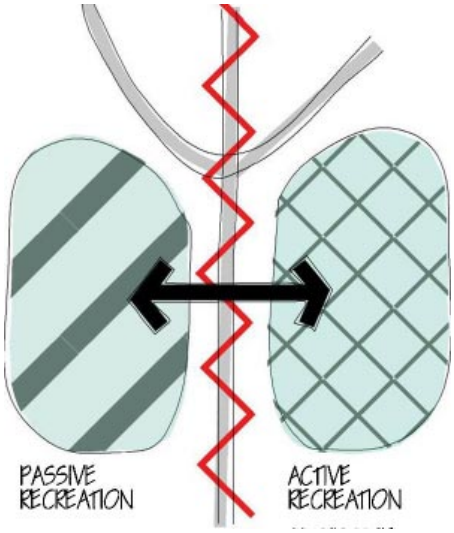
5.0 The Master Plan

5.1 Overall Concept

The Blue Ball Properties Master Plan as presented on the next page is an integration of transportation and recreational planning goals and efforts. Each component of park planning was designed in conjunction with road design. The organization of the Master Plan is a result of functional and programmatic decisions reached during the planning phase of the project and reflects the goals and concepts of the Committees and the community. Primary factors identified through the planning process that influence the Blue Ball Properties Master Plan layout include usage, stormwater management, circulation, landscape and built structures.

5.1.1 Functional Use Concept

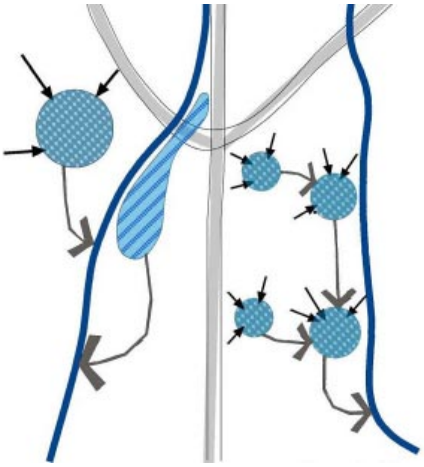


Functional Use Concept

The property is divided into two parts by Route 202. The western portion is designed principally for passive recreational uses and for habitat enhancement. A major goal for the west side is to provide a regional stormwater management facility that will address both quantitative and qualitative aspects of existing runoff problems, the runoff from the AstraZeneca project to the north and roadway and park improvements on the west side of Route 202. An additional benefit for this side of the Blue Ball property is the potential for environmental and ecological education for users. Natural drainage systems, wetlands, stormwater cleansing, hydrologic cycles, and habitat enhancement for wildlife can be experienced as one moves along the paths and roadways throughout the project. Interpretation of these natural systems can be integrated with the park paths as part of the overall park signage system.

The land east of Route 202 is reserved for active recreation. This side also offers some educational opportunities including historic interpretation of the Weldin Plantation as well as examples of natural drainage systems and wildlife habitat along the abutting Matson Run.

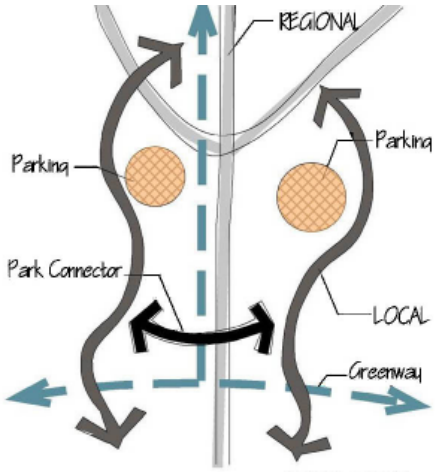
5.1.2 Stormwater Management



Stormwater Concept

A priority for the project development is to provide a regional system for stormwater. This includes necessary management systems to detain and improve the quality of stormwater runoff from the new AstraZeneca project to be constructed north of Route 141, as well as all transportation and park improvements incorporated in the project. Because the AstraZeneca property sits within the Alapocas watershed west of Route 202, most of the stormwater management systems will be located within the west portion of the property. The east side of the project will also provide stormwater management systems to address quality and quantity of runoff into Matson Run from transportation and park improvements on the east side of Route 202. Stormwater management features will include bioswales (sloped depressions in the topography lined with plant materials and rock to slow drainage and filter sediments and other contaminants from stormwater), detention basins, and meadow depressions to improve water quality and enhance habitat.

5.1.3 Circulation

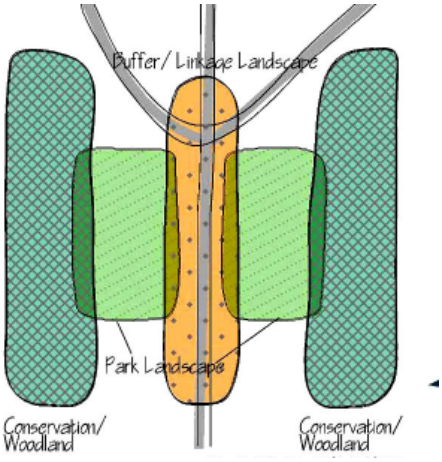


Circulation Concept

A system of roads and paths provides circulation throughout the Blue Ball properties. Roads consist of Regional (Route 202 and ramps, Foulk Road, Route 141 Spur), Local (Augustine Cutoff, Rockland Road, Weldin Road) and Park roads that facilitate movement between the two parts of the park and provide access to parking. Road design is integrated with the layout of park uses and routed to maximize and enhance usable park spaces.

Pedestrian paths consist of a Greenway trail system and park paths linking bicyclists and pedestrians with neighborhoods surrounding the Blue Ball properties. Paths are routed specifically to maximize diversity of experience as one moves from woodlands bridging bio-swales through meadows, through tunnels, through playfields, over bridges, and back to woodlands again. Pedestrian path crossings of roadways are located at intersections to maximize safety.

