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INTERAGENCY RESOURCES DIVISION
NATIONAL PARK SERVICE

NPS Form 10-900
(Rev. 10-90)

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

1. Name of Property

historic name: **Hacienda Buena Vista**

other names/site number: **Hacienda Vives**

2. Location

street & number: **Puerto Rico State Road #10, Kilometer 16.8**

not for publication

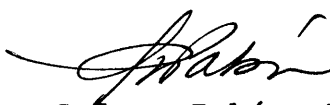
city or town: **Barrio Magüeyes** vicinity **X**

state: **Puerto Rico** code: **PR** county: **Ponce** code: **113**

zip code: **00731**

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this **X** nomination request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property **X** meets does not meet the National Register Criteria. I recommend that this property be considered significant **X** nationally **X** statewide **X** locally. (See continuation sheet for additional comments.)


Arleen Pabón PhD

Signature of certifying official

September 9, 1994

Date

Puerto Rico State Historic Preservation Office

State or Federal agency and bureau

In my opinion, the property meets does not meet the National Register criteria. (See continuation sheet for additional comments.)

Signature of commenting or other official

Date

State or Federal agency and bureau

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4. National Park Service Certification

=====

I, hereby certify that this property is:

- ☒ entered in the National Register
_____ See continuation sheet.
_____ determined eligible for the
National Register
_____ See continuation sheet.
_____ determined not eligible for the
National Register
_____ removed from the National Register
_____ other (explain): _____

Ma. J. M. M. 10/17/94

for Signature of Keeper Date
of Action

=====

5. Classification

=====

Ownership of Property

- ☒ private
_____ public-local
_____ public-State
_____ public-Federal

Category of Property

- _____ building(s)
☒ district
_____ site
_____ structure
_____ object

Number of Resources within Property

Contributing

11 Mule Stables, Corn
Mill, Caretaker's
Office, 2 Warehouses,
Hurricane Shelter,
Caretaker's House,
Horse Stable, Carriage
House, Slave Quarters,
Manor House

1 Garden
2 Canal System, Aqueduct

0
14

Noncontributing

1 buildings Coffee Mill
(reconstruction)

0 sites
0 structures

0 objects
1 Total

Number of contributing resources previously listed in the National
Register 0

Name of related multiple property listing: N/A

6. Function or Use

Historic Functions

Cat: Agriculture	Sub: processing - corn and coffee
Domestic	dwelling
Landscape	garden

Current Functions

Cat: Recreation and Culture	Sub: museum
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7. Description

Architectural Classification: Spanish colonial vernacular

Materials

foundation: Brick, Concrete
roof: Corrugated zinc metal
walls: Brick, wooden frame with shingles, board exterior siding
other: Cast iron machinery

Narrative Description

8. Statement of Significance

Applicable National Register Criteria

- | | | |
|-----------|---|--|
| <u>X</u> | A | Property is associated with events that have made a significant contribution to the broad patterns of our history. |
| <u> </u> | B | Property is associated with the lives of persons significant in our past. |
| <u>X</u> | C | Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction. |
| <u> </u> | D | Property has yielded, or is likely to yield information important in prehistory or history. |

Criteria Considerations

- ☐ A owned by a religious institution or used for religious purposes.
- ☐ B removed from its original location.
- ☐ C a birthplace or a grave.
- ☐ D a cemetery.
- ☐ E a reconstructed building, object, or structure.
- ☐ F a commemorative property.
- ☐ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance: **Agriculture**
Architecture
Commerce
Industry
Engineering

Period of Significance: **1833 - 1845**
1845 - 1872
1872 - 1899

Significant Dates: **1847, 1851, 1892**

Significant Person: **N/A**

Cultural Affiliation: **N/A**

Architect/Builder: **Unknown**

Narrative Statement of Significance

9. Major Bibliographical References

Previous documentation on file (NPS)

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested.
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☒ recorded by Historic American Engineering Record # 24-4

Primary Location of Additional Data

- ☒ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☒ Others

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Name of repository: **Puerto Rico Conservation Trust**

10. Geographical Data

Acreage of Property: **87 acres**

UTM References

	Zone	Easting	Northing	Zone	Easting	Northing
1	—	—	—	3	—	—
2	—	—	—	4	—	—
	<u>X</u>	See continuation sheet.				

Verbal Boundary Description

Boundary Justification

11. Form Prepared By

name/title: **Robert Sackett, Preservationist, PRSHPO (Original 1990 draft). Substantial contributions by Mark Barnes, Senior Archeologist, SERO, NPS; Puerto Rico Conservation Trust; and, PRSHPO.**

organization: **PRSHPO; SERO, NPS; and PUERTO RICO CONSERVATION TRUST**

date: **July 8, 1993**

street & number: **109 San Jose St.** phone: **(809) 721-3737**

city or town: **San Juan** state: **PR** zip code: **00901**

NPS Form 10-900-a
(8-86)

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Hacienda Buena Vista
Ponce, Puerto Rico

NARRATIVE DESCRIPTION

Describe Present and Historic Appearance.

