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Blue Ball Properties – initiating responsible environmental stewardship

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BLU3E BALL PROPERTIES –
INITIATING RESPONSIBLE ENVIRONMENTAL STEWARDSHIP

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Abstract: The Blue Ball Properties Area Transportation Improvement Project encompasses roadway and associated transit improvements surrounding the expansion of the AstraZeneca Headquarters at U.S. 202 (Concord Pike) and Delaware Route 141 near Wilmington, Delaware. Delaware secured 232 acres bordering the Zeneca site, known as the Blue Ball Properties and offered to provide land for the company’s expansion, as well as transportation, recreation, and other improvements that would benefit both AstraZeneca employees as well as the local community. Leaders from the Delaware Department of Transportation (DelDOT), the Delaware Department of Natural Resources and Environmental Control (DNREC), and the Delaware Economic Development Office (DEDO) became equal partners with the community in developing a master plan for the Blue Ball Properties.

Project development included preparation of an environmental assessment (EA) document under NEPA, and identification of sensitive historic, cultural and natural resource areas. The project development process underwent a comprehensive minimization and avoidance evaluation to reduce impacts to natural and cultural resources on the project site and incorporated a proactive, environmental stewardship approach to mitigate for the impacts. A comprehensive mitigation package was developed for the project, including extensive stream restoration and wetland replacement initiatives. Agency coordination and frequent agency meetings were held to discuss and enhance the proposed package.

The project incurred approximately 500 linear feet of encroachment at various crossing areas of Alapocas Run. Through coordination with the resource agencies, approximately 800 linear feet of incised and eroding channels was restored by raising the channel bed to its historically correct elevation and stabilized with the use of natural bed and bank materials.

As mitigation compensation for the proposed impacts to approximately 1.12 acres of wetlands associated with the proposed improvement project, wetland replacement design has been completed on a 2.1-acre site adjacent to an existing wetland along the Alapocas Run corridor.

Another priority during Blue Ball Properties development planning was to provide a regional system for stormwater management. Features include bioswales, detention basins and meadow depressions to improve water quality and enhance habitat.

Introduction

The Blue Ball Properties Area Transportation Improvement Project, located just north of Wilmington, Delaware, is an exceptional example of the integration of transportation improvements, environmental stewardship, smart economic growth and land-use planning, historic preservation and community involvement.

The Blue Ball Properties Transportation Improvement Project is located north of Wilmington in New Castle County, Delaware, in the proximity of U.S. Route 202, Delaware Route 141 and Foulk Road (figure 1) in an area commonly known as the Blue Ball Properties. The U.S. Route 202 and Delaware Route 141 corridors in the Blue Ball area have experienced residential and commercial development, traffic congestion and safety problems for many years. At the same time, local residents and civic groups have been interested in preserving several tracts of land from high density development for two principal reasons: (1) maintaining the open space in the area, and (2) avoiding the additional traffic and congestion problems that would likely result from continued residential and community development.

In May 1992, an environmental assessment (EA) was approved for a much larger project in this area for the Delaware Route 141 improvements. A public hearing was held, and after much public opposition between 1992 and 1994, many components of the transportation improvements were put on hold.

Subsequently, in 1999, the England-based drug company Zeneca merged with the Sweden-based drug company Astra, to form the fifth largest pharmaceutical company in the world. Because of the economic development benefits represented by large corporate expansion, the Delaware Economic Development Office (DEDO) offered several incentives to attract the expansion to Delaware. As a result, Delaware succeeded in getting the North American headquarters and the 5,000 new high tech jobs it would create. The selection of the Delaware location was based on infrastructural improvement commitments made by the Delaware State Government. The proposed AstraZeneca expansion would include an additional 2,000,000 square feet of office and research and development facilities (beyond the 1,000,000 square feet currently located at Delaware Route 141 and U.S. 202). As part of the agreement, the state was to provide adequate transportation improvements and acquire two tracts of land in the Blue Ball Properties, known as the Alapocas tract and the Weldin tract, for open space and recreation.
Project Master Plan
A master planning process was undertaken to develop and evaluate the transportation and recreational improvements for this area. This was a coordinated effort between the Delaware Department of Transportation (DelDOT), DEDO, the Department of Natural Resources and Environmental Control (DNREC), New Castle County and other public officials and civic leaders. DEDO was designated as the lead state agency and provided overall project management. DelDOT focused on transportation improvements, DNREC focused on park and recreation improvements, while DEDO and New Castle County focused on the proposed expansion of the AstraZeneca site.

