



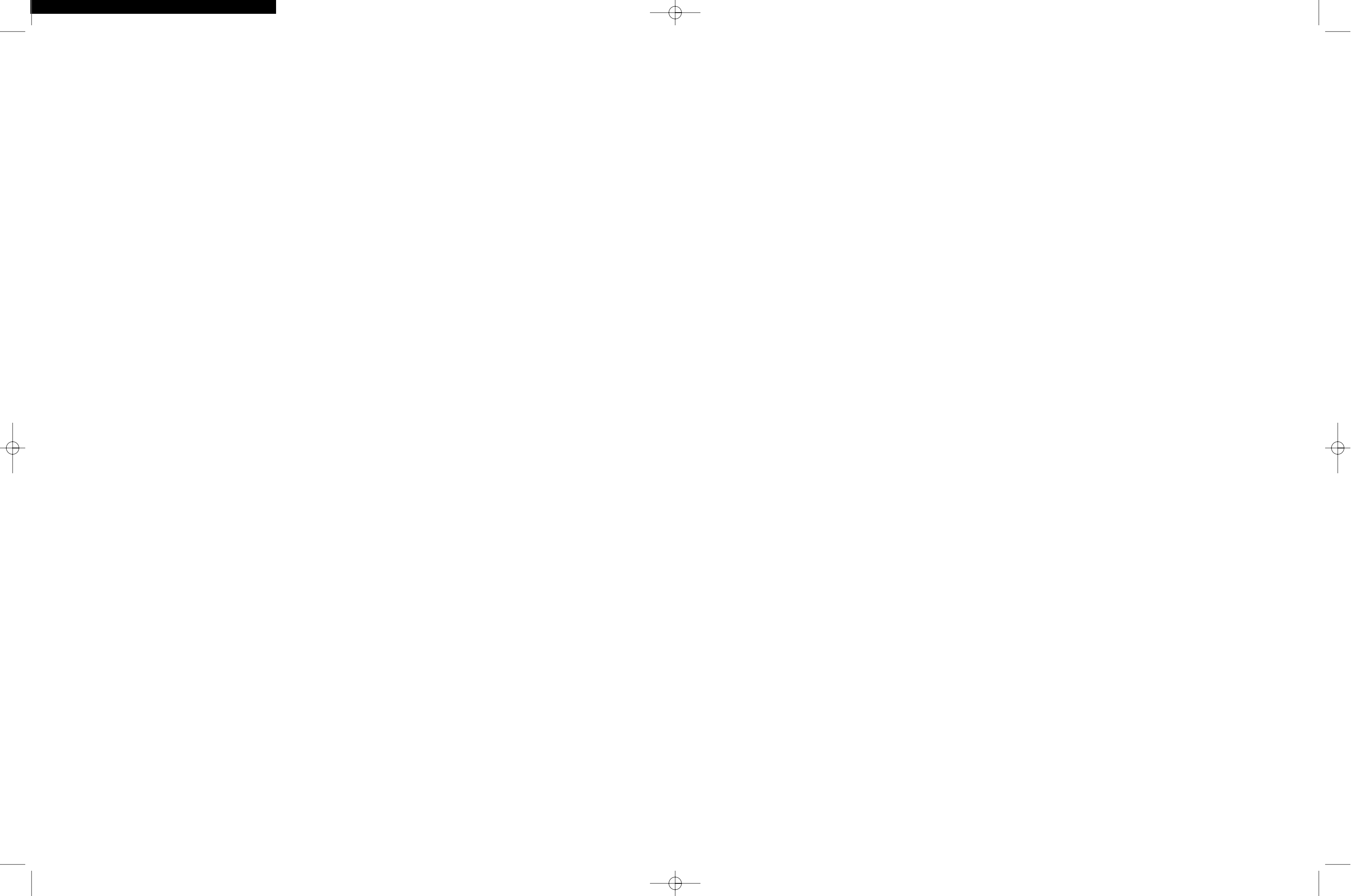
EARTH CONSERVANCY

SASAKI



I-81 Exit 168/Rte 115 Connector Road | Luzerne County, PA

MASTER PLAN



I-81 Exit 168/Rte 115 Connector Road | Luzerne County, PA

MASTER PLAN

Prepared for

**Luzerne County, Pennsylvania
&
The Earth Conservancy**

Prepared by

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December 2003

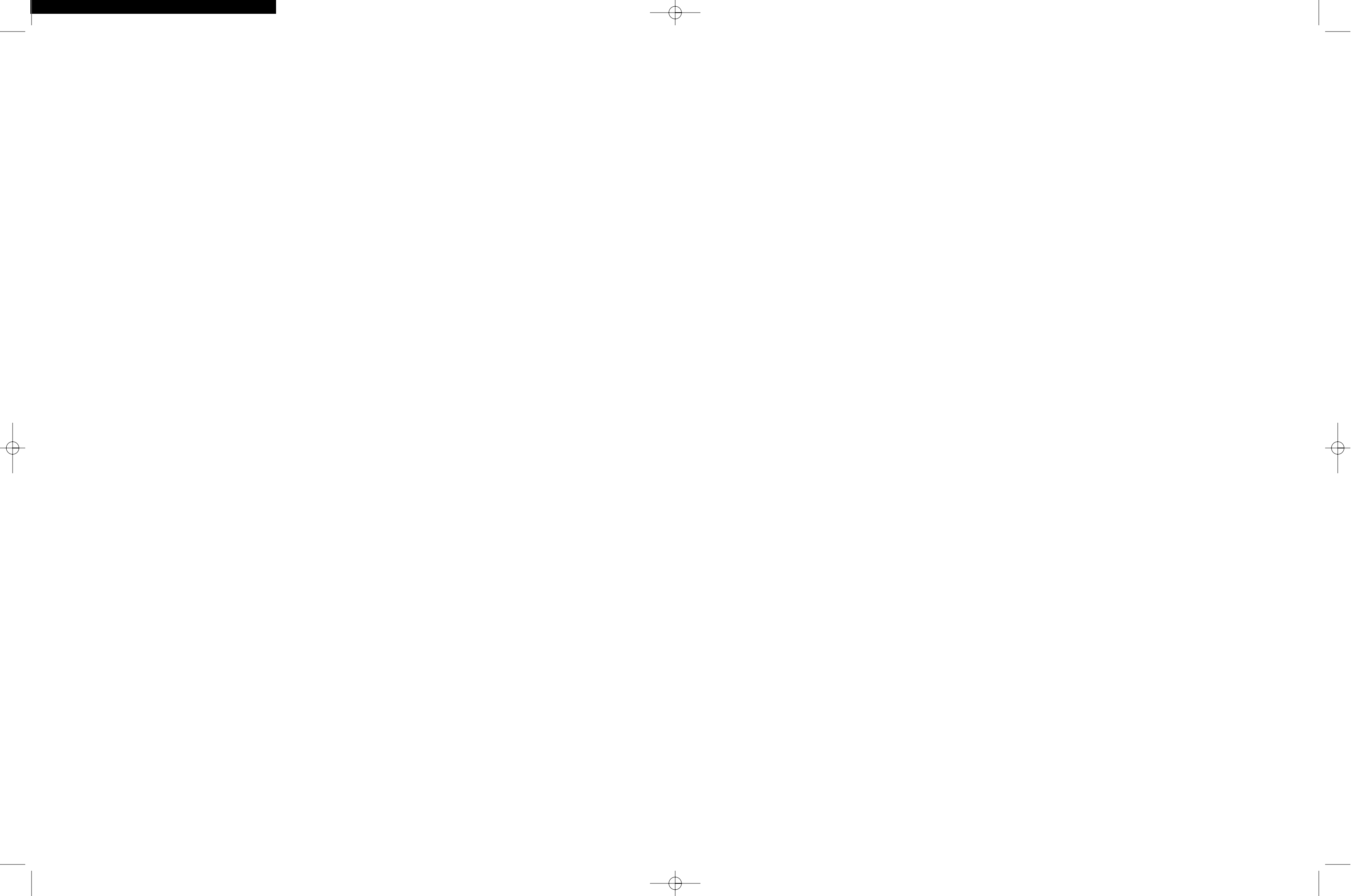


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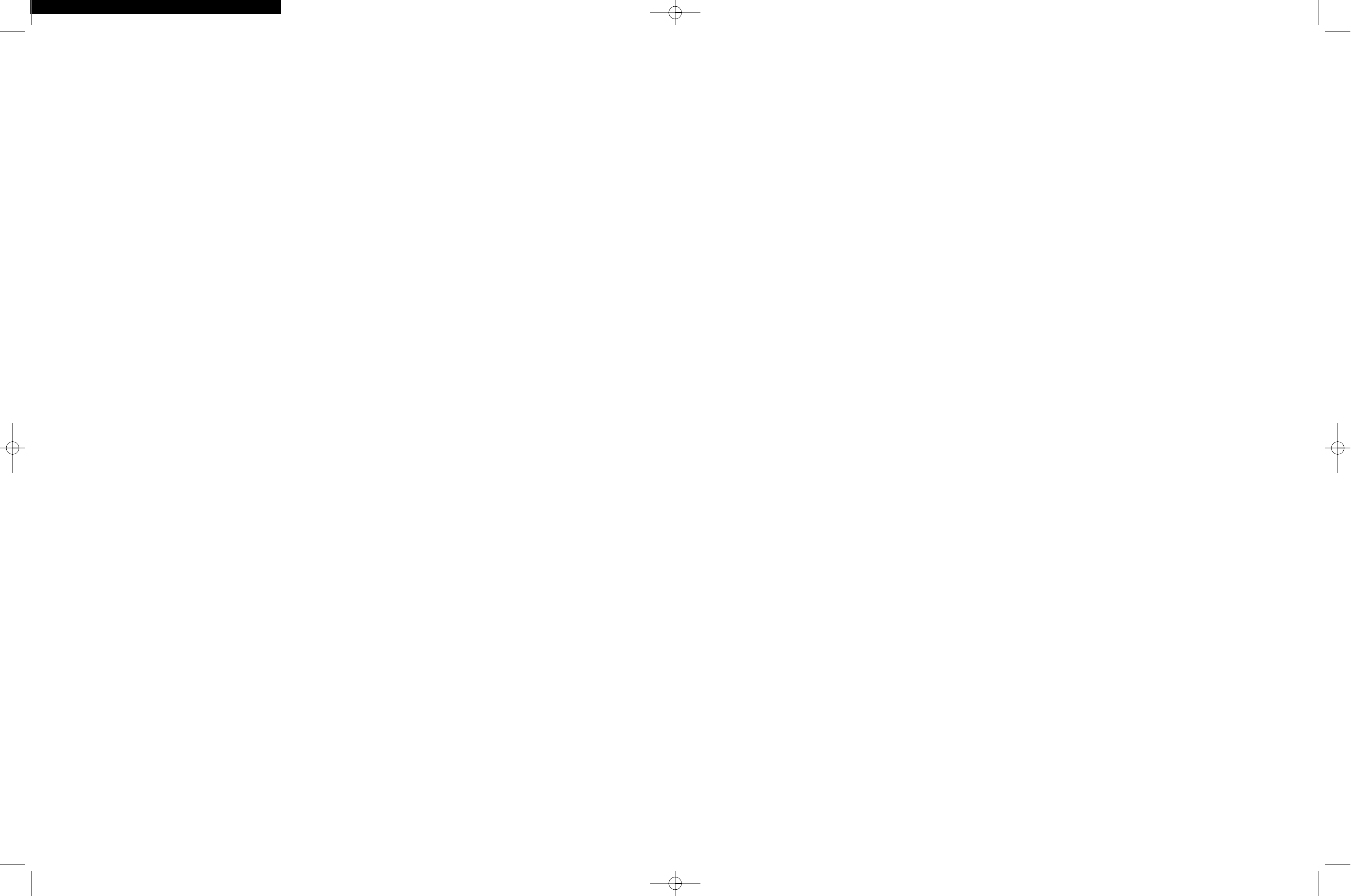
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I. INTRODUCTION



The Valley and Ridge geographical region of Pennsylvania offers scenic mountain views.

The I-81 Exit 168/Route 115 Connector Road Master Plan is a step towards the implementation of the long-range land use plan developed in 1996 for the 16,300-acre land holdings of the Earth Conservancy, a non-profit corporation whose mission is to reclaim and utilize the degraded land formerly owned by the Blue Coal Company.

In accordance with the long-range land use plan, Luzerne County worked with the Earth Conservancy to initiate this master planning process to bring about the creation of a mixed-use development for a 310-acre parcel located just south of, and visible from, Interstate 81 and the City of Wilkes-Barre in Luzerne County, Pennsylvania. The

project site serves as an important “gateway” property for Wilkes-Barre and Luzerne County. The Master Plan also looks at improving the nearby county open space and Seven Tubs Nature Area and integrating them with the development.

In commissioning this master plan, Luzerne County and the Earth Conservancy seek to make the best use of their prime developable land holdings for business park, commercial, residential, and recreational amenities. Their primary goal is to create high-quality jobs and to economically revitalize northeastern Pennsylvania while at the same time restoring and enhancing the surrounding environment.

The master plan outlines a framework for phased development in concert with market demand. A study of real estate market conditions, development opportunities, and financial and economic impact analysis was conducted in conjunction with the plan and is summarized in this report. The full economic study is included under separate cover.