5.1.4 Landscape



Planting Concept

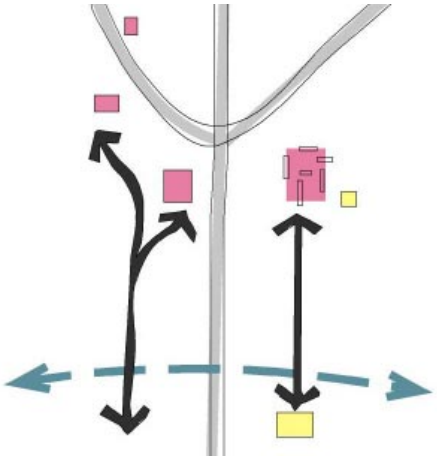
The conceptual approach to planting addresses three landscape zones:

Existing Woodlands – woodlands on the west and east edges of the property are preserved as much as possible and augmented where necessary to enhance natural habitat areas along Alapocas Creek and Matson Run and buffer the park from adjacent neighborhoods.

New Landscape - new park landscape is layered between woodlands and Route 202 on both east and west sides. The west side landscape focuses on native plant materials that reinforce the bio-swales, roadways, natural earthforms and passive recreational areas that make up this segment of the project. The east side landscape emphasizes retention and augmentation of the cultural landscape while adding maintained grasses for active recreation.

Buffer/Linkage Landscape Zone – the landscape zone between Route 202 and the parallel park roads on each side is designed to buffer highway traffic from the park activities while visually linking the two component parts of the project. Emphasis on the use of indigenous plant materials will provide a pleasant visual landscape while minimizing maintenance.

5.1.5 Buildings



Park Structures

Buildings within the project consist of historic structures and several small new buildings. Historic structures identified to receive some level of *restoration and/or adaptive reuse* include:

- Bird-Husbands House
- Murphy House
- DuPont Dairy Barn
- Weldin Plantation (ruins)

Proposed new project buildings include:

- Golf Pro Shop at practice area
- Sheltered tee area
- Restrooms
- Small picnic shelter(s)
- Maintenance Building

5.2 Park Features

The park features are the result of a synthesis of site constraints/opportunities weighed against park program needs. The Park will provide users with a balance of passive and active recreational opportunities while seeking to preserve and enhance the existing natural resources of the site. The Park segment west of Route 202 is reserved primarily for passive recreation, natural and historic interpretive opportunities, and facilities to detain and improve stormwater runoff from site improvements. The East Park segment will be devoted principally to active recreation executed within the context of environmental enhancement and stormwater management of the watershed east of Route 202.

Park landscaping emphasizes conservation of the natural environment (including woodlands on the east and west perimeters of the site) protection of wetland environments, preservation of the cultural landscape to make outdoor "rooms" for active recreation facilities. New landscape is added to enhance stormwater management features, reinforce park open spaces, beautify roadways, create habitats and provide maintained turf for active recreation. The zone between Route 202 and West and East Side Park Roads is planted with informal masses of trees, meadow grasses, and wildflowers to serve as a visual buffer between Route 202 and the two sides of the park. Visual linkages between the two sides are suggested in similar landscape treatment along both sides of this planting zone. A formal tree allee extending the central hedgerow on the east to the Dairy Barn on the west makes a further gesture of visually connecting the two sides.

Active recreation is focused on the east side of the park with multi-use fields, picnic areas, children's playground, dog exercise park, golf teaching facility and expansion of the Rock Manor Golf Course to the south. All active recreation is served by a central parking lot that is linked to all activities with park paths.

Historic interpretation is an integral component of the park plan. The Dairy Barn is restored to enable adaptive reuse for multiple uses by the State park system. Site improvements for the Barn include converting a cornfield into a public "lawn" on the south side of the Barn to support public activities. The existing ruins of Weldin Plantation on the east side will be stabilized and interpreted as part of the trail system. Bird-Husbands House and Murphy House along Route 141 on the west side will also be renovated for adaptive reuse.

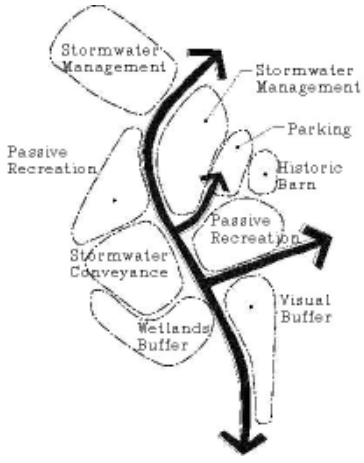
The Park will be easily accessible by all modes of transportation to be enjoyed by people of all ages and physical conditions. Walkers, hikers, and cyclists will be linked to the City of Wilmington through extending the Northern Delaware Greenway from the Brandywine River. Park users to the east will also be able to access the park via extending the Greenway trail from Talley Road. Greenway links to the north and south facilitate access from those directions.

Visitors to the park via automobile will access the park from new local and park roads. East and West Side Park Roads extend direct access from the abutting neighborhoods to central parking areas. A 30-foot wide zone abutting the west side of Route 202 is free from any proposed structures to provide for potential modes of transportation in the future.

Within the park, all major park facilities are interconnected with paved park paths providing ADA accessibility and accommodation of occasional service and emergency vehicles. All park paths link to the Greenway system and facilitate accessibility from abutting neighborhoods to all parts of the Park. Trails/paths will enable users to experience the park's diversity as they pass through the Park between woodlands, open meadows, hedgerows, and maintained lawn areas. The south underpass below Route 202 links the two park segments for pedestrians, cyclists, and vehicular park traffic alike.

5.2.1 Functional Programmatic Relationships

The program of park uses was designed to fit with the existing natural and cultural characteristics of the land. The park has west and east sections – those areas respectively west and east of Route 202.



Functional Relationships

5.2.2 West Park Features

Land Use

The Blue Ball Dairy Barn forms the primary focus of activities for the West Park with a strong visual presence along Route 202 and with primary access from the West Side Park Road. The Barn will be renovated for adaptive reuse. This will include a stone paved entry courtyard, vehicular drop-off, 100-car paved parking area with 50 lawn overflow spaces, and a large public lawn immediately to the south of the Barn for unprogrammed use including occasional community gatherings.

