

## ABTRACT

This write-up includes an analysis and historic recommendations of the Tweed's Park Permit Area for potential archaeology (historic and pre-historic) and a standing structures evaluation for a single property consisting of a mushroom house and residential dwelling. The project evaluation was conducted by DelDOT qualified staff during the winter months of 2004 and 2005.

Based on conceptual park design and proposed plans for Tweed's Park, wetland permits are necessary. This anticipated federal action triggers the need for Section 106 compliance within the designated "Permit Area" under the National Historic Preservation Act of 1966, as amended.

The Antonini mushroom building and dwelling (N-14127) was identified as potential historic standing structures located within the Permit Area. Located at 6409 Limestone Road, New Castle County, Delaware, the property is situated in Mill Creek Hundred. The property is also identified on the Kennett Square Quadrangle, SHPO map # 06-07-36.

Based on project analysis and enclosed information, no historic properties are evident within the U.S. Army Corps of Engineers Permit Area for Section 106 compliance needs. Beyond the Cultural Resource Inventory Forms already prepared and submitted to the SHPO for the Antonini mushroom building and dwelling (N-14127), no further work or measures are recommended.

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## INTRODUCTION AND PROJECT BACKGROUND

The proposed Tweed's Park is located northeast of the Valley Road and Limestone Road (SR 7) intersection in northern New Castle County – see Figure 1. The Permit Area property includes Tax ID number 08-012.00-008 and a southwestern portion of Tax ID number 08-012.00-009. The combined Permit Area is approximately 5.21 acres and is illustrated in Figure 2. The Permit Area includes stream relocation and restoration efforts that impact designated waters of the United States. The Permit Area also includes the designated area for wetland mitigation creation as part of the park's amenities for flood control. The Permit Areas lands are owned by the State of Delaware and John McGrellis. Despite not having full title, the State of Delaware has right of entry to make any improvements on the John McGrellis lot (Tax ID number 08-012.00-008) for which the buildings are located on.

The purpose of the undertaking, itself, is to address the larger flooding conditions within the project area. Beyond enlarging existing stormwater management ponds on existing State of Delaware lands, the federal permit applicant, the Delaware Department of Transportation (DelDOT), has purchased approximately 38 acres with the intention of providing approximately 30-acre-feet of stormwater storage.

A review of other available land within the area shows that either there is insufficient stormwater flow or an insufficient area to accomplish the needed floodwater storage anywhere else immediately above (north) Valley Road or within the project vicinity. Also, an alternative flood and regional stormwater management effort at a different location would take place where insufficiencies in water containment may exist. Thus, control upstream and by the Valley Road crossing is needed to assure that runoff and heavy volume flows in the stream immediately below Valley Road is not causing flood damage and safety concerns to private property and towards other natural and altered water courses. The project site is best suited for this purpose.

Regarding the Permit Area, the stream redirection and restoration effort within the current design is necessary to help manage and control the hydrologic flow within culvert inlets for proper flow downstream, while re-directing additional floodwaters during their peaks into newer wetland areas for additional flood storage. Stream bank enhancement and improved hydrology changes will also provide perpetual base and peak flow into the wetland area, while restoring the natural channel and addressing stream bank erosion.

Beyond the stormwater, flood control, wetland, and proposed stream restoration efforts, residual uplands within and outside the Permit Area will be converted into multipurpose athletic fields, a practice field, and recreational trails. Existing forested areas will remain as permanent open space, while other open space areas will be reforested. Mushroom soils and other soil deposits will be removed, properly spread out with new grades, and properly disposed of offsite. This cleanup will improve past intensive land use operations and years of residual mushroom soil deposits from approximately 75+/- years continual operations. The residual soils have been deposited, cultivated, and intensively compacted over the years and are known to contain higher levels of nutrients. Due to past agricultural practices and during an era where best management practices and land use ordinances were non-existent in the mushroom growing industry, some soils have migrated into or have been historically disposed and compacted into or near natural

areas. It is believed that intensive soil and mushroom compost deposits and operations have directionally altered or influenced changes in the natural stream channel.

As part of the overall park project, a log dwelling, for which the park is named for (i.e. Tweed's Tavern), and an exhibit center building with gardens and trails will be constructed outside the Permit Area. Other historically reproduced or moved buildings labeled on the site plans are anticipated in the future. However, these actions are outside the Permit Area and are independent actions not subject to Section 106 review or compliance. DelDOT and SHPO, along with the Hockessin Historical Society (local historic interests) have treated the total reconstruction and relocation effort of Tweed's Tavern in the interests of historic preservation. Despite the Permit Area in close proximity and as a flood control facility, which resulted in further development of an open space park, there are no potential direct or indirect impacts to historic properties.

Details of other park features outside the Permit Area are illustrated on Figure 3.

#### SECTION 106 INITIATION AND DESIGNATED PERMIT AREA

To satisfy the Corps of Engineers compliance with the State Historic Preservation Office for Section 106 of the National Historic Preservation Act as amended, on May 29, 2003 an agency introduction walk over was conducted with representatives from Delaware Department of Transportation (DelDOT), Duffield Associates, Inc. (DelDOT's engineering consultant), US Army Corps of Engineers (Corps), Delaware Department of Natural Resources and Environmental Control (DNREC), and the State Historic Preservation Office (SHPO). A subsequent follow-up letter was issued by DelDOT dated 1/8/04 (see Enclosure 1) that made reference to confirming federal participation and Section 106 compliance with the SHPO in order to secure wetlands permit.

In a response letter dated 4/19/04, the Corps Chief Regulatory Personnel, Frank Cianfrani informs the SHPO's Director, Daniel Griffith of federal participation and a request from the applicant (DelDOT) to initiate consultation under Section 106 of the National Historic Preservation Act (see Enclosure 2).

In October and December 2004 plans were revised – see Figure 2 and Figure 3. As such, DelDOT consulted with agencies to reflect a reduced Permit Area. While a newly designated wetland mitigation and flood control area for this project increased in size, the overall wetland impacts were significantly reduced in size and limited to designated waters of the U.S. Those wetland reductions were presented to the Joint Permit Process (JPP) on October 21, 2004. As a result, the Corps of Engineers and SHPO concurred that the project undertaking, overall, was now subject to a more narrowly defined Permit Area. Stream embankment relocation and restoration as well as culvert adjustments are the applicable Permit Areas under the U.S. Army Corps of Engineers Nationwide Permit #27. Meeting minutes and post agency correspondence from the JPP are included in Enclosure 3.

Based on the new delineated Permit Area subject to Section 106, a number of potential standing structures exist for the National Register of Historic Places. Potential archaeology is

also limited to the construction area (LOC) to build and/or restore all designated wetland/flood control areas and altered waterways.

## RESEARCH DESIGN

As part of the overall background evaluation process and after verifying that standing structures 50+ in age exist within the Permit Area, CRS survey forms, past road plans, National Register files, and previous survey reports at both DelDOT and SHPO were examined to determine if any historic resources within the Permit Area have been previously surveyed, identified, discussed, or found as eligible for, or listed in the National Register of Historic Places. Geo-technical, engineering design, and wetland delineation data were also used in the sources of resource information for determining site conditions. A Permit Area walk over was conducted with the DelDOT and SHPO archaeologist whom both felt that areas were well disturbed and that sources of available information might only be necessary to verify and document levels of disturbance before a final decision might be determined.

Additionally for standing structures, background research conducted within DelDOT's Environmental Studies available sources of information was also undertaken. A series of articles, project knowledge, and verbal interviews with previous property owners were conducted. Internet sources discussing the history and evolution of the mushroom industry were obtained. Many of the internet sources focused on Kennett Square, PA, which is located near the project area. In terms of development of an overall historic context and identification of specific property types in Delaware, the same factual history and architectural field observations located in Kennett Square, PA (and nearby surrounding region) can be consistently applied to this Permit Area evaluation.

The *Southeastern Chester County Mushroom Industry Historic Context* was also obtained from Pennsylvania DOT Region 6-0. This 2003 report was prepared for the Pennsylvania Route 41 Corridor Improvement Project (i.e. Avondale, PA region). Like the township of Kennett Square, PA, which is only located within 3-5 miles from the Permit Area property, the historic context developed along the PA Route 41 Corridor is within the same proximate distance from the Permit Area property. Despite a state border difference, considering same region and the property type defining characteristics, the same identifying background and general principals of the mushroom industry and of its building and property types can be similarly reflected and applied upon this evaluation. Similar buildings, historical development, and construction methods, all exist throughout the region.

However, as stated in the context report in the Avondale, PA mushroom farming region, the largest issue is that mushroom farms can all differ in the type and overall size of their facility operation. They all have a similar built landscape such as their basic construction and layout forms. For example, when concrete block replaced wood framed mushroom housing and became readily available during the 1920's, block-housing units became synonymous with all mushroom house construction. Regardless of actual differences in building sizes and the magnitude of specific operations, the problem today is that most modern mushroom farm facilities look very similar to those built during the 1920's, 1930's, 1940's and 1950's. Therefore, accurately gauging the construction dates of mushroom houses and other related property types can

sometimes be more difficult. (Parker, Walls, Brother, 2003). Over time, their vernacular form and specific building functions and layout are relatively unchanged.

According to the Delaware Department of Transportation's research methods and historic evaluation approaches, while mushroom buildings possess no outstanding architectural features, integrity factors upon the property and its operations prevail in an eligibility assessment. Most important integrity factors to consider in a historic evaluation are the following: active and continual operations; generational family ties to a mushroom farm property and its operation; tactful adaptations to the property based on industry and technological changes; degree of upkeep and limited expansion to a property and/or buildings over time; degree of remaining original building fabric still present; and, conditions of the site layout.

