Addendum to Maryland Historical Trust Maryland Inventory of Historic Properties Form

Inventory No. PG:62-14

Name of Property: Beltsville Agricultural Research Center (B.A.R.C.)
Location: Beltsville, Prince George's County

The purpose of preparing this addendum to the Beltsville Agricultural Research Center (B.A.R.C.) is to provide an updated, concise historic context since the property the was first recorded in 1970s and updated in the 1990s.

8.Significance

Historic Significance: Beltsville Agricultural Research Center Historic Context

BARC is an Agricultural Research Service (ARS) research facility of the USDA. The USDA acquired the first parcel of BARC land in 1910 for use by its Bureau of Animal Industry. The farm expanded gradually over the next few decades until New Deal policies and programs led to its substantial expansion beginning in 1933. By 1938, the property reached its peak size of 12,461 acres. Today, the site comprises 6,582 acres divided into five farms: the 367-acre South Farm (separated from the other four farms by Interstate 495), 549-acre North Farm, 460-acre Linkage Farm, 2,980-acre Central Farm, and the 2,225-acre East Farm (Robinson and Associates 1998) (Figure 1).

BARC's landscape consists of vast open space, cultivated fields, and hundreds of buildings and structures scattered throughout the facility. Historically, buildings were constructed in groupings associated with individual bureaus/divisions of the USDA or other federal agencies that leased or were assigned portions of the facility. The majority of BARC's buildings are farm research outbuildings, such as sheds, greenhouses, barns, and poultry houses, and the remainder are laboratories, dwellings, and office buildings. The Bureaus of Animal Industry, Dairy Industry, and Plant Industry were responsible for most of the building programs and land acquisitions at BARC (Robinson and Associates 1998).

The South Farm, located at the far southwestern end of BARC, includes open cultivated fields with a small number of small farm buildings on land purchased by the Bureau of Plant Industry between 1941 and 1943 for plant research. The North Farm, located immediately to the northeast of the South Farm, was acquired in 1933 and expanded in 1940 by the Bureau of Plant Industry. The North Farm contains cultivated farmland to the west and a densely developed area to the east. The Linkage Farm, located across Route 1 from the North Farm, contains the National Agricultural Library and the newer portion of the USDA George Washington Carver Center, but mostly includes open or cultivated fields. The Linkage Farm was assigned to the Bureau of Plant Industry in 1938, after being transferred from the Resettlement Administration to the USDA. The largest of the farms, the Central Farm, adjoins the Linkage Farm and contains approximately 12 clusters of farm or research-related buildings, as well as pasture and forested areas. The Central Farm, which contains the original acreage USDA purchased in 1910, historically was used by the Bureaus of Dairy Industry and Animal Industry, and their successor organizations. The USDA acquired the East Farm, which is adjacent to the east side of the Central Farm and largely forested, in the mid- to late-1930s for the Bureau of Animal Industry and other agencies, including the Soil Conservation Service. The East Farm only has a few building clusters (Robinson and Associates 1998).

The following historic thematic statements present BARC within the contexts of the federal role in agricultural research, experimental agricultural research, New Deal policies and programs, landscape architecture, experimental agricultural architecture, and Georgian Revival architecture.

Federal Role in Agricultural Research

The United States' public agricultural research system is rooted in several legislative acts Congress passed in the mid- and late-1800s. These acts established the USDA and the state agricultural experiment stations, and granted funds for agricultural colleges. Subsequent congressional acts in the first half of the twentieth century led to significant expansions in research funding and diversity of federal agricultural research subjects. The USDA and state agricultural experiment stations have been responsible for the majority of public agricultural research undertaken since the federal government

began to actively support agricultural research in the nineteenth century (OTA 1981). The BARC, established by the USDA in 1910 and significantly expanded in the 1930s, was the nation's largest and most prominent agricultural research facility, a key component of the federal agricultural research system.

Nineteenth Century Legislation
Three primary pieces of nineteenth century legislation form the foundation for the federal government's involvement in agricultural research: the Organic Act establishing the USDA in 1862, the Morrill (or Land-Grant College) Act of 1862, and the Hatch Act of 1887 (Huffman and Evenson 2008). The United States had an agricultural-based economy in the nineteenth century, and by the 1850s, farmers were lobbying for a new government department devoted to agriculture. Because of strong opposition from southern farmers, however, the USDA was not created until 1862 after the southern states seceded and the Civil War was well underway (Huffman and Evenson 2008). The new USDA had a mandate to serve the nation's farmers (Bowers 1993). The department inherited the government's agricultural library that had been created in 1839 (USDA 2016). Research was a primary component of the department's work from its inception, although research is not mentioned in the act that led to its creation (USDA 2016). The first USDA research bulletin (on sugar content of grapes and suitability for wine) was published the same year the department was founded (USDA 2016). By 1868, the USDA had begun research on animal diseases and published an analysis of corn as food (USDA 2016). It created the Bureau of Animal Industry in 1884 (USDA 2016).

The Morrill (or Land-Grant College) Act of 1862 authorized public land grants for colleges in each state to teach agriculture and mechanic arts. Some of the land-grant colleges eventually became agricultural research institutions that would go on to collaborate with the USDA's research efforts in the twentieth century. A second Morrill Act passed by Congress in 1890 provided additional funding. Though both acts were vague on the role of agricultural research, they made funds available for experimental farms and special projects (Huffman and Evenson 2008).

The passage of the Hatch Act in 1887 was "one of the most important legislative steps taken to develop public agricultural research in the United States" (Huffman and Evenson 2008; OTA 1981). The act authorized a crucial expansion of public agricultural research by allowing for the quick establishment of state experimental agricultural stations in all of the states (Huffman and Evenson 2008). The Office of Experiment Stations was established in 1888 to oversee the new stations. With the passage of the act, the modern network of state agricultural experiment stations was established and the close cooperation between regional research facilities and the USDA's nationally focused research activities was initiated (OTA 1981). Although the Hatch Act led to a rapid increase in the number of facilities nationwide that were undertaking agricultural research, funding for agricultural research was modest between 1888 and 1897 and USDA research facilities were limited (OTA 1981).

Expansion of Federal-State Agricultural Research System
It was not until the arrival of James Wilson as Secretary of Agriculture in 1897 that the USDA's research program began to significantly expand (OTA 1981.) During Wilson's 16-year term, the USDA established seven new scientific bureaus (only the Bureau of Animal Industry had existed previously): Plant Industry (1901), Forestry (1901, would became the Forest Service in 1905), Soils (1901), Chemistry (1901), Statistics (1903), Entomology (1904), and Biological Survey (1905) (OTA 1981). Congress quadrupled the Department's budget for research between 1897 and 1904 (OTA 1981). In 1898, Congress appropriated the first funds to collect, test, and prepare foreign plant materials and authorized testing of seeds purchased on the open market (USDA 2016). The department's staff increased more than six fold between 1897 and 1912 and expenditures increased from $800,000 in 1900 to $4 million in 1910 (OTA 1981).

The USDA's earliest national research facilities were on the National Mall, but as the department's research programs grew, researchers needed more space. Initially, the USDA procured use of 400 acres of the now-Arlington National Cemetery in 1900 for experimental farming and built two laboratory buildings on the Mall site in 1907, but these were insufficient to accommodate all their needs (OTA 1981). In 1910, the USDA purchased the 475-acre farm parcel in Beltsville, Maryland for work on dairying and animal husbandry (OTA 1981). Over the next two decades, gradual additions were made to the Beltsville and the Arlington farms as the department's programs continued to expand (OTA 1981).