As part of the master planning process two committees were established to review the proposed improvements to the Blue Ball Properties area: a Transportation Technical Committee and a Recreational and Historic Preservation Technical Committee, totaling close to 125 people. These committees comprised representatives from agencies, stakeholders and citizens groups with expertise and/or interest in a particular aspect or key component of the master plan. These committees met regularly with the project team to assist in the process of developing a preferred alternative. All meetings were open to the public, as well.

Environmental Streamlining

NEPA Compliance
Project development included preparation of an environmental assessment (EA) in accordance with the National Environmental Policy Act (NEPA); Section 106 of the National Historic Preservation Act; Section 404 of the Clean Water Act; and Section 4(f) of the United States Department of Transportation Act. The project development process underwent a comprehensive minimization and avoidance evaluation to reduce impacts to natural and cultural resources and incorporated a proactive, environmental stewardship approach to mitigate for the impacts. A comprehensive mitigation package was developed for the project including extensive stream restoration, wetland replacement and stormwater management initiatives. Agency coordination and frequent agency field meetings were held to discuss and enhance the proposed package.

The project's environmental assessment (EA)/draft Section 4(f) evaluation was circulated in July 2001. On February 1, 2002, the U.S. Federal Highway Administration (FHWA) approved a finding of no significant impact (FONSI) for the project.
Agency Coordination
Agency coordination was an integral part of the project throughout the planning and project development process including several field coordination meetings throughout the permitting process. Field views and agency coordination meetings were held continuously with the regulatory and stakeholder agencies that included the following: Army Corps of Engineers (ACOE); Environmental Protection Agency (EPA); Federal Highway Administration (FHWA); the U.S. Fish and Wildlife Service (USFWS); Delaware State Historic Preservation Office (SHPO); Delaware Department of Natural Resources and Environmental Control (DNREC); and New Castle County.

In addition to the agency coordination and transportation committee meetings, several public workshops were held to disperse information to the public and gather feedback from this sector. Quarterly newsletters were distributed, and a project website (www.blueball.net) was established for interactive communication and up-to-date project progress and news.

Permit Streamlining
The project incurred impacts to approximately 500 linear feet of area streams and 1.12 acres of wetlands. These impacts required permits from New Castle County, a Coastal Zone Management (CZM) consistency determination, a 404 Permit from the U.S. Army Corps of Engineers (USACOE), a Subaqueous Lands Permit from the Delaware Department of Natural Resources and Environmental Control (DNREC) and a Section 401 Water Quality Certification.

As part of the master planning and project development process, field views were held with representatives from the regulatory agencies to determine the extent of impacts to the site’s natural resources, as well as mitigation requirements. As a result of this early project coordination, the permit process was streamlined; the agencies were aware of impacts and had negotiated their mitigation requirements throughout project development, requiring less time for the permit review.

Project Components and Environmental Stewardship
Transportation
The Master Plan Transportation Committee’s goals included:

- No level of service degradation
- Roadway network that separates regional from local traffic
- Provide a trail system that separates vehicular and pedestrian traffic and links walkers and bike riders to neighboring communities and parks
- Minimize the impact on the local street system
- The park, transportation, and Blue Ball properties’ developments are linked and need to progress together
- Minimize environmental impact on the socioeconomic environment, cultural resources, natural resources, and aesthetics.