Finally, a field tour of various mushroom complexes in Hockessin, DE, Avondale, PA, and Kennett Square, PA were conducted in order to understand and note common similarities or differences in the types of mushroom buildings and operations that exist in the area. An interview and site visit with one of the remaining Italian-American mushroom family growers (W.A.C Mushrooms, Inc., Tony Angelucci) took place in Kennett Square to verify specific mushroom building components of the same era as well as to discuss early growing and modern practices of the industry.

Following the completion of gathering all relevant sources, assessment of site reconnaissance information, and interviews, both the archaeological potential and architectural survey was carried out to: 1) identify and confirm the range of potential resources 50 years of age or older within the current Permit Area; 2) locate any individual properties in the Permit Area that could be potentially eligible for listing in the National Register of Historic Places; 3) discuss previous areas cleared and/or covered under Section 106 efforts in the Permit Area; and 4) determine and document for the SHPO and DeIDOT's archaeologist the level and intensity of ground disturbances that have already occurred in the Permit Area.

In order to be eligible for listing in the National Register of Historic Places, a resource (e.g. building, site, structure, object, or district) must meet the 50-year age criterion, or meet the criteria for properties achieving significance within the last 50 years. Potentially significant resources located in the project study area were documented for this project. In addition to meeting the age consideration, resources must also meet the Criteria for Evaluation (36 CFR§ 60.4) as stated in the *National Register Bulletin: How to Apply the National Register Criteria for Evaluation*:

The quality of significance in American history, architecture, archaeology, engineering, and culture that is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- A. that are associated with events, that have made a significant contribution to the broad patterns of our history, and:
- B. that are associated with the lives of persons significant in our past; or
- C. that embody the distinctive characteristics of a type, period, method, of construction, or represent the work of a master, or that possess high artistic

- values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. that have yielded, or may be likely to yield, information important to history or prehistory (National Park Service, 1997)

## GENERAL GEOGRAPHY, LAND USE, AND GEOLOGY

The Permit Area contains past and current mushroom farming activities and a residential housing dwelling situated at the northwest corner of Limestone and Valley Roads (N-14127). Ground cover has been allowed to restore where soils have generally been generally stripped and/or are bare. However, the majority of the ground surfaces have been soil storage piles and compressed layers of mushroom soils. In fact, according to accounts of previous property owners (Antonini family) spreading out, compacting, tilling, and re-stripping and reusing residual soils both at surface levels and below was a common mushroom agricultural practice in the early years. This early practice was used on the property (Permit Area) where residual compost soils were not only stripped and reused, but ultimately disposed. Within typical practices of the mushroom industry, some residual compost soils might be partially used and recycled throughout the growing process. However, like all mushroom farming, excess soil and compost piles would always exist and be spread out and mixed in with other soils located on the property. Ultimately when that practice became labor intensive or exhausted, residual stockpiles of spent mushroom soils and compost would simply add up on the property. From there, either the soils would remain stockpiled, be taken offsite to be sold as part of a commercial mulch and peat moss by-product, or simply hauled offsite. The Permit Area is evident of this common mushroom farming practice.

Towards the northeast, lands situated within the designated Permit Area were recently leased out to a major logging/timber industry where soils and ground cover has also been stripped and filled. The area is essentially bare of vegetation. This area is also marked with soils scars at surface levels with exposure to rubble concrete, pea gravel, lumber/mulch, and other types of by-product debris and fill at or near surface level. Disposed mushroom soils and its former agricultural practices of stripping and utilizing natural and recycled soils back into the ground is also evident in this area as well. It is suggested that grades and soils within the entire Permit Area are not in their natural condition and have been significantly altered multiple times to some degree.

Additionally, the 4-unit mushroom building was originally constructed with man-made elevation differences between the rear and the front of the building. Grounds have been graded around the immediate building since most mushroom houses are typically built along or into a slope (natural or manmade). In this case the Permit Area is a relatively a flat surface. Original soils were excavated, filled, moved, and/or re-graded in order to achieve a sloped or grade difference in the building's construction and layout. Although deteriorated and barely recognized, a concrete skid pad (or wharf) is also constructed towards the rear of the building. An underground septic system also exists near the front of the building.

Photographs and Maps of the Permit Area, including standing structures, are included in Enclosure 4.

From a regional aspect, the majority of the entire park project is nearly level (0-3%) to gently sloping (3 to 8%). Although minor sections have the northwest and northeast areas consist of sloping ground (8-15%). Elevations range from a high of 325 feet above mean sea level (MSL) in the northeast and northwest corners, to a low of 267 MSL along the stream in the southern corner. The vast majority of the site drains to a small tributary under Valley Road, which bisects the site in an approximate northwest to southeast direction. The tributary drains to the Mill Creek, which drains to the White Clay Creek, itself a major tributary to the Christina River.

The entire park project is also within the Appalachian Piedmont Physiographic Province above the fall line between the Piedmont and the Atlantic Coastal Plain. The steep slopes in the northern area of the site are apparently attributed to the underlying geology. The north of the site is Baltimore Gneiss, a biotite gneiss, hornblende-biotite gneiss, and amphibolites, with or without pyroxene. The southern area of the site is a Water Resource Protection area since the Cockeysville Formation, a major aquifer for New Castle County, underlies it. The Cockeysville formation is found in broad flat valleys of the Hockessin-Yorklyn and Pleasant Hill areas. The Cockeysville is a well-weathered dolomite marble.

An unnamed stream or tributary system, causing much of the flooding, currently flows from two directional sources: one area from the southwest and the other from the northeast. The stream flows are guided by three independent culverts (or piping systems) located within the Permit Area. One of the culverts (boxed) is located under Limestone Road allows unnamed tributary waters to flow into the Permit Area from the southwest. The other two culverts, a boxed system and the other a triple pipe culvert, are situated along Valley Road and are both located in the southern most Permit Area termini. These two culvers carry flow from the upstream tributaries both from the north and west. See Figure 1, 2, 3 and Enclosure 4.

The culvert structures involved in the Permit Area are newer engineering and drainage systems installed between 1999-2001 by DelDOT. They are not historic nor are considered to have any historic value as structures less than 50 years old, nor have achieved significance in the last 50 years. The culverts were previous actions subject to Section 106 review under the Federal Highway Administration as part of previous intersection improvements along Limestone and Valley Roads. A new culvert was installed along Limestone Road replacing the previous, while a new culvert system was retrofitted and replaced within existing right-of way. Additionally, a new triple pipe culvert system was installed under Valley Road. Stream and embankment areas were reconstructed and restored to more ideal conditions. From this previous undertaking, no archaeology studies were needed or required.

As part of this previous DelDOT action, the new triple pipe culvert was intended to increase flow capacity. It was also intended to divert flow temporary during construction and in the future from the previous aged culvert that continued under Valley Road. When the stream flow diverged into the new triple pipe culvert, the original aged culvert system under Valley Road was then replaced within existing right-of-way and under Valley Road. During this time, all the culvert and construction actions, including land access and stream diversions, had no

historic value. Ground cover was extensively disturbed, new lines and grades were set, and stream bank areas were restored and then re-landscaped.

Therefore, this same area, approximately the southern end and a portion of the western half of the current Permit Area has been subject to previous Section 106 review with no recommended actions needed. Under this project undertaking, the same holds true, as the new culverts, stream bank land areas, and subaqueous lands have no historic or archaeological value.

Furthermore, aerial photographs suggest that portions of stream to the northeast have historically flowed toward the vertex of Limestone and Valley Roads. Thus, the stream is not in its current natural alignment. Some of this migration is believed to be caused by either natural migration, or was influenced by the spreading and tilling of mushroom soil deposits with in-situ mushroom soils that have been deposited and compressed near and into this area.

Therefore, beyond the past DelDOT construction projects, portions of the stream embankment within the Permit Area have disturbed landforms. Equally, portions of the stream channel have eroded forming new or migrated channel locations that appear unnatural. The current stream relocation effort will restore the stream, stream channel, and embankment areas (i.e. areas outside former DelDOT projects) into a more natural flow. This action should warrant no archaeological investigations because the area has been severely disturbed by past human, erosion, and flooding activities.

## WETLAND DELINEATION

Within the entire 38 acres, the majority of the 6.9 acres of wetlands and waters of the U.S. delineated are forested. Although historic photos demonstrate that all vegetation was cleared at one time, the wetlands are currently undisturbed relative to the remainder of the site identified within the Permit Area. Ironically, all of the U.S. classified waters within the Permit Area have been disturbed or have been modified by past human and construction activities. A jurisdictional determination was completed by the U.S. Army Corps of Engineers on May 19, 2003. The wetland boundary is shown in both Enclosure 2 and 3.

## HISTORIC POTENTIAL

### *Archaeology*

The Permit Area from an intact archaeological standpoint has been impacted by significant past activities and disturbances and carries a low to almost no potential for intact soils that might contain artifacts. This recommendation is based on past historical accounts and more recent land use activities of the 20<sup>th</sup> century.

The physical attributes of the Permit Area consist of Hathboro soil series. Field observations include the presence of hydric soils including alluvium on the margin of the existing stream. Two soil cores six feet into the proposed wetland mitigation area (Permit Area) were undertaken. Generally, results of the core borings demonstrated fill and debris at surface levels to depths of 3 to 4 feet below the surface. Depths immediately below the fill also demonstrated a high water table. In fact, according to the hydrologic analysis for wetland

mitigation assessment, the Permit Area contains a perched water table on top of a silt/clay layer. The sands above this layer also provide for a fluctuating water table with good lateral subsurface water movement. These results are better presented in Enclosure 5.

Vegetation within the Permit Area consists of *Coronilla varia* (purple crown vetch), *Aster ericoides* (white aster), *Alliaria petiolata* (garlic mustard), *Ambrosia trifida* (great ragweed), and *Polygonum sagittatum* (arrow leaved tear thumb). Plants identified within the Wetlands Delineation report are common with disturbed soil activities and many are considered invasive. Aerial photographs (see Enclosure 4) also suggest that woody vegetation was cleared for farming and lumbering activities.