Congress passed a number of key pieces of legislation during the Beltsville farm's early decades that grew the USDA's programs and would ultimately contribute to the department's decision to centralize agricultural research at Beltsville. Through the 1914 Smith-Lever Act, the USDA received an increase of funding that established the Agricultural Extension Service (later the Cooperative Extension Service) and formalized the department's educational outreach to farmers (Huffman and Evenson 2008). By 1916, there were 29 agricultural research stations in operation (it would eventually be 30) by the federal government, states, or cooperatively (OTA 1981). The subsequent 1925 Purnell Act authorized funds for research by agricultural experiment stations on economic and social problems of agriculture (USDA 2016). The Bankhead-Jones Act of 1935 provided for expansion of agricultural research (USDA 2016). In 1938, the Agricultural Adjustment Act established four regional USDA research centers to develop new uses for farm produce (Wyndmoor, PA; Peoria, IL; Albany, CA; and New Orleans, LA) (USDA 2016). The department created the Agricultural Research Administration in the early 1940s to administer the increasingly complex coordination between the many agricultural experiment stations and laboratories that were in operation by that time (OTA 1981). The Research and Marketing Act of 1946 included substantial funding for research, so that by the 1950s, the USDA's research programs were well funded (OTA 1981).

Between 1933 and 1953, the USDA centralized the Washington, D.C.-area research facilities at the Beltsville farm, which was re-designated as the National Agricultural Research Center. Research continued to be conducted concurrently at field and state stations, yet Beltsville swiftly became the largest agricultural research center in the country. Through its various divisions and bureaus, the USDA expanded its scientific inquiries into a wide number of topics related to animal husbandry and breeding, crop cultivation and soils, animal and plant diseases, and nutrition (USDA 2016). The "National" before the center's name was dropped in 1945 (USDA 2016).

Between 1888 and 1953, the federal and state agricultural research programs were integrated in both policy and funding through the USDA, which led to ongoing conflicts over funding for national research and state-level research. In 1915, 25 percent of the USDA's budget was devoted to research, but by 1920 only 6 percent, continuing to drop to 2.5 percent where it remained until the 1950s (OTA 1981). Despite its relative declining importance in the USDA budget, the dollar amount devoted to federal research remained steady, with an average of 78.8 percent devoted to federal research and 21.1 percent to State research through the early 1950s (OTA 1981). Conflict was inevitable between the USDA, who sponsored its own research, and the state agricultural experiment stations, since the USDA was also responsible for passing on funds to the states and determining the division of responsibility for research (OTA 1981).

Research System Decentralization

In 1953, the new Secretary of Agriculture, Ezra Taft Benson, led a major reorganization and decentralization of the department's agricultural research program that continued through the 1970s (OTA 1981). The decentralization had long-lasting consequences for Beltsville. The USDA's scientific bureaus and the Office of Experiments Stations were discontinued and the USDA's research functions were centralized under the new Agricultural Research Administration (OTA 1981). A separate Cooperative State Research Service was established in 1962 (OTA 1981). The reorganization "had the effect of subjecting the research structure of the Department—which had substantial stability and immunity from

political interference for 40 years...—to a succession of pressures for further drastic reorganizations with the changes in political administration in future years" (OTA 1981). The USDA again reorganized in 1972 with administrative decentralization in mind (OTA 1981). Operating responsibility was delegated to four regions, which were then subdivided into research area centers. Beltsville's scientists and facilities became a regional research facility, rather than a national one (OTA 1981). In the years between 1953 and 1973, research funds averaged 3 to 4 percent of the USDA budget. Of those funds, 77.4 percent went to federal research programs and 22.6 percent went to the states (OTA 1981). About half of the department's research facilities were built between 1958 and 1977 (OTA 1981).

Congress' preference for supporting local and state research stations over national stations lessened BARC's role within the United States' agricultural research system. By 1980, the USDA's research program was highly decentralized, with research undertaken at 148 locations, including the much diminished 450-scientist facility at Beltsville (OTA 1981). Between 1965 and 1985, Congress appropriated $242 million for the Agricultural Research Service's (ARS) facilities nationwide, while Beltsville (re-designated the BARC in 1984), which had 20 percent of the agency's employees, received only $8 million (Sinclair 1988). In 1988, Beltsville was bypassed in a continuing budget resolution, which diverted federal funds to research programs in powerful lawmakers' home districts. That year, Congress approved more than $57 million around the country for new agricultural research facilities at universities and outposts of the Agricultural Department of the USDA and "most of these projects, assigned to the USDA Agricultural Research Service that manages Beltsville, went to states represented by senior senators and representatives with key seats on congressional appropriations committees" (Sinclair 1988). Today, many of BARC's facilities are unused and in disrepair.

Experimental Agricultural Research

Developments in agricultural technology occurred more rapidly in the twentieth century than in all previous human history, predominantly due to advances in scientific knowledge discovered during experimental agricultural research. Major agricultural changes in technology began in earnest with the invention of hybrid corn varieties at the beginning of the twentieth century and continued with the introduction of herbicide and insect-resistant field crop varieties by the end of the twentieth century (Huffman and Evenson 2008). During the period between 1900 and 2000, the real aggregate agricultural output grew at an average annual rate of 1.61 percent per year, and 2.08 percent over 1970 to 1999 (Huffman and Evenson 2008). Particularly in the 1930s and after, agricultural research findings dramatically improved agricultural productivity in the United States. Through most of the twentieth century, BARC, which was established by the USDA in 1910 and substantially expanded in the 1930s, was the nation's largest and most diverse agricultural research center. BARC's scientists and researchers have made considerable contributions to agricultural science, and BARC has been the "location of an enormous body of important, innovative, agricultural research of national scope and significance" (Robinson and Associates 1998).

Agricultural advancements in the United States can be separated into four main periods: 1775 through the Civil War, when productivity relied on hand power and some later labor-saving equipment; Civil War to World War I, when productivity increased modestly because of the introduction of more efficient horse-drawn equipment; World War I to World War II, when animal power gave way to mechanical power; and World War II to the present, the era of "science power," when major advancements were made in agricultural research that substantially improved productivity and reduced many uncertainties of production (OTA 1981). Science power was largely the result of research that the public and private sectors began to take in earnest in the mid-1930s (OTA 1981). The Green Revolution from the 1930s to the late 1960s was a particularly ripe period of technological progress. New crops and techniques, new strains of plants and animals through the use of genetics, improved animal breeding, and pest and disease control in crops led to significantly increased food production in the United States and worldwide (Rasmussen and Mellanby n.d.).

Early Agricultural Research, Eighteenth to Early Twentieth Century
Prior to the 1862-acts that established the USDA and the Land-Grant College system and the 1887 act that established the state agricultural experiment stations, the U.S. patent system stimulated agricultural research by protecting individuals' inventions and implementing an active seed collection and distribution program (Huffman and Evenson 2008). Patents for agricultural inventions exceeded those for all other fields between 1790 and 1849, and the largest share were mechanical patents for agricultural tools and machinery (i.e., chemical and electrical inventions were not submitted in large numbers until after 1850) (Huffman and Evenson 2008). The Patent Office's foreign plant/seed introduction program was instituted in the 1840s (Huffman and Evenson 2008).