Hacienda Buena Vista, located in Barrio Magüeyes, north of Ponce, Puerto Rico, is an 87 acre agricultural complex constructed in the middle decades of the nineteenth century (HAER sheet 1-15). The hacienda's principal buildings are grouped together within a three acre area (HAER sheets 4-15 and 5-15). Eleven original buildings; the hacienda manor house, carriage house, horse and mule stables, caretaker's house and office, two warehouses, hurricane shelter, corn mill, and slave quarters, are included within the property. The hacienda has a functioning water canal system and aqueduct, and house garden site which are also important features of this complex (HAER sheet 2-15). The coffee bean processing building is a reconstruction of a 1892 building.

Setting: Hacienda Buena Vista's main buildings are located on lands 160 meters above sea level on the south side of the island of Puerto Rico. This area is predominately grass lands and is usually very dry during the summer season. However, the hacienda is located on steeply rising ground that reaches an elevation of 460 meters above sea level which mitigates the dry climate of the area. The area allows for the cultivation of corn, coffee, and fruits on the hills around the hacienda. Another important factor is the nearby Canas River, the source for the hydraulic power of the hacienda's waterworks system.

The Canal and Aqueduct:

The oldest part of the canal, also known as the coffee mill canal, was built along a section of the Canas River named the "Vives Waterfall" which was purchased by Salvador de Vives in 1834 (58 acres for 360 Spanish pesos). In 1847, he was authorized by the Spanish Colonial Government to use the waters of the Canas River, and to construct the canal and aqueduct, using plantation slave labor, to bring water to his hacienda to power a corn mill and later coffee processing machinery. By 1851, the canal and aqueduct were finished.

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The brick and mortar canal (1 ft. 6 in. deep and 1 ft. wide) runs 2600 feet along the steep slopes of the Canas River Valley above Hacienda Buena Vista (see Photos #1, #2, #3 and #4). Over the total length of the canal, water drops 360 meters to the coffee mill at the hacienda (HAER sheets 2-15, 3-15).

The canal begins at the top of "Vives Waterfall" goes through an aqueduct and on to the coffee mill. In the upper part of the canal the slope of the ground has the canal run underground in a tunnel. This underground section has four vaulted access openings or clean-outs for maintenance (see Photos #5 and #6). The canal crosses a ravine in a 15 foot high and 30 foot long aqueduct which also serves as a footbridge (see Photo #7). The capstone on the aqueduct reads "Buena Vista Año de 1851" (see Figure 2; HAER sheet 3-15).

Just before arriving at the coffee mill (see Photo #8), the canal becomes wider and deeper to form an elongated pool. The change in this section of the canal diffuses the water energy and slows it down, and thus acts as a sedimentation or decanting tank. From here it enters the headrace canal to the manifold and sluice gates which control the hydraulics of the coffee mill. At this manifold and through the operation of its three gates, water is diverted according to need; one gate diverts water to the water wheel, and the corn mill water turbine; another gates diverts water to the fermentation tank, the water troughs, the ornamental washbasin, the bath, and back to the river; and, a third gate diverts water to a race which sends water back to the Canas River.

At the overshot water wheel, there is a watergate to divert water under the wheel to the corn mill's sluiceway and through this to the corn mill turbine's penstock. Both mills can operate simultaneously by closing this watergate. In this segment of the canal there is a smaller decanting tank and two sluice gates, one to the penstock, and another to a raceway to the river. The canal ends with the corn mill's trailrace where water is sent back to the Canas River (HAER sheet 12-15).

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The Coffee Depulping and Husking Mill (Reconstruction)

The coffee depulping and husking mill is a two story wooden building located to the northwest of the Hacienda Manor House (see Photo #9). It housed the original corn mill constructed in 1845. In 1892, with the need for processing the coffee beans produced by Hacienda Buena Vista the machinery housed in this structure underwent a change, and became the Coffee Husking Mill.

The machinery and coffee processing spaces at the coffee mill demonstrate that the hacienda's coffee beans were subjected to seven distinct processing stages: pulping (despulpado), washing (lavado), drying (secado), husking (pilado), airing (aventado), selecting (seleccionado), and packing (empacado). The pulping and husking machinery are both powered by an overshot waterwheel fed by the canal and aqueduct system discussed above. The wooden water wheel is 16 ft. 6 in. in diameter, and 2 ft. 6 in. in breath, and has 56 water buckets (HAER sheet 11-15). ^a

As noted above, before water from the canal reaches the water wheel at the coffee mill the canal waters can be distributed into any or all of three sluiceways. The first powers the waterwheel at the coffee mill. The second and third, run under the coffee mill to power the corn mill and form a cattle drinking trough in the hacienda courtyard, or "batey (see Photo #10)," respectively, before being returned to the Canas River. Water can be directed to any or all of the sluiceways by means of a headgate mechanism next to the coffee mill.

The coffee mill consists of a brick and plaster structure (56 ft. x 49 ft. 6 in.) divided into three separate work areas (HAER sheet 9-15). The first area on the east side of the building was where the freshly picked coffee beans were weighed and accounts kept of the amounts harvested by the pickers. The beans were then transferred to the middle third of the mill to the depulping machine. The current depulping machine (see Photo #11) in the coffee mill, in one process washed the beans and removed the viscose outer and internal skins, exposing the hard inner coffee bean.