Historic land uses at the proposed wetland mitigation site (Permit Area) include mushroom soil farming, composting practices, timber, and logging industries. According to SHPO records, no previous archaeological sites (pre-historic or historic) exist within the Permit Area. All known historic maps and aerials have always demonstrated that the Permit Area parcel was vacant until the early 20<sup>th</sup> century for mushroom farming, timber, and logging (See Enclosure 4). Previous archaeological studies near the Permit Area include Tweed's Tavern Archaeological site (7NC-A-18). This previous federal action was subject to Section 106 by DelDOT under the Federal Highway Administration. No historic properties were found eligible under Phase II efforts. Additionally, previous archaeological testing included two negative test units (under Phase I) that were taken northeast along Limestone Road. This effort was part of previous DelDOT historic identification efforts along Limestone Road (Catts, Custer and Shaffer, 1986). The two test units were recorded and situated northeast along Limestone, which is beyond the Permit Area.

Further core testing may confirm the presence of fill and disturbances within the Permit Area, but is this action necessary considering that accounts continue to confirm that the land area was intensively used for mushroom soil farming and as a timber industry? By-product soils and unnatural deposition of fill soil at and below surface levels are evident throughout this area. Common practice of the early mushroom growers was stripping and rotating topsoil and soil compost on the property. This occurred and was confirmed by previous owner accounts and soil borings. Original mushroom building construction excavated, shifted, and significantly re-graded soils in a large portion of the Permit Area.

In short, the Permit Area as been significantly altered by:

- Past DelDOT construction projects within waterways, culverts, and along most of the stream bank areas and along the roadside;
- Underground utilities – water and gas lines separated vertically and horizontally from one another;
- Continual stream bank flooding and unnatural channel and erosion caused by human interferences;
- Past timer industrial and agricultural land use activities, which have stripped and altered natural underlying soils.
- Woody vegetation clear-cut and stripped throughout the Permit Area (including streambed wetland areas) during the early to mid 20<sup>th</sup> century; and

- Man made buildings facilitated with larger concrete pads and surfaced with improved and unimproved driveways and grades.

As previously stated, a Permit Area walk over was conducted with DeIDOT and SHPO's Archaeologist whom both felt that areas were well disturbed and that sources of available information might only be necessary to verify and document levels of disturbance before a final decision might be determined.

In sum, ground disturbances are intense around all standing structures. Man-made features include a larger 4-unit mushroom building (4 doubles) and an unoccupied 1 and ½ story dwelling. The standing structures within the Permit Area support pavement, altered driveways, intensive work areas, and a concrete skid/wharf pad. Areas along all streams have been disturbed by previous land use activities and have been precipitated by erosion, and more recently by roadway construction. No testing is suggested along stream bank areas due to their previous coverage under Section 106 that did not warrant any intensive studies and testing due to their disturbed nature.

#### *Standing Structures - Description*

All standing structures within the Permit Area are scheduled to be removed by demolition. They consist of a single dwelling and a larger 4-unit mushroom building. This property is known as the Antonini mushroom building and dwelling (N-14127). Some interior mushroom shelving may be salvaged and re-used.

According to the Delaware Historic Comprehensive Plan, the Permit Area for this historic evaluation consists of the following:

**Geographic Zone:** Upper Peninsula  
**Time Period:** 1880-1940+/-: Urbanization and Early Suburbanization, and  
 1940-1960+/-: Suburbanization and Early Ex-urbanization  
**Historic Period Theme:** Architecture, Engineering and Decorative Arts; Agriculture  
**Property Type:** Agricultural – 4-unit (2 doubles) mushroom farming & operations facility  
 Architecture - front gable cottage

#### *1940's Cottage*

The 1 and ½ story cottage is situated at the southeast intersection corner of SR 7 and Valley Road. It was first constructed by the Antonini family in the early 1940's. The dwelling was residentially owned and occupied by the Antonini family who entered the mushroom industry beginning in the mid 1920's. Like many other first generation Italian-American families of the same era, the Antonini family left New York City from the construction industry to begin a small business and agricultural trade of mushroom farming in Delaware.

The house originally was occupied by five adult members and served as a residence for the Antonini family for approximately two generations. The family also owned, operated, and

managed a 4-unit mushroom building facility on the same tax identified property until the early 1990's. In 1992, mortgage foreclosure forced the property transfer at sheriff's sale. Subsequently, John McGrellis took possession of the property and also acquired other larger land holdings of the Antonini's on adjacent lands (i.e. beyond the Permit Area) that later functioned as the majority of their overall expanding mushroom farm operation.

The property within the Permit Area was only one of the overall parcels and facilities that the Antonini's operated as a mushroom agri-business (i.e. labeled as Plant 1). Similar and larger mushroom buildings as well as operations formally owned and operated by Antonini Brothers, Inc. are located on other private property, which are both outside the Permit Area and proposed Tweed's Park area for any formal Section 106 review. The remaining extant mushroom facilities of Antonini's (outside the Permit Area and proposed Tweed's Park) were constructed during the mid to late 1960's and vastly improved/expanded again in the early 1970's.

Since the early 1990's, the house and mushroom facility within the Permit Area have been rented out to a recent in-flux of migrant Mexican workers whom occupied the house and have continued to operate the mushroom facility. In 2003-4 the State of Delaware purchased (via - eminent domain and right of entry) the 4.37 acre property off John McGrellis at which time the tenants soon vacated the house. The mushroom tenant has been allowed to continue harvesting mushrooms on a marginal basis until the Tweed's Park commences under full construction.

The dwelling, itself, is a double cell, concrete and wood framed building covered in white stucco. Concrete block trims are situated around all windows and ledges. Doorframes as well as wooden fascia boards and are painted dark green. Architecturally, the cottage style dwelling is flank with three bays and a center front gable pitch that is sheathed in aluminum siding. Wooden shake shingles cover the roof. The front center gable covers the main entry and extends as an open porch across most of the facade. The entrance door/bay is off center to the southwest. The wooden entrance door does not appear original and has a fan shaped window feature.

A full basement is present and the dwelling rests on typical concrete block foundation walls that are covered with stucco. All bay windows appear original and are all 6/1 double-hung sashes. Windows are covered with modern storm window casements. A single casement window is present at each upper 1/2-floor gable end. Other notable features include a side and basement entrance door to the southeast and two 1/2 windows for the basement on the northwest side. There is a centered interior brick chimney situated near the southeast gable end. No decorative brickwork could be noted and the terra-cotta flue lines the square block chimney configuration. The roof and cornice line are plan with no overhang. The overall layout plan of the dwelling is irregular.

The side gable roofline is extended in the rear with a lower pitched shed roof. While deteriorated wood shakes cover the roof, asphalt shingles cover the same rear shed roof. The only known addition is a semi-attached 1-story storage shed, which was added in the 1980's. The flat roof shed is covered with corrugated metal sheets and is approximately 7' X 9'. The shed is located at the far northeast and southeast corner towards the rear and side of the house.

Within the main dwelling, the most recent tenants have altered some interior fixtures to accommodate living quarters. The dwelling is currently vacant. The house is in poor condition due to lack of upgrades, maintenance, and general deterioration with wear and decay of original materials.

Underground utilities, poles, aerial utilities, and an altered stream channel with a modern culvert, retaining wall, and rip-rap front the southeast end of the cottage. There are no worthy landscaped features on the property as exotic vegetation has taken over in various places. Some shrubbery fronts the porch. No defined driveway is present, but the shared entranceway to the house and mushroom building has been recently altered and partially relocated by recent DelDOT construction in 1999-2001.

The architectural style fits into the era of an early to mid-20th century roadside cottage with minimal tradition and ornamentation. Oriented parallel to the street, the cottage consists of a centered front gable open porch, marking its main entrance into the house. No other maps (Beers, Baist, DelDOT Historic Reports and map records, and USGS) locate buildings or former buildings on the property (see Enclosure 4).

A 1937 aerial and an early 1930 ground level photograph along Limestone Road confirm that the dwelling was not built at the time. Accounts of Ms. Eileen DeFelice, whom is the granddaughter of Charles and Ruby Antonini, indicate that the dwelling was built in the early 1940's. Before the Antonini's built the dwelling they lived in the Hickman or Springer house that was originally along Valley Road. According to Ms. DeFelice, the Antonini's along with three other Italian families from the same New York City area acquired and divided up a number of surrounding properties. During this time, the current parcel (along with others) fell into their possession. While taking title to the property, the 4-unit (only three units at that time) mushroom complex parcel was already present and extant. The Antonini family built the cottage in the beginning of 1940 and solely owned and operated the 3 unit (later added one unit) concrete double mushroom houses beginning in the late 1930's until 1992.

#### *Circa 1925 Mushroom Building*

The continuous four-unit (4 doubles) concrete block mushroom building is situated in a portion of the Permit Area to the northwest. The unfinished walls are all concrete blocks laid in 8-inch thick wide blocks with a regular running block pattern. The building is also marked with front lean-to components known as the "packing room". The packing room was added in the mid to late 20<sup>th</sup> century (between 1954 and 1967).

The three building unit was originally constructed in the early 20<sup>th</sup> century, sometime around circa 1925. The building has been altered with a 4<sup>th</sup> unit (single) addition known as the "dirt room" that occurred sometime between 1954 and 1967. The dirt room is somewhat smaller in dimension 20 feet in width while the three double units are approximately 37 feet wide. Collectively, the 4-unit building is approximately 132 feet by 67 feet. The packing room, which is separated by a central office, is approximately 49 feet by 10 feet and 69 feet by 10 feet. The packing room with a central office was also added during the addition of the dirt room, likely with the innovation of HVAC systems, unit fans, or air temperature control units during the late

1950's. The dirt room's front and rear gables are solid concrete walls. Recent concrete block and front gable repairs to the packing room and 4<sup>th</sup> building unit (i.e. the dirt room unit) took place in 1992.

