8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Summary of Findings

The archaeological site evaluation and data recovery investigations at the Black Diamond site (7NC-J-225), in southern New Castle County, Delaware, represented an extensive investigation of early Native American occupation of the Delmarva Peninsula. The work was conducted in compliance with federal legislation, employing a work plan designed specifically to mitigate the adverse effects of road construction associated with the upgrading of U.S. Highway 13/State Route 1. The site lay in the Coastal Plain uplands near the drainage divide between Blackbird Creek and the Smyrna River watersheds. The area is characterized by wide, rolling terraces that contain a series of distinctive topographic features known as bay/basins. The Black Diamond site was located adjacent to one of these features, with the occupation centered on a dune-like ridge on the northeast side of the basin. The right of way of the proposed road construction extended through the site. The archaeological investigations were thus planned to recover significant information, in advance of the development, about the people who had once lived there.

Initial site evaluation work entailed the excavation of a 5-m-interval grid of shovel tests across the portion of the landform on which the site occurred in an effort to fully define the site boundaries. Shovel testing was followed by the excavation of 1-m^2 test units on 10-m intervals across the site. These evaluation procedures successfully defined a dense and discrete concentration of prehistoric artifacts, primarily quartzite flaking debris, centered near the crest of the ridge overlooking the bay/basin. A plow zone mantled the entire site, while undisturbed sub-plow zone contexts occurred in the area of the main artifact concentration. Data recovery investigations were carried out primarily within a block of contiguous units placed over the main artifact concentration. Individual units were also excavated in other locations associated with the site with the aim of obtaining sedimentological data to aid in reconstructing the site setting.

The following concluding sections of the report review the findings and consider some of the implications of the analyses.

8.1.1 Cultural and Environmental

Temporal Components

Temporal data from the site indicated the presence of a single cultural component that appeared to have represented a very limited time span. Data used to assess chronology at the site included the results of three standard forms of analysis: stratigraphic associations, diagnostic artifacts, and absolute (AMS) dates from organic material.

Stratigraphy

Natural and cultural stratigraphies did not correspond fully, but the variation was uncomplicated and did not appear culturally significant. Natural soil horizons were characterized by a classic A-E-Bw sequence that is typical of what is referred to as a spodosol order, which occurs in association with needle-leaf or coniferous forest communities. That these horizons did not directly correlate with the primary cultural occupation remains was attributed to soil formation that had continued following the

occupations in a process referred to by the project geoarchaeologist as overprinting. Archaeological excavations suggested that a single cultural component was present within the soil column and that the uppermost portion had been disturbed to some extent in late historical or modern times by plowing. A plow zone occurred across the site area with a nearly uniform thickness of approximately 20 cm. The presence of horizontal concentrations of artifacts within the plowed sediments suggested that at least some evidence of the original structure of the site was preserved. The sediments directly below the plow zone appeared to be the undisturbed portion of the occupation zone, as evidenced by patterned artifact distributions that directly correlated with those in the plowed layer. Vertical artifact distributions indicated that most of the artifacts occurred in the first 10-cm level below the plow zone, implying that the artifacts in the occupation layer had been partially buried prior to the agricultural disturbance. The relatively rapid buildup of soil on a ridge top such as this appeared contrary to typical geomorphlogical models of erosion, but detailed analysis of various attributes of the sediments, including particle size, roundedness or sphericity, and surface frosting, indicated that they had accumulated largely by aeolian or wind-blown processes.

Artifacts

The Black Diamond artifact assemblage was dominated by a distinctive type of quartzite that had been used to manufacture a series of stemmed points. The points were well-flaked, exhibiting wide blades that were symmetrical and triangular in shape, with straight-to--slightly convex blade edges and prominent to rounded shoulders. Stems were wide, short, and contracted slightly to a rounded base. Temporally, the points were considered to have been related to broad-blade traditions prevalent across the Middle Atlantic in the latter part of the Late Archaic and, more specifically, to the Savannah River tradition. Although two narrow-bladed points were contained in the artifact collection, no clear evidence for substantial additional components was recognized the site. Quartzite dominated the artifact assemblage, while a number of secondary lithic materials were present. Spatial analysis indicated that the occurrence of these secondary types corresponded sufficiently closely with the well-defined distributions of the dominant quartzite artifacts to demonstrate temporal, if not functional, association rather than separate cultural components.