The wooden structural system for this structure is post and beam with trusses for the roofs. The wooden structural members are made

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of balata (manikara bidentata) wood, while the wooden siding is tongue and groove southern long-leaf pitch pine, and part of the roof is covered with western red cedar shingles. Covering the rest of the roof is hot-dipped, galvanized corrugated sheet metal.

Once the husks of the beans were then removed, the beans were set out on an open patio on the west side of the coffee mill where they were sun dried. The sun-dried beans were then collected and put into the coffee husker, or tahona. The coffee husker (see Photo #12) at the hacienda occupies the western third of the coffee mill, and like the pulping machine is powered by the water wheel. The coffee husker at Buena Vista consists of a circular wooden tub, 13 ft. 6 in. in diameter and 3 ft. 6 in height. Two parallel mounted wooden wheels (5 ft. in diameter) attached by an axle to a central pivot, and powered by the waterwheel, rotate in the wooden tub. The movement of the rotating wooden wheels against the bottom and sides of the coffee husker breaks loose the dried external skin, or husk, of the coffee beans. Dehusked coffee beans would fall through a hole in the coffee husker to be collected in bags below the wooden tub (HAER sheets 10-15 to 12-15).

The coffee beans would then receive their final air drying on the rolling drying pans described below. After drying, the beans were taken across the courtyard, or "batey," to the warehouse under the manor house where the final selecting of the coffee beans and packaging was accomplished.

The Corn Mill

The second corn mill of Hacienda Buena Vista was built in 1854. It is a two story wood frame structure (16 ft. wide and 25 ft. 4 in. long) (see Photo #13). The wooden pitched roof is supported on wooden trusses, one side of the roof extends over the entry gallery on the upper level and thus, is longer than the other. The base of the structure, made of brick and stone masonry, houses a 10 ft. by 12 ft. shaft, 32 ft. deep. The main work area on the upper story of the mill is made of wood. It has three levels, entry and storage area, corn handling area, and milling. Two of these levels house the basic elements of the mill, the grain or corn hopper which feeds the mill stones, and the mill itself

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comprised of the usual upper grinding and nether stones enclosed in a wooden drum (see Photo #14). Close to this drum is the control for the water intake; which controls the movement of the millstone. The ground level is paved in brick. This work area is where the ground corn flour falls and is sieved and packed in either sacks or barrels. The shaft or pit was excavated into the side of the hill overlooking the Canas River to provide the necessary drop for the hydrostatic head to run the turbine (HAER sheet 6-15).

It is on the floor of the corn mill that the actual corn milling took place. Dried corn was fed from a hopper above the corn mill into the fixed upper mill stone eye. The action of the rotating lower mill stone ground the dried corn into corn meal, which was collected in bags as it was forced outward between the stones by the action of the rotating lower stone. The miller, by manipulating the control valve in the headrace controlled the hydraulic energy in the penstock, the speed of the turbine, and the rate of production of the corn meal (HAER sheet 7-15).

As noted above, a plastered brick and mortar water canal from the coffee mill runs underground to power the corn mill. Water enters a penstock or cast iron pipe, 44 ft. tall and 11 in. wide. This water flow is transformed into hydraulic energy by the sheer weight of the water in the penstock into the turbine pit, 44 ft. below the floor of the corn mill. At the bottom of the pit the penstock goes underground and discharges from below into a two-arm cylindrical runner (9 in. wide and 8 ft. 6 in. long) located at the center of the pit. As mentioned earlier, discharged water flowed out of the pit down a tailrace (3 ft. wide and 50 ft. long) back to the Canas River (HAER sheet 8-15).

At the end of each arm there is a 1 3/4 in. (in diameter) bronze nozzle each pointing in opposite directions, but parallel to each other. The water pressure in the penstock activates the runner as it shoots water through the nozzles. The center of the runner is connected to the corn mill above by a 34 ft. long drive shaft, that turns the corn mill when water from the penstock enters the cylindrical runner (HAER sheet 8-15).

The hydraulic turbine for the corn mill was ordered by a Mr. Bennet, in August of 1853, as agent for Carlos Vives, from the West

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Point Foundry in Cold Spring, New York, through the Maitland and Phelps Company, also of New York. The turbine follows the design patented by James Whitelaw and James Stirrat, of Paisley, county of Renfrew, Scotland, in 1841.

The design of the Hacienda Buena Vista turbine, with its arms in a straight line, is not the same as the best known patent for the improvement of these types of turbines, called the Scotch turbine, which has a spiral arm or arms design in the form of the letter S, and its interior diameter section is not uniform for it goes from large to small from its center to its outlets.

Nevertheless, both turbines operate under the same reaction principles and both receive water under pressure from their lower sections by means of a supporting penstock pipe buried below the turbine. This design feature was the contribution of Nathan de la Cour (ca. 1775) to the Baker turbine (ca. 1740) at the end of the 18th century, which was later improved and patented by Whitelaw.