With each building unit, corrugated metal sheeting covers the moderately pitch front gable roof that is wood framed and topped with continuous ridge vents. The rafters in the gable roof are open and notched at ends. Each building's front gable is characterized with three original hinged loft doors (two hinged loft doors for the dirt room) in the upper gable. The hinged loft doors are trimmed with a brick header in order to fill in voids. The two lower hinged loft doors are blocked and partially covered by the lean-to addition of the dirt room. Because of the interior elevation changes within mushroom houses and growing beds, loft doors were or are commonly used and functional as a temporary measure to allow natural light and airflow in. This enabled growers and/or laborers to better see visually and breathe during picking, cleaning, mushroom bed preparation, and other facility operations. Many early mushroom houses did not support electricity for lights or other air control measures.

Dividing the packing room is a 14 by 23 foot concrete and concrete block office building. The office has a front gable roof and side brick chimney. The building is flank with 2 over 2 fixed metal windows (plastic panes) at each corner and one entrance door that is also located at each side. Another exterior access door (damaged) is situated on the side of the office building and serves as a stairway to the basement boiler room. Like many double units in a mushroom building, its front gable roof has a flat cornice line and is sheathed in corrugated metal. The building is, however, missing many fascia boards.

Currently the packing room is an area commonly known today as a "breezeway". Many of its previous functions (i.e. packing and distribution of mushrooms) have been abandoned, inoperable, and functionally replaced/transferred by other packing and distribution methods. Thus, many packing room areas, such as this one, are really an enclosed area with no particular room function. The packing room is severely compromised with damaged or missing doors, plastic windows sashes, damaged electronic devices, and missing or deteriorated cornice and roofing components.

The packing room is 12 bays consisting of 7 wood panel access doors (one replaced) and 5 windows that are 2 double fixed metal with a clear plastic pane. Additionally, hardware and latches (metal or wood) reflected in typical mushroom entrance and access doors are not evident. Hardware in the current doors (new or original) is missing or damaged. Within the interior, no tables and packing distribution functions are evident – other than storage of packing boxes in one area. Interior doors into each mushroom building unit are damaged or altered. Voids in walls have been covered where missing electrical vents/fans once operated.

The side of the mushroom building towards Limestone Road is a solid concrete block wall and has suffered a significant vertical crack with a spacing gap from top to bottom. A void in a small concrete block section is also present.

The sidewall of the dirt room (4<sup>th</sup> unit) towards the northeast is a solid concrete block wall. However, it is characterized with three individual concrete block step-ups that help support the structural stability of the wall as a buttress.

Towards the rear of the building, each individual building unit has either a single or two smaller HVAC/air flow venting systems that have been installed and/or greatly retrofitted into the building. The rear of the building consists of 7 bays that is made up of two access doors to each building unit and one access door into the building unit of the dirt room. Within each building unit, an air control system or HVAC system is positioned between the access bays/doors. This is evident in 2 of the 3 building units with one central unit missing. The dirt room double is evident with two smaller forced air units that no longer function within the walls. Voids in the concrete block wall for the dirt room have been covered over with wood. Also, within the building unit of the dirt room, the single access bay/door has been removed and substituted with a single forced air unit.

Except for the dirt room consisting of a solid concrete block gable, the three other building unit gables are sheathed in corrugated metal. Each building unit in the rear is characterized with an upper gable loft hatched door (original) and two venting windows (alterations) that are metal louvers.

Throughout the rear of the building, a number of missing doors and louvered vents have been removed, damaged, and/or substituted with additional or smaller HVAC/air flow units. HVAC/air flow units, which are commonly located in each double and between each access door is not evident. There are various substitutions, wall breaks, or void fill-ins. Typical wooden or metal latch doors that are commonly found in mushroom buildings have been removed, damaged, and have been substituted with HVAC/air flow systems.

The rear of the building is sloped or positioned on a higher plane than the front. Considering that the overall site conditions are relatively flat in this area, an attempt to position the building into a side of a slope or hill was undertaken. Thus, significant grading and excavation was undertaken to initially construct this building. The elevation construction difference is common and standard among mushroom buildings (for various reasons explained later).

Ground conditions immediately surrounding the building are un-maintained and have been for several years. A concrete skid pad (or wharf) is remotely evident in the rear of the building. The large concrete skid pad is typically used to support the mobility of compost while also providing access facilitation of trucks and other heavy equipment.

Lastly, the supporting grounds are extremely deteriorated and have not been functional for years. Compost piles are situated throughout the surrounding grounds where vegetation has regenerated over the mounds. Trash and debris are evident everywhere surrounding the building. Poor drainage is evident, which has damaged the building and its grounds. Unlike other mushroom farms and buildings of the area, this building and overall facility is situated very close to the road. Unlike most mushroom farm properties of the surrounding area, the property does not exhibit a continual circulation pattern around the facility.

## HISTORIC CONTEXT DEVELOPMENT

### *Overview Mushroom Farming*

France was the leader in the formal cultivation of mushrooms. Some accounts say that Louis XIV was the first mushroom grower. Around this time, mushrooms were grown in caves near Paris set aside for this unique form of agriculture. "From France, the gardeners of England found mushrooms a crop to grow which required very little labor, investment, and space. Mushroom cultivation began gaining popularity in England with more experimentation with spawn and publicity in journals and magazines." (<http://www.historickennettsquare.com/mushrooms.htm>)

In the late 19<sup>th</sup> century the mushroom cultivation had been introduced into Pennsylvania, specifically areas in Chester County. According to records, in 1890 mushroom culture was introduced in the region of Kennett Square, Pennsylvania. Specific credit is given to William Swayne of Kennett Square in 1895. By importing mushroom spawn from England, he introduced mushrooms as an agri-industry and grew commercial mushrooms for consumption on beds beneath the flowers in his greenhouse.

During this time, descriptions of structures built especially for the cultivation of mushrooms began to appear in horticultural publications. "Subsequent buildings constructed follow an English plan and were 'single' buildings with either a shed or gable roof. The buildings either stood independently, or were attached to greenhouses or hothouses. The dimensions were long and narrow." (Parker, Walls, Brother, 2003) Other accounts also indicate that at first, mushrooms were cultivated in basements of buildings and in early flower and garden beds without the luxury of heating and cooling systems to control temperatures.

As a combination of sources seem to prevail, as increased production grew and the mushroom industry established its niche, wood framed houses customized for growing mushrooms were constructed. They were similar to a greenhouse: long and narrow in design and situated side by side with "an interior arrangement of the beds and aisles resembling their greenhouse counterparts." (Parker, Walls, Brother, 2003)

Unique to the mushroom growing industry is the number of Italian-Americans, who first began as laborers after the turn of the century, and by the 1980's own, manage, or operate most of the mushroom farms of the region - including ones located in Delaware. Today, it has been estimated that 75% of the remaining mushroom farms in Southern Chester County and Northern Delaware (the Hockessin area) are now owned and operated by Italian-Americans. They are second and third generation of people, many of who have succeeded in this labor-intensive business (Harris, <http://mushroominfo.com/history/chesterco.html>).

This strong ethnic tie is important to know as Pennsylvania Quakers, who are believed to be the original mushroom growers and suppliers of the region, first employed Italian-American as their source of labor. Many early Italian-American immigrants came to the Chester County region as sources of labor in local quarries, railroads, or nurseries. Some also came to this region

of the county to grow mushrooms exclusively in part by the physical geography, proximity to markets, and natural resources. However, many of the first generation Italian-Americans learned the business and began buying farms in order to grow their own products. Although there is no definitive transition from an English dominated industry to an Italian dominated industry, the mushroom industry by the early 20<sup>th</sup> century would become associated with families of Italian-American origin (Parker, Walls, Brother, 2003).

### *Mushroom Buildings and Operations*

“Known as the American standard house, the basic design of an early ‘single’ was a gable end-roofed building measuring 18 to 20 feet wide and 66 feet long. Many early houses were built into a side of a hill or slope, in order to facilitate the filling of beds from the composting wharf.” (Parker, Walls, Brother, 2003)

Due to sanitation reasons and to better control dampness, temperatures, and hygiene, framed houses were abandoned for newer concrete block construction. Concrete block units, known either as “singles” or paired together and joined as “doubles” are the most common form of mushroom building construction design and facility operation. “Typical mushroom houses that are doubles (and of rectangular concrete block units) measure approximately 68 feet by 40 feet.” (Herman and Lanier, 1997)

However, based on an assessment of the mushroom farms of the region, all building construction dimensions (doubles, singles, early doubles, one units) all significantly vary in length, size, and width. In fact, early buildings in the southeastern Chester County and northern Delaware region are believed “to adhere (or follow) to the model introduced in New York, ranging from 18 to 24 feet in width and 50 to 150 feet in length.” (Parker, Walls, Brother, 2003). The Antonini mushroom building (N-14127) measures 37 feet by 67 feet for each individual building unit.

From a building design aspect, the only fenestration and access to mushroom houses are at gable ends. Each house usually had three doors at one end. Positioned over one another, the doors accessed three levels of the mushroom house: ground, catwalk, and ceiling or loft level. Houses built into a hillside might only have two doors, one at the catwalk, and the other at the ceiling level. The roofs were usually gable, with a ventilation louver running along the ridgeline (Parker, Walls, Brother, 2003).