AMS Dates

The absolute dates returned on organic samples from the excavations were later than the presumed range of the diagnostic artifacts, and thus they were problematical in terms of determining the chronology of site occupation. The dates ranged from the latter part of the Woodland period onward to the present, while diagnostic artifacts suggested that the site occupation probably dated to the latter end of the Late Archaic period. Poor preservation of early organic material may have been a factor in the absence of dates corresponding with the artifacts, although similar sedimentary regimes at the nearby Frederick Lodge sites included preserved carbon dated solidly to the Archaic. Little fire-cracked or thermally altered rock was present at the site, which could indicate that most of the site activity was not fire-related. Inconsistencies were also observed in dates from bulk sediments and features cut into the sediments. The geoarchaeological analyst suggested that a variety of post-occupational processes and sources of potential contamination may account for the discrepancies. Given the ambiguity of the chronometric results, temporal placement of site use relied on several

diagnostic attributes of the material culture assemblage, including the horizontal and vertical distributions of artifacts, feature patterning observed in the site data, and the stylistic characteristics of particular artifacts. This information considered as a whole suggested that the record from the site was that of a single cultural component from the latter part of the Late Archaic

Interpreting Site Use

The archaeological remains at the Black Diamond site were characterized by a large amount of chipped stone that represented the intensive use of a distinctive form of quartzite for the manufacture of a specific projectile point form. The form appeared to be related to or derived from the Savannah River tradition, itself characterized by points with broad blades, prominent shoulders and straight or contracting stems. At the Black Diamond site, the points and their manufacture were part of a widely recognized pattern in the Late Archaic of broad-bladed point forms made from hard, coarse-grained stone that was generally available from local sources. The source of the quartzite used at Black Diamond remains unclear, but was projected to have been in the Herring Run area of the Blackbird Creek Valley, located some two kilometers north of the site.

Site Activity and Occupation Duration

Although quartzite flaking debris dominated the site assemblage, a variety of secondary lithic types was present, including stone such as quartz, jasper and chert, derived from local pebble sources, and non-local material such as argillite and rhyolite. While quartzite reduction was the most visible site activity, tools unrelated to lithic reduction were also recovered, indicating that the people living on the ridge above the bay/basin engaged in a range of activities beyond biface manufacture. These items included flake tools, unifaces, a drill, and at least one formal, multi-purpose cobble tool. Also among the archaeological remains was drilled slate pendant. Some of the features documented at the site may well have been related to domestic occupation, perhaps representing the bases of structures, prepared floors, or purposefully excavated pits. The archaeological evidence was not clear, but it would not be unreasonable to think that such features would be present. Further, the spatial distribution of artifacts at the site indicated areas without debris, suggesting site maintenance within domestic activity areas. These findings strongly suggested that the occupation of the Black Diamond site was functionally diverse and represented more than a simple lithic reduction locale.

Missing from of the site was evidence of fire-cracked or thermally altered stone. While hearth-related activities typically played a major role in most significant prehistoric occupations, these activities are not represented in the feature and artifact record at the Black Diamond site. At first glance, the absence of thermally altered rock seems unusual for an occupation site. But that interpretation could merely be a matter of current perception. That is, we associate heated rock with fire and settled occupation when in fact our sense of that relationship may only be a product of previous analysis and interpretation. The data could indicate fire-related activities—simple cooking or lighting—that required little use of heated stone. Alternatively, the absence of heated stones could indicate little use of fire, implying among other things that the site was occupied during seasons of warm weather. A corresponding pattern was noted in the absence of charcoal from the occupation period

represented by the artifact assemblage. While that finding could in part be a function of the variable long-term preservation of organic material, it may further indicate little fire-related activity at the site. In the end, a clear interpretation was not apparent.

It does seem clear, however, that the site was not a temporary workshop location and that, in spite of the large amount of debris from a single type of stone, it did not appear to have been a quarry location. People lived at the site for a period of time. Yet, the site was essentially contained within an area measuring about 30 m in diameter, representing a limited portion of the landform alongside the bay/basin and directly implying that the site was occupied by a small group of people. The compact nature of the site and the presence of curated items such as hammerstones further suggested that people repeatedly returned to the same location at short intervals, probably not more than a generation or two such that memory of the location was maintained. Because they had been there within recall, they returned to the same familiar place on the ridge.