The initial project needs for this study were traffic congestion relief and traffic safety. These were the primary problems present on the existing roadway system, which were expected to worsen in the future without area transportation improvements. The project quickly merged both the public and private sectors to create a partnership project with many different stakeholders collectively making decisions on the transportation and transit improvements, and environmental, recreational, and cultural elements. The project needs incorporated the comprehensive planning and economic development goals for the area. This included the development of open space and recreation facilities as well as the AstraZeneca campus expansion to support the recommended master plan (figure 2).

A Greenway Trail network will be constructed to separate vehicular and pedestrian traffic while linking bicyclists and pedestrians with surrounding neighborhoods. The Blue Ball Properties is situated in a key location to link existing greenway and park trails to the north and south and will connect the proposed Blue Ball parkland with the Brandywine Park and other county and state parks and museums. This greenway trail will also facilitate pedestrian/bicycle access to the recreational facilities proposed for the area.

In addition to the proposed new transportation roadway elements and the Greenway Trail, intelligent transportation management systems strategies (ITMS) will also be incorporated as part of the project. Some of these ITMS strategies include:

- Coordinated traffic signals, integrated and regional signal system and DelDOT transportation management center (TMC)
• Surveillance cameras linked to TMC and the DelDOT web page
• Dynamic message signs
• Traffic/transit information kiosks
• Vehicle detection systems used to optimize traffic signals and detect incidents

Recreation Components
The goals of the Recreation and Historic Preservation Committee were to preserve and design open space as signature spaces for the State of Delaware; address the ongoing recreation needs of the local communities; provide a means of reusing the historic structures in the area; maximize active recreation components; and design standards needed to provide the highest quality design for the area.

Recreational elements of the master plan included 143 total acres of passive recreation and planted meadows on the west side of US 202 (known as “West Park”) and 89 acres of active recreation on the east side of US 202 (known as “East Park” (figure 2)). The active recreational areas will include:

• A children’s playground
• Picnic area
• A dog park
• Multi use athletic fields
• Network of walking and biking trails as part of the Greenway Trail mentioned previously

Improvements to the adjacent Rock Manor Golf Club, a public golf course, have also been included as part of the project’s master plan goals. These improvements include a golf teaching facility and the expansion of the course to 18 holes. A central parking lot will link all the activities with park paths on the east side of the park.

Fig. 2. Blue Ball Properties transportation improvement project.
**Historic Components**
The historical and archaeological resources adversely affected by the Blue Ball Properties Area Transportation Improvement Project are the Nemours Historic District, Porter Reservoir, Concord Pike Milestone, One Rock Manor Avenue, J.R. Weldin Archaeological Site, and the Ronald McDonald House archaeological site. Through extensive coordination efforts, the Federal Highway Administration (FHWA), the Delaware State Historic Preservation Office (DESHPO), and consulting parties signed a memorandum of agreement (MOA) to address these adverse effects.

Highlights of the stipulations and agreements reached in the MOA for architectural and archaeological elements include the following:

- *Preservation and adaptive reuse of the Blue Ball Dairy Barn* - built by industrialist A.I. duPont in the early twentieth century; the barn will be renovated and used for community events and meeting space.

- Stabilization and rehabilitation of the historic Murphy House - a mid-19th century farmhouse formerly occupied by duPont estate caretakers; a permanent preservation covenant for the House and property will be developed.

- *Rehabilitation of the historic Bird-Husband’s House* – the historic home has been stabilized and the exterior has been renovated.

- *Preservation and creation of an interpretive education area at the J.R. Weldin Archaeological Site and Ruins* - includes remains from the mid 17th century; the existing Weldin Plantation Ruins will remain in place in wooded area (to be selectively cleared) adjacent to the multi-purpose athletic fields. The area will be enhanced with picnic tables, interpretive signs and history markers at the site.