Aerial View of Renovated Blue Ball Dairy Barn, Courtyard and Parking

Landform is sculpted throughout West Park to provide bio-swales and basins to manage stormwater. The majority of stormwater will be detained in a large basin cut into the existing rock pile. This allows for a series of environmentally sensitive swales meandering through the West Park to address water quality issues. Development of bioswales and conveyance swales will include vegetative enhancement and will provide opportunities for environmental education in conjunction with the park path system.

Circulation

The alignment of local and park roads is partly driven by the need to facilitate stormwater basins and swales while expressing a park-like character in scale and detail. Road widths will be minimized to serve design speed and promote the character of park drives. Lawn and meadow planting will abut

West Park Plan

road edges. Road shoulders will be grass in order to facilitate drainage of roads directly into bioswales and emphasize the rural character of the park.

Construction of a new portion of the Northern Delaware Greenway through the West Park will link the City of Wilmington at the Brandywine River to the east park via an expansive underpass below Route 202. This will provide the primary connection between the two park segments. The 10-foot wide asphalt path will cross under Route 202 with a 10-foot median separating it from the park road to provide a safety separation and greater breadth to the underpass for more natural light and a more friendly link between park segments.

Greenway connections also extend north and south along the West Side Park Road to link neighborhoods surrounding the park and provide access to the Dairy Barn.

Secondary park paths will provide access between and through passive recreational and natural areas while limiting impact on habitat. In the West Park, these paths will offer a diverse range of experiences for hikers, bikers, joggers, and those seeking passive recreation.

At various points along the path system, enlarged paved areas will offer pedestrians and cyclists places to stop, rest and become oriented to the park layout. These nodes will provide information kiosks with orientation maps and other park information, benches, and trash receptacles. Site furnishings will be designed as part of the park design palette to provide continuity and identity for the park.

Parking

A central parking area is located west of the Dairy Barn to provide parking for those attending Barn activities as well as visitors to the park. The parking area will contain 100 paved parking spaces with 50 additional parking spaces available on an abutting lawn overflow parking area.

Signage

A system of signs with an attractive logo will instruct users to access park facilities, interpret the history of park elements, and direct travel between communities

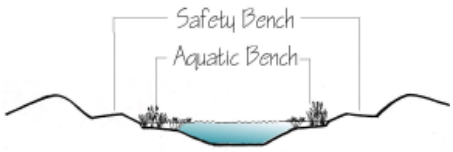
Landscape

The West Park landscape focuses on indigenous plant materials that rein-

force the bioswales, natural earthforms and passive recreational areas.

The landscape design between Route 202 and West Side Park Road is designed to visually buffer highway traffic and help mitigate traffic noise from the park activities. This buffer zone will be planted with indigenous grasses, wildflowers and informal tree massings to reflect the buffer zone east of Route 202 and to visually link the two component parts of the Park. The existing trees along the south side of the park abutting Alapocas 1 and 2 subdivisions will be augmented with additional evergreen and deciduous trees, particularly on the east side of the development, to mitigate noise from the new road and trail. The Park connector road within this landscape zone will be heavily planted with trees on the north side of the connector to reinforce the public "lawn" abutting the Barn. The south side of the connector will be planted only in upland grasses to maximize solar exposure of the road as it enters the underpass.

View along park road connector and Greenway

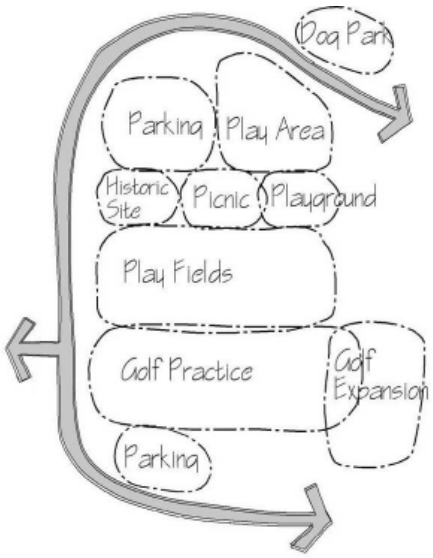


Stormwater Safety Bench

The Barn "lawn" will be graded as a gently sloping, continuous plane to provide positive drainage yet provide a large area of maintained grass for public gathering in support of Barn activities. Views of and across the "lawn" from Route 202 will be framed by tree massings to retain historic visual connections to the Park site. A stone wall and heavy planting screen between the barn and the new ramp accessing Route 202 will mitigate traffic noise and visual proximity of traffic.

Upland slopes will be seeded with a mix of shortgrasses and perennial wildflowers to reinforce the passive nature of West Park and minimize maintenance. Bioswales and meadow depressions associated with stormwater conveyance and quality will be seeded with native grasses. Though isolated from the Park because of its utilitarian function, the west basin will include the planting of aquatic emergents and a wetland seed mix to enhance the safety bench of the basin. This basin should be fenced for security reasons, the design of which will ensure that it visually fits into the landscape.

All new trees and shrubs will be installed as large, specimen size to make an immediate visual impact on the Park.



Functional Relationships

5.2.3 East Park Features

Land Use

East Park is oriented toward active recreation within a strongly defined physical framework established by the existing hedgerows. Three multipurpose play fields are grouped together in the north space for efficiency of play and to minimize grading requirements throughout other parts of the park. This space is sufficiently large to provided ample space between fields to permit spectators and allow overrun of play.

The major south space framed by existing hedgerows will be designed as a golf practice facility providing a driving range with partially covered tees at the west end of the space. Additionally, target greens and a practice green will be included as part of the facility. There will be an office/pro shop where users can rent practice balls and equipment. This facility will also provide maintenance and storage for equipment to maintain the park. The driving range will be graded to provide stormwater storage in major storms to maximize use of the site.

Weldin Plantation

The ruins of Weldin Plantation remain in the existing wooded area just north of the play fields. The woods will be selectively cleared to expose the ruins and "retrieve" this historic built environment from the natural vegetative succession that has hidden it for years. New plantings expressive of a traditional farm cluster may be added in contrast with the remaining woods. The walls will be stabilized to indicate the location of the historic buildings and signage, maps, and story boards will tell the history of the site. A grid of new park paths reinforcing the built forms will run through the plantation site to link other park elements with the ruins. The remaining woods will be selectively cleared for picnicking and curvilinear park paths will be designed to lead visitors from the parking area to other facilities in the Park.