Technology

The archaeological remains recovered from the Black Diamond site appeared to represent those of a small group of people engaged in a variety of tasks related to day-to-day living, the most visible activity from our analytical perspective being the reduction of quartzite in the manufacture of stone tools. Since flaked stone debris was the most plentiful data recovered from the site, the technology it represented became the main focus of the archaeological investigation.

Scale of Production

Using experimental data from several biface replication studies, the amount of flaking debris from the site was used to estimate the number of points manufactured there—at least 100. At first glance this number may seem high, representing more tools than would be needed by a single group of individuals. However, that interpretation may be yet again a matter of our own perception, compounded by the visibility of the artifacts archaeologically. Because of the distinctive and unusual nature of the material, we have the ability to link the debris to a particular incidence of production, whether a single episode or more than one over the course of several years or decades. The debitage was concentrated, not dispersed by post depositional forces or activity. In typical archaeological deposits, in contrast, we see a mixture of debris—various material types from several episodes of site use at widely different time periods—and we have little way of associating particular groups of debitage analytically with a particular set of finished artifacts. Nor do we often have a dependable means of assessing the number of points manufactured at a specific location. Points were by nature expendable, being easily damaged or lost. Given the opportunity people probably made as many of the tools as was practical. Access to raw material and portability would seem to have been the limiting factors in the numbers manufactured at any one time. With gravel or cobble deposits available nearby as a source, as was the case at the Black Diamond site, raw material would not have been an issue. The number of points that could be practically carried might be an important determining factor. Thus, if we assume several visits to the site over the course of a generation or two, the manufacture of a cumulative total of 100 artifacts would not necessarily seem excessive.

Taking this line of interpretation a step farther, Mounier (2007:7) noted that at the Abbott Farm complex, in the Delaware Valley of New Jersey:

> …expert artisans of the Middle Woodland period produced thousands of broad-bladed Fox Creek bifaces with 'cookie-cutter' exactitude, giving rise to the claim of their membership in a small, but elite class of specialists (Jack Cresson, personal comm; Mounier; 2003:154; Stewart 1987:40-42). Mass production to very close tolerances (if not specifications) would seem to demonstrate special roles and statuses for individuals who were capable of such finesse.

We cannot claim the same volume of data at the Black Diamond site, the same level of precision in analysis, or the same level of artifact production, but we assume from the size of the site that the group of individuals living there was small and that while more than one person appeared to have been responsible for the points made at the site, the social organization of the group most likely did not exhibit labor specialization.

Regarding the uniqueness of the quartzite from the site, the material is sufficiently unusual in appearance that it can be easily identified, and artifacts manufactured from it have been documented at other locations in the region. Sites with examples in the immediate vicinity of the Black Diamond site included Blackbird Creek (7NC-J-195D), and to the south, Puncheon Run (7K-C-51) and Hickory Bluff (7K-C-411), on the St. Jones River in Kent County. Artifacts from these sites included points, flaking debris and fire-cracked rock. Notably, the diagnostic points were not the broad-bladed Type I form characteristic of Black Diamond, suggesting that they were not manufactured at that site.

As a final note regarding technology and occupation duration, some researchers have argued that ready access to raw material, particularly in pebble or cobble form, was related to or even fostered *ad hoc*, less formalized tool production by emphasizing expediency and mobility (Mounier 2007). Others have correlated decreased mobility and long occupation duration with characteristics such as abundant local material (Holdaway et al. 2008), greater tool diversity (Shott 1986), and core rather than biface technology (Parry and Kelly 1987). At the Black Diamond site, although only a few finished artifacts were present from which to judge, we assume that the artisans engaged in a formalized industry that repeatedly generated a specific tool form, and therefore we see the association of local material, relatively long occupation duration, and a formal production sequence that included initial reduction at the material source, some distance from the site.