Private agricultural societies and the Yale Scientific School were also dabbling in agricultural research prior to the establishment of the USDA-state agricultural experiment stations system. Agricultural societies provided early support for agricultural improvements and were active during the 1800s distributing information to their members, collecting and distributing seeds, building reference libraries, and purchasing land for trials and experiments in plant and animal breeding and soil improvements (Huffman and Evenson 2008). In 1845, the Yale Scientific School was the first American educational institution to initiate an agricultural science program, a precursor to the later land-grant colleges inaugurated through the Morrill Acts of 1862 and 1890 (Huffman and Evenson 2008).

Although the legislation that created the USDA did not mention research, it was nevertheless an important component of the department's work. Early USDA research focused on four main areas: importation of seeds and plants and plant classification, statistics, chemical analyses, and livestock disease control (Huffman and Evenson 2008). The first three research areas were transferred from the Patent Office, which had previously instituted those programs. In its early years, the USDA led international exhibitions to search for new plant materials and widely distributed seeds to farmers to test in the nation's various climates (the public seed distribution was discontinued in 1923). One early success was the USDA's introduction of the Brazilian seedless navel orange to California (Huffman and Evenson 2008). Research on animal disease began in 1868 and resulted in the discovery of the causes of tick fever and hog cholera (Huffman and Evenson 2008). In the 1890s, the USDA established regulations for chemical analyses of soils and minerals that were used by public and private laboratories (Huffman and Evenson 2008). Between 1900 and 1914, the USDA expanded its mission to improve the social aspects of farm life as they worked to increase American farm diversification; the USDA began to conduct surveys and research into farm life and conditions in an attempt to obtain an accurate picture of American farm life (Edwards, Holycross, and Barnes 2004).

Early Research at Beltsville, 1910-1933
BARC began as an experimental farm for scientists focused on animal husbandry, dairying, and animal disease research. USDA purchased the 475-acre Beltsville farm on June 30, 1910 to supplement its research facilities in Bethesda, MD and elsewhere (Houck 1924). The 475-acre parcel in Prince George's County was divided between the department's Animal Husbandry Division and the Dairy Division, both part of the USDA's Bureau of Animal Industry (USDA 1949; Robinson and Associates 2000; USDA c. 1937; USDA 1921; Wiser and Rasmussen 1966). The bureau designated 190 acres for the Dairy Division to research dairy cattle breeding and care, forage crops, silage, and effect of feed on flavor and odor of milk, and granted the remainder to Animal Husbandry Division for experiments in breeding and feeding animals and poultry (Wiser and Rasmussen 1966; USDA 1921). The bureau moved the first mules and horses from Bethesda a week after purchase; sheep, goats, hogs, guinea pigs, and poultry equipment were transferred to the farm by early 1911 (Wiser and Rasmussen 1966, Houck 1924).

To accommodate the experimental farm's many research tasks during BARC's early period (1910-1933), staff constructed laboratories, farm buildings, pastures, and staff housing. The experimental farm acreage and facilities grew gradually.

Within a year of Beltsville establishment, the divisions had constructed the first buildings and fences, and equipped the farms (Wiser and Rasmussen 1966, Houck 1924). In 1912, the bureau erected a laboratory building (Mohler 1939; Houck 1924) and, in 1913, a barn (USDA n.d.; USDA 1921). In 1916, the bureau set aside 100 acres for work on intensive farm production of sheep and built a large concrete barn (Wiser and Rasmussen 1966). The Bureau of Animal Industry added laboratories for the Pathology and Zoological Divisions, and the Bureau of Plant industry began to operate at Beltsville on approximately 425 acres of leased land (subsequently purchased from Public Works funds) during the first few decades (Wiser and Rasmussen 1966; USDA c. 1937; USDA c. 1937; Wiser and Rasmussen 1966). By 1925, the USDA owned 1,062 acres at Beltsville and leased about 1,000 more acres (Wiser and Rasmussen 1966). By 1933, four land purchases, totaling 1,381 acres, further increased the farm's size (USDA c. 1937).

The scientists at Beltsville between 1910 and 1933 considered a broad range of research topics. By 1921, the farm had 145 head of dairy cattle (purebred Holsteins, Jerseys, Guernseys, and others) used in breeding, feeding, and dairy herd management experiments (USDA 1921; Trimble 1952). A large acreage was set aside at the farm for the study of sheep, and a new breed of chickens was developed at the farm ("Lamona") (Houck 1924). Staff were conducting experiments with forage crops for dairy feed and with silage growing under various conditions; studying the nature and extent of losses in the silo to determine relative merits of wood and concrete as silo building materials (Creamery Journal 1916); experimenting with open-shed types of barns versus ordinary closed barns and different kinds of stable floors; and studying factors effecting bacterial count of milk, breeding, and physiology of milk secretion (USDA 1921). Experiments on poultry breeding had been underway since 1912, and researchers were also studying the incubation of eggs and the effects of feeding on egg production (Mohler 1939, Houck 1924). In the 1920s, the Beltsville Farm researches showed that using pasteurized sweet cream instead of sour ripened cream helped butter last longer, thereby solving a major food problem (Yao 2010). They also released 'Mary Wallace,' the first disease-resistant shrub rose (Yao 2010).

Broadening of Beltsville Research, 1933-c.1960s

The USDA substantially expanded the Beltsville facility beginning in 1933. In 1935, the department re-designated the farm as the National Agricultural Research Center. Major landscape improvements and new facilities were designed and constructed to accommodate researchers. By 1939, the Beltsville facility contained laboratory buildings (including the Animal Husbandry Laboratory, Building 200, and the Germplasm Resources Laboratory, Building 004); the Bee Research Library (Building 476); brooder houses with service quarters in the center; colony houses; laying houses; pigeon lofts; feed houses; carpenter shops; garages; storage sheds; incubatory rooms; a coccidiosis building with incinerator for the Zoological Division's isolation unit for experimental work with coccidiosis of poultry; insectary; and experimental pens (Mohler 1939, Living New Deal n.d.). Beltsville expanded rapidly to accommodate the various bureaus that were consolidated at the site, including the Bureau of Animal Husbandry in 1942 (USDA ca. 1990) and facilities from the Arlington Farm of the Bureau of Plant Industry in 1942 (Wiser and Rasmussen 1966). Between 1940 and 1942, funds were also allocated for establishment of National Youth Administration Youth Resident Project "to give young men practical experience in the mechanical shops and laboratories of the farm" (Wiser and Rasmussen 1966).