**Environmental Elements**
As a primary focus of this paper, the environmental elements of this project uniquely demonstrate the commitment of the stakeholders to true environmental stewardship practices. Mitigation and permit requirements for direct project impacts were adhered to; however, many other techniques and commitments were made that show responsible stewardship. These elements include stream restoration efforts for a severely degraded and eroded waterway, wetland mitigation and the selection of native plantings, stormwater best management practice’s (BMP’s) including bioswales, and landscape beautification plans (figure 3).
Stream Restoration

Alapocas Run is the main waterway situated in the project area and is part of the extensive Brandywine Creek watershed that eventually drains into the Delaware River. Alapocas Run has its headwaters in the project area. Over the past several years, primarily as a result of rapid development and increased impervious surface in the watershed, Alapocas Run has become severely eroded, deeply incised (down to bedrock in several areas), and extremely flashy during stormwater events. As a result of the project, approximately 595 linear feet of waterway will be affected along Alapocas Run from proposed new road crossings and culvert replacements. Through coordination with the agencies and project stakeholders, the following stream restoration commitments were made for the Alapocas:

- A stream restoration plan (figures 4 and 5) for Alapocas Run will help control the existing flash stormwater conditions resulting in severe scouring and undercutting in the stream. The stream restoration plans include restoration and enhancement of the riparian buffer along Alapocas Run, south of Rockland Road.
- Additional riparian plantings will be installed along the areas of Alapocas Run being restored. These additional plantings will benefit water quality, aquatic biota and other wildlife.
- A permanent easement for maintenance access will be granted for the stream restoration area.

Stream Restoration Goals

The primary goals of the stream restoration are to lessen velocities and shear stresses to reduce bank and bed erosion, improve the in-stream and riparian habitat both within and downstream of the restoration sites and to construct the channels to exhibit endemic attributes.

Methods

The methods utilized to achieve the restoration goals are raising the channel bed at reaches 1 and 2 (location shown on figure 4) to provide a rough, undulating channel profile for energy loss, as well as saving existing riparian and woodland areas.
The channel segments restored as reach 3 (figure 5), have been developed to both accommodate the proposed roadway improvements and to provide the channel attributes natural to that setting.

Expected Results
It is expected that the stream restoration will improve water quality and in-stream habitat both within the restored areas and downstream of the site. A reduction in sediment loads, more diverse macro-invertebrate and fish communities, water chemistry, and physical habitat features, such as pool and riffle depth, embeddeness of fines, cover, width-depth ratios, and riparian bank coverage, are also expected.

Stormwater Management/Bioswales
Because of the severe flooding problems associated with Alapocas Creek and other existing drainage problems, the project team joined together to think “outside of the box” and designed a stormwater management system that provides natural flood control, pollution filtration, and protects water quality.

Stormwater Management Goals
The goals of the stormwater management system are to reduce water quality impacts associated with construction and flood control and to reduce the potential water quality impacts through the vegetated bioswales and detention of stormwater. Additionally, the stormwater management system will provide pollution control by collecting the roadway surface runoff before it reaches the project area streams or infiltrates into the groundwater table.

Methods and Expected Results
This stormwater management system includes:

- A large vegetated detention basin off Rockland Road to handle drainage for the AstraZeneca campus parcel and proposed roadway improvements
- Three (3) additional retention/detention basins and a series of vegetated runoff control swales
- Bioswale conveyance system south of Rockland Road to increase filtration, sediment trapping and water quality in the area
Management of stormwater in this area will help compensate for the impact of development that has resulted in the current flooding conditions, erosion and sedimentation problems, concentration of flow on adjacent residential properties, as well as non-point source pollution washed off from upstream impervious surfaces. Dry and wet detention basins will control peak discharges by delaying runoff. Wet basins will also improve water quality by allowing sediment and pollutants to settle.