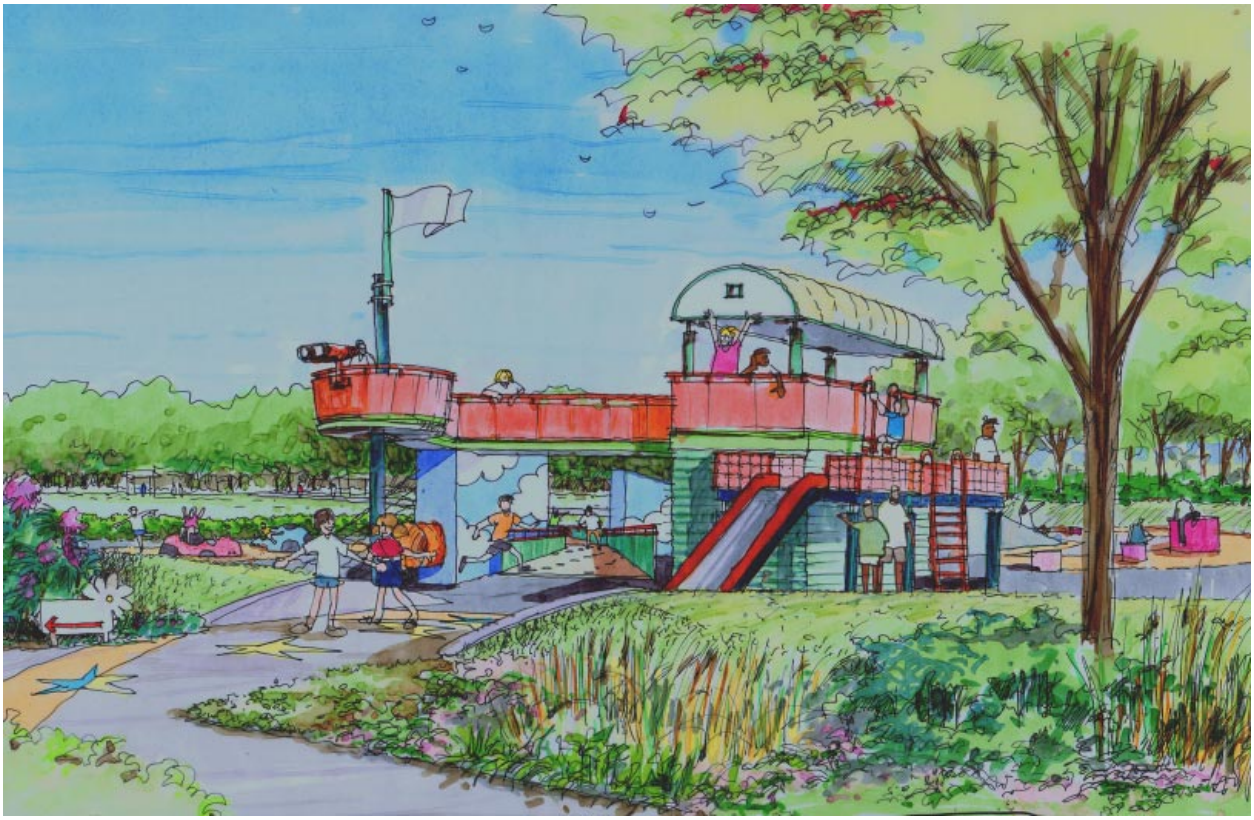
View looking south towards Weldin Plantation Ruins

Children's Garden

The open space just east of this wooded area and north of the play fields will be designed as a children's playground and garden to provide play and adventure opportunities for children of all ages and abilities. Play apparatus will physically challenge users of the playground while the garden will offer mazes, games, and theme gardens to challenge the mind and visually enhance the park. Its proximity to the parking area and play fields makes it easy for parents to oversee younger children using the playground as well as those older children engaged in activities on the play fields.

Picnic areas are located within the woodlands around the historic plantation site and in the fringe areas of the woods. While several of the picnic sites may have a small shelter, a large picnic pavilion for large groups will not be included in the park program. Access to picnic areas is facilitated by their close proximity to the main parking lot via the park trail system. The correlation of picnic areas near play fields and the children's playground promotes a family atmosphere in the park where activities are diverse and participation is open to all.

The space north of the Children's Playground will be reserved for stormwater management and an additional multi-use play field.



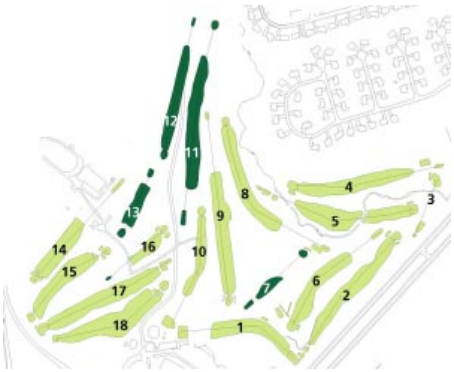
View of Playground

A dog exercise area, approximately one acre in size, will be provided in the area north of Weldin Road. This area will be separated from other park uses and sensitive habitat areas and will provide dog owners with a contained space to safely run their dogs unleashed. The dog exercise area will be connected to the rest of the park by park roads and paths and will be served by a 20-space parking lot.

The East Park stormwater management system is integrated with existing Matson Run and overall park development. Several small detention basins will collect stormwater from park watershed zones. Water is then conveyed via bioswales and pipes to larger basins and, subsequently, back into Matson Run after detaining peak storm flows and improving water quality. Development of stormwater facilities including vegetative enhancement within the park context provides opportunities for environmental education in conjunction with park programming.