The order for the Hacienda Buena Vista turbine Bennet sent to the West Point Foundry originally specified the construction of a cast iron turbine with a diameter of five feet, so that with a head of 45 feet it would have the capacity of rotating 170 revolutions per minute. James Finlay, Whitelaw's and Stirrat's representative in the United States, along with William Kemble, administrator of the foundry, and the foundry superintendent Robert Parrott studied the order by Bennet. Finally, they recommended that the turbine be eight feet in diameter and not five, as Bennet had originally proposed.

The construction of the turbine and its elements was complex, and well executed in cast iron and equipped with features advanced for its time, such as the clean-out ports covered with removable metal plates and bronze jet nozzles fitted with pear-shaped needle valves located at the end of the turbine wheel facing in opposite directions. These valves have a threaded stem to allow adjustments and to balance the thrust from both arms, and in this way, reduce vibrations. These features are the ancestors of the needle regulating valves which were patented half a century later by the Abner Dole of the United States, as improvements to the Pelton wheel or impulse turbine.

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Carriage House, Horse Stables, and Caretaker's House

The carriage house, the horse stables, and the caretaker's house are located slightly northwest of the hacienda manor house, and form a continuous space (100 ft. x 15 ft.). The carriage house and horse stables form a single 63 ft. x 15 ft. open-sided wood structure. Some of the floor sections were made of Portland cement and others of brick (see Photo #15; HAER sheet 4-15 and 5-15).

The caretaker's house is a traditional Puerto Rican small rural wooden dwelling. It is built 3 ft. above ground on "ausubo" (Native hardwood) supports or plinths. The house contains a living room and bedroom area (25 ft. x 15 ft.) and a connecting kitchen/dining area (12 ft. x 15 ft.). The roofs of all of these structures are corrugated zinc sheeting.

Coffee Bean Drying Building/Former Slave Quarters

This two story wooden building is located to the northwest of the Hacienda's manor house and was constructed in 1847. Originally, this building served as slave quarters until the Spanish Republic abolished slavery in Puerto Rico in 1873. It is recorded that as many as fifty-seven slaves lived in this structure in 1854.

After 1887, the building was converted into a coffee bean drying building to house the coffee drying pans. The structure is approximately 40 ft. x 30 ft. with a large open space on the second story, and a holding area for coffee bean drying pans on the first floor. There are 24 drying pans, 12 on each side of the building, and all are arranged in horizontal or vertical sliding racks (see Photo #16; HAER sheet 5-15).

The last stage in the processing of coffee beans was to expose them to three to five days of direct sunlight which removed any excess moisture from the beans. During this time the beans could not become wet or they would mildew. The Vives family constructed a series of twenty-four staggered "correderas", or drying pans, (each 8 ft. x 18 ft. 6 in.) mounted on iron wheels that could slide into the drying building during the night to protect the beans from morning dew, or in the event of a daytime rain shower. During the day the drying pans were brought out of the drying building to

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expose the beans to the sunlight. When the beans were completely dry, they were packed in wooden boxes, marked with the family's stencil and sent to Ponce for export.

Hacienda Manor House

The brick and wooden two-story hacienda manor house, constructed in 1845, measures 62 ft. x 50 ft. The ground floor was designed for storage purposes, and contains three separate storage or warehouse areas. The largest one (directly under the west side of the living area) is 45 ft. x 24 ft., and has a brick floor. The other two storage areas are located on the south side of the ground floor. One is 17 ft. x 9 ft. and the other is 13 ft. x 9 ft. and both have modern concrete floors. A brick sidewalk, 5 ft. wide partially surrounds the west and south sides of the ground floor (see Photo #17; HAER sheets 13-15 to 15-15) (Also see 1986 Conservation Trust of Puerto Rico Recording Project sheets 1 through 7).

The brick walls of the ground floor are 2 ft. thick and 9 ft. high. The west wall of the ground floor has three door openings. Two of the door openings are standard sized doors, but the middle opening is 8 ft. 6 in. wide and connects the main storage area with the courtyard, or "batey", of the hacienda. Four windows are located on the north and south walls (two windows per wall) of the ground floor. Access to the second floor living area is by a tiled stairway located in the northeast corner of the storage area.

The second floor is composed on the west of wood and on the east of brick. The wooden western half of the second story contains three bedrooms and a living room. Two identically sized bedrooms (15 ft. x 13 ft.) on the north side, and a master bed room (26 ft. x 22 ft.) on the south side all open on to a large living room (26 ft. x 22 ft.). Eight floor to ceiling glass panned doors provide access from the three bedrooms and living room to a wooden balcony that surrounds the western half of the second floor. These doors were also designed to provide cross ventilation. The western section has 12 ft. high ceilings. In addition, the master bedroom, the dining room, the living room, and the two bedrooms are flanked on the outside by a covered wooden balcony.

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The eastern half of the manor house is made of brick with 2 ft. thick walls. The floors of the courtyard (34 ft. x 25 ft.), and the kitchen (12 ft. x 10 ft.) in the northeast corner both have tile floors. A pantry or storage area (12 ft. x 10 ft.) is located just west of the kitchen. On the south side of the eastern half of the second story are two bedrooms (both 13 ft. x 10 ft.) and a bathroom (8 ft. x 10 ft.). These have wooden floors. All of these rooms open on to the courtyard which is open to the sky. On the eastern side of the second story is the main entrance to the house which opens on to a small formal garden area (55 ft. x 55 ft.). The entire manor house roof is made of corrugated galvanized zinc sheeting.