The Agricultural Research Center had grown to approximately 12,000 acres by 1949. The Bureau of Plant Industry, Soils, and Agricultural Engineering; Bureau of Agricultural and Industrial Chemistry; Soil Conservation Service; Forest Service, Bureau of Entomology and Plant Quarantine; Production and Marketing Administration; Bureau of Dairy Industry; Bureau of Animal Industry; and the Bureau of Human Nutrition and Home Economics all operated from Beltsville (USDA 1949). Staff on site numbered 2,300 persons and included agronomists, animal husbandmen, apiculturists, architects, bacteriologists, biochemists, biologists, botanists, chemists, dairy technologists, engineers, entomologists, geneticists, grain technologists, helminthologists, home economists, horticulturists, mycologists, nematologists, olericulturists, nutritionists, parasitologists, pathologists, physicists, physiologists, statisticians, veterinarians, and zoologists (USDA

1949). The center had 3,000 experimental farm animals (cattle, hogs, goats, and poultry), more than 10,000 mature laying and breeding fowls, and about 5,500 small animals for laboratory testing, including guinea pigs, hamsters, rabbits, rats, and mice. The center also had bees (USDA 1949). The center's facilities included 40 laboratory buildings, 31 greenhouses (including 5 acres under glass), an apiary for bees, approximately 100 barns and storage buildings, 500 small animal and poultry houses, a granary, shops, warehouses, and heating, water-treatment, and sewage-disposal plants. Open areas included experimental pastures, ranges, orchards, gardens, fields for cultivated crops, timber stands, and soil-treatment plots (USDA 1949).

In 1952, the facility was 11,000 acres and the Bureau of Standards of the Department of Commerce, the Geochemical Prospecting Unit of the Geological Survey of the Department of the Interior, and the Veterinary Section of the Food and Drug Administration of the Federal Security Agency were also conducting research at the site. The Patuxent Research Refuge, where the US Fish and Wildlife Service of the Department of the Interior studied wildlife problems related to agriculture, adjoined the site (USDA 1952).

The USDA undertook a major reorganization in 1953 that abolished the bureaus as organizational units, though research continued in the same channels. At that time, Beltsville, then the nation's largest agricultural experiment center, became part of the ARS (Wiser and Rasmussen 1966, Matthews 1953). In 1959, the divisions and departments undertaking research at Beltsville included the: Agricultural Engineering Research Division, Animal Disease and Parasite Research Division, Animal Husbandry Research Division, Crops Research Division, Eastern Utilization Research and Development Division, Entomology Research Division, Institute of Home Economics, Plant Pest Control Division, and Soil and Water Conservation Research Division (USDA 1959). The Agricultural Marketing Service, Forest Service, Soil Conservation Service, and Fish and Wildlife Service of the Department of the Interior also operated on the site (USDA 1959).

The center researched "broad problems of national interest" in 1959 "to accumulate scientific information that can be applied anywhere." This research was often conducted in cooperation with state agricultural experiment stations (USDA 1959). On August 21, 1957, the first pioneering research laboratory with the purpose of investigating the mineral nutrition of plants was established at Beltsville. In 1959, the Agricultural Research Center still covered about 11,000 acres, which were divided into experimental pastures, ranges, orchards, gardens, fields for cultivated crops, timber stands, and soil-treatment plots. There were 950 buildings that provided office and lab space for approximately 2,300 employees. Half of employees were scientists or technicians, and the others were clerical, farm, and maintenance workers. Buildings included 58 laboratories, 31 greenhouses, 161 barns and storage buildings, 700 small animal and poultry houses, shops, an apiary, a granary, a warehouse, and heating, water-treatment, and sewage-disposal plants. The center had 3,000 experimental farm animals, more than 10,000 laying and breeding fowls, and about 5,500 small animals used in laboratory tests (USDA 1959).

In 1966, BARC staff had grown to 1,250 scientists and 1,500 supporting personnel who collaborated with 300 field stations around the country and overseas. Scientists and researchers studied crops, animal science, agricultural engineering, entomology, soil and water conservation, and human nutrition. By the mid-1960s, thousands of people were visiting the center to tour the $50,000,000 facility with 200,000 square feet of greenhouse space and 1,160 buildings, including the National Agricultural Library, previously in Washington, D.C., that had moved to Beltsville in 1967. The library holdings comprise 90,000 subject headings and cross references and are the most extensive agricultural collection in the world (Bowers *et al.* 1993).

Beginning in the mid-1960s, and particularly after the 1972 reorganization that decentralized the USDA, Beltsville declined in importance as significantly more funds were being directed to experimental stations elsewhere in the country (Sinclair

1988). By 1982, the center had diminished to 7,200 acres (Olmert 1982). In about 1984, the facility was re-designated as BARC. In 1988, BARC occupied 7,000 acres (Sinclair 1988). BARC contained eight institutes in 1990: Agricultural Environmental Quality, Animal Parasitology, Animal Science, Horticultural Science, Insect Identification & Beneficial Insect Introduction, Plant Genetics & Germplasm, Plant Physiology, and Plant Protection. About 2,550 USDA employees and 200 employees from other federal agencies worked at BARC in about 800 buildings that included research laboratories, greenhouses, barns, poultry houses, shops, and offices. About 900 of the employees were scientists and technicians. Animal researchers focused on livestock diseases, animal nutritional needs, and animal genetics and physiology to improve productivity of cattle, poultry, swine, and sheep. Plant specialists researched greater crop yields by breeding plants that used light and nutrients efficiently, had built-in disease resistance, and were able to cope with marginal growing conditions. Other researchers were developing new methods to fight plant pests and using biological controls and naturally occurring chemicals to reduce crop loss and to ensure meat, milk, and produce had natural taste and nutritional value (USDA ca. 1990).

Notable Research at Beltsville

The research accomplishments of BARC scientists and researchers have had wide- and long-reaching beneficial effects on national and international agricultural practices. Agricultural research at BARC has been a blend of foundational and applied scientific research. While the private sector has typically focused on practical applications of science (applied science) that would lead to profit, federal research has worked more frequently on biologically oriented research, which provides the foundational (basic) knowledge needed for practical applications (OTA 1981, USDA 1963).

Each of the units based at BARC has made major accomplishments. The Bureau of Dairy Industry, the earliest of the USDA's research divisions at Beltsville, conducted breeding and feeding research that has led to major improvements for small dairy farms, larger commercial dairies, and dairy production and manufacturing industries nationwide (Robinson and Associates 1998). The Division of Animal Husbandry of the Bureau of Animal Industry, the largest bureau at the site, undertook critical poultry and swine research improving the size and health of farm animals. The Bureau's Zoology Division's parasite research brought innovate new approaches to treating infestations. The Animal Disease Station developed vaccines to prevent Bang's disease and developed sterilization methods for contaminated hides. The Bureau of Entomology and Plant Quarantine, which came to BARC in the 1930s, conducted important research as the national headquarters for the Division of Bee Culture and developed the DDT aerosol bomb. The Bureau of Human Nutrition and Home Economics during World War II researched important nutrition and textiles. The Bureau of Plant Industry, the second largest bureau at BARC, developed many of the soy bean, blueberry, Easter lilies, zoysia turf, and forage crop lespedza used widely today, and conducted fundamental research into photo periods. The Food and Drug Administration conducted important research on insecticides (Robinson and Associates 1998).

Specific examples of BARC scientists and researchers' contributions to agricultural science include:

- 1930s: Developed and introduced pest-resistant potato varieties from the 'Katahdin' potato to grow in the northeastern United States ('BelRus') (USDA ca. 1990).
- 1930s: Produced the first successful *brucellosis* vaccine to immunize cattle against the disease that causes high numbers of miscarriages (Yao 2010).
- 1930s and 1940s: Bred the Beltsville Small White Turkey (USDA 1963).
- World War II: Invented and developed a new group of pesticides—DEET, DDT, rotenone, and allethrin—to guard soldiers and the general public against insect-borne diseases such as malaria and other tropical disease that saved thousands of lives during and after World War II (USDA ca. 1990; Yao 2010).