View of Boardwalk at Detention Basin

Existing Golf Course



Proposed Golf Course

The plan integrates the full park program with expansion of Rock Manor Golf Course to the south. Course expansion includes the modification of three holes and the relocation of two holes to improve play and enable inclusion of stormwater detention opportunities within the golf course design. Greens 9 and 18 are located near the clubhouse in the reconfiguration. The plan adds approximately 375 yards of play to the course, bringing its total length to 6,184 yards. Much of this lengthening is accommodated in approximately six acres in the southeast corner of the Weldin parcel in East Park

Circulation

Local and park roads provide connections with local neighborhoods and communities and link the two park segments under Route 202. Park road widths will be as narrow as possible and lawn and meadow planting will abut road edges. Road shoulders will be grass, and will not be curbed, in order to facilitate drainage of roads directly into bio-swales and emphasize the rural character of the park.

The plan abandons existing Carruthers Lane to create an uninterrupted open space linkage between active recreation and the existing woodland to the east. A new access road to Rock Manor Golf Course will be provided from East Side Park Road along the south property line of the park to the course.

The Northern Delaware Greenway trail will extend from West Park through the underpass, across East Park abutting the central hedgerow, and meander through the woods providing an eventual link to Talley Road. The asphalt paved Greenway will be lighted with custom designed light fixtures along its length, expressing a park design motif that recalls other park elements. Lights will be low in scale and will remain on only during park evening hours.

Secondary park paths will provide access between and through active uses and natural areas while limiting impact on habitat. In the East Park, these paths will offer a diverse range of experiences for hikers, bikers, joggers, and those seeking other active recreation.

At various points along the path system, enlarged paved areas will offer pedestrians and cyclists places to stop, rest and become oriented to the park layout. These nodes will provide information kiosks with orientation maps and other park information, benches, and trash receptacles. Site furnishings will be designed as part of the park design palette to provide continuity and identity for the park.

Parking

A central parking lot of approximately 200 spaces will service the needs of all active recreation except the golf practice facility and dog exercise park. This parking area is directly accessible from West Side Park Drive and Foulk Road. Its location provides close proximity to picnic, playground and historic interpretive areas and is convenient to all play fields. Parking bays will be separated by wide islands where bioswales will convey parking runoff to other stormwater management facilities. Where soil conditions exist to permit percolation, it is proposed that parking areas will be surfaced with permeable paving.

The golf practice facility has a separate parking lot with approximately 40 parking spaces. It is accessible from the new golf course access road along the southern edge of the park.

The dog exercise park, located to the north of Weldin Road, is provided with a separate parking lot with a capacity of about 20 spaces.

View Across Play Fields to Hedgerows

Landscape Buffer

Landscape

The East Park conserves the existing cultural landscape of agricultural hedgerows and emphasizes them as a strong, geometric frame organizing all active park program components. It also preserves the oldest woodland along Matson Run as the east edge of the park and as buffer between it and abutting neighborhood. Hedgerows will be augmented with understory plantings to enhance habitat and aesthetics. Young woods will be partially cleared to accommodate golf course expansion. Woodlands to the north of the active play fields will be selectively cleared to enrich the plant understory and provide places for picnicking.

The landscape design between Route 202 and the parallel East Side Park Road is designed to buffer highway traffic and help mitigate traffic noise from the park activities. This buffer zone will be planted with indigenous wildflowers and informal tree massings to match the buffer zone on the west side of Route 202 to visually link the two component parts of the park.

Active play fields will be seeded with maintained grasses.

Plant materials will be installed in large, specimen sizes at key places throughout the park to provide an immediate visual and functional impact.

5.3 Transportation Features

Roadway Plan

5.3.1 Regional Transportation System

5.3.1.1 Roadways

This section describes the regional roadway system developed by the Transportation Committee and selected by the Governor and County Executive. The section first covers the regional roadway links, and then describes some of the major study area intersections.

Regional Roadway Links

- *I-95 Ramp*. As the ramp curves to the north, it will be joined by the ramp serving I-95 southbound traffic traveling to northbound US Route 202 with a lane addition. These three lanes will run northbound parallel to US Route 202, but separated by a barrier. South of Foulk Road, the

three lanes will split: the left-most lane will continue onto US Route 202, the right-most lane will continue to an intersection with Foulk Road and the Route 141 Spur, and the center lane will be a "choice lane" where drivers can travel to either of the two mentioned destinations.

- *US Route 202*. This route will generally vary from two to four through travel lanes in each direction within the study area. Beginning in the south end of the study area, US Route 202 will maintain two lanes in each direction from Broom Street through the I-95 ramp area. The median area and the sides of the roadway will be enhanced with landscaping throughout this area.

  Traveling northbound out of the city, US Route 202 will narrow to one lane north of Augustine Cut-Off, before being joined by two lanes from the I-95 ramp. Continuing northbound, US Route 202 will carry three lanes through the intersection with Foulk Road, and widen to four through lanes through the intersection with Existing Route 141/Murphy Road. North of this intersection, US Route 202 will narrow to its existing configuration of three through lanes.

  Traveling southbound from the north end of the study area, US Route 202 will pick up a fourth through lane at the AstraZeneca entrance which will continue through the Existing Route 141/Murphy Road intersection. The fourth lane will become an "exit-only" lane just north of the Foulk Road intersection; the exit will serve as a ramp to the Route 141 Spur and the West Side Park Road. Three through lanes will be provided at the Foulk Road intersection, and a fourth lane will be added south of the intersection from the Route 141 Spur. These four lanes will continue through the Augustine Cut-Off intersection. South of the Augustine Cut-Off intersection, the two right-most lanes will serve I-95 southbound traffic, while the two left-most lanes will serve I-95 northbound traffic and traffic traveling into the city.

- *Route 141 Spur*. This roadway will consist of two travel lanes in each direction with a center landscaped median and exclusive turn lanes at signalized intersections. The Route 141 Spur will originate in the vicinity of the Existing Route 141/Childrens' Drive intersection and travel along

the southwest side of the AstraZeneca south campus towards the existing intersection of US Route 202 and Foulk Road. The Route 141 Spur will continue under US Route 202 and connect directly into Foulk Road. Ramps from the Route 141 Spur will allow eastbound traffic to access both northbound and southbound US Route 202. Proposed signalized intersections along the Route 141 Spur are located at Childrens' Drive, the AstraZeneca entrance, the West Side Park Road, the I-95 Ramp intersection, and Weldin Road (as the Route 141 Spur connects in with Foulk Road).