House Garden

At the eastern end of the manor house, the main entrance of the house opens on to a formal garden of rectangular, square, circular, and oval planting beds, containing roses brought from Europe and the United States. This garden is surrounded by a wrought iron and brick 6 ft. high fence and was used exclusively by the Vives family. Historically, this garden served as the formal entrance to the hacienda complex, however, it was most often used as a private family place.

The Mule Stables, Caretaker's Office, Two Warehouses, and Hurricane Shelter

The mule stables and caretaker's office are both one story wooden buildings located just south of the manor house. Both buildings are made of wood and have dirt floors. The office was built 3 ft. above ground level. It is formed by two small rooms, both encompassing an area of 11 ft. x 22 ft. These two structures are covered with galvanized corrugated zinc roofing (see Photo #18; HAER sheet 4-15).

Located opposite the first floor storage areas of the manor house, is the hurricane shelter (see Photo #19), a solid brick structure (15 ft. x 25 ft.) built 3 ft. above ground. Its walls are 2 ft. thick and its floor is made of Portland cement. The ceiling (10 ft. high at its highest point) is gracefully vaulted in order to

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resist unusual atmospheric stress of tropical hurricanes. The shelter windows and doors are placed to help avoid and dissipate the destructive vacuums created by tropical storms (HAER sheet 4-15).

Two warehouse wooden frame structures (both 15 ft. x 30 ft.) (one warehouse can be seen in Photo #20) are located on the south and east side of the hurricane shelter. These structures have dirt floors and zinc roofing.

Integrity: The Vives family developed Hacienda Buena Vista in the mid-nineteenth century, and maintained the buildings and structures in excellent shape down to 1956. When the Historic American Engineering Record (HAER) undertook the recording of the hacienda in 1977, there was little physical deterioration.

The Conservation Trust of Puerto Rico (Fideicomiso de Conservación de Puerto Rico), purchased the remaining 87 acres of the Hacienda Buena Vista from the Vives family in 1984. Using a team of international consultants, the Trust, using HAER documentation and voluminous original historical documentation of the Vives family, was able to restore the agricultural machinery, the buildings and landscape features to their historical appearance and function by 1988.

During the restoration of the Hacienda (1988), the canal system was found to be in good shape. Work was done to clear sections of the open water canal and patching was done on the mortar on the bottom and sides of the canal. The initial 30 foot long segment of the 2600 foot long canal at the top of the Vives Waterfall was reconstructed, this segment having been demolished in a landslide.

Only one building at Hacienda Buena Vista was totally reconstructed -- the 1892 Coffee Mill (see Figures 3 and 4). The original structure, constructed in 1847 as a corn mill and modified in 1892 as a coffee mill, was destroyed by a hurricane in 1928. The Vives family rebuilt their coffee mill after 1928. This post-1928 building is shown in the 1977 HAER sheets 5-15 and 9-15. The coffee mill was reconstructed, by the Trust, in 1988, to resemble the coffee mill of 1892, based on HAER documentation, historical descriptions and documentation, and a 1902 historic photograph (Baralt 1988). The internal machinery for coffee processing, as

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documented in the 1977 HAER project, was well preserved and retained in place within the reconstructed building (HAER sheets 9-15 to 12-15).

Hacienda Buena Vista now serves as the only coffee museum in Puerto Rico. Currently the Trust uses the 87 acres around the hacienda for the cultivation of coffee, corn, and other agricultural products. These are processed in the mills for educational purposes for people visiting the museum.

NARRATIVE STATEMENT OF SIGNIFICANCE

Summary

Hacienda Buena Vista is a historic property that has national, State and local significance. It is considered of national significance as one of the best remaining example of a Puerto Rican coffee plantation. During the latter part of the nineteenth century coffee produced in Puerto Rico was considered among the finest in the world. The complex of buildings, structures, and landscape associated with the hacienda constitute a typical Puerto Rican coffee plantation setting during the late nineteenth century, which had great significance as a cultivator and processor of Puerto Rican coffee beans for export. At the State level, under criteria C the property has achieved importance for its plantation house and the engineering significance of its canal systems and surviving processing equipment. The plantation house, the surrounding buildings, and their relationship shows the integration of man's work with the natural topography and energy resources. The property includes an extremely rare and sophisticated example of a turbine development representing an important stage in the early history of hydromachinery. Its presence points to the owners concern to be abreast with the latest technical developments in Europe and America, in order to have the most profitable operation. The Hacienda Buena Vista is significant also at the local level under criteria A, as evidence of the evolution of agriculture in this area. From the cultivation of produce (1833-1845), especially plantain; to the production of flour (from rice, corn or manioc) (1847-1872), these were vital food sources for the coastal inhabitants (especially for the slave populations) of the growing sugar cane farms in the lowlands of Ponce municipality up to the last quarter of the nineteenth century.