A composting wharf (on a concrete skid pad or wharf) would typically be built at one end of the mushroom house, usually at the upper end, if built into a slope. At the other end was the packing room, which was built off the block of the mushroom house. The packing room might have a central office, which might consist of several floors. Typically, the packing room office portion might have a basement containing a boiler, an office room at ground elevation, and a basket storage or residence in the second story (Parker, Walls, Brother, 2003).

From a historic context and an understanding of property types, mushroom houses are specialized agricultural buildings specifically used and designed for cultivating mushrooms. They first began to appear in southeastern Pennsylvania and northern Delaware around the turn

of the century and are still evident and popular throughout Kennett Square and Avondale, PA and in parts of Hockessin, Delaware. “Mushroom houses and their supporting grounds are designed to accommodate every aspect of the growing process, from soil preparation and sowing to cultivation and harvest.” (Herman and Laniner, 1997) According to family accounts, this assessment is relatively consistent in the Permit Area, except given the fact that the Antoini’s white mushroom operations (*Agaricus bisperus*) were facilitated in much more larger building units that were located outside the Permit Area and proposed Tweed’s Park area.

“By 1912, there were two mushroom houses in Hockessin, one located off Southwood Road and the other in the center of Hockessin (Old Lancaster Pike). Also, by the second decade of the 20<sup>th</sup> century, northern Delaware and southeastern Chester County Pennsylvania had become significant mushroom producers, accounting for more than 80 % of the total U.S. crop. According to accounts, some of the widely scattered farms owned and operated in Delaware include such families as Dixon, Wilson, Kelly, Pierson, Sharpless, Miles, and McVaugh.” (Lake and Pugh, 2004) Other notable families include names include Paloni and Taylor/Orsini.

In the early 1920’s, Italian-American laborers entered the mushroom growing business in the Hockessin, Avondale, and Kennett Square area. In fact, after 1919 there was one large Italian-American family group that came from Wilmington, DE to Kennett Square, PA as a result of the Volstead Act. The Volstead Act closed all legal breweries and made it necessary to seek other ways to earn a legitimate living (Harris, <http://mushroominfo.com/history/chesterco.html>).

The Italian-American families improved upon the mushroom building by adding the packing sheds to the facility operation and/or added living quarters within and above the entire packing room facility. By 1941, Tim Buonamici, who’s buildings are still present along Valley Road and opposite the Antonini property, was operating two mushroom building facilities and a package and canning operation (not to mention a Tavern later converted into Tim’s Liquors). He, like the Antonini’s family and other first generation Italian-Americans, began growing mushrooms in soils that were first made by shredding the horse manure, existing grass and soil, and sods into a rich loam soil that was processed under steamed conditions to remove unhealthy portions of the soil and spores and promote more edible growth in the mushroom (Lake and Pugh, 2004).

1950 marked the high point in the number of mushroom farms existed in the Hockessin area. Individual housing, storage, compost, and garage bays, or an office may have been constructed and improved on the property. However, an abrupt downturn of the economy and of labor sources in the late 1950’s caused many smaller growers to close their operations or be combined and consolidated with others. The results were larger mushroom operations and facilities like Limestone, Camorano, Yorklyn, and Stinson Mushroom Farms. Today, only the Camorano and Stinson and a few smaller family growers that are typically tenant, leased operated, and labored by recent Mexican-American immigrants exist in northern Delaware (Lake and Pugh, 2004).

According to field reconnaissance survey of northern Delaware, there are a total of 11 different individual properties (include one as the Permit Area) that are present and associated in the landscape – see Enclosure 6. Eight different properties: five off Valley Road, two off

McGovern Road, and one off Southwood Road are active in the mushroom growing process and act independently from one another. A former canning factory associated with the mushroom industry exists off Valley Road, while one large compost/storage and mushroom soil deposit facility exists along Valley Road. However, like the consolidation and corporatization that has basically minimized the mushroom industry and growers of Delaware, most of the mushroom farms in northern Delaware, like those in Chester County, are family owned and/or managed.

According to sources and accounts of former growers, mushroom buildings typically have front gable roofs that are sheathed in wood siding, shingle, corrugated, seamless, or sheet metal. Continual concrete or cinder blocks walls may be evident throughout building's design and construction, particularly in dirt rooms. Concrete block in larger mushroom buildings may be purposely spaced apart in upper end gables for ventilation. Gaps in the upper gable may be architecturally configured and spaced apart such that the upper ventilation spaces spell out the first letter in a owner's last name.

Additionally, smaller building units (double or singles) are added onto and become part of the main building facilities. Referenced as the "dirt room", this particular building is interiorly functioned as an area where soils are prepared for cleanliness and sanitation by steaming stockpiles of new compost. The composed might be commonly mixed in with soils and recycled compost soils that may already exist on the property. Those prepared compost soils would then be stored and used for the next crop/harvest within the mushroom growing beds.

In its greenhouse or warehouse like construction, dirt rooms, single, or double mushroom building units are open rectangular rooms with no partition walls. Within each building there are two levels (sometimes three); an underground basement level and a one story above ground level (and an upper loft). Within these buildings are rows of wooden shelves called beds that are usually 5 and ½ feet wide and extend for the length of the building. The beds are stacked three to five high allowing only enough space for the harvesters to reach and pick the mushrooms that will grow in a compost mixture that fills the beds (Flammini, 1999).

As indicated above, the interior arrangement is evident in the Antonini mushroom building (N-14127), but beds were known to be stacked closely in multiple shelves that are separated vertically 2 rows high from another (four rows total). Today, and within the mushroom growing industry many wooden shelves and bedding have been replaced by stainless steel, plastic, moisture or corrosion resistant material.

During the growing cycle, each individual bed contains a 6-inch layer of compost that is scattered with mushroom spawn and placed in specific growing trays. Growing trays are typically built of rot-resistant wood such as cedar, cypress, or redwood. Today, most of the growing trays are plastic containers, while cheaper versions may consist of synthetic/plastic bags. Wooden catwalks often run between the levels so that workers can constantly monitor the growth in the beds. Catwalks and ladders are evident not only for monitoring growth in production and preparation process, but growers and labors typically needed the mobility to reach in and pick by hand all mushrooms before the shelves or soils beds are removed.

Lastly, to address some temperature controls, access, and mobility of heavy compost piles, mushroom houses are best insulated and might be purposely built into the hillside. "Prior to the development of the conveyer belt, the heavy wet compost had to be carried by hand into the mushroom houses and the houses that were built against a hillside enabled the owner/manager an easier time filling as well as emptying a house." (Parker, Walls, Brother, 2003). It is also believed that prior to the innovation of conveyer belts, a center narrow gauge track (with cart) might have been assembled as a temporary means in the building's lower level to mobilize and distribute compost piles into or out of the building.

Mushroom buildings continued to be built or expanded in the basic "double" form until after World War II. Starting in the late 1940's and progressing in the 1950's, 1960's and 70's several growers introduced a new construction technique to Chester County, PA and the Hockessin, DE area. "Instead of traditional doubles under one roof, an entire block of houses (units) were placed under a single hip or gable roof with a ridgeline perpendicular to the building's length." (Parker, Walls, Brother, 2003). Larger mushroom houses built of the post World War II era and under one roof enabled bed levels to be stacked 5 to 8 rows high.

During the mushroom harvest operations, crops are packed in sheds or in separate packaging facilities, where they would be cleaned, cut, canned, and/or packaged away. Finished products would be transported to local markets and across the eastern coast by rail or by means of truck. Several mushroom farms of the area provide their own sources of trucking transport.

Southwood Farms, which is currently owned by the DeFelice/Buonamici family and is situated across the street from the Antonini property (Permit Area), became the only local and immediate mushroom canning plant. This facility open in the early 1940's and was recently closed in October 2002. Southwood Farms closed due to changes in foreign market trade laws and competition that made local canning for either domestic and overseas trade unprofitable.

Southwood Farms became one of the only mushroom canning operations and business in Delaware. It is, however, not historically linked or associated with the Antonini property (N-14127), in terms of combined business operations or ownership of property (other than a family marriage later in time which did not combine or unite the two operations). The two properties are (were) independently owned and operated. Additionally, prior to leasing or tenant operations that are evident today, early mushroom facilities as an agri-business operate differently and independent from one another. However, to the extent that might be related by association, all local mushroom growers, like the Antonini family, took excess or a percentage of their mushroom crop to Southwood Farms to be canned and sold off.

From a facilities operation, the Antonini family employed local labor sources from the Hockessin area. According to family accounts, sources of included not only family members, but also poor white and African-American labor sources of the Hockessin, DE area. This labor source is consistent of its time and overall trend where cheap and available farmhands and harvesters began with the Italian-American. Gradually, labor sources shifted to poor southern whites to African-Americans between the years of 1920-1950. During the mid to late 20<sup>th</sup> century (i.e. late 1950's and into the 1970's), the common source of mushroom farming labor

consisted of Puerto Ricans. Today, this typical source of labor has now shifted to migrant-worker Mexicans and Mexican-American.

With the passage of local, county, or state ordinances such as the Seasonal Farm Labor Act in Pennsylvania and nationally with the Immigration Reform and Control Act of 1986, tenant or labor houses first developed, evident, and supplied on mushroom farms are extremely limited and have since been removed. Although rarely seen today because of their horrific conditions and impacted by local land use laws, housing and/or living quarters for tenants and mushroom laborers are a less common feature and characteristic of the mushroom industry.

Today, the level of extant housing remaining on a mushroom farm property may consist of individual living quarters above packing rooms. Their architectural style may resemble a motel or dormitory. Early housing may also be evident above or within the main central office. Other sources of available tenant or worker housing may include mobile or trailer homes, and smaller detached units that are provided as separate living quarters – see Enclosure 7. Rental properties may also be located on or near the mushroom farm.