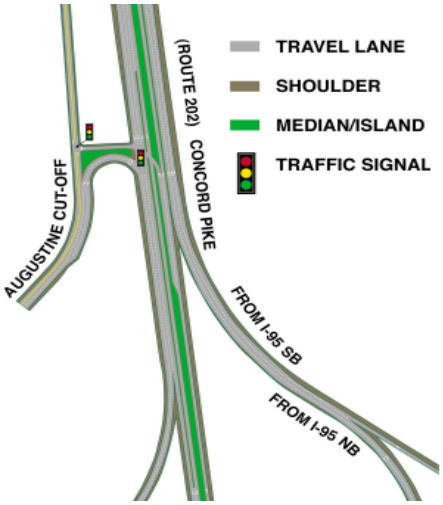
- *Foulk Road*. This roadway will continue to be two through lanes in each direction. Near the intersection with US Route 202, some modifications to Foulk Road are proposed. The roadway will be shifted slightly to the south to tie directly into the Route 141 Spur through to the underpass under Route 202. However, the portion of the roadway serving westbound to southbound traffic will remain in its current location and continue to meet US Route 202 at a signalized intersection, at the same location as existing conditions.

- *Existing Route 141*. This roadway will continue to be two through lanes in each direction. Near the proposed intersection of the Route 141 Spur and Childrens Drive, the roadway is proposed to curve slightly south of its current alignment to tie into a new four-leg intersection. No changes are proposed on existing Route 141 at its intersection with US Route 202.

Major Intersections

US Route 202/Foulk Road/Route 141 Spur

- *US Route 202/Foulk Road/Route 141 Spur*. The proposed "Diamond" interchange is shown in the figure at the left. Although the signal between US Route 202 and Foulk Road remains in the proposed alternative, it satisfies the "no-degradation" criteria because: 1) the heavy traffic movement from I-95 to the west is taken out of this intersection and moved to the I-95 ramp to the Route 141 Spur, and 2) the signal can be re-timed as a two-phase signal rather than the existing four-phase signal, thereby significantly reducing the "lost-time" during the signal cycle.



Route 202 / Concord Pike

- *US Route 202/Augustine Cut-Off*. This intersection arrangement allows for movements from Augustine Cut-Off to the south, and from northbound US Route 202 into Augustine Cut-Off. Traffic traveling southbound on US Route 202 to Augustine Cut-Off must exit US Route 202 on the ramp just north of Rockland Road, travel through the intersection with the Route 141 Spur onto the West Side Park Road, which then changes names to Augustine Cut-Off. Traffic on Augustine Cut-Off traveling to northbound US Route 202 must use the West Side Park Road to come to the intersection with the Route 141 Spur, turn right onto the Route 141 Spur and then use the ramp up to US Route 202, where it can then turn left onto US Route 202. Traffic travelling between Augustine Cut-Off and Foulk Road, Rockland Road, or Weldin Road will be able to avoid the regional roads altogether by utilizing the West and/or East Side Park Roads and the Park Road/Greenway underpass of US Route 202.

US Route 202/Existing Route 141/Murphy Road

- *US Route 202/Existing Route 141/Murphy Road*. Three travel lanes are proposed to be added to Route 202,this intersection (shown in figure at left): a northbound through lane, a southbound through lane, and a westbound left or right-turn lane.

Childrens Drive Intersection

- *Route 141 Spur/Existing Route 141/Childrens Drive*. As shown in figure at left, this intersection is proposed to have two through lanes in each direction and duel left-turn lanes on each approach to the intersection.

5.3.1.2 Greenway and Pedestrian Bike Paths

Greenway and Pedestrian/Bike Paths

Construction of a new portion of the Northern Delaware Greenway through the Blue Ball properties will link the City of Wilmington at the Brandywine River to Talley Road. The 10-foot wide asphalt path will cross under Route 202 with a 10-foot median separating it from the road to provide a safety separation and greater breadth to the underpass for more natural light and a friendlier link between park segments.

Greenway connections also extend north and south along the West Side Park Road, Route 202 and Rockland Road to Route 141 linking neighborhoods surrounding the park. Park paths will connect with the Greenway System.

5.3.1.3 Transit

To meet the growing traffic demands which will be placed on this area, various transportation improvements, including roadway and multi-modal options are being developed and analyzed. The purpose of this ongoing work is to identify alternatives to reduce the number of trips made by single-occupancy vehicles in the area.

Today there are approximately 2,000 transit trips per day in the entire Brandywine Hundred area. The Delaware Transit Corporation's (DTC) goal for this area is to increase this number to 10,000 trips per day by the year 2007. To do this, multi-modal options must capture not only AstraZeneca employees, but also local retail workers, nearby residents and employees from other major area employers.

In particular, it is important that multi-modal options attract and serve choice riders. Choice riders are those travelers who have the option of driving. The majority of the workforce in this area does have the option of driving, and these employees could comprise a substantial number of transit trips per day. Attracting these riders will require services that are a convenient and comfortable alternative to driving. Therefore, the success of any multi-modal options in the Brandywine Hundred area will depend in large part on how well it serves this workforce.

To date, existing transit service in the area has been analyzed and trip patterns (origins and destinations) have been determined. Based on this analy-

sis, conceptual multi-modal options are being evaluated. Providing multi-modal options in the Brandywine Hundred area could consist of expanding and improving existing services, and/or developing new service options in the area.