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Historical Background

As a result of the struggle for independence that ensued in the Central and South American Spanish Colonies in the first two decades of the nineteenth century, a wave of emigrants of Spanish officials, soldiers, citizens and loyalists settled on the islands of Cuba and Puerto Rico. Among those who emigrated to Puerto Rico was Salvador Vives, a twelve year Spanish career officer from the province of Catalonia in Spain, who had been stationed in Caracas, Venezuela, until he was forced to leave after the defeat of the Spanish Army in the battle of Carabobo in 1821. Vives traveled from Venezuela on June 27, 1821 with his wife Isabel Díaz, son Carlos and two slaves, to the southern port of Ponce, where the sugar industry was blooming, to start a new life.

With no capital to buy lands, Salvador Vives worked for the municipal government of Ponce during the 1820s and 1830s; first to assist other displaced Spanish emigrants and later as public notary. Between 1833 and 1838 Salvador Vives was able to purchase 482 acres of undeveloped land in barrio Magüeyes, in the hills north of Ponce, near the Canas River. The lands bought consisted mostly of dry pastures and mountainous terrain with thick forest; far from the town. He was able to acquire them at relatively low prices for in the first half of the nineteenth century the lands which were in greater demand were the rich alluvial coastal lands where the sugar industry flourished.

Since its establishment, the Hacienda Buena Vista's agricultural activity was closely tied to the needs of the agricultural industry in the coastal area of Ponce. As more coastal lands were taken up in the first decades of the nineteenth century to grow sugar cane, the amount of land in the coast used for subsistence crops did not grow. This in face of the arrival of large numbers of foreign emigrants attracted by the sugar boom and the subsequent increase in slave population in the area of Ponce accentuated the necessity for more food sources. The production of sugar cane in Puerto Rico required an expanse of lands and a large slave population that had to be fed. It was up to farms located in the mountainous region, like Hacienda Buena Vista, to provide some of the foodstaples necessary to sustain the development of the sugar industry in Ponce and its growing population.

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Under Vives' direction, the Hacienda Buena Vista specialized in growing plantains, beans, yams, and corn to feed the slave labor force of the sugar plantations. However, the hacienda also grew other crops (cotton, coffee, and rice) and raised cattle, oxen, mules and horses in the lower pastures in the vicinity of the hacienda's buildings complex. Initially, the hacienda's principal crop was plantain (*Musa paradisiaca*), a vegetable rich in carbohydrates which was originally brought to the New World from the Orient. Already by 1845 there were 40 acres cultivated with plantain in the hacienda. The demand for this crop continued as the acreage of land dedicated to the cultivation of plantains decreased 398 acres in the coastal plains in the years from 1822 to 1841. The location of the hacienda was an advantage, since it was located in the humid mountain ranges and was not seriously affected by the occasional drought conditions that hit the coastal production of subsistence crops during the nineteenth century. Particularly, in 1839 there was a terrible drought which decreased the production of subsistence crops, causing shortages and starvation among the poor and the slaves. Stimulated by this demand, the hacienda was able to increase its production from 329,200 in 1852 to 475,380 plantains in 1860.

Seeing a limited future in exclusively harvesting the crops without the capacity for processing them, in 1837 Vives purchased a corn mill, a coffee depulper, a cotton gin, and a rice husking machine, all animal powered, to process the agricultural produce of the hacienda. For this purpose, Vives obtained an interest-free loan of 2,000 pesos from his fellow catalonians Manich & Esteban Domenech, merchants in the city of Ponce. At the end of the 1830's and during the 1840's the hacienda's economic activity started to slowly integrate, aside of the lucrative sale of subsistence products, the production of corn flour for distribution among the coastal population. From the beginning, Hacienda Buena Vista cultivated some acres in yellow and white corn. However, the cultivation of corn was better suited to the coastal lowlands than the mountainous region. The hacienda's administrators bought the grain customarily through contract crops from the nearby coastal areas of Ponce, Peñuelas, Guayanilla and Yauco municipalities. When the corn supply was not enough, the crops were bought from places as far as the Isabela municipality in the northwest coast of Puerto Rico.

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As the demand for food staples increased, Vives became a prosperous farmer gaining enough prominence to be elected mayor of Ponce, between 1841 and 1845, serving three terms. At a time when the southern coast of Puerto Rico was being transformed by the development of large sugar plantations that utilized the port of Ponce to ship sugar to world markets, Ponce became the second largest city of the island; after San Juan. As mayor, Vives was responsible for many measures that contributed to the city's development. He had the District Court Tribunal Center moved from Coamo to Ponce, constructed the City Hall, and arranged for the official coat of arms of the city from the Spanish crown, for which, Don Salvador is considered one of the founding fathers of Ponce.

With Salvador Vives' death in 1845, his son Carlos took over the management of the hacienda. Carlos perceived the production of corn meal to feed sugar plantation slaves would be of enough economic importance to finance the construction of a water powered corn mill to replace the animal powered corn mill built by his father. Built between 1845 and 1847, the new corn mill installed by Carlos had a sixteen foot in diameter wooden water wheel that moved the gears for the grinding stones of the corn mill. Carlos powered the new corn mill with water derived from the waterfall on the Canas River that traveled through a 2,600 foot long water canal, which was begun in 1847 and completed in 1851. Within the corn mill structure Carlos also constructed a corn toasting room where corn was dried before it was milled. Carlos completed many of the hacienda structures and buildings currently part of the complex, including the slave quarters, the manor house and warehouse, and carriage house with stables for horses and mules.