Conveyance systems consist of linear pipes and swales draining sequentially from one to the next. They are designed to carry the peak flow rate during a design year storm. Bioswales are the main conveyance system in the park areas, acting to improve runoff and restoring the natural hydrologic balance. Bioswales are a combination of a shallow drainage way and dense vegetation that reduce peak flows by slowing runoff and allowing for the infiltration of water into the ground. Infiltration that occurs during smaller storms can recharge groundwater and contribute to base flow in streams and wetlands. Bioswales can also remove a high percentage of pollutants found in runoff through bacterial action that occurs when runoff flows through swale vegetation and soil.

The integrated stormwater system can enhance and protect existing riparian systems from excessive flooding and function as a buffer to sustain the natural system’s integrity (Blue Ball Properties Master Plan 2001). The wet basins also provide additional aquatic habitat for wildlife.

![Photo 9. Bioswales under construction.](image1)
![Photo 10. Stormwater pond 2, wet detention basin with vegetated banks.](image2)

It is expected that the stormwater management basins and bioswales will provide improvements to the overall long-term water quality of the project area streams by reducing sediment loads and reducing stream bank erosion due to storm event flashiness, as well to improve the stream’s base flow.

**Wetland Mitigation**

On-site wetland investigations conducted throughout the project corridor resulted in the identification and delineation of 20 wetland areas located along Alapocas Run and Matson Run and are classified primarily as palustrine forested systems with small areas of scrub/shrub and herbaceous wetlands.

![Photo 11. Bioswales leading to stormwater management basin 3.](image3)
![Photo 12. Stormwater basin 3, wet detention basin with vegetated banks](image4)
**Functional Value**

The project area wetlands share many of the same functions. The most predominate functions provided by the wetlands include groundwater discharge, floodflow alteration, sediment stabilization and wildlife diversity/abundance. Additional functions provided by some of the wetlands include sediment/toxicant retention and nutrient removal/transformation.

Throughout the project development process, measures to avoid and minimize wetland impacts were pursued; however, the final design necessitated the encroachment on approximately 1.12 acres of mostly forested wetlands.

As part of the U.S. Army Corps of Engineers (USACOE) permitting process, the acreage and function of the wetlands lost as a result of the preferred alternative required replacement. The design goals for the amount of wetland replacement were obtained through coordination with the USACOE, EPA and DNREC during an August 17, 2000 agency field view. Forested wetland losses were replaced at a 2:1 ratio, totaling approximately two acres needed for replacement. The design goals for the replacement of lost wetland functions were to effectively replace the functions lost in combination with a mitigation package including the stream restoration, natural vegetative plantings and riparian buffer enhancement.

**Mitigation Site Identification and Site Conditions**

Early on in project development, it was apparent that the project would result in unavoidable wetland impacts. The search for an appropriate wetland replacement site was initiated utilizing the following criteria: in-kind/in place wetland replacement in the immediate Alapocas watershed or Brandywine Creek watershed; adequate surface water/groundwater hydrology; conducive soil conditions; ability to replace functions lost; opportunity for creation of lost forested habitat and educational opportunities.

After much research of secondary sources and several field visits, three potential sites were chosen. Monitoring wells were installed in the potential site areas and well readings were recorded for over one year to determine groundwater levels. After the groundwater levels were evaluated, a 2.1-acre site was selected in cooperation with the regulatory agencies and project team. The replacement site is situated within the West Side Park area on the southern portion of the Alapocas Tract, adjacent to an existing wetland within the watershed of the Alapocas Creek (figure 6).

A spring seep in the northern portion of the site was identified and is the initial hydrologic source. Groundwater monitoring results also indicated that hydrologically, a forested wetland could be supported on this site. Forested wetlands in the region tend to be vernal, and the replacement wetland was designed for seasonal inundation.