Reflecting tenant or mushroom labor housing to the Permit Area, according to family accounts, this portion of the former Antonini property (N-14127) did not house local or seasonal labor sources like other mushroom facilities typically do/did. During its family operations, the Antonini family lived on the property (Permit Area). When the Antonini family lost their property through foreclosure, the building and dwelling was then rented out to tenants who also produced mushrooms on a marginal basis and sold portions of the harvest to several different mushroom companies located in Chester County, PA.

In terms of ideal harvest and crop operations, the basic requirements for growing mushrooms are controlled by HVAC or forced air units that control temperatures and allow proper airflow and moisture. While some units are elevated on the second floor, most units evident in mushroom houses are located on ground elevation and situated in the rear of the building. The HVAC unit or airflow system is positioned in the middle of the building, spaced between bay (access) doors.

At first mushroom growing was confined to one or two seasonal growing periods, primarily during the late fall, winter, and early spring when larger control air units were not part, nor available, in the building complex. Harvests and growing seasons were not operable during warmer times, particularly summers when cooler indoor temperatures could not be controlled. Houses were filled once, maybe twice a year and during the downtime, growers had time to clean out the building, perform maintenance, and prepare compost. In fact this is evident with the Antonini mushroom building as local accounts indicate that HVAC units or air control measures were not initially part of the original operations. Today, innovative temperature and monitoring control systems are electronically controlled and have been retrofitted into most mushroom buildings. This has resulted in an all year growing process in which most growers can produce 4 to 5 crop cycles per year.

For the Antonini 4-unit mushroom building facility (N-14127), airflow and temperature control units for all year round production were installed in mid to late 20<sup>th</sup> century. However, it

appears that those units, as part of the industry's innovation, are not original. Other temporary temperature control units (HVAC) are systematically evident and installed outside the building.

Mushrooms are also grown in compost manure in complete darkness with ideal humidity and moisture. Ideal temperatures are set at controlled temperatures of 55 to 60 degrees Fahrenheit. The building facilities typically have larger surrounding spaces such as concrete pads/wharfs and larger flat skids to prepare, fill, stockpile, and remove compost. Proper circulation around the entire building is typical for heavy trucking and equipment mobility.

In obtaining larger quantities of manure and other resources, within the Hockessin region and before the trucking industry replaced the use of the railroad, horse manure was purchased from Delaware, Timonium and Laurel Raceways. It was railed and delivered to the Hockessin or Southwood Station in obsolete gondola cars along the Baltimore and Ohio Rail Road (current Wilmington and Western). The manure was stored in the gondola cars along spur lines where local deliveries would haul bulk manure from the railroad to growers by local truck deliveries. (Lake and Pugh, 2004)

In terms of soil byproduct, used mushroom soils were initially spread and/or tilled into the surrounding area and mixed in with other soils on residual lands on the same property. Since most of early mushroom farms had additional open space acres, spent mushroom soils were commonly placed in open spaces used as part of a disposal and soil recycling process. Spent mushroom soils were continuously mixed in with excavated natural soils piles might sit in a designated area and remain idle for a number of years. At the same time, soils left idle were also stripped and reused as part of a new mushroom soil and mixture batch. Prior to mechanically develop and ready mixed batches of mushroom soil, this recycling, stripping, and re-generation soil process was common early as resources were scarce.

Today, whether compost is mechanically developed, labor intensively processed by-hand, or comes ready mixed, there are specific ordinances now regulating the stripping of top soil and sod as well as establishment of mushroom composing operations. Although spent compost is now marketed as a potting mix or garden soil additive, the common practice of spreading out the spent compost on the same property is not undertaken today. Thus, spent compost collected from various mushroom farms is typically collected and consolidated/stockpiled on the same property or can be taken off-site where it is stockpiled for sale and re-distributed for garden centers. In Delaware, one representative property type also remaining associated with the mushroom industry as a compost/staging/or residual soil area is active and evident off Valley Road.

### *The Future of the Mushroom Industry in Delaware*

Research and regional accounts conclude that the greatest concentration of mushroom farming existed in southeastern Chester County, PA and Hockessin, DE. In 1930, the U.S. Census Bureau revealed that there were 516 edible growers in the U.S. and that 363 individual growers were located in Pennsylvania. Approximately, 330 growers were within Chester County, PA (Parker, Walls, Brother, 2003). In fact, "mushroom houses dotted the land and townships of Pennsbury, Pocopson, East and West Marlboro, London Grove, and London Britain, are all within a ten mile radius of Kennett Square. By this time (1930) Pennsylvania

alone accounted for 85% of all the mushrooms grown in the U.S.” (Harris, <http://mushroominfo.com/history/chesterco.html>)

On a comparison basis, in 1930, Census for Agriculture recorded that Delaware was second with 29 growing facilities. However, to what degree those 29 growing facilities operated in Delaware and with the amount of support buildings and operations recorded is uncertain. Accurate records and statistics prior to 1970 are questionable (Parker, Walls, Brother, 2003).

In the year of 2005, the viability of the mushroom farm industry has declined specifically in Delaware to essentially a few remaining growers and associated property types (i.e. canning, worker housing, and composting/stockpile operations). Migration shifts, economies of scale, and larger concentrations in Kennett Square and Avondale are part of the reason. More importantly, increased property values, ordinance and exclusion controls, and development pressures in northern Delaware as well as overseas competition from parts of China under new open trade laws has virtually eliminated the mushroom industry in Delaware. What remains of the mushroom industry (commercially) in Hockessin and in Delaware is confined to several properties located off Valley, Southwood, and McGovern Roads - see Enclosure 6.

From a regional perspective, Delaware’s decrease in mushroom growers is no different than southeastern Chester County, PA. According to a local mushroom producer in the Kennett Square, PA area, approximately 300 mushroom farms were located in a 25-mile radius from Kennett Square, PA. In 2003 there are approximately 75 mushroom farms in the same radius. In fact, according to the United States Census of Agriculture, in 1987 there were 133 farms in Chester County devoted to mushroom production. In 1997 there were only 103 mushroom farms (Parker, Walls, Brother, 2003).

Despite the decreased number of mushroom producing farms in the Chester County region and those remaining in Delaware, Delaware’s growers are suppliers to the Chester County’s mushroom production. In 2003 this region accounts for more than ½ of Pennsylvania’s production and approximately 20% of the national production (Parker, Walls, Brother, 2003).

From an operations perspective, “mushroom farms, by and large, have similar built landscapes. The type and size of mushroom farms as well as operations, however, can be very different. Like most of agriculture, the trend is toward consolidation, with farms getting larger each year and larger farms absorbing smaller farms. Thus, very small mushroom farms (in operation), with one or two houses (Permit Area) have become less common. These farmers often depend on their own family for labor. Growers with five to six acres and a few houses often grow mushrooms for another producer. Their farms usually consist of some mushroom doubles, equipment or maintenance shed, a packing room (if they market their own mushrooms) and possibly a compost wharf. If the shipper does not market their mushrooms grown, they are taken to another farm and packed and shipped. Larger farms grow, pack, and ship their mushrooms. Thus, on larger mushroom farms, the number of support buildings is larger.” (Parker, Walls, Brother, 2003)

Thus, a trend toward larger and larger individual mushroom producers and distributors has lead to the dramatic decrease in the overall number or industry growers and a substantial

increase in the productive capacity of the growing farms that remain. What was once a predominately family operation continues to be, but is now big business that is largely influenced by market trends and economies of scale. The smaller and mid-sized growing and operations farms, like the Antonini Brothers and other farms typical of the region, simply cannot compete and are likely to sell out.

## ELIGIBILITY REQUIREMENTS

Using the eligibility requirements developed under the *Southeastern Chester County Mushroom Industry Historic Context* and expanding upon them with additional research, observation, and documentation, the landscape and continual operations of the mushroom industry reflects an important trend within the region and country. Given the fact that this region accounts for approximately 20% of the national mushroom production, Delaware's contribution is minimal, but vital to the area.

### *Criteria A*

As outlined in the National Register Bulletin 15, a potentially eligible mushroom farm or property associated with the mushroom industry should be evaluated under Criteria A for its association and contribution with the mushroom industry. Most mushroom facilities consist of many properties throughout southeastern Chester County. However, a small portion of this mushroom industry, both formally and currently, still exist in the Hockessin, Delaware area. The growers and remaining properties in Delaware are still evident, which contribute to the larger association.

In Delaware, each remaining property could be evaluated based on individual merit alone, but are more wholeistically part of a larger context that is important to the region under Criteria A. Provided a property's association can be conveyed and maintains integrity, as a remaining unit or individually evaluated, mushroom farm properties have made significant contributions to the development of this country and as a small sector to the state.

Another associational factor to the mushroom industry under Criteria A is to consider whether or not a mushroom farm or an existing property is reflected with an Italian-American family origin. If so, to what degree does it still maintain that early ethnic affiliation? Realizing that labor and tenant forces have shifted from Italian-American, African-American, Puerto Ricans, to migrant Mexicans, and Mexican-American citizens, those properties that are still owned, managed, or operated out of early family descent, whether it is ethnically Italian-American or not, seem to have a strong continual family history and direct associational family tie to the mushroom business.

Thus, those properties likely to be recommended eligible should have continual and ongoing operations for over 50 years and be likely affiliated under the same family source and origin.

As the mushroom farming industry has evolved though innovation, all properties and facility operations exceeding 50 continual years of growing should still be fully operable and be

originally on a single lot. An eligible mushroom farm/property should not be subdivided into independent lots (for whatever reason) since many operations are co-dependent and functional upon one another. The property's history and association behind one operation is not evaluating a single component the property, but collectively everything as it is reflected in the overall operation.

Larger mushroom farms or those more competitive in the industry may have acquired other properties (growers) in the region and those operations may be leased, contracted, or tenanted out. However, each facility operation or individual property has its own set of individual buildings present in the landscape, as well as its operational features that differ in size, building configuration, and location from another.