In 1847, with the demand for milled corn rising with the increase in sugar plantation slaves around Ponce, Carlos constructed another building for a new corn mill powered with a hydraulic turbine from the West Point Foundry, in Cold Springs, New York. The turbine was patented in the United States, in 1843, by James Whitelaw, of Scotland. The Hacienda Buena Vista's flour gained islandwide prominence due to its excellent quality. From 1847 to 1873, the corn flour of the hacienda reigned supreme over other local mills, as those of Ferrer and Guilbee, Juan Meylan, Francisco Manich and Geronimo Rabasa. Shortly after, the corn mill to pulverize the corn was mounted, and the hacienda's white and yellow corn flour

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received the gold medal for excellence in the second public exposition celebrated in San Juan in June 1855.

Among the factors that contributed to the success of the flour production of the Hacienda Buena Vista was the scarcity of wheat flour that continuously afflicted the island's population during the nineteenth century. The scarcity of flour can be traced to the Spanish Crown's discriminatory tariff system against foreign flour in favor of the Castillean wheat flour. However, since sufficient Castillean wheat flour could not be supplied by Spanish merchants for the national or Antillean markets, it was up to the local corn mill to provide a necessary supply of low priced flour for the island.

By the time Carlos died in 1872, sales of corn meal were gradually decreasing, as world demand for a new crop - Puerto Rican coffee - began to become as significant an export crop as sugar. The new manager of Hacienda Buena Vista, Carlos' eldest son, Salvador Vives installed a new coffee depulping machine and a coffee bean husking machine in the old corn mill (1892) and ran them both with the original wooden water wheel. Production of corn meal and coffee provided a diversified economic basis for the continued success of the hacienda.

There were few changes in the operation of Buena Vista after the United States took Puerto Rico from Spain after the Spanish-American War in 1898. However, as a result of the destruction suffered by the effects of the Hurricane San Ciriaco of 1899 which devastated the Puerto Rican coffee crop, and coupled with the decline in world-wide prices in 1900 for coffee from Puerto Rico, caused a mortal setback to the industry. The coffee industry would lose its primacy in favor of the incipient sugar industry in the coastlands at the beginning of the twentieth century. Also in 1901, the coffee production's recovery was hindered by the inclusion of Puerto Rico into the United States Customs System, which set the local product in a disadvantageous position with its customary European markets, and did not provide favored status in the United States' markets.

In spite of these problems, the Vives family and the Hacienda Buena Vista managers responded by switching to a successful orange growing program for the New York City market. This new phase of

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agriculture continued until 1956, when the government of Puerto Rico expropriated most of the lands of Buena Vista as part of an effort to distribute land to local farmers.

The Vives family kept only 87 acres which included the manor house, agricultural complex and the water channel system. These lands and buildings were acquired in 1984 by the Conservation Trust of Puerto Rico which completed restoration of the hacienda complex (1988) as a living museum and interprets the property as a nineteenth-century coffee and corn processing hacienda.

Coffee Production in Puerto Rico

Coffee was introduced into the Caribbean, during the eighteenth-century, from plants acquired in Arabia, and grown in the Paris Botanical Gardens, from where it was transplanted to the French colonial possessions in the West Indies. By the 1740s, a strain of coffee called 'Coffea Arabica', was introduced into Puerto Rico and successfully cultivated. Coffee is a tropical plant that does not grow well outside 23 N and S latitudes, in low or coastal lands, or above 1000 meters above sea level.

Some of the best Puerto Rican coffee was produced in the central mountain area of the island around Yauco, Ponce, Lares, Maricao, Utuado, and Cayey. This mountain region is characterized by constant spring-like weather, light breezes, frequent rain, high humidity, and a porous red clay soil. The Vives' family hacienda lands were ideal for coffee production, but they also modified the natural landscape by introducing large and tall trees to provide shade for the coffee plants to protect them from the strong tropical light.

By the late nineteenth century, Puerto Rican coffee was in high demand in European markets due to its recognized excellence, especially the "caracolillo" or peaberry variety. In 1891, on the international markets, Puerto Rican "caracolillo" was valued at \$30.00/100 lbs., as compared to Brazilian coffee which was valued at only \$19.00 to \$24.00/100 lbs. In 1896 the total value of Puerto Rican coffee production was nearly \$14 million dollars. At its height, Hacienda Buena Vista, in the last decade of the nineteenth century, produced and processed considerably more than

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10,000 lbs. of coffee per year for shipment to Europe. Within just a few years, however, the natural and economic problems noted above caused the island production of coffee to drop from 338 tons to only eight tons.