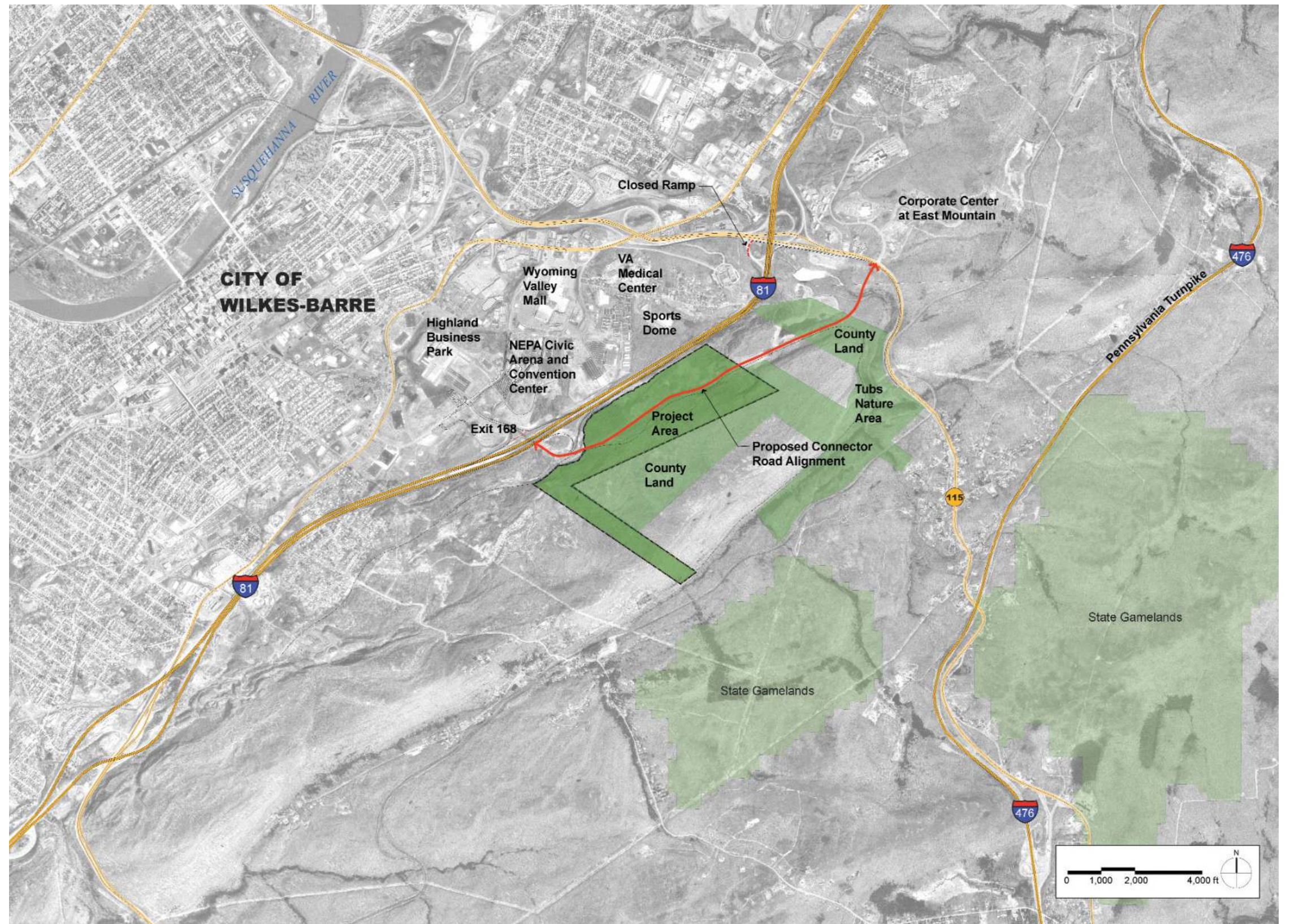


Figure 1. Context

II. EXISTING CONDITIONS

The project site is located in the Valley and Ridge geological region of Pennsylvania, and offers scenic views northwest and southeast to parallel mountain ranges. Like all of the Earth Conservancy's land holdings, the property was once owned by the Blue Coal Company and mined for anthracite coal. Large areas of strip-mine tailings remain on the site today and make up much of the wooded portion of the master plan site. These areas are generally not appropriate for development due to their structural instability, but can be traversed by trails and, to some extent, roads.

The Earth Conservancy's long-range land use plan proposed several regional highway improvements, including a connector road bisecting the project site, that would provide a more direct connection between Route 115 Northbound and I-81 Southbound at Exit 168. The Pennsylvania Department of Transportation (PennDOT) is currently working on the environmental studies required for the potential construction of this new road and, if anticipated impacts are not significant, expects to be studying possible road alignments in the spring of 2004.

There is a concentration of relatively recent development located across I-81 from the project site. Existing uses in this vicinity tend to be large-scale institutional and commercial uses and include the NEPA Civic Arena and Convention Center, the Sports Dome, the Highland Business Park, Wyoming Valley Mall, and the VA Medical Center. Older and higher-density development in the City of Wilkes-Barre surrounds this development to the north and west. The Pennsylvania Turnpike is located to the southeast of the site.

The project site is also adjacent to the Seven Tubs Nature Area, a 532-acre park that contains a collection of unique glacial potholes ("tubs") that are listed among the "Outstanding Scenic and Geologic Features of Pennsylvania" by the Department of Environmental Resources. A master plan for the Seven Tubs Nature Area was developed by Luzerne County in 1989 and its recommendations have been included in this current plan. Among the recommended improvements are a series of new trails and modest visitor support facilities, including pavilions, parking and restrooms. The location of these improvements was adapted to respond

to in the current plan to accommodate the proposed connector road. Most notably, a new entrance to the Tubs Nature Area will be located off of the connector road along the old alignment of East End Boulevard.

Concurrent with the plans for this site is the development of a Rails-to-Trails project that will convert the existing Conrail corridor to a regional bikeway named the D&L Trail. It is important that the trail network being proposed on and around the project site tie into this regional system.

The project site itself is characterized by mostly heavily forested, steeply sloped terrain, with elevated pads that have been graded and cleared. These pads sit in a linear arrangement at two general elevations above I-81 and are visible from the highway. The bank leading down to I-81 is steeply sloped. The highest site elevations are to the south of the site as it slopes up Wilkes-Barre Mountain. The lowest site elevations are located to the north of the site as it meets the I-81 right-of-way. Existing site access is by a single unpaved road roughly parallel to and south of I-81.



Typical Section: Glacial Tubs



Figure 2. Net Usable Land Area

Net Usable Land Area Analysis

Before the design process began, the site was analyzed for its capacity to support the mixed-use development program. A Net Usable Land Area (NULA) analysis was conducted to identify areas of greater than 20% slope and strip mine tailings located on the site. These areas were removed from consideration for development. The remaining area, excluding the railroad and road rights-of-way, was deemed to be usable land. Of the 310.8-acre site, 108.1 acres—35%—were identified as usable land. It was also determined that the finger of land that extends to the southeast within this site was too steeply sloped to justify the development of site infrastructure. The proposed development is concentrated, therefore, on 89.4 acres of usable land on the portion of the site that parallels I-81.

III. MARKET STUDY

To support the master plan effort, a market analysis and a development program were prepared by Economics Research Associates (ERA). The full economic analysis is included under separate cover.

The overall objective of the market analysis was to identify a development program and a realistic absorption schedule and phasing strategy. In addition, the market analysis informed a financial analysis that illustrates the probable return-on-investment and the associated risks pertaining to specific uses as well as an evaluation of the project’s overall local and regional economic impacts on surrounding municipalities. The market analysis was crafted to build upon work completed previously, such as the Legg Mason study of 2001. The work was conducted between November 2002 and July 2003.

Key findings and program recommendations are detailed below, by use.

Commercial Office

From a regional perspective, future employment levels and market demand for office space are closely linked. In addition, a critical determinant of both future employment and market demand is the degree to which a community or specific site is competitive. Factors defining this competitive positioning include local and regional access, overall physical characteristics such as highway frontage and visibility, proximity to economic activity such as job creation, business costs such as property taxes, and the like.