Within the mushroom industry, all building, grounds, and property lots have changed to some degree. However, important to note is what severity of impact changes have occurred and to what degree? What is or what was the original property lot configuration? Do original buildings and buildings added or modified over time still support the overall operation and do they exist on a single lot? If not located all in a single property lot, do all the buildings still function and operate together?

With this being said, properties that have experienced a recent business change (i.e. less than 50 years old) where loss of continual family affiliation, ownership, property lot size, and management might hinder its historic association to the mushroom industry. Tenant based or leased facilities are also a recognized phenomena in this industry. However, is the original facility still owned or managed by the same family or business operation?

Other important factors under Criteria A consideration is whether or not the property has an intact location, setting, and feeling as a landscape or build environment? This is important since the property type and its association to the mushroom industry needs to be conveyed. Building or property changes on a mushroom farm delineate the historical evolution of that facility, but if not taken or considered together and conveyed as a single resource and operation, its evolution of the property can not be fully conveyed.

Most mushroom farms still reveal their evolution of the industry through minor changes or expansions. Their physical attributes and alterations should be properly seen, present, and understood as a whole. Knowing that a mushroom farm or property represents a limited number or functional components, most, if not all, components should still be operable and identified as one unit.

Mushroom farm properties with deteriorated ground and building conditions and those with inoperable or isolated building features on property lots will not be able to convey its association to the mushroom industry. Its setting, feeling, and design elements might be compromised. However, are alterations or changes reversible and would the majority of the historic fabric or layout still remain?

In sum, under Criteria A consideration, important factors to consider are to what degree of associational change reflected in the mushroom building's operations, property ownership and

management has occurred. Are all buildings on the property in continual operation? All most buildings functional either individually, or to one another? Eligibility recommendations may depend on individual judgment with the degree of research and analysis conducted.

### *Criteria B*

Unless a mushroom farm, mushroom related building, or property is associated with a pivotal figure, company, or innovation, it is unlikely that any mushroom property in Delaware will be considered eligible for or listed to the National Register or Historic Places under Criterion B.

### *Criteria C*

Under eligibility Criteria C consideration, “the basic form of a mushroom house building or operation has remained basically the same since the 1950’s. Modern mushroom facilities of concrete or cinder block look very similar to those built in prior years. Depending on the type of mushrooms grown (such as agaricus, or the common white or brown button mushrooms or specialty mushrooms, i.e. shiitake) houses may be modified and adapted on the interior, but the overall form of the standard mushroom house is still utilized by the industry. Though the basic form has remained the same, the interior has experienced changes. The infrastructure of the interior must be rebuilt approximately every ten years, primarily due to the deterioration of the wooded beds and shelves.” (Parker, Walls, Brother, 2003)

In order for a mushroom farm, building unit, or facility operation to be recommended eligible under Criteria C, it must embody the distinctive characteristics of a mushroom farm, including traditional construction, materials and design. The mushroom building will have typically a variety (size and dates) of unfinished concrete block. Although not uncommon, early cinder blocks may be evident. Smaller frame building units, perhaps sheathed in asphalt or asbestos shingles and known as “singles”, have all but disappeared. If evident, they are likely to be immediately recommended eligible as such a rare and remaining property type. Most eligible mushroom buildings of concrete block will either be traditional doubles, or occasionally 50+ years of larger doubles compressed under one roof. All buildings vary in overall size, length, or width.

The construction date in most of the mushroom houses and other facility or support buildings (composts functions, garages or storage bays, packing rooms, office, tenant, labor, or owner housing) should be at least 50 years or greater, too. Equally, the majority of the property’s buildings through innovation, alterations, and building additions should be at least 50 years old. Many additions are themselves historic, while others are adaptations brought on by innovation and technological change. Additions and alterations brought about by innovation and technological change (i.e. buildings less than 50 years) should compliment the mushroom building from. As long as additions to mushroom buildings and units do not camouflage the traditional rectangular form or alter its operations and its association, the building or property might be recommended eligible.

For example, packing rooms, which is a continuous shed (or enclosed lean-to) on one gable end, office, dirt rooms (smaller double units), or worker's houses might be among the additions to a mushroom property. Other mushroom farm buildings, such as garages and storage bays or composting operations, should continue to relate to one another and support their association or innovation with the mushroom industry. Individual mushroom buildings should be continuous operational examples that are well maintained in form and function to be considered eligible when they are not located in the context of other supporting buildings that are present on a larger farming operation (Parker, Walls, Brother, 2003).

Under Criteria C consideration, an eligible mushroom farm in Delaware should retain a historic setting, feeling, and location. The landscape should be intact without too many post-1955 modifications.

In summary, many mushroom farms (or those remaining or associated with the industry) have added modern buildings, whether new mushroom houses or auxiliary buildings, such as offices. "These buildings should not be judged to detract from the historic integrity and original elements of the property as long as the modern buildings assist in defining the continuity of the mushroom farm operations. The mushroom housing units and associated buildings should possess enough materials and fenestration (design and workmanship). Further, it should possess enough materials to help convey the builder's original design. The mushroom building(s) should retain their basic form, original materials and configuration and continue to relate to one another to help convey the property's historic feeling of a mushroom house. This will help convey the property's historic significance (and association).

The built landscape may illustrate past and present trends, but it is important to consider the entire operations as a whole, with components working together, rather than singling out one facet of the farm." (Parker, Walls, Brother, 2003)

So what makes a good example of a mushroom house, property, or building unit?

According to the Department of Primary Industries and Fisheries, mushrooms are grown in specially constructed sheds. "There is no standard size or design of buildings for mushroom culture. Factors to include when planning include construction costs, machinery space requirements, tray and bed size, stacking design, etc. Doors (typically numbered) must be designed to suit all machinery and equipment that is used. Windows are not required. Although mushrooms do not require complete darkness to grow, do not allow direct sunlight to reach the beds. Any electrical equipment installed must be able to withstand high humidity. Buildings should be rodent proof.

Cement floors with adequate drainage are required for ease of cleaning and hygiene operations. Flat roofs should have sufficient slope to prevent condensation from dripping onto the beds. Insulation (commonly polystyrene panels) prevents temperature fluctuations and increases the energy efficiency of the air conditioning.

Good ventilation to supply a constant flow of fresh air and prevent carbon dioxide buildup is essential. Ventilation units should be fully adjustable in terms of circulation volumes and include a filter, which will prevent entry of insects and airborne spores. The filters must be cleaned regularly. Do not recycle unfiltered air between different growing rooms. Trays or shelving should be arranged to allow ease of air circulation.

Controlled environment of rooms (temperature and humidity) are required for efficient production of high quality mushrooms. Computer monitoring equipment to maintain the temperature and humidity at the required levels during the production cycle is expensive, but streamlines production considerably.” (<http://www.dpi.qld.gov.au/horticulture/5193.html>)

According to local growers, the Manual of Mushroom Culture provided the earliest guidance in building design, functional layout, growing practices, and operations. This manual, in its 4<sup>th</sup> addition by 1948, provided the means and know-how for the mushroom industry. Many of the early and mid 20<sup>th</sup> century mushroom operations are believed to use this manual as a means to construct, add, or modify and innovate their property.

Using both the previous and modern guidance in construction of mushroom buildings, DelDOT Qualified Staff collectively visited a number of mushroom facilities in Delaware and Pennsylvania to assess, photograph, and note a number of common similarities or differences that are characteristic in a mushroom building, operation, and overall property. The following illustrations provided in Enclosure 8 are examples that help characterize and communicate elements of this specific property type. The illustrations can and should be used in an eligibility assessment under Criteria C for identifying mushroom building properties. By understanding and visually highlighting the common construction and other site elements, it will help identify and note the conditions of building materials and the property’s condition.

As exhibited in the illustrations (i.e. Enclosure 8) mushroom houses that might be eligible under Criteria C consideration share some particular traits. The illustrated traits generally consist of a rectangular sized building that is constructed in concrete block with a gable roof pattern (although some larger building units may have a hipped roof). As also illustrated, the property should be clearly recognized as a mushroom farm with growing and operations that are active. All identified mushroom house buildings are intact with a limited number of additions such as packing and dirt rooms. Packing and dirt rooms are clearly distinguished additions that are commonly applied to this property type.

Equally, under a historic eligibility assessment, the illustrations in Enclosure 8 should establish a property’s historic integrity and directly link it to justify its association to the mushroom industry under Criteria consideration A.

In terms of other representative property types, in consideration of Criterion C, the Antonini residential dwelling might be representative and eligible as a front gable cottage. Since it is a house of unembellished design, alterations should not exist or be in-kind replacement. Regular maintenance and upkeep should be evident to convey its integrity of feeling and

association as a front gable cottage. More importantly, its historic significance must be first defined and justified before its architectural materials can be assessed on integrity of design, materials, and craftsmanship.

#### *Criteria D*

Under consideration of Criteria D, from an archaeological site perspective, mushroom buildings (individually or collectively) might be eligible if they can yield and or have the potential to yield new or unknown information important in history. Construction methods would have to be so unique, undocumented, and/or add to the general knowledge of design or of construction techniques to be considered.

#### ELIGIBILITY *(Please See Enclosure 8 with Evaluation Write-up)*

Applying the National Register Of Historic Places criteria consideration, under Criterion A, the Permit Area property (i.e. house & mushroom complex as part of the former Antonini's mushroom agri-business) is closely associated with events that have made a significant contribution to the broad pattern of our history.