- 1950s: First to develop the framework of the sterile insect technique, releasing sterilized male flies to mate with native flies, so that by the 1980s, screwworms were eliminated from the United States (Yao 2010).
- 1950s: Developed many new varieties of fruits and vegetables that were both disease-resistant and more flavorful (Yao 2010).
- 1950s: Pioneered research on photoperiodism (plant response to variations in the light/dark cycle) that culminated in the chemical isolation of phytochrome (triggering mechanism of plant growth), a core concept in plant physiology (USDA ca. 1990, Yao 2010).
- 1960s: Developed the first computerized near-infrared spectrophotometer to measure traits without destroying a sample (Yao 2010).
- 1970s: Discovered plant viroids—a new class of disease-causing particles 80 times smaller than viruses (USDA ca. 1990; Yao 2010).
- 1990s: Developed technology to separate X- and Y-bearing sperm in animals, allowing for sex selection during breeding (Yao 2010).
- 1990s: Developed detergent chemical methods for determining nutritional value of feedstuff—now used in both human and animal nutrition (USDA ca. 1990).
- 1990s: Adapted automated equipment to energy metabolism research to determine exact amount and kind of feed required for optimum milk production (USDA ca. 1990).
- 1990s: Discovered and synthesized chemicals that a variety of major insect pests emit to attract their mates, now used in mass trapping to survey insect populations for integrated pest management programs (USDA ca. 1990).
- 1990s: Developed genetics concepts that laid the foundation for modern plant and animal breeding, and proved the value of statistical methods in evaluating inherited characteristics in populations (USDA ca. 1990).

Through most of the twentieth century, BARC was the nation's largest and most diverse agricultural research center. BARC's scientists and researchers have made major contributions toward scientific knowledge that have resulted in incredible advances in crop production, plant and animal disease control, and pest control.

New Deal Policies and Programs

The New Deal was a series of policies and programs initiated by President Franklin D. Roosevelt between 1933 and 1939 in response to widespread hardship during the Great Depression. The programs, which focused on "relief, recovery, and reform," greatly increased the scope of the federal government's activities (Berkin *et al.* 2011). Initial programs (1933-34) provided quick relief for banks through the Emergency Banking Act and the 1933 Banking Act. These acts granted funds to states and local municipalities through the Federal Emergency Relief Administration, as well as established make-work projects through the Civil Works Administration and conservation and reforestation projects through the Civilian Conservation Corps (CCC). Later programs (1935-1939) included the creation of the Works Projects/Progress Administration (WPA), Social Security Administration, the United States Housing Authority, and the Farm Security Administration; passage of the Fair Labor Standards Act of 1938 set minimum wages and maximum hours. BARC's substantial expansion between 1933 and 1941 was a direct consequence of the policies and programs of the New Deal.

Policies and Programs for Agriculture

In the 1930s, President Roosevelt, the Secretary of Agriculture Henry A. Wallace, and the Undersecretary of Agriculture Rexford G. Tugwell were determined to improve the lot of the nation's farmers through New Deal programs; BARC

became the nation's primary agricultural research center as a result. Even before the Great Depression, the agricultural markets had been struggling. Advances in farm production in the 1920s had led to overproduction and a near collapse of agricultural markets. Crops were left in the fields unharvested because prices did not warrant transporting them to market. The first major initiative was the Agricultural Adjustment Act of 1933 that paid farmers to produce less, thereby creating an artificial scarcity and raising prices, rapidly improving farm incomes (USDA 2016).

Nearly $11 million dollars in Public Works Administration (PWA), Civil Works Administration (CWA), WPA, and direct appropriations went to Beltsville between 1933 and 1941 (Robinson and Associates 1998). Secretary Wallace and Undersecretary Tugwell, keenly recognizing that there was more to be done to ensure the stability of the agricultural economy, orchestrated the allocation of funds from the Federal Emergency Administration of Public Works and other agencies for the construction of new scientific research facilities (USDA 1963). The experimental farm at Beltsville was significantly expanded to be a national model experiment station for agriculture (Robinson and Associates 1998). Tugwell specifically saw the capabilities of Beltsville as a way to help small farmers who were too poor and unorganized to conduct scientific research (Robinson and Associates 1998).

The drought and windstorms that created the Dust Bowl in the southwestern states made the need for agricultural research even more urgent. In 1934, the USDA relocated most of the department's facilities around the Washington, D.C. region to Beltsville, including an animal disease station in Bethesda, MD; the experimental greenhouses on the National Mall between 13th and 14th Streets; the bee culture research building in Somerset, MD; and a small installation in Takoma Park, MD that studied the control of insects (USDA 1963). The Agricultural Adjustment Act of 1938 granted funds for the establishment of regional agricultural research centers that would collaborate with the Beltsville center (USDA 2016). Most of the historic buildings at Beltsville are a product of the New Deal-era funding programs.

Works Progress Administration and CCC at Beltsville
New facilities were needed at Beltsville to house the expanded role of the facility. The research center hosted four CCC camps, designated as Camps A-1, A-2, A-3, and A-4, during the Great Depression. The CCC men played an important role in the shaping the landscape of BARC by installing significant new infrastructure, including sewer, water, electrical, roads, bridges, fences, and landscaping/land clearing funded by the WPA. In addition to major landscaping projects, they constructed many new buildings including residences, laboratories (such as the Animal Husbandry Laboratory (Building 200), the Germplasm Resources Laboratory (Building 004), and the Bee Research Library (Building 476)), barns, sheds, an administration building, greenhouses, headhouses, and other outhouses (Robinson and Associates 1998, Living New Deal n.d.).

The first camp, Camp A-1, was organized in June 1933 at the Bureau of Animal Industry's Experimental Station. The camp commander, four officers, staffers, and 126 enlistees of Company 2301 (a "white" company) arrived in October 1933. The company built their barracks and, probably, their support structures. Their work focused on public campground improvements, fire hazard removal, firebreak construction, installation of truck trails and driveways for livestock, forest culture work, planting, topographical and timber surveys, landscaping, and drainage. The camp expanded in December 1934 to 200 men and by then was also completing road and fire lane construction, tree planting, and telephone line erection. Camp A-1 was discontinued by September 1936 when the Bureau of Animal Industry agreed to consolidate the four camps into three (Thomas, Newell, and Zebooker 1993).

Camp A-2 was established in September 1934 and was occupied in October 1934 by Company 1362, including 172 white personnel. The men constructed their own barracks and the officer's quarters and established a newspaper. Their duties included surveying; draining and ditching; road construction; forest clean-up; road clearing; road, surface drain, and water

line construction; drainage and sewage disposal; and bridge and culvert construction. In 1938, a 181-man "colored" company, Company 322-C, was established at Camp A-2. The camp continued to operate until at least April 1942 (Thomas, Newell, and Zebooker 1993).