As a rule, office uses require access to a qualified labor pool, contemporary floorplates/ building configurations, adequate (and oftentimes the provision of extra) parking, nearby convenience and supporting retail and services and pedestrian-scale amenities.

- ERA estimates that future employment growth in office-using sectors will generate demand for roughly 1.5 million square feet of office space in the Wilkes-Barre/Scranton Metropolitan Area (MSA) between 2000 and 2010 based on

employment projections prepared by the Pennsylvania Department of Labor and Industry. This translates into demand for roughly 150,000 square feet per year.

- Based on limited information available on current office absorption patterns, the regional market appears to be absorbing on the order of 300,000 square feet per year—almost all of it among suburban business parks in the I-81 corridor. The accuracy of this estimate, however, cannot be confirmed.
- The next step in any such analysis would be to identify the amount of future office demand that could be “captured” on the Earth Conservancy site. This is known as “fair share.” In this case, the relationship between the amount of usable acreage on the site to the remaining developable parcels across the entire MSA would be the best way of measuring fair share. The lack of data on the amount of land available to accommodate office uses elsewhere in the MSA precludes this calculation.

- As illustrated in the site plans prepared by Sasaki Associates, a program of 400,000 to 500,000 square feet of Class A office space on the Earth Conservancy site would need to capture roughly 30% of the forecasted demand for office space across the entire four-county MSA. In light of other competing sites (and future sites not yet known), this may be considered an aggressive capture of demand generated by future employment growth.

A 500,000-SQUARE-FOOT OFFICE PROGRAM REQUIRES A 30% CAPTURE OF DEMAND FROM FUTURE EMPLOYMENT GROWTH IN THE REGION.

- This planning target assumes that office pads have strong visibility from I-81 and adequate levels of on-site parking to enhance overall marketability. Depending on site configuration, parking requirements and densities, the most highly marketable office buildings should include two to three floors each with floorplates in the range of 15,000 to 25,000 square feet to provide sufficient flexibility for a range of tenant types.

Housing

The site’s physical characteristics include heavily wooded areas and outstanding views of the Wyoming Valley from several ridgelines. Moreover, its adjacency to the Seven Tubs recreation area could be expected to enhance the site’s marketability for residential development in selected locations.

There are several other advantages to high-quality housing on the Earth Conservancy site. High-end housing will:

- Expand the tax base of close-in communities that currently lack such product;
- Foster some limited amount of demand for other uses on-site, such as convenience and service retail from residents with disposable incomes; and
- Enhance the overall marketability of the project’s commercial uses such as office space.

There are several ways to examine market potentials for residential development. One method includes target marketing, which measures selected “lifestyle clusters” of households living in specific trade areas with a propensity to live in certain housing products. Another method is to measure the jobs-to-housing ratio against regional comparisons. As detailed feasibility for specific types of housing

moves forward on the Earth Conservancy site, yet another method is to “income-qualify” potential target households.

ERA examined those market factors that are likely to inform the success of new housing development on the Earth Conservancy site. As noted in Section II, these include the following:

- Preliminary data about population projections through 2010 indicate that the region’s population will continue to decline, however, at a lower rate than occurred during the 1990s. The MSA’s population is forecast to decline by about 5,700, a decrease of less than 1%. In Luzerne, the population is forecast to decrease by 4,400 residents, a decline of 1.4%.
- Conversely, the number of households (and by extension, demand for housing) is forecast to increase. By 2010, the number of households in Luzerne is forecast to increase only slightly—by approximately

300 new households—to 131,000.

- It is not known how many of Luzerne’s 2,200 new households during the 1990s chose a new housing unit or a previously vacant unit. For the past three years, however, more than 1,800 unit starts have been recorded across Luzerne County, reflecting an average of 350 housing starts per year according to the Pennsylvania Builder’s Association. Clearly, the market is responding to this net increase in households. Whether this momentum (development activity) can be sustained, however, remains uncertain in light of the modest increase in the number of new households forecast for Luzerne, relative to the rest of the region, for the 2000 – 2010 period.
- In addition, in any given year, there are always households that desire (or require)

a change in housing and, hence, turnover, among both renters and owners. Turnover generates additional potential demand beyond the creation of new households from population growth and/or immigration, and can be attributable to many factors, including replacement units for obsolete housing. In older, established areas like the Wyoming Valley, it would not be uncommon to have upwards of 30% to 40% turnover in any given year.

The ability to successfully capture demand for new housing on the Earth Conservancy site will be based largely on critical assumptions related to location, visibility, access, product quality, amenities and overall project environment, critical mass and other factors. This would suggest that, after current starts are absorbed by the marketplace, future new housing development in Luzerne—especially

over the next five to seven years—will be focused on those sites with excellent highway access, visibility and amenities, and proximity to retail and services. As a result, planning on the Earth Conservancy site must ensure that design, unit features and overall project amenities are of the highest quality so that the project’s competitive position in the market is reinforced.

In light of limited near-term growth among area households, a housing program of 150+ single-family detached (20), attached/cluster townhouses (65), and multi-family garden units (75) will require careful positioning in the marketplace. Key advantages of the Earth Conservancy site include a diverse product mix, the ability to phase delivery of infrastructure and finished lots, high quality project and unit amenities, highway access and proximity to demand generators, among others.

- This analysis suggests that average annual deliveries of 15 to 30 units are probably appropriate depending on market conditions. This would equate to a phasing/project buildout schedule of roughly five to ten years, and appears reasonable in light of the anticipated completion of the Route 115 connector through the site.
- Of course, the project's 75 multi-family units are more likely to require the delivery of a larger number of units for a multi-family developer to achieve economies-of-scale. A two-phased delivery of roughly 30 to 40 units each is more likely.
- The Earth Conservancy and the municipalities in which the site is located wish to create high-quality design, uses and amenities. Presuming that high-quality design and amenities are provided could

be expected to enhance the marketability of high-end housing. To that end, the program includes single-family detached product priced from \$350,000 to \$400,000 per unit at densities of two to three units per acre. Townhouse units priced in the range of \$200,000 to \$225,000 also appear market supportable, at densities of five to six units per acre.

Retail

For a number of reasons, ERA does not believe that the Earth Conservancy site is an appropriate location for large-scale destination retail or food and beverage uses, to wit:

- Given the "critical mass" of retail established in the Arena Hub and the availability of readily-developable, flat "pad" sites along Highland Park Boulevard that offer strong visibility and

traffic counts, it is likely that near-term retail development will be focused in these locations;

- On-site household and employment densities are insufficient to support large-scale retail uses; and
- Challenging physical characteristics such as slopes and PennDOT's desire to provide only limited curb cuts on the Route 115 Connector.

Therefore, it is not likely that retail will emerge as a predominant use on the Earth Conservancy site, nor could retail effectively compete with the Arena Hub.

However, new housing and on-site employment could be expected to support a small amount of convenience and service retail uses. Over time, as the Route 115 connector is completed and traffic counts increase, addi-

tional retail development may be possible. Tenant types could include a dry cleaner, bank, coffee shop and other convenience retailers meeting day-to-day needs. Retail tenants should be clustered in highly-visible, streetfront locations (i.e., providing frontage on Route 115) on the site.

In terms of planning targets, a program containing 15,000 to 30,000 square feet of retail space with some limited food and beverage appears to be market supportable. Of course, supporting retail is likely to be built in stages as the number of on-site employees and residents increases.