Material Selection and Color Symbolism

The use of quartzite at the Black Diamond site seemed to be consistent with the regional patterns of the Late Archaic in which hard, coarse-grained stone, procured locally, was the preferred material. And while availability and hardness were certainly factors in the selection of the stone, its appearance may also have been an important concern—symbolic aspects of the color of the stone may have featured in the decision to choose the material. Symbolism, particularly when associated with an experience as arresting and immediate as our perception of color, is often culturally pervasive, even in what would seem to be mundane technological aspects of life. Boivin (2008), for example, noted that materials and production techniques may be selected not only to maximize strength or durability, but for

their symbolic significance. Yet, the derivation of the symbolic relationship—the connection between symbol and object—has been contrastingly regarded by anthropologists as either arbitrary (Renfrew 2001) or direct (Boivin 2008). The unusual appearance of the quartzite used in the tool making industry at the Black Diamond site may have been a critical factor in its selection and use and an example of direct symbolism. The stone consistently bore a gray to occasionally reddish gray color, the gray perhaps directly symbolic of harnessing the power inherent in the earth, the red for the power of blood and its implications for hunting success. The sparkling quartz grains, moreover, may have been seen as a further source of brilliance and power. While we have no hard evidence that this symbolic connection was made, it is not unlikely that the stone was selected and used in part due to these factors.

Technological Sequence Modeling

The *chaîne opératoire* analytical process was used as a means of assessing the lithic technological data from the Black Diamond site. A basic assumption of this form of analysis is that manufacturing technology is a planned sequence intended to generate a standard design or form. The model also accounts for what is sometimes referred to as situational variability, the possibility that irregular implementation of the design may result from such things as variations in raw material, craftsmanship, or personal choice, and which may, by implication, provide insights into individuality (Bleed 2001).

In the Black Diamond assemblage the small number of finished points made it difficult to determine with confidence whether a standard form may have been intended and, consequently, how much variation from a standard plan there actually may have been. Some obvious constraints could be identified: for example, the size and form of the raw material—cobbles—would have affected the maximum size and to some extent the cross-sectional shape of the artifacts. It was more difficult to assess other aspects of form, such as shoulder configuration—whether the form was related to the intended form or function of the tool, or whether it was it a factor of the workability of the material, the skill of the artisan, variations in skill or choice among different artisans, or possibly some type of social constraint.

However, with a few additional assumptions we can provide some conjectures. The repeated appearance of a set of stem and blade characteristics—a wide blade combined with prominent but rounded shoulders and a wide, slightly contracting stem with rounded base—did suggest that a standard design had been followed. This pattern occurred on three points (#616-1; #1429-2; #161-2). Assuming this was a standard form, two artifacts (#1295-1 and #572-2) represented sharp-shouldered variants. No obvious raw material constraints within the quartzite appeared to have influenced the variation, and the workmanship seemed competent in each instance. In terms of raw material types, two additional examples (#235-1 and #490-1[1]) were made from quartz but exhibited the standard form. A third point (#859-1) was an ironstone variant, also of the standard form. This material, still within the pattern of hard, coarse-grained stone, could have been a piece brought to the site from outcrop areas in Cecil County, but was more likely found in the cobble source with the rest of the quartzite. These variations in stone types suggested that from a practical standpoint at least, raw material was not necessarily a major constraining factor. Thus the sharp-shouldered

[1] #490-1 exhibited a different blade form—narrow and beveled—probably reflecting use and refurbishing more than the originally intended form.

variation may have been functional, the tools intended as a specific type of hunting projectile with barb-like shoulders designed to keep the projectile embedded in the prey. Alternatively, the variation could have been evidence of a specifically idiosyncratic action in which an individual artisan varied the form according to personal choice.

The two longer stemmed and narrow-bladed argillite points (#109-1 and #572-1) could represent alternative templates or alternative outcomes based on raw material form, although given the absence of flaking debris of the same material, the points did not appear to have been manufactured on-site and so may not have been part of the same manufacturing sequence.