Camp A-3 was established in November 1935, when Company 370, a 142-man white unit, transferred to Beltsville from Big Stone Gap, VA. The company members worked on 11,000 acres of the experimental farm, and performed work in animal husbandry, landscaping, laying sewer lines, forestry improvements, and road construction. The 5438th, a 220-member white company, occupied Camp A-3 in May 1936 and constructed sewer systems, fencing, water lines, and roads, as well as razed old buildings. A colored company, the 2134th-C, occupied Camp A-3 in October 1937. The 180 men worked on fencing and installed drainage, water, and sewer lines. By 1938, their work also included construction of equipment sheds and new lodges. In August 1939, they built an education building and a barracks. The company was relocated to Fort Meade, MD by November 1941. The exact date of the closing of Camp A-3 is not known (Thomas, Newell, and Zebooker 1993).

Company 309 occupied Camp A-4 in 1935. The 181 white men of Company 309 completed landscaping. The 204-member Company 5445 was assigned to Camp A-4 in May 1936; they worked on forestry improvement, landscaping and developing, maintaining a nursery, and constructing firebreaks and trails. By 1937, they were also involved with road construction, land clearing for experimental pastures, fencing, reclaiming wet grounds and swamps, and large landscaping projects. Three "junior colored companies" were transferred to the camp in 1937 and then Company 2317-C, consisting of 181 black men, occupied the camp. Camp A-4 was still operating in April 1942. No records have been found that indicate the closure date of Camp A-4 (Thomas, Newell, and Zebooker 1993).

BARC's Log Lodge, built by men of the PWA between 1934 and 1937, served as the recreation center for the four CCC camps at Beltsville. The Log Lodge was modeled after lodges in Yellowstone National Park and used lumber and logs from trees growing on BARC. The CCC used the lodge for recreation until 1942, when it was converted into a cafeteria that was used until 1985 (USDA 1988).

Overall, the camps were constructed by the first companies to arrive; additional structures and improvements were added as needed. Although early buildings, such as educational buildings and the recreation center (Log Lodge) were permanent buildings, as time passed, more temporary buildings were constructed. All but Camp A-1, which closed in 1936, were operational until at least mid-1942. It appears that each camp was assigned a certain tract within the BARC complex (Thomas, Newell, and Zebooker 1993).

Landscape Architecture

BARC's landscape consists of vast open space and cultivated fields, scattered with hundreds of buildings and structures. Historically, the landscape was grouped by association with individual bureaus/divisions of the USDA or other federal agencies that leased or were assigned portions of the facility. The Bureaus of Animal Industry, Dairy Industry, and Plant Industry were responsible for most of the building programs and land acquisitions at BARC (Robinson and Associates 1998). The landscape is unique and distinctive, combining elements found on typical farms, such as cultivated fields and grazing plots, with features required for agricultural research, such as large-scale infrastructure and large building clusters.

The landscape of BARC was chiefly devised in the 1930s, during the significant expansion of the property. Albert David (A.D.) Taylor (1883-1951) and architect Delos H. Smith (1884-1963) created the plan for BARC's Central and East Farms in 1934. The Central Farm, which encompassed the 375-acre parcel the USDA first purchased for the facility in 1910, was

used by the Bureau of Dairy Industry for several decades. Comprising 912 acres, the Central Farm was bound by Baltimore-Washington Parkway on the east, Edmonstron Road on the west, Greenbelt on the south, and the U.S. Department of Health and Human Services and U.S. Department of State complex and Muirkirk on the north. The Central Farm's designed farm landscape comprised five major clusters and contained most of the buildings and research activities at BARC (P.A.C. Spero 1998, Robinson and Associates 1998).

The CCC men at the four Beltsville camps constructed much of BARC's landscape, including roads, landscaping, fencing, drainage, and trails, and laid infrastructure such as water and sewer lines (Thomas, Newell, and Zebooker 1993).

A.D. Taylor graduated from Cornell University in 1905 with a Master's degree in Landscape Architecture and joined the office of Warren H. Manning in 1908. In 1914, he relocated to Cleveland, Ohio where he established his own firm and founded the Ohio State University landscape architecture program; he taught there from 1916 to 1926. Taylor participated in many Civil Works Administration (CWA) projects including Boys Town, NE, and Marine hospitals in Cleveland, New Orleans, and Baltimore. He served as a consultant to the U.S. Forest Service and published *Problems of Landscape Architecture in the National Forests* in 1936. He consulted with the federal government on the site plan for the Pentagon in 1942. He was a Fellow of the American Society of Landscape Architects and was president from 1936 to 1941 (Cultural Landscape Foundation n.d.).

Delos H. Smith graduated from George Washington University with a B.S. Arch in 1906 and an M.S. Arch in 1916. He trained in the Office of the Supervising Architect of the Treasury and with the firms Hornblower & Marshall and Jules Henri de Sibour. During World War I, Mr. Smith was Supervising Engineer at the U.S. Naval Academy. After the war, he completed a pioneering survey of Annapolis' historic resources; during the Great Depression, he completed Historic American Building Surveys (HABS) for churches, residences, schools, colleges, and industrial buildings in Arizona, Connecticut, District of Columbia, Maryland, Massachusetts, New Mexico, North Carolina, Ohio, Pennsylvania, South Carolina, Virginia, and Utah (HABS) (Kelly 2011, Library of Congress n.d.).

According to Robinson and Associates (1998), BARC "possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically" resulting from its "research mission, its physical development under the New Deal, the involvement of professional design and planning professionals, and the interrelationship of its resources." Contributing elements of the landscape include major paved roads, including Powder Mill Road, minor service roads, field and research crops, pasture lands, seasonal ponds, forests, sustainable meadows, other landscape features, and buildings." (P.A.C. Spero & Company 1998; Robinson and Associates 1998).

Experimental Agricultural Architecture

From early in BARC's history, agricultural architecture was a topic of inquiry. BARC scientists and researchers experimented with a wide array of designs and tested different materials, both for efficiency and usefulness in their own research facilities and for the improvement of the nation's farms. The result is BARC's collection of distinctive and unique architecture that was derived from the needs and findings of agricultural research.

The first instance of research into agricultural architecture at Beltsville was in 1916 when researchers developed a plan to build dairy-supportive buildings for specific regions, including a dairy stable to meet conditions in the south, and a combination creamery and milk-shipping station for use in the New England states (The Creamery Journal 1916). These new buildings were to be added to the existing Beltsville facilities, which then included the mess house, small animal house, and 30,000-gallon concrete reservoir and cooling tower, house for fire apparatus, heating system for

superintendent's house, refrigeration and darkroom equipment for administration building, electrical equipment, and refrigerating and pumping plant (The Creamery Journal 1916).

A few years later, in 1921, the Beltsville scientists began to study the nature and extent of the losses that take place in silos. They researched the use of different silo-building materials to determine which material would best withstand the acids of the silage. They also compared different stable floors and barn types for the care of dairy cattle, seeking materials and designs that could reduce the bacterial count in cow milk (USDA 1921).