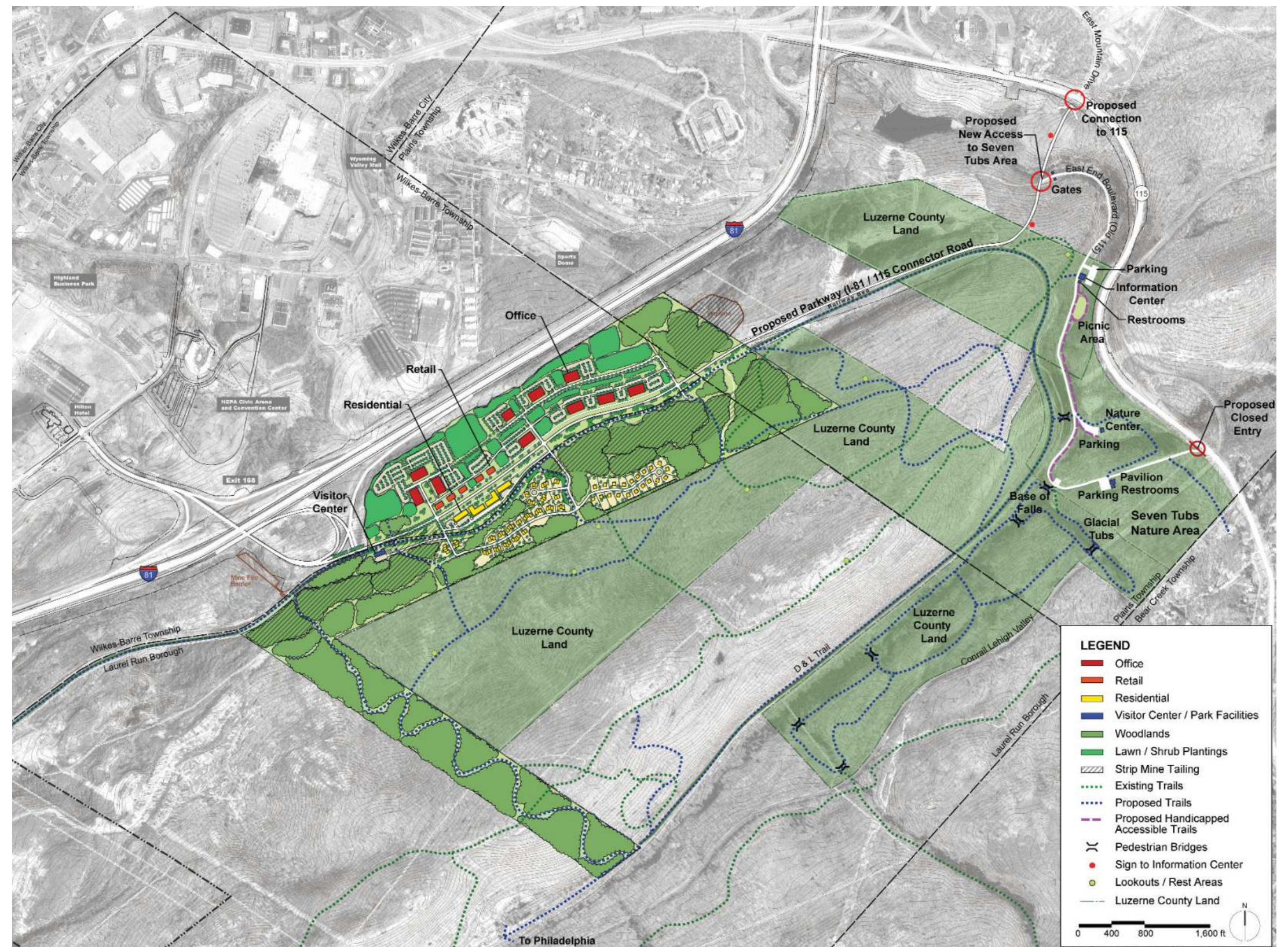


Figure 3. Master Plan

IV. MASTER PLAN

In accordance with the Earth Conservancy’s goals, the master plan seeks to create high-quality employment opportunities while restoring and enhancing the physical environment. The plan proposes a mixed-use development and includes a program of office, retail and residential uses oriented around the planned connector road linking I-81 to State Route 115. Development stemming from this master plan should be designed to minimize impacts on the site’s natural environment. Every effort should be made to ensure that buildings fit into their surroundings and that scenic views to the mountains from the surrounding region are not compromised by any new development on the site.

The master plan proposes a potential connector road alignment that runs from Exit 168 of Interstate 81 to Route 115, generally bisecting the site and following the existing topography so that minimal grading will be required. Locating the road through the center of the site facilitates access to each development parcel. Where the road leaves the eastern edge of the site, it is recommended that it run parallel to the railway bed on the north side then turn north to intersect with Route 115 opposite East Mountain Drive. Further study of the challenging topography in this area will be needed. It is the desire of Earth Conservancy and Luzerne County that the recommendations of this