Individual Agency

The variations in projectile point form may be seen as part of a wider concern regarding the relationship between cultural tradition and the individual. Current anthropological theory holds that social relations are manifested and reinforced through everyday activities, present in the immediate context of material culture but further within a framework of tradition, beliefs and values. The core of this dynamic is the relationship between individuality and tradition, sometimes referred to as agency. Technology is embedded in culture—it is traditional, and therefore constrained by culture, yet not blindly determined by it. People are seen as agents of technology, acting within cultural constraints. The flintknappers at the Black Diamond site operated within the structure of their own socio-cultural environment following a sequence of production that ended in the consistent replication of particular design criteria—points exhibiting the same base/hafting element, the same overall artifact size and proportions. They also appeared to operate within the larger, regional pattern of Late Archaic stone tool technology, working with hard, coarse-grained raw material and manufacturing a specific broad-bladed and stemmed point form. However, evidence of individual choice was observed in a degree of variation in the design (prominent rather than rounded shoulders) and the occasional use of different raw material (quartz or ironstone rather than quartzite).

Theory also suggests that idiosyncrasies introduced into traditional systems, whether considered or accidental, provide innovation that can effectively recast tradition, reinterpreting and redefining it. Innovation may be slow to develop or to be accepted, since resistance to change is part of the human condition. With the blossoming of industrial technology in western European societies since the nineteenth century, our own response to change has become increasingly open. In contrast, reaction to change in traditional societies, which tend to be conservative, is guarded (Renfrew 2001; Service 1966; Young and Bonnichsen 1984). Ultimately, though, the source of innovation and thus of culture change is human action or agency (Robb 2001). At the Black Diamond site, stone tool manufacture was not a new technology. The process dates to the very beginnings of human culture millions of years ago, and so it did not foster change in and of itself. Indeed, the technology presumably had the opposite effect, promoting stability by encouraging the use of the same production techniques that had been used for many generations.

To summarize, the lithic material at the site (Type I quartzite) was atypical or at least unusual, in that it was slightly different from the materials more regularly used for stone tool

manufacturing in the region, which included the locally prevalent pebble chert, jasper, quartz and other quartzites, as well as argillite or rhyolite introduced from other areas. The choice of the quartzite did fit into the regional pattern of the use of locally prevalent, hard and coarse-grained stone, but the selection may also have had a non-utilitarian basis related to the appearance of the material and its implied symbolism. The constraints of the lithic material were expressed to some degree in the conservative nature of the manufacturing technology, since there are relatively few ways to reduce cobbles. And although it may not have been the original reason for occupying the site, the nearby source of the stone may have encouraged re-occupation of the locale, serving to further link the people to it. The material would consequently have changed their image of the landscape, altering their pattern of using it and acting as the agent of that change.

Paleoenvironment

Geoarchaeological investigations documented evidence that the bay/basin at the Black Diamond site held water in the past, although no specific information was recorded regarding the period during which this may have occurred. Potentially relevant data were acquired from related investigations at the nearby Frederick Lodge Site Complex, however, and given the proximity and similarity of the landforms, the results of that investigation appear applicable. The Frederick Lodge bay/basin features, located several hundred meters to the southeast, were likely to have been ponded for periods of time after about 6000 BP. This finding was based on regional data regarding water table levels during the period, as well as on the presence of sediments fringing portions of the basins at Frederick Lodge that were interpreted as re-worked sands, indicating an active shoreline. Although not precise, the time period does encompass the span during which people are presumed to have lived on the ridge above the Black Diamond bay/basin. Thus, it is likely that a suite of wetland-related floral and faunal communities would have been present adjacent to the occupation site. Archaeobotanical material from one of the Frederick Lodge contexts included bayberry, a species that is intolerant of shade and is typical of the edges of wetlands. Similar resources may well have been what initially attracted people to the Black Diamond site landform and encouraged their repeated use of the site.

The investigations also documented evidence of aeolian or wind-blown deposition as the main mechanism for sediment accretion on the ridge at the Black Diamond site. Artifact distributions suggested that a single cultural component was present. While truncated by plowing, the artifact-bearing deposit had been shielded somewhat by the ongoing wind-blown deposition leaving most of the material intact below the level of the plow disturbance. In accord with the pattern documented for most bay/basin features in the central Delmarva region, sediments appeared to have been transported out of the depression by southwesterly winds, presumably during dry summer months.

