication of heat exposure, size grade, refit/mend group, and weight. Additional subfields were recorded for historical period artifacts.

In addition to descriptive attribute analysis conducted during cataloging, analytical studies performed in-house included lithic usewear analysis, ceramic cross-mending, and spatial analyses. Analyses performed by outside laboratories or consultants included radiocarbon analysis (Appendix E), archaeobotanical analysis (Appendix F), and ceramic thin section analysis (Appendix H). Summaries of results of these studies are presented in the appropriate sections of the Archaeological Findings (6.0) in the main body of the report. Complete texts of specialized studies are presented in the appendices.
The remainder of this section contains information about the methods and terminology used in several of the analyses.

**Ceramics**

Each sherd was examined individually and catalogued for temper, interior surface treatment, exterior surface treatment, weight, and thickness. Interior and exterior sherd surfaces were examined for evidence of scraping, smoothing, finger impressions, fabric/mat/net impressions, cordage impressions, adherent residue, and any other surface variation present. When applicable, information regarding cordage was recorded. The sherds were classified in relation to established types to facilitate the discussion of chronology and help highlight the similarities and differences of the collection with others in the region.

Residues were noted on four sherds, and these were photographed and removed before the sherds were handled. Residues were removed from ceramic sherds 367-1, 409-1, 420-2, and 422-2 by gently scraping the sherd surfaces with a clean blade. The residues were stored in aluminum foil and curated with the collection to allow for future analysis.

After cataloging and the removal of the residues, the sherds were cross-mended in order to reunite sherds from individual vessels and provide data on vessel form as well as sherd distribution patterning within the features. After mending, descriptions were prepared for the vessel lip, rim, body, and base. The range of exterior, interior, and core surface colors on representative sherds from each ware also were recorded using a Munsell Color Chart (1990 Edition).

Two sherds from the collection were selected for petrographic thin-section analysis to more fully document the characteristics of the tempering materials and natural inclusions within the ceramic bodies. The selected sherds were representative of the two wares present at the site, Dames Quarter and Marcey Creek. In addition, an experimental clay tile was prepared, fired, thin-sectioned, and submitted with the artifact thin sections to help determine whether the clay used to make the ceramics found archaeologically was similar to a sample of clay that was collected near the site. A description of the methods used to prepare the tile and thin sections is found in Section 7.2.2. A full description of the methods of thin-section analysis is found in Appendix H.

**Lithic Material and Technology Analysis**

**Points.** Points are chipped stone artifacts, usually bifacial in manufacturing technology and bi-laterally symmetrical in shape, that have a thinned, proximal end that functioned as a hafting element, and a distal end with blade edges that converge to an apex or point. Labels ranging from “projectile point” to “hafted biface” have been used to designate these artifacts. The simpler term point is used here, chosen since it does not imply an undemonstrated function, as in the former case, but is not as deliberately non-functional as the latter.

The descriptive analyses of points from the Blackbird Creek site have been organized morphologically. For artifacts that were sufficiently complete, a standardized series of attribute data were recorded. These data included dimensional measurements, such as length, width, and thickness.
**Bifaces.** Bifacial artifacts were defined by the presence of patterned flake removals from opposing surfaces along at least one edge. Most bifaces were further defined by a regularized shape. All of the complete bifaces from the sites were measured for length, width, thickness, and weight. Bifaces were subdivided into two categories during the cataloging process: *early stage* and *late stage*. These subdivisions were based on several attributes related to the overall appearance of the artifacts, including the degree of shaping that had been undertaken, relative thickness, and the sinuosity of edge profiles.

**Retouched Flakes.** Retouched flake tools were characterized in the analysis by marginal flake scars at least 3 mm in length oriented perpendicular to the flake edge that had resulted in minimal shaping along the flake perimeter. The focus of the flaking on retouched flake tools was edge modification rather than formal shaping.

**Utilized Flakes.** Utilized flake tools were identified by the presence of usewear along the edges of the artifact, but no evidence of intentional edge modification. Usewear was indicated by the presence of various types of edge degradation or modification, such as microflake removal, rounding, or blunting.

**Cores.** Cores are typically separated into two categories based on flake removal patterning: multidirectional and bipolar. Multidirectional cores were defined as cores with flake removal occurring in a random pattern from multiple platforms. Bipolar cores were identified by the crushed proximal and distal ends resulting from force generated from the percussor and the anvil.

**Flaking Debris.** Flaking debris was separated into two basic categories: flakes and chips. Flakes were defined by the presence of identifiable attributes such as bulbs of percussion, striking platforms, dorsal flake scars, and feather, snap, or hinge terminations. Chips, sometimes referred to as shatter, represented small-to-medium sized, angular pieces of lithic material with no identifiable flake attributes. The artifacts were assigned a size grade using the following interval scale:

- Size Grade 1: < 1 cm
- Size Grade 2: ≥ 1 cm and < 2 cm
- Size Grade 3: ≥ 2 cm and < 3 cm
- Size Grade 4: ≥ 3 cm and < 4 cm
- Size Grade 5: ≥ 4 cm and < 5 cm
- Size Grade 6: ≥ 5 cm

**Groundstone tools.** Groundstone or pecked stone tools were used for a variety of tasks including battering, abrading, grinding, and pecking. These tools typically consisted of unmodified, rounded cobbles procured locally from stream beds or other exposed gravel deposits. In the current analysis, three functional categories were recognized: hammerstones, abraders, and anvils. Some groundstone tools contained multiple usewear patterns and were categorized based on most frequent use type in evidence.
Spatial Analyses

Analysis of artifact distributions was conducted using commercially available software (Surfer) that generates contour plans from grid-based data. The software was originally designed to produce topographic maps diagramming the physiographic features of a landscape. It has subsequently been adopted by other disciplines, including archaeology, to model various additional types of data. Archaeologists regularly use the software to perform a type of spatial analysis that results in frequency maps of horizontal artifact distributions. Isopleths, or lines connecting areas of equal magnitude (in this case frequency), are determined by one of a series of interpolation algorithms that estimate the distribution of material at a given point within the site grid by examining the arrangement of the surrounding data. Artifact concentrations are implied by contour lines that form concentric polygons indicating regions of higher or lower artifact frequency.