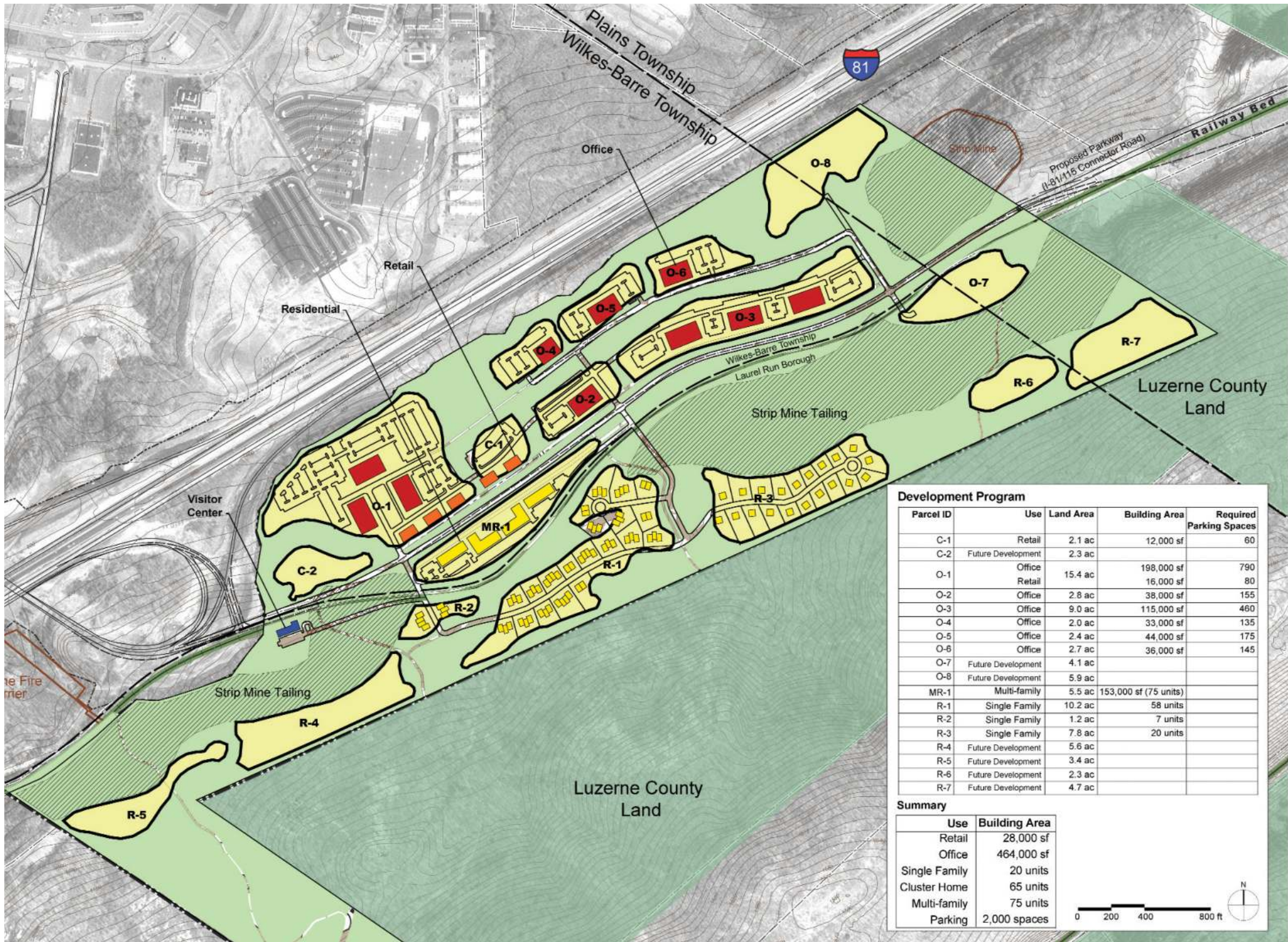


Figure 4. Program



The Master Plan includes improved facilities and access for the 532-acre Seven Tubs Nature Area.

report influence the alignment designed and engineered by PennDOT as they study the road's feasibility.

A key benefit of this connector road is the opportunity to provide a new vehicular entrance to the Seven Tubs Nature Area from the new road in place of the current entry off of Route 115. The proposed new access to the Nature Area is indicated in the Master Plan drawing. As PennDOT completes engineering for the connector road, the specific design of this intersection will need to be carefully studied. It is proposed that the entry drive to the Nature Area follow the old alignment of East End Boulevard (Old Route 115).

Program

The plan calls for 464,000 square feet of office development, 28,000 square feet of retail development and 160 residential units. A visitor center, park facilities, trail systems, rest areas, and lookout facilities within the project site and Seven Tubs Nature Area are also proposed.

Although the project site contains 108.1 acres of usable land, only 89 acres are cost-efficient for development, considering the accessibility and costs of the required infrastructure. Accessing the fragmented developable land areas in the long rectangular portion of the site at the southwest edge would require extensive and lengthy road construction on steep slopes. For this reason, development is concentrated on the remainder of the site.

The amount of usable land on the site exceeds the 10-year development demand for the area identified in the market study. However, the plan proposes a program that meets the site's full development capacity over the long term.

The total number of parking spaces required for all development will be approximately 2,000.

Parking will generally be accommodated in on-surface lots, however some structured parking could occupy portions of the ground level of office buildings, as needed. Shared parking among separate site uses is also encouraged.

Land Use

The elevations of the project site rise from the lowest point at the northern edge of the area where I-81 is located, to the highest point at the southern edge of the site. The east-west connector road bisects the site at the mid-point of the grade change, creating two sections with different topographic character—high land and low land.

Distant panoramic views are great assets in residential settings. The plan capitalizes on the long views towards Wilkes-Barre and the mountains beyond by locating the various residential uses on the site's high land. The residential neighborhood will be characterized by compact development in a natural woodland setting. The preserved woods will provide a natural amenity to the community.

Separated from other uses by the connector road, the residential community will enjoy a high-quality environment with minimal disturbance from traffic and noise. The types of residential products to be offered include multi-level townhouses, multi-family condominiums, single-family detached houses, and single-

family attached (cluster) houses. The variety of residential projects is intended to foster diverse community-oriented neighborhoods.

The multi-family residential buildings will be located near the connector road and across the street from the site's retail uses. These buildings will create a sense of entry to the site. The retail area will support all of the site's residents as well as office workers. The type of retail uses could range from cafés and restaurants to dry cleaning and other convenience services. A small day care center might also be provided.

Office buildings will be located on the site's low land near I-81 and the connector road to capture higher real estate values by ensuring visibility. Cluster building layouts are encouraged to promote frequent interactions among workers. Pedestrian connections between buildings are necessary to create opportunities for casual social interaction. The plan calls for small, outdoor gathering places in the lawns or gardens to provide amenities and encourage outdoor uses.

Visitor Center

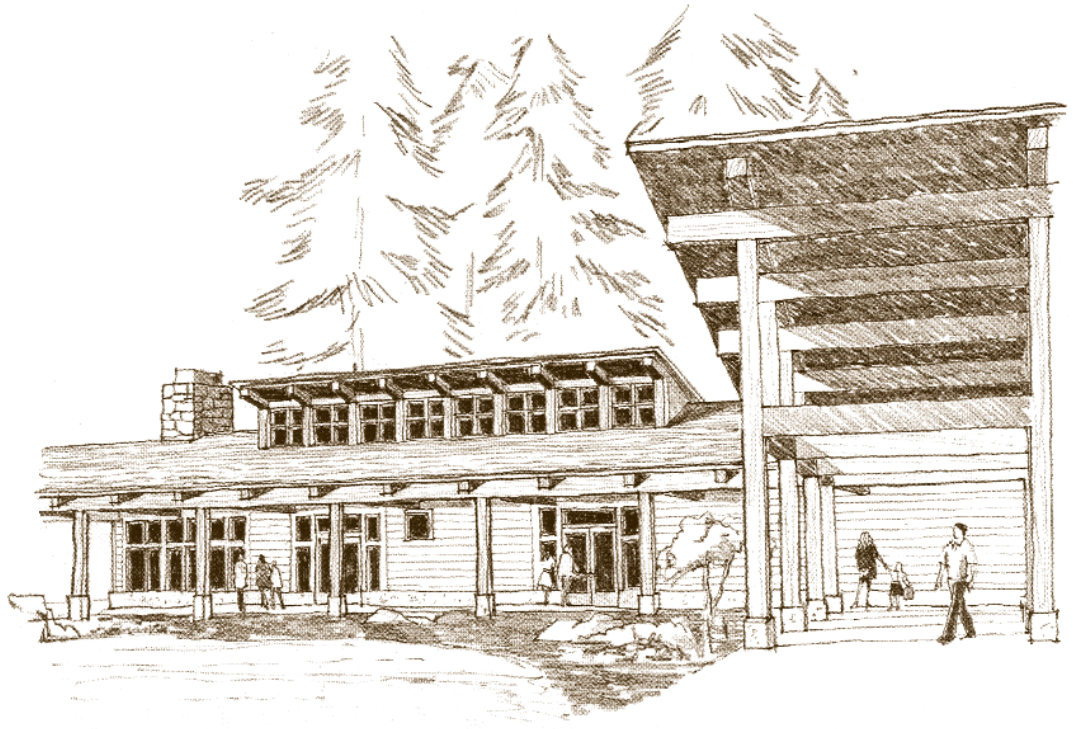
A visitor center will be located near the western entry to the site on the connector road. The visitor center will house the Luzerne County Convention and Visitors Bureau and serve as a landmark within the development. The "Building and Growing in Travel Marketing" study developed by the Luzerne County Convention and Visitors' Bureau describes the most appropriate location and outlines the program and space needs for a County Visitors' Center. The Visitor Center proposed in this master plan is consistent with the recommendations of the County's report. The County report states that a site along the interstate highway would be most suitable. The Visitor Center's location adjacent to the interstate meets the County's needs, taking advantage of the easy access and visibility afforded by the highway. It is important that directional signage be located on Interstate 81 to guide visitors to the center.