Settlement and Landscape

Black Diamond and Regional Organizational Models

Environmental adaptation has been an important theme in the development of conventional settlement models in Delaware. Various researchers have proposed models that emphasize the movement of people between different environmental zones, which in the Delaware Coastal Plain occur close together. Models for the Late Archaic period present the middle

reaches of the main drainages as areas in which large base camp locations would be likely to occur. However, clear evidence for large sites such as these has typically been lacking in the regional archaeological record. Researchers from Custer (1994) to LeeDecker (et al. 2005) and Petraglia (et al. 2002) have come to question whether the so-called macro-band base camps existed at all during the end of the Late Archaic and the start of the Woodland period, citing evidence that seemingly large sites such as Snapp, Leipsic, Pollack, Puncheon Run and Hickory Bluff may actually represent numerous repeat occupations by small groups.

Likewise, conventional models of upland settlement in the region during the latter part of the Late Archaic period suggest that locations such as the Black Diamond site, particularly those in bay/basin settings, were typically procurement locales focused on specific resources, affiliated with mid-drainage base camps, and populated on a short-term basis, the latter evidenced at least in part by low artifact type variety (Custer 1984). In contrast to this model, evidence from the Black Diamond site indicated that people lived at this small, upland site over an extended span of time. Prolonged and possibly repeated site use was suggested by the presence of what appeared to have been storage features, scatters of apparent domestic debris including a variety of artifact types beyond tool manufacturing waste, and artifact-free areas within the site indicating site maintenance.

In spite of the large number of artifacts present at the site, the absence of overlapping components gave the occupation a visibility not often observed at archaeological sites in the region. The concentration of distinctive artifacts from a single component allowed insights into lithic technology by providing a more complete view of the manufacturing activity carried out at the site. It also had the effect of overshadowing other aspects of the occupation, possibly exaggerating the importance of stone tool making in the lives of the site occupants. The activity appeared important because of the footprint it left behind, and yet it may not have been the ultimate reason for people having chosen to live in this location. The quartzite did not occur on-site, and thus it did not appear to have been the immediate attraction to the bay/basin ridge crest. It seems more likely that the unusual looking quartzite was discovered along Herring Run or another locale relatively close by and was brought to the ridge location for tool manufacture as a complement to other activities at the site. Nevertheless, the stone became part of the cultural landscape. On making a return visit to the bay/basin sometime later, the artisans may have revisited the source for additional material. They would have known both where to settle on the ridge crest, since they had been there recently and knew the resources that were available, and also would have known where to find more of the quartzite. The heavily used hammerstones left at the site suggested that any return trips were indeed planned. And so, the initial draw at this location remains unclear—it did not appear to have been primarily the stone, yet the material may have influenced the return.

Alternative Models of Social Organization

Conventional models of settlement organization in Delmarva during the Late Archaic and other periods have been criticized as rigid and deterministic. Perhaps a more appropriate way of describing the social organization of which settlement is a part involves what may be termed the non-progressive development of social complexity, a perspective that suggests there is no inevitable, evolutionary scale of developing complexity in socio-cultural systems.

Typical of developing scales of social complexity are hierarchical systems in which the elements of society are arranged in some form of regularized, dependent order. Models of base-camp/support-camp or macro-band/micro-band settlements, with their implications of dependency and ranked ordering, are examples of hierarchical systems. In contrast to strict ordering, heterarchical systems are composed of elements that can be both independent and interdependent. A heterarchical social organization would include settlements whose relationships might vary depending on the specific conditions present during the occupations, whether environmental, seasonal, social, political, ceremonial, or some combination of factors. The context of the relationships between the elements would be situational and the duration short-term. As an element of a heterarchical system, the Black Diamond occupation would not necessarily be linked in a dependent relationship to a larger settlement—part of a fission/fusion structure, for example, governed by seasonality. While the people living at the site may have been part of a larger polity, as Dent and others have suggested were beginning to form at the end of the Late Archaic, in the end there is little evidence connecting the site on a functional basis with any other location.

A final, alternative view of the settlement in relation to broader cultural patterns such as migration, conflict and enculturation was also presented as a contrast to models that assume culture change to have been environmentally driven, with material traits spread by trade and diffusion. In this context, the Black Diamond site, with its interior location, single extended occupation, and intensive utilization of an unusual lithic material, could represent the occupation remains of a specific group that was intrusive to the area.