Improvements to existing services in the area could include the following changes to routes described in section 3.2.4

- Increase the frequency and directness of bus Route 28
- Extend bus Routes 20 and 21 to AstraZeneca and Dupont complexes
- Improve customer comfort and increase the number of bus stops and shelters
- Improve marketing and fare media
- Other ridesharing and TMA activities

New service options could include the following:

- Park and ride facilities in Pennsylvania with shuttle service and exclusive lane/signal preferences
- Bus shuttle service to Claymont Station
- Bus route in Foulk Road corridor
- Bus routes along Routes 41, 48, and 141 corridors
- Area-wide neighborhood shuttles/flexible routes

Other innovations that could make multi-modal options more attractive to potential riders include:

- Queue-jumper lanes
- Bus preferential treatment on Route 202 (and possibly Foulk Road)
- Passenger communications
- Portable electronic signs

The *development of a Transit Center* is another amenity that could make transit service more attractive in the area. However, for a Transit Center to be useful and attractive to potential users it may need to:

- Be located at a destination point for some area workers.
- Serve as a transfer point (possible with shuttle service) for an area employer or a local community.
- Also serve as a Park and Ride and/or Kiss and Ride site.
- Be combined with a Day Care/Concierge Service or other services.
- Provide convenient access to bus service and bicycle and pedestrian routes.

Transit service would be enhanced by implementing amenities that could be linked with bicycle commuting. Designated bicycle lanes, as well as secure bicycle racks are examples of these amenities. These types of amenities can work well at Transit Centers, Park and Ride facilities and at major area employment centers.

Employer-based incentives can also encourage employees to use multi-modal transportation options instead of single-occupancy vehicles. These incentives include:

- Company Shuttles – new and continuations of existing service
- Tax Benefits - for employers, as well as employees
- Dedicated parking for car/van pool vehicles
- Site design changes to accommodate transit commuters
- Bicycle facilities on site

The multi-modal analysis associated with the Master Plan has not been finalized. Once completed it will support the goals and objectives of the Blue Ball Properties Project.

5.3.2 Local Transportation System

5.3.2.1 Roadways

- *West Side Park Road*. This roadway is proposed to wind through passive recreational area of the Alapocas tract, and connect Augustine Cut-Off to Rockland Road and the Route 141 Spur. It is proposed to be one (11-foot) lane in each direction with grass shoulders. Although this roadway will include park-like design features, it is not proposed to be gated.
- *East Side Park Road*. This roadway is proposed to wind through active recreational area of the Weldin tract, and connect the West Side Park Road to Foulk Road and Weldin Road. It is proposed to be one (11-foot) lane in each direction with grass shoulders. This roadway will cross under US Route 202 through the proposed Greenway underpass. Although this roadway will include park-like design features, it is not proposed to be gated.
- *Augustine Cut-Off*. Near the intersection with US Route 202, this roadway will be reconfigured into the "Partial Signal" configuration, described in more detail in Section 5.3.1.1. Augustine Cut-Off will tie directly into

the West Side Park Road.

- *Childrens Drive*. This roadway link will be shifted slightly east of its current alignment to form a four-leg intersection with the Route 141 Spur and Existing Route 141. The intersection with Rockland Road will not be modified. See Section 5.3.1.1 for more details.
- *Murphy Road*. This roadway will remain physically unchanged, except for the addition of a turn lane at the intersection with US Route 202.
- *Rockland Road*. This two-lane roadway (one lane in each direction) will no longer directly tie into US Route 202. Instead, its east end will terminate at an unsignalized "T"-intersection with the West Side Park Road.
- *Weldin Road*. This two-lane roadway (one lane in each direction) is proposed to be relocated to the north of its existing alignment. Near the existing intersection with Carruthers Lane, Weldin Road will curve north, before curving west and then south to tie directly in with the East Side Park Road. A short connector road will connect relocated Weldin Road to Foulk Road.
- *Carruthers Lane*. This two-lane roadway (one lane in each direction) is proposed to be abandoned between the water treatment plant and Weldin Road. Near the water treatment plant, Carruthers Lane will be linked to the East Side Park Road through a two-lane (one lane in each direction) local connector road.

5.4 Stormwater Management

A major component of the park master plan is stormwater management for AstraZeneca expansion as well as park and roadway improvements. These changes to the site have the potential to increase stormwater volume and its rate of run-off substantially. Management of stormwater will compensate for possible impact of development such as flooding, erosion and sedimentation problems, concentration of flow on adjacent properties as well as non-point source pollution washed off from impervious surfaces. This project, located north of the Chesapeake and Delaware Canal in New Castle County, will not exceed the post development peak discharge for the 2-, 10- and 100-year frequency storm event.

5.4.1 Goals

The goals for stormwater management practices in the park development include:

- Controlling peak discharge of run-off from buildings, park development, and new road and parking lot construction.
- Controlling water quality to prevent further degradation of downstream water quality.
- Protecting and enhancing existing stream channels.
- Maintaining groundwater recharge and quality to protect existing wetlands.
- Storing the upstream stormwater (from the Shellpot watershed) in the East Park to decrease extreme downstream flooding.
- Integrating stormwater management into park features such as educational feature, open space amenity, and habitat enhancement and restoration areas.

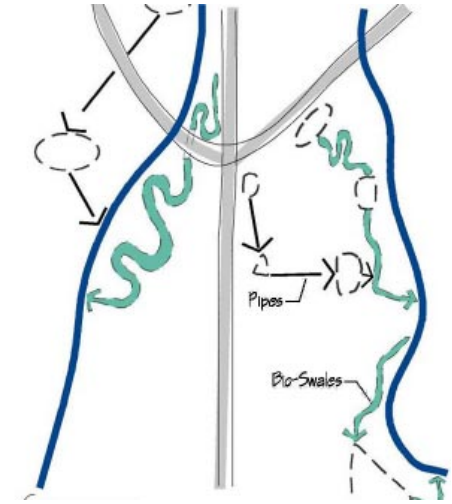
5.4.2 Design Intent - "*Integrated Stormwater Management*"

Integrated stormwater management seeks the best practices to manage stormwater safely, efficiently and responsibly on site. The design integrates stormwater with ecology and site engineering (infrastructure), and provides a balance between community needs and ecological systems. It combines the use of wet detention basins, conveyance systems and habitat restoration and enhancement to achieve the environmental objectives of hydrologic balance and water quality to the highest possible standard.

Detention Basins

Dry and wet detention basins are proposed to control peak discharges by delaying runoff. The stormwater management plan includes a single, large wet basin on the west side of the park and two wet basins along with a group of small dry basins on the east. Wet basins on the west side serve as landscape features while improving water quality by allowing sediment and pollutants to settle.