Buildings to Control Disease, Productivity, and Efficiency
As part of the substantial expansion of Beltsville in the 1930s, and specifically beginning in 1934, the USDA constructed new poultry laboratory buildings and poultry houses on 177 acres to be used for poultry research work. These improvements to the facility's poultry research were placed into operation on July 1, 1935 through the National Poultry Improvement Plan, which was developed to aid the poultry industry in improving its efficiency. The Beltsville poultry farm had four laboratory buildings, a central heating plant, and more than 200 houses of various sizes for its poultry stock, including brooder houses, laying houses, and colony houses. Researchers experimented with many designs to control disease transmission, animal productivity, and efficiency. The brooder houses had varying plans, often having a two-story service quarter in the center with one-story wings that each had eight to 10 temperature-controlled sections. The use of wire-floor sections in both the brooder houses' interiors and yards facilitated the control of parasites and disease. The exterior pens had wire fencing that extended over the top of the pens to keep out birds; the buildings were supplied with supplementary steam heat. The facility had laying houses for breeding and nutritional investigations. The one-story laying houses had shed roofs and were divided into sections with solid partitions between the sections, and the fronts were left open during cold weather. The small colony houses were used for growing pullets in breeding investigations. These one-story, shed-roof buildings were located in a large enclosure with no separate yards, and the covered feed troughs and water fountains were located in the front of each building (Mohler 1939).

Post-World War II Farm Building Designs
Recognizing that many farmers did not have access to or could not afford to hire individualized architectural services, the USDA created Regional Plan Exchanges in the late 1940s through the 1960s to provide farmers access to plans and working drawings of farm buildings and structures. To develop the plans, the USDA conducted in-house research at Beltsville and collaborated with state agricultural experiment stations, Bureau of Home Economics, and agricultural engineering departments of state agricultural colleges to provide farmers with various plans and tools to aid in the building and remodeling of farmhouses, buildings, and structures. At least some of the designs were constructed at Beltsville (Marsh n.d.).

Beltsville researchers produced the farmhouse plans by organizing Regional Plan Services in four regions: Northeast, South, West, and North Central. Committees in each region reviewed plans for farmhouses and other farm buildings and selected the plans that best met their regions' needs. A 1947 USDA publication, *Your Farmhouse: How to Plan Remodeling*, acknowledged that most farming families lived in houses that were at least 50 years old, some too large or small for their present needs, and many not be suited to modern ways of living. Yet they were well-built houses that were maintained and worth the cost of remodeling. *Your Farmhouse: How to Plan Remodeling* was paired with another 1947 publication, *Your Farmhouse: Cut-Outs to Help in Planning*, which helped farmers make sound investments when remodeling an older farmhouse or building a new farmhouse. Recommendations included planning for the needs of all family members, such as preparing for more bedrooms, having a spacious living room for social gatherings, and including a modern kitchen and space for work rooms and storage. The report emphasized the importance of budgeting for extra costs such as insulation, weather stripping, heating, lighting, water and sanitation systems, repairs, and decoration.

Consequently, farmers could better understand the room lay-outs for improved use of space, minimum and desirable room sizes, and necessary clearances for furniture and equipment. The publication even provided instructions for farmers on how to make a cut-out plan to scale with a scale and ruler card, paper and scissors, pencil, and pins. In 1948, USDA published *Farmhouse Plans for Northeastern States*, which included 15 farmhouse plans for the northeast region (Marsh n.d.).

Future booklets become more specific. A 1950 guide addressed farmhouse plans for minimum budgets by presenting ideas for additions using standard building materials and approaches for building in stages as budgets allowed. In 1954, *Farmhouse: Split-Level Expansible,* featured plans for a split-level brick house designed for a sloping site that was suitable for a family with two or three small children to live comfortably. The plan provided options to utilize different materials and easy ways to add another bedroom with only minor changes in the original design. The researchers at Beltsville constructed this house on site (Marsh n.d.).

Following the theme of expansible and economical buildings, the 1954 report *Expansible Farmhouse: Frame* provided plans for a basic unit adequate for two people. The wood-frame, box-shaped house was inexpensive to build due to its simple wood-framed walls clad with exterior sheets of cement asbestos board, interior gypsum board, with two inches of wall insulation between. The design had the option to add two more bedrooms, a combination living room and sleeping area, dining room, spacious kitchen, work area, and bathroom. A subsequent report focused on the same building plans but for a concrete masonry house, offering flexibility in choice of building materials (Marsh n.d.).

In 1960, the USDA developed reports focusing on two and three-bedroom farmhouse configurations that were planned around the Beltsville Energy-Saving Kitchen Design No. 2. These house designs were of masonry and frame construction with low-pitched roofs, large window areas, carport, and basement. Both design themes were centered on convenience for the residents, such as having convenient indoor-outdoor living spaces and room layouts that worked in conjunction with each other. Emphasis was made towards families wanting larger living spaces and areas to entertain large groups, and options to partition off spaces to create extra bedrooms for growing families or elderly relatives. Additionally, these plans provided step-saving options to eliminate unnecessary storage, but also provided room options for laundering, storage, and modern appliances such as freezers and furnaces (Marsh n.d.).

Utilizing all the interior space in a thoughtful way was important in the USDA's 1965 report for the three-bedroom farmhouse with Beltsville Energy-Saving Kitchen-Workroom Design No. 1. The one-story, rectangular-shaped house had ample-sized rooms that were accessed by a main hall from either the front or rear entrance. Closets were strategically placed to act as sound buffers between sleeping and activity areas and the single chimney contained flues for both the fireplace and furnace. This extra level of planning for the interior spaces, and use of a grade beam and pier foundation with a concrete slab floor proved to be more economical (Marsh n.d.).

Farm Layouts

The experimental farms at Beltsville were a resource for individual farmers and agricultural scientists alike. Representational farm types included beef, cattle, dairy, poultry, sheep, horses, swine, fruit, vegetable, silage, and forage crops. Though the farms' foundational purpose was to support scientific research space, they were also working models of farm layout and operations. Visitors to Beltsville could tour the layouts directly and models based on Beltsville research were widely distributed in agricultural bulletins and journals (Robinson and Associates 1998).

Overall, scientists and researchers at BARC investigated the architecture of agricultural buildings and landscapes for a half century. The breadth of their research stretched from small brooding houses and large silos, to dairy barns, farm

residences, and cultivated fields, all with the intent to increase scientific knowledge and improve the efficiency and productivity of the country's farms.

Georgian Revival Architecture

A substantial number of the BARC buildings constructed during the expansion of the property in the 1930s and the following decades, including offices, laboratories, and greenhouses, are in the Georgian Revival style. The Georgian Revival style, a subset of the Colonial Revival style, was most popular from about 1880 to 1955. Inspired by the original Georgian style buildings of the eighteenth and early nineteenth centuries, the Georgian Revival building has a classic shape, typically two or three stories tall, with symmetrical balanced double-hung windows and a center accentuated front door. Distinguishing features from the original Georgian style are adjacent windows and a more accentuated front door that often extends forward and is supported by columns (McAlester 2013; Foster 2004). The consistent use of Georgian Revival architecture has created a cohesive built environment at BARC (Bowlin 2000).