Landscape Archaeology

The recovery of a large number of artifacts from an archaeological site with multiple temporal components may often complicate the interpretation of specific occupations, particularly if non-diagnostic artifacts from more than one period are intermixed. The amount of material recovered from the Black Diamond site was extensive, but the single component occupation and the presence of a distinctive type of stone for tool production simplified the analysis while giving the occupation a visibility and clarity not often attained at archaeological sites in the region. The conspicuous nature of the data may in fact have exaggerated the apparent uniqueness of the technological evidence, since we were able to identify aspects of the lithic industry with more confidence than is often practical.

For the people who lived at the site, the location became more than just another point in the natural environment. Why they came to the ridge overlooking the bay/basin the first time is unclear—there may have been resources on the edge of the depression, some aspect of topography that provided shelter, or perhaps a non-utilitarian interest or concern. But the choice highlights the ability of individuals to make decisions, in this case picking a location in which to live. The site became part of the personal landscape of the inhabitants. In this sense, the individuals who lived there altered the landscape from a natural environment to a culturally constructed world. The site became part of their cultural or mental landscape, shaping their view of the world.

8.2 Critique and Future Directions

The research conducted at the Black Diamond site provided valuable information about a variety of aspects of Native American life in Delaware in the era before European settlement. The study, as detailed in this report, included analyses of a large amount of data collected in the field and lab investigations, and from these analyses developed interpretations about how people lived at the Black Diamond site. Continuing evaluation of the analytical methods and techniques used in the study also resulted in an appraisal of the processes employed.

8.2.1 Field Methods

The approach used in the Black Diamond archaeological project followed the three-tiered method that is typically used in cultural resource management investigations as a means of finding, assessing, retrieving significant information from archaeological sites. As carried out at the Black Diamond site, the process successfully and efficiently discovered and assessed the site and subsequently mitigated the adverse effects of the proposed road development. Ongoing consultation with DelDOT and DESHPO were critical to efficient execution of the investigation. Of the stages reported herein, the site evaluation study involved a combination of systematic shovel testing and test unit excavations. The evaluation procedures were effective in identifying the site and delineating its boundaries. However, some of the vertical contextual information was not fully documented, due in part perhaps to the concentrated nature of the artifact distributions comprising the archaeological deposits. Specifically, the results of testing during the evaluation phase indicated that most of the artifact deposits were contained in the plow zone, as summarized in Figure 6-3. The data recovery excavations, in contrast, determined that the majority of the artifact deposits in the central part of the site occurred in the first 10-cm level below the plow zone, as indicated in Figure 6-11. That this finding was different from analysis of the evaluation data provided a cautionary methodological note. The variation was probably a matter of sampling, and as such it was an indication of the care needed in developing representative samples, particularly when sample sizes are small. In this case, criteria other than stratigraphic integrity were used to recognize the research potential of the site and those indications directed the data recovery investigation.

8.2.2 Analysis Methods

AMS Dating

Absolute dating provided information that did not correlate well overall with other sources of temporal data from the site. Carbonized organic material suitable for absolute dating was obtained from the flotation of sediments excavated from feature contexts and unit levels. Two of the dates returned in the analyses overlapped the modern era, having ranges that ran beyond the end of the calibration data set, and thus could not be interpreted with certainty. An additional set of dates was obtained from bulk soil samples that provided general dates for the sediments that were considerably younger than expected based on the distribution of diagnostic artifacts and on stratigraphic associations, the latter including apparently contemporary dates from features excavated into the sampled strata. Overall, none of the dates from the site appeared to correlate well with associated artifact data, being younger than expected. *Post hoc* analysis suggested that these findings may have been related to the

small sizes of the carbonized particles that were dated and difficulties in establishing secure contexts for them.

The AMS process is a powerful analytical procedure that can elicit absolute chronological data from very small fragments of organic material. But an essential part of the analysis goes beyond obtaining a chronometric date from the carbon—it involves firmly establishing the context of the material targeted for the procedure. Features and artifacts cannot normally be dated directly: rather, they are dated on the basis of their association with material from which absolute dates can be obtained, be it a fragment of burned wood in a hearth or charred residue on a ceramic sherd. In every case, the relationship between the material that is dated and the artifact must be clear. Small, free carbon particles are susceptible to postdepositional movement, and consequently care must be taken in investigating their contexts. Aspects of sediment character, the size of the targeted particles, potential issues of soil chemistry and preservation, as well as natural disturbance processes, should all be accounted for in order to obtain the most effective use of this analytical technique.