However, with the typical owner management and operations, and most importantly, given that the property is a divisional piece of land in which other agricultural mushroom buildings and supporting operations to this same operation existed, this property is a single and isolated example that does not individually or solely contribute to the broad patterns of local, region, or state history. Taken out of context from its larger operations with supporting characteristics, the property represents a residual portion from an overall period, time, and place of history. It is a property type that is not fully representative of the mushroom industry. As part of a larger facility operation that no longer operates or is associated as a unified or complete complex, the building and individual property in the Permit Area is not able to fully convey its significance to the mushroom industry. Other mushroom buildings and supporting operations once associated with Antoini Brothers, Inc. total operations are located outside the Permit Area. More importantly, the other buildings supporting the overall operations are not 50 years or older, nor have achieved individual significance in the last 50 years.

Under Criteria A, other factors considered that compromise its association to the mushroom industry include:

- The property's setting and condition is no longer characterized by active mushroom farming operations.
- Most surrounding mushroom houses still extant and/or operable are larger facilities with multiple bays of doubles and supporting building operations and grounds. This is a smaller and isolated property example that is missing many other key elements and supporting buildings that are commonly situated on that same property. Other supporting elements may include garage and storage bays, the main office, compost storage areas, worker/tenant housing, and a central or fully tiered facility layout with access and circulation of the operational grounds and buildings. The Permit Area and mushroom

building are only a smaller portion of a much larger facility that was later constructed and improved in the late 20<sup>th</sup> Century.

- By general neglect of the property and the lack of upkeep and innovation, the property exhibits a loss of setting, feeling, and association as operations cease to exist. When recently operating, the property displayed poor quality of operations, contrary to best practices and recommended guidelines in the mushroom growing culture.
- According to historical and current accounts, growers of the industry, plant management, or property owners are most likely to be of Italian-American decent – past and actively. This ethnic affiliation is no longer evident.
- Integrity of setting, feeling, and site design elements appear compromised. The property has been subject to past roadway improvements encroaching upon the buildings and property's grounds, which has resulted in proximity and livability issues. Greater setbacks and improved grounds were noted in the region that allow adequate trucking and access operation into the property and around the building(s). Finer examples exist in the state and in the region.
- In its current layout with changes in land use, property ownership, access, and property function, the property's built landscape has simply resulted in one individual facet. It does not exemplify past and present trends of an operation (or former operation) that works as a whole.

As such, in its current marginal and isolated property function as well as under tenant operations with sources of cheap or illegal labor, the building or property within the Permit Area cannot fully convey its historic significance into the larger patterns of social and agricultural history.

In sum, although some significance may lie in the property's close association to the mushroom industry in Delaware, the buildings within the Permit Area do not convey that significance. Integrity factors of design, materials, craftsmanship, setting, and feeling have severely compromised its ability to convey or understand its overall historic significance, meaning, association, and contribution as a mushroom growing facility and residence at this location.

In total, it is believed that 11 different properties (one being in the Permit Area and one another partially in the state) remain or are located in Delaware. Eight facilities are fully or partially operable during the time of this write-up with building facilities and unified functions in continual operation. Most of those properties exceed 50 years or older with continual operations, too. Thus, the Antonini mushroom building and dwelling (N-14127) is not the only remaining or representative property left associated with the mushroom industry in Delaware.

In consideration of Criterion B, the Antonini family as well as other local Italian-American families in the area who entered the mushroom industry during the first quarter of the 20<sup>th</sup> century are interesting family accounts for the local area, but are not significant within the Permit Area for serious consideration into the National Register of Historic Places. Other mushroom family businesses with larger land holdings, more complex accessory buildings, and continual land and mushroom operations currently exist and are active. Land holdings and mushroom operations formally owned and operated by Antoini family were pieced together and

developed over time. However, parcels and family operations were dramatically sold off or quickly divided to have serious consideration for National Register eligibility of listing status. Operations as a family business no longer exist due to financial or personal changes. The Antonini family, like other families in the same area, became local mushroom farmers in the northern Delaware region. They are not associated with the lives of significant persons since many other families entered the same industry either prior to or during the 1920's and exist today. Individually, the Antonini as a family name and as a contribution to the mushroom growers in Delaware should not be solely highlighted for individual consideration into the National Register. However, family mushroom farms, thematically, might be collectively grouped in or be recognized with other families and operational growers of the era and region.

In consideration of Criterion C, the main dwelling does not appear eligible as a front gable cottage. As a single residential dwelling, it is an inexpensive property type or architectural style popular in the early years of the 20<sup>th</sup> Century. Although the dwelling is generally consistent and unaltered with its typical architectural style described earlier, there are much better examples of roadside cottages with better integrity. Its state of poor upkeep by past tenant occupation has resulted in deterioration of original fabric and alteration of property setting and feeling with driveway and overall property re-configurations contributed by past DelDOT road projects. More importantly, as an architectural style of minimal tradition, its significance cannot be defined within a broader context to minimally meet or exceed consideration into the National Register of Historic Places.

The 4-unit mushroom building does not appear eligible as a typical mushroom farm or facility operation. Although the concrete block building is generally consistent with its typical early architectural style there are much better area examples and mushroom complexes still in operation, functioning, and present in the Hockessin, DE area and throughout the entire southeastern Pennsylvania region (see Enclosure 6 and 7). Even though, the building was first constructed in the 1920's, its common construction methods, building elements, and alterations are unilateral and no differently characterized or distinguished than other mushroom houses constructed at the same time or later.

Its state of deterioration with missing or damaged fabric in packing rooms, entrance doors, and other materials, the building's architectural integrity has been compromised. Its setting and feeling as a mushroom facility is also compromised with loss of functional building operations. Packing rooms and their association in their overall operations fail to convey their purpose and design detail, which hinders the building to convey its significance as a mushroom house. Grounds and operations are inoperable and access surrounding the building impacts the properties, location, setting, feeling, and association with the mushroom industry.

According to the eligibility requirements, the Antonini mushroom building, itself, might retain basic building and architectural form. However, original materials are missing, damaged, and/or deteriorated. Additionally, an altered layout configuration with the lack of property access around the property does not continue to convey the property's historic feeling and association of a functional mushroom building in or not in operation.

In addition, the altered and non-functional landscape of the property does not illustrate past and present trends of the mushroom industry. It is a one facet that has been subdivided out from the overall facility that is not 50 years or older. However, taken as a whole, its entire operations today no longer operate or function together or are closely link together.

In sum, the property's overall integrity and all its current or remaining features fails to convey and maintain most of the ideal description and guidance according to the Department of Primary Industries and Fisheries for mushroom houses and building operations. For example, the HVAC or air control units have significantly altered the arrangement of door and concrete block wall fabric, access and operations, and typical unit spacing. Bay doors, which are typically numbered and serve as functional aspects to the rear of this building, have been removed and substituted for the smaller and temporary airflow units. Due to its semi-abandoned and marginal condition, skids/wharf, loading and compost areas as well as surrounding conditions, the Antonini property (N-14127) is in poor condition, non-functional, and in disarray– see Enclosure 8.

Under criteria C, the Antoini mushroom building and dwelling (N-14127) is not a good historic example of a mushroom house, property, or building unit. Collectively, both standing structures do not embody the distinctive characteristic of a type, period or method of construction or represents the work of a master, or possesses high artistic value or representing a significant and distinguishable entity whose components may lack individual distinction. It is a common and utilitarian design not attributable to a particular designer, architect or building traditions or materials. Although an example of an agricultural building type, the mushroom building is not known to contribute to a greater or further understanding of building technology or design. Because of this and due to the integrity of the property in its current condition, its lack of architectural features and operations fail to add serious National Register eligibility consideration under Criteria C.

In consideration of Criterion D, neither the dwelling nor the mushroom building, individually or collectively, can yield and or has the potential to yield new or unknown information important in prehistory or history. No evidence exists to suggest that the property is connected to a historic activity other than mushrooms. Common and well-documented construction methods would not add the general knowledge of design or of construction techniques.

Past disturbance and removal of soils and materials within the entire Permit Area is not likely to yield any information, too. Because of its past land use history the Permit Area ground and subsurface areas are known to be altered and disturbed.

DelDOT and SHPO archaeologist's considered the area well disturbed during independent field visits and did not recommend any immediate testing to verify.

SHPO review may require further testing and write-up such as any additional boring information, but it is of the opinion of the Delaware Department of Transportation that this may not be warranted and may not gain additional information beyond what is already known and documented.

## CONCLUSION, RECOMMENDATIONS, and FUTURE RESEARCH GOALS

No sites or standing structures are recommended eligible as either an object, district, multi-listing, or individual structure for the National Register of Historic Places. A lack of significant association and the degree of integrity was applied and considered under National Register Criteria A, B, C and D.

However, for future recommended research needs or goals, it is suggested that a multi listing or thematic National Register nomination might be best appropriate to document or better nominate the mushroom industry in the Hockessin, Delaware vicinity and Southeastern Pennsylvania area. The Antonini 4-unit mushroom building facility (N-14127), and its standing structures located within the U.S. Army Corps of Engineers Permit Area is an interesting historical account to the early development of the mushroom industry, but not individually historic in both collective significance and maintaining integrity for National Register eligibility status. Some local significance does lie in the fact that the 4-unit building complex was an operable mushroom growing and harvest facility for over 75 years, but is this representative of a local mushroom agri-business building? Its state of deterioration, lack of upkeep, loss of multi-functions in building components and site conditions, the lack of family business operation, and its current irreversible state of operation and building condition compromises its association and integrity to be a good or reflective property example of a mushroom farm or individual building representative of the industry.

Lastly, due to area consolidation, innovation, economies of scale, and sophistication of business and mushroom practices, much better representative property types of mushroom buildings and of property examples exist in the same area. Some of the same representative property types are operating continuously under the same original family name that are much larger, fully operable, functional, and in better condition. Additional supporting buildings of the mushroom agri-industry also exist on other properties that maintain their integrity and association together. Thus, other representative examples, greater or less then 50-years and operable, do exist.

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