Functions served by the Visitor Center will include: a visitor welcome area with informa-

tion counters and brochure displays, restrooms, a staff conference room, office space, rental space for souvenir retailers, and storage. A modest amount of additional space will be reserved for future needs. The physical space requirements for the Visitor Center are outlined in the County report and included in Appendix 2 of this document. In total, the Visitor Center will require approximately 7,000 square feet of space to accommodate all of its functional needs.

Care should be taken to maximize views to the outdoors from the rooms and public spaces of the Visitor Center. Porches or patios should be included in the visitor center design to provide outdoor gathering spaces.

Trailheads into the regional D&L Trail as well as to the extensive Seven Tubs Nature Area trail network will be located on the visitor center site, improving the visibility of both. Parking and information for trail users will be available at the Visitor Center.



Like this one designed for the Yosemite National Park, the Visitor Center should afford views to the surrounding outdoors.



Signs for the Visitor Center should be located on Interstate 81.

Landscape and Open Space

While PennDOT has not yet designed the connector road, it is recommended that the road take on the character of a parkway or “Green Boulevard,” a gently curving road offering broad, sweeping views through canopy trees, green lawns, and native wildflowers and grasses. This road treatment will serve to buffer adjacent development from the road and to create a cohesive mixed-use neighborhood. A trail along the abandoned rail bed running roughly parallel to the road at a higher elevation will help create a green spine through the development for pedestrians and bicyclists

and offer an amenity to residents, office workers and visitors.

A network of trails and open spaces, including neighborhood parks and natural wooded areas, will weave through the site, providing a variety of recreational opportunities and allowing people to walk and bike among housing, office and retail areas. In accordance with the master plan developed by Luzerne County for the Tubs Nature Area, the trail system also connects the development to and through the Tubs Nature Area as well as to the regional D&L Trail along the abandoned rail bed.



A modest information center such as this will be part of the Seven Tubs Nature Area.

Seven Tubs Nature Area

A variety of park facilities, including an information center, pavilions, restrooms, picnic areas, lookout areas, pedestrian bridges, and parking are proposed at the Seven Tubs Nature Area. Visitors will enter the Tubs Nature Area from a new entrance off the connector road. The information center will be a small building with public information counters, brochure and map kiosks, restrooms, vending machines, and drinking fountains. It will be accessible from the entry road, which will follow the old alignment of East End Boulevard. Signs directing visitors to the information center should be located on the connector road outside the new entrance. Handicapped-accessible trails will lead from the information center and will follow the stream channel while significantly steeper trails will lead up to the new development and throughout the surrounding Luzerne County land.



New trails will be constructed in the scenic Seven Tubs Nature Area.

V. IMPLEMENTATION

Phasing

The recommended phasing plan includes five development phases over ten years. The first two-year phase assumes at least partial completion of the connector road and some additional infrastructure and the construction of eighty-two residential units, one office building, and the visitor center. The recommended improvements at the Tubs Nature Area should commence in this first phase as well.

The second phase will include 16,000 SF of retail development as well as an additional 71,000 SF of office space and 74 residential units. The remainder of the office, retail, and residential development will follow in Phases 3 through 5, as supported by market demand.

A number of future development parcels have been identified in the phasing diagram. There is currently no program proposed for these sites, but they could be developed over the long-term, if supported by the market.

| Development Phasing Schedule | | | | |
|------------------------------|-------------------|-------------------|-----------------------------|------------------------------|
| | Office (sq ft) | Retail (sq ft) | Multi- family (units) | Single- family (units) |
| Phase 1 | 66,000 | | 38 | 7 |
| Phase 2 | 71,000 | 16,000 | 37 | 37 |
| Phase 3 | 77,000 | | | 41 |
| Phase 4 | 104,000 | | | |
| Phase 5 | 146,000 | 12,000 | | |