Flake Analysis

Detailed analysis of the flake assemblage from the Black Diamond site was conducted, including attribute comparison with an experimentally derived data set. The analysis relied heavily on aggregate flake analysis, examining relative artifact mass and the presence of remnant cortex across a series of standard size intervals. The analyses indicated that some primary reduction had been undertaken at the site but that it was relatively limited in scope—the majority of the quartzite had been brought to the site partially reduced, with most of the initial stages of reduction undertaken off site.

Analytically, aggregate flake analysis provided useful data describing the overall character of the assemblage. In a general sense, the procedure appeared to provide reasonably clear identification of flaking material derived from the extremes of reduction sequences, distinguishing the typically large and more angular debris that results from cobble or core reduction from the smaller and thinner debris that results from biface thinning and shaping. Selective examination of individual flakes provided supplemental information and may best be reserved for assemblages from which specific information is sought.

Reduction Sequence

Lithic reduction is an inherently structured process that involves a series of consecutive and irreversible steps. Sequence models are well-suited to describing the process. Standard lithic reduction sequences have been characterized as teleological, describing predetermined patterns. In contrast, the *chaîne opératoire* has been characterized as an evolutionary model, one that accounts for reactions to situations (Bleed 2001). "The element of human cognition (and, in turn, its recursive nature) is what separates chaîne opératoire from simpler forms of sequence modeling" (Mounier 2006:66). In contrast, Shott (2003) holds that there is essentially no difference between the *chaîne opératoire* and the reduction sequence; reduction sequences are just as rooted in culture. Regardless of the degree of difference, both theoretical models can be useful analytical tools, but should be recognized as models—descriptions of a real process made from the perspective of a theoretical analyst. The models typically assume a staged sequence, and the stages are our own explanatory device, heuristic

in nature in the formal sense of simplification for the purpose of understanding and instruction. They do not necessarily reflect the perspective of the original artisans. A thick, cortical flake or a thin flake with a lipped platform may have certain identifiable technological attributes, the former typically produced by hard hammer percussion from a core, the latter by soft billet flaking from a biface. But whether the artifacts resulted from a particular stage of production or whether the process that produced them was perceived in stages may be debatable. We view the process of manufacture systematically because we are trained systematically (*v*. Bourdieu 1998). Effective use of experience-based methods to foster understanding requires an explicit recognition that experience can be accompanied by bias. Acknowledging bias and avoiding the mistaking of models for reality are critical to real understanding of the human processes we study.

8.3 Final Conclusions

Small sites in upland areas remain a valuable part of the archaeological record of the region, and their study should be an important part of future research. From a practical standpoint, extensive sites that contain a large amount of evidence may in the end provide relatively little useful data in comparison with the effort involved in recovery and analysis. If few non-diagnostic artifacts can be confidently assigned to component assemblages, the artifacts in general have relatively little analytical value. Smaller sites with clearly defined components, such as the Black Diamond site, can provide entire artifact assemblages for study and can result in deeper, more complete insights into the lives of people living in Delmarva in the past. Adequate testing and evaluation studies that clearly define the range of temporal components present and the integrity of depositional contexts are an essential element in determining the research value contained in such sites. The investigation of small upland sites, combined with continued study of the existing database of previously recorded occupations and new data from large occupation sites, should bring the patterns of use of the region throughout prehistory into increasing clarity.

In conclusion, the archaeological investigations undertaken on behalf of DelDOT at the Black Diamond site have been successfully completed (Figure 8-1). The testing program indicated that valuable information about Delaware prehistory was present in the proposed highway right-of-way. The data recovery program included retrieval of the information using specific research questions as a guide to structure the investigations. The adverse effects of the proposed construction were mitigated by the research conducted at the sites. It is thereby held that the goals of the archaeological investigations at the Black Diamond site have been satisfactorily achieved.

Figure 8-1. Data Recovery Block Excavations.