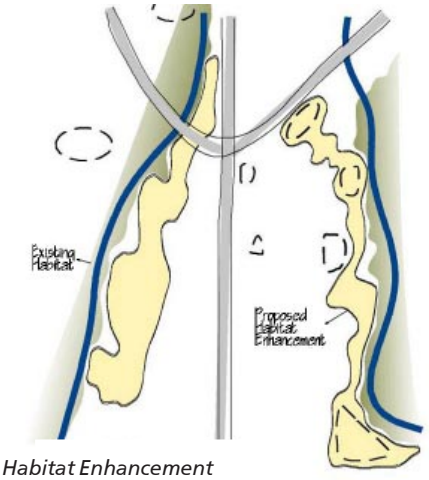
View Across Bioswale in West Park



Conveyances

Conveyances

Conveyance systems consist of linear pipes and swales draining sequentially from one to another. They are designed to carry the peak flow rate during a design storm. Where possible, bioswales are proposed as main conveyance systems in the park to improve runoff and restore the natural hydrologic balance. Bioswales, a combination of a shallow drainage way and dense vegetation, 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 of water in streams and wetlands. Bioswales also can remove a high percentage of pollutants found in runoff through bacterial action that occurs when runoff flows through swale vegetation and soil.



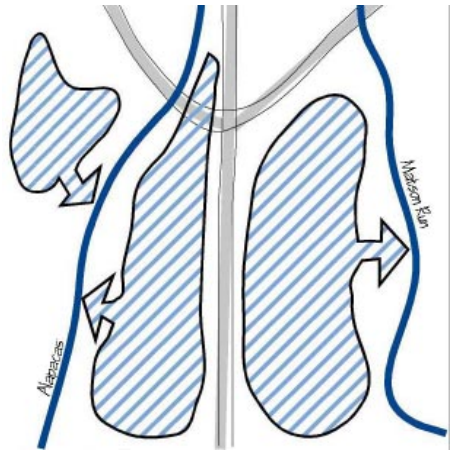
Habitat Enhancement

Habitat Enhancement

Stormwater management systems integrate a series of proposed basins and bioswales with existing habitats – stream corridors, wetlands and woodlands – so they can support one another and link habitats within a sustaining natural system. Since the proposed stormwater management systems are placed between the park and existing streams, they protect the existing riparian system from excessive flooding and function as a buffer to sustain the system's integrity. The wet basins also provide additional aquatic habitat for wildlife such as wading birds.

5.4.3 Design Considerations

Watershed



Watersheds

The watershed in the study area can be divided into two zones by Route 202: East Park watershed and West Park watershed. All stormwater from East Park watershed drains to Matson Run while the stormwater from West Park watershed drains to Alapocas Run.

Required Storage Volume

The West Park watershed controls the peak discharge and quality of stormwater from the AstraZeneca development, Route 202 expansion, Route 141 Spur, Rockland Road, West Side Park Road, and the parking lot at the Blue Ball Dairy Barn. The preliminary estimate of impervious coverage is about 30 acres including the AstraZeneca parcel of 17. 4 acres. The preliminary stormwater runoff volumes for the new development are approximately 22.5 acre-feet.

The East Park watershed controls the peak discharge and quality of stormwater from relocated Weldin Road, East Side Park Road, a ramp from Route 202, Foulk Road, the new access road to the golf course, three parking lots, and the conversion of agricultural field to parkland. The overall stormwater volume in this watershed is significantly less than that of the West Park watershed since the impact of converting agricultural fields to parkland is very low. The preliminary stormwater runoff volumes for the East Park are approximately 3 to 5 acre-feet.

Stormwater Management Concept - West Side

West Park Stormwater Design

SE Corner of AZ North Campus Basin:

This basin will accommodate a portion of stormwater from AstraZeneca's North Campus development. The basin may hold approximately 3 acre-feet. To the extent that it can be sized to accommodate additional flows, it can help to mitigate existing quality and quantity issues. A portion of the overflow of the basin will be released at a prescribed rate under Route 141 into Alapocas Run. The remaining overflow will be diverted to the West Basin via pipe through the AstraZeneca South Campus expansion. Because of its prominent location, the basin will require particular care in development of its design and landscape.

West Basin:

This large wet basin will accommodate all flows from the AstraZeneca expansion and overflow from the southeast corner of the AstraZeneca North Campus Basin. The basin will be excavated from an existing rock pile area created during construction of the abutting hospital. The full basin storage is approximately 21 acre-feet. Water from this basin will be released back into Alapocas Creek at a prescribed rate that will not exceed peak flows.

BioSwales:

The combination of bioswales and series of small shallow pools will accommodate stormwater from Route 202 and new roads and park improvements before flowing into the Run. The bioswales will convey water in a series of S-curves to slow runoff and allow a certain amount of infiltration. This will help sustain the base flow essential to long term viability of wetlands and stream corridor revegetation along Alapocas Run. This system will filter and infiltrate the polluted runoff mainly from roads to help achieve the environmental objectives of the project.

East Side Stormwater Management Concept

East Park Stormwater Design

The objective of the stormwater management of East Park is to control the peak discharge and quality of stormwater from park development and to detain some stormwater from the Matson Run watershed in Rock Manor Golf Course without negatively impacting the course.

The approach to stormwater management for East Park is to divide the study area into several subareas, and locate a small basin within each. Each sub-area functions as a small watershed and is defined by topography and road profile. The stormwater from each basin flows into a bioswale or other basin to extend ponding time before discharging into the stream. Basins are inter-woven in spaces between roads and also in the golf teaching and practice area to integrate stormwater management with recreational use.

Two wet basins are proposed within the Rock Manor Golf Course. A small wet basin to the west collects runoff from the golf course access road and some golf holes. The larger basin to the east accommodates some of the upstream stormwater from the Shellpot watershed. A shallow bypass swale with a series of check dams diverts stormwater from Matson Run to this basin and stores stormwater temporarily, eventually discharging it back to Matson Run. Both wet basins also provide visual enhancement for the golf course.