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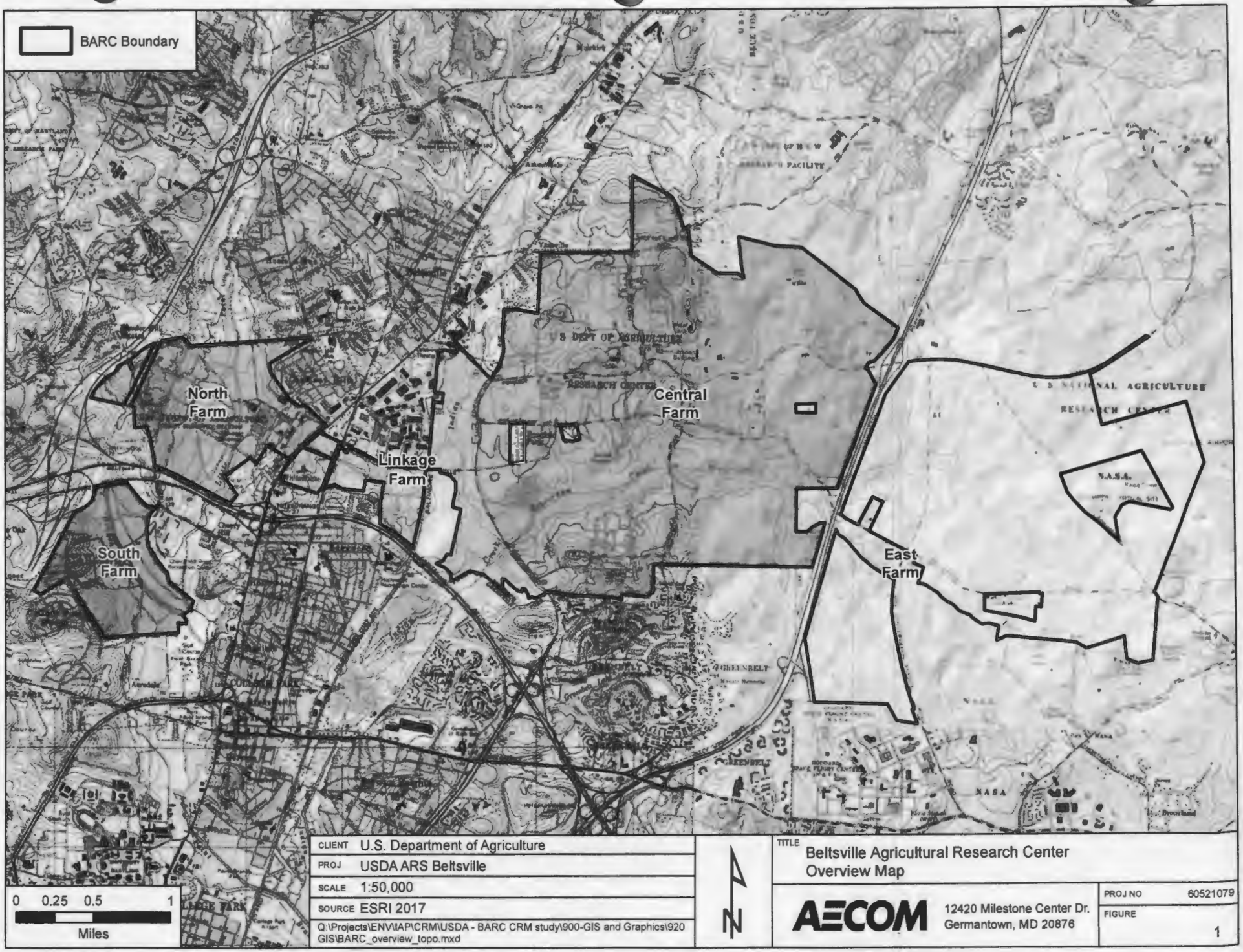

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TITLE: Beltsville Agricultural Research Center Overview Map

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12420 Milestone Center Dr.
Germantown, MD 20876

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FIGURE 1

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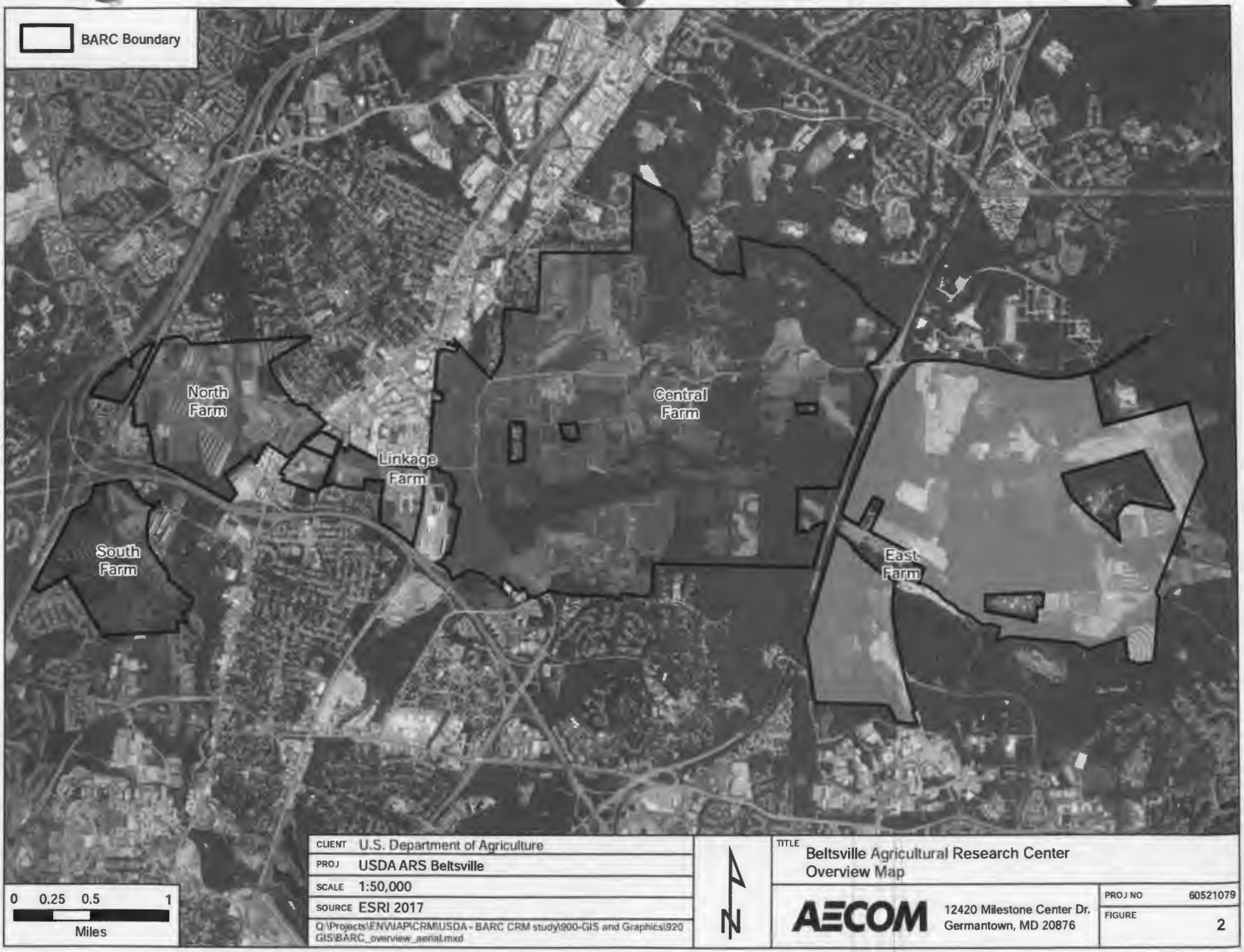
BARC Boundary
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Central Farm
Linkage Farm
South Farm
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12420 Milestone Center Dr.
Germantown, MD 20876
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FIGURE 2

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