Architectural and Engineering Significance

The success of this Hacienda was due, in part, to the sophisticated machinery and advanced production facilities (see description). Architecturally, the Hacienda Buena Vista complex is also important since it the best example of coffee plantation architecture in the island. The building complex belongs to a typical Puerto Rican plantation typology characterized by the use of a brick rubble for the ground floor and wood for the second floor with metal roofs; smaller structures are also of wood and metal roofs and are located around a central courtyard or "batey" much like an urban development.

The "Scotch type turbine" on the pit's floor of the Corn Mill is a unique piece of machinery pertaining to hydraulic technology. Although the turbine is not a classic 17th century Baker's centrifugal or reaction turbine wheel it might be a transformed one, since the "Buena Vista Turbine" does not fit within the Baker's description. Nevertheless, the wheels have an element in common since their arms are very similar as long as they refer to shape, position and function. On the other hand, it is not a Scotch turbine either, being this a Baker's modification. Apparently, the Buena Vista turbine builder used the Scotch turbine principles to make the one in situ, adapting at the same time the Baker's design with added improvements of its own as for example, the brass nozzles, adjustable needles and access ports. But, and here lies the key question, it could also be a Baker's modified wheel, not an "improved" scotch turbine. Whatever the case, it offers a sample of a formidable and unique technological hybrid.

It is significant that in the mid-1840's - while the hacienda was being developed - the Scotch turbine was being patented in the United States after European designs (particularly La Cour's centrifugal wheel). If further analysis is made of contemporary sources it can be derived that the "Buena Vista Turbine" was

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assessed by R.L. Johnson the following way,

Only the three Scotch turbines - first patented in the 1840's - are known to exist in the United States....This acute shortage of extant early hydromachinery is the principal reason why the technological history of the water motor remains obscure and relatively poorly documented.... Recently, however, the discovery of a unique turbine located on a plantation at Ponce, near the South Coast of Puerto Rico, promised to open a new window on the past of a prime mover.... The turbine at Hacienda Buena Vista,...is unique for a number of reasons: it is the only pre-Scotch type known to exist and is the sole extant example of a pioneer and historically important machine that was invented at the close of the 17th century by Dr. Baker.... The Buena Vista turbine is, in effect, a missing link in the evolution of mechanical artifacts better known to the historians of technology. (from "The Journal of the Society for Industrial Archaeology", Vol. 4, No.1 [1978], 55-58).

In July 16, 1994 Robert B. Gaither for the American Society of Mechanical Engineers presented a plaque to the Puerto Rico Conservation Trust designating as a National Historic Monument of Mechanical Engineering the Hacienda Buena Vista's hydraulic turbine. The award was given in recognition not only of the value of the turbine but also of the extraordinary work carried in its restoration.

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GEOGRAPHICAL DATA

Acreage of Property: **87 acres**

UTM References: Zone Northing Easting Zone Northing Easting

A	18	748210	2003200	B	18	748890	2001840
C	18	748220	2000800	D	18	747660	2000890
E	18	747310	2001590	F	18	747600	2002350
G	18	747850	2002870				

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Verbal Boundary Description:

"Legal Description - "Rural": Coffee plantation by the name of Buena Vista, located in Magüeyes Arriba ward in the municipality of Ponce, with an area of EIGHTY POINT FOUR THOUSAND FIVE HUNDRED FIFTY TWO cuerdas (80.4552 cds), which is equivalent to THREE HUNDRED SIXTEEN THOUSAND TWO HUNDRED TWENTY ONE POINT FOUR THOUSAND NINETY ONE square meters (316,221.4091 m2), equals to THIRTY ONE (31), hectares, SIXTY TWO (62) areas, FOUR THOUSAND NINETY ONE (4,091) miliareas, as per survey made by the Social Programs Administration of the Department of Agriculture and ONE HUNDRED AND SIX POINT NINE THOUSAND NINE HUNDRED THIRTY FIVE cuerdas (106.9935 cds.) according to the Registry of Deeds and abounding on the:

NORTH: with land property of the Commonwealth of Puerto Rico [Social Programs Administration, Title SIX (VI)] with Road Number Ten (10) from Ponce to Adjuntas and the Canas River;

SOUTH: with lands of the Estate of Juana Rodríguez, Natalio Maldonado, Road Number Ten (10), Felipe Rodríguez Colón, José Santiago, Cristina Cornier, Braulio Mejías and the Estate of Cosme Ortiz;

EAST: with the lands of the Estate of Juana Rodríguez, Natalio Maldonado, Felipe Rodríguez Colón, the Canas River, Cristina Cornier and José Santiago;

WEST: with lands of Cristina Cornier, Braulio Mejías and Angel Vázquez.

The aforementioned tract is crossed from North to South by the State Road Number Ten (10) and the Canas River.

On this tract there is a series of structures."

Boundary Justification:

The boundary for Hacienda Buena Vista includes the buildings, structures and lands that remained under the Vives Family's control

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and continued its historic association with the Hacienda Buena Vista Agricultural Complex after the Commonwealth government (Social Programs Administration, Puerto Rico Department of Agriculture) expropriations of 1956. Excluded from the National Register boundary are the other 413 acres (original Hacienda Buena Vista Complex consisted of 500 acres) that were expropriated because they were subsequently parceled out to farmers.