The 2.1 acres have been utilized for the mitigation, and were divided into two planting zones. The upper replacement zone (contours 250-256) was planted as a buffer zone in concert with the master plan planting plan, utilizing native plant species. The buffer zone consists of a shrub understory and canopy planting. Nursery sized plant material was planted in late Spring 2003 to coincide with the master plan plantings. The lower replacement zone (contours 249-250) was planted at 1,000 whips per acres to replace the impacted forested wetlands.

![Wetland Replacement Site](image)

Fig. 6. Wetland replacement site is adjacent to the proposed Greenway Trail and West Park Road.
Wetland Construction and Site Conditions

In the spring of 2003, ground excavation was initiated at the site. Soil was excavated to depths ranging from at-grade to approximately four feet. The wetland was designed for final grade to be within one foot of the groundwater levels at the seasonal high. Early in construction, the wetland was receiving all of the stormwater flow from the construction site, resulting in standing water. As a result, a swale was constructed at the outflow end, adjacent to the existing wetland, to drain the excess water.

The stormwater management system ties hydrologically to the wetland replacement site through an overflow weir connecting to an adjacent retention basin. The stormwater that flows into the adjacent basin has gone through a series of vegetated swales prior to reaching the retention basin.

Two types of wetland seed mixes were created for the site. The lower replacement zone’s seed mix contains a mix of sedges, rushes and wetland grasses. The upper replacement zone’s seed mix contains sedges, rushes, grasses and hydrophytic wildflowers for both aesthetics and to promote wildlife habitat. The wetland was seeded in early summer 2003. Additionally, microtopography was created after the initial grading to allow for pockets of water, and stumps and other woody vegetation were added to the wetland site to provide for and enhance wildlife habitat.

Wetland Monitoring

In cooperation with the agencies and as part of the permitting process, a minimum five-year post-construction monitoring plan has been developed and will be implemented as part of the wetland replacement project after construction is completed. A permanent easement will be granted for the wetland replacement area to protect it from future construction or disturbance.

Landscape Beautification

Landscape beautification measures are included as part of the master plan. Some of the landscape beautification measures include utilization of native trees, wildflowers and grasses; the use of recycled materials; inclusion of public art in the garden and underpass designs; and the utilization of natural stone for bridges and underpasses.
Preservation of Natural Features
Wherever possible, existing natural features will be protected or preserved on the project site. They include existing hedgerows, forest and wetlands. These will be incorporated into the parks, recreation areas, greenway, and roadway improvements as per the master plan design. The master plan also includes several large areas that will be seeded as meadow.

Biographical Sketch:
Jayne E. McColl, PWS, graduated from Colorado State University in 1984 with an environmental degree in range and forestry management. McColl has over 17 years of experience in the environmental consulting field with a strong background in natural sciences. As an associate and project manager for McCormick Taylor, McColl has extensive experience in NEPA documentation, environmental studies, extensive client/agency coordination and public involvement. For the Blue Ball Area Transportation Improvement Project, McColl played a lead role in agency coordination, agency site visits, impact assessment, NEPA documentation and environmental clearance, mitigation strategies, permitting, and compliance. A multitude of meetings took place during project development to ensure agency involvement, discuss streamlining strategies and to obtain feedback on mitigation approaches for project area impacts. The extensive permits required for the project were issued shortly after environmental clearance was received. This was a result of the successful streamlining, coordination and stewardship efforts on the project.

Dorothy Daly, MLA, C.A., has been employed by McCormick, Taylor & Associates for four years as an environmental planner. She specializes in wetlands and plant identification. Daly recently became certified as an arborist by the International Society of Arborists. Daly was involved in many aspects of the Blue Ball Properties Area Transportation Improvement Project. She acted as project coordinator for the Environmental assessment report; was involved in project public involvement; was responsible for writing meeting minutes posted on the project website of the project’s committee meetings; designed the wetland replacement site (including grading and planting plans); and now continues in the role of coordinator for the master plan, stream restoration, and wetland plantings for the ongoing landscape construction as well as the landscape components of the next contracts.

References