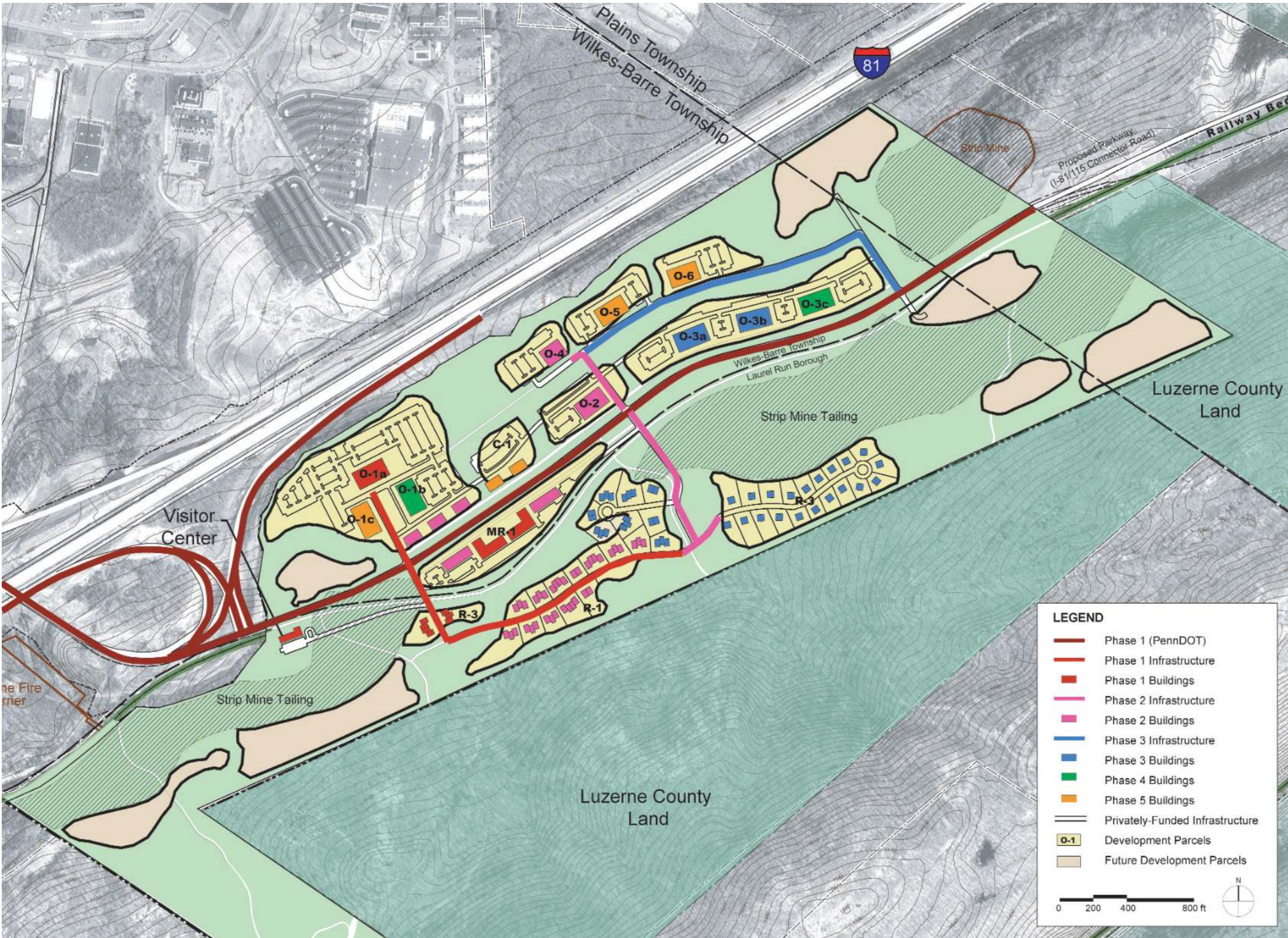


Figure 5. Phasing

The current Conservation designation does not support the land uses proposed in this master plan. Before the Parkway can be constructed, providing access to the Earth Conservancy land, it will be necessary to rezone the land to accommodate mixed-use office/commercial and residential development.

**Financial Analysis:
Horizontal (Land Disposition) Strategy**

As a means of testing the preliminary financial feasibility of the uses outlined in the plan, ERA prepared a multi-year financial model to illustrate potential revenues to Earth Conservancy assuming a horizontal disposition (i.e., land sales) strategy for the uses identified in the plan. In addition, ERA also analyzed the potential economic impacts generated by the project on the municipalities most directly affected—including Wilkes-Barre Township and Laurel Run Borough. (We note that the plan did not identify potential uses at buildout of several parcels located on that portion of the site located in Plains Township; as a result,

our economic impact analysis was limited to those parcels located in Wilkes-Barre and Laurel Run where uses have been identified.)

The financial model utilizes preliminary development and infrastructure cost estimates prepared by Quad 3 Engineers. ERA estimated overall financial results assuming a ten-year buildout schedule using market inputs on land sale revenues and expenses, and identified the magnitude of return-on-investment to the Earth Conservancy.

The project’s financial analysis is summarized below. The detailed financial model is illustrated in Tables 16 through 22 in Section IV of the economic report submitted under separate cover.

The financial analysis indicates that:

- Assuming that land sales prices are achieved and utilities/infrastructure costs are as identified, the project has the potential to generate upwards of \$10.4 million in gross revenues (in current dollars) for the Earth Conservancy.

- The project’s office component—roughly 33 acres of the parcel’s developed area—is expected to generate almost half of the gross revenues, or \$4.7 million. Minor revenue estimated at \$1.3 million would accrue from the sale of several pad sites for supporting retail development.
- In addition, the project’s residential component, comprising 160 units on almost 25 acres, is expected to generate \$4.4 million in land sales revenues.

Table 22 in the economic report also illustrates potential project costs in the form of sales commissions, closing costs and capital costs paid by the master developer. Capital costs include project amenities (e.g., entry signage, landscaping) required to position the project in the marketplace, marketing/other soft costs, and utilities/infrastructure.

- Net revenues before capital costs are estimated at \$7.8 million. Assuming capital costs of \$7.2 million—the majority of which are generated by significant utilities and infrastructure costs estimated by Quad 3 Engineers—generates total net cash in the range of \$2.5 million for a master developer. (In this case, the model assumes Earth Conservancy).

- Under the assumptions identified in this analysis, ERA estimates that the project would generate an annual internal rate of return (IRR) of approximately 8.2%.

ESTIMATED ANNUAL IRR TO MASTER DEVELOPER: 8.2%

The net present value of the net cash flow under a range of current discount rates—ranging from 5% to 10%—is estimated in the range of \$255,000 to \$761,000 using a 5% to 7% discount factor.

Economic Impact Analysis

The economic impact analysis examined the potential economic impacts resulting from development. The model arrays the expected project benefits such as construction and permanent employment, income tax receipts and permanent payroll, estimated taxable sales and sales tax receipts, and estimated assessed value and property tax receipts accruing to various jurisdictions.

The project’s economic analysis is summarized below. The economic impact model is illustrated in Tables 23 through 26 in Section IV of the economic report.

**Economic Impacts of New Housing:
Wilkes-Barre Township**

The program’s housing component includes 75 multi-family units located in Wilkes-Barre Township. Project impacts include:

- Total development costs estimated at \$6.5 million, generating \$2.6 million in construction income, \$73,000 in temporary taxes generated by construction jobs, and 76 equivalent person years of employment.
- The number of permanent jobs created by housing is limited to eight or so, creating \$217,000 in permanent wages and \$6,100 in state income taxes.
- Permanent jobs are also expected to generate more than \$3,200 per year in local income taxes for Wilkes-Barre Township using a tax rate of 1.5%.
- Under current tax and equalization rates, future annual property taxes of more than \$184,600 per year should accrue to Wilkes-Barre Township.

Financial Summary (In Current Dollars) 10-Year Development Program

| | |
|---|---------------------------------|
| Average Annual Land Absorption (All Uses) | 6.1 Acres |
| Gross Revenues—Land Sales | \$10.4 Million (\$165,000/Acre) |
| Net Revenues | \$7.8 Million |
| Estimated Capital Costs | \$7.2 Million |
| Net Cash Flow | \$2.5 Million |
| Annual IRR | 8.2% |

**Economic Impacts of New Housing:
Laurel Run Borough**

The program’s housing component includes 65 attached townhouse units and 20 single-family detached units located in Laurel Run Borough. Project impacts include:

- Total development costs estimated at \$19.7 million, generating \$7.9 million in construction income, \$221,000 in temporary taxes generated by construction jobs, and 229 equivalent person years of employment.
- The number of permanent jobs created by housing is limited to less than 10, creating \$246,000 in permanent wages and \$6,900 in state income taxes.
- Permanent jobs are also expected to generate almost \$2,500 per year in local income taxes for Laurel Run Borough under the borough’s current tax rate of 1.0%.
- Under current tax and equalization rates , future annual property taxes of more than \$565,000 per year should accrue to Laurel Run Borough.

**Economic Impacts of New Commercial:
Wilkes-Barre Township**

The program’s commercial uses include up to 464,000 square feet of office space and 25,000 to 30,000 square feet of supporting retail such as convenience and service, and restaurants located in Wilkes-Barre Township.

Project impacts include:

- Total development costs estimated at \$78.2 million, generating \$31.3 million in construction income, \$875,000 in temporary taxes generated by construction jobs, and 909 equivalent person years of employment.
- The number of permanent jobs created by commercial uses is substantial—2,400—which could be expected to create \$69.1 million in permanent wages annually and \$1.93 million in annual state income taxes.
- Permanent jobs are also expected to generate more than \$1.0 million per year in local income taxes for Wilkes-Barre Township under a current tax structure of 1.5%.
- Under current tax and equalization rates , future property taxes are significant, estimated at more than \$2.2 million per year for Wilkes-Barre Township.
- In addition, the project’s commercial retail component could be expected to generate about \$420,000 per year in retail sales tax receipts assuming annual productivity of \$250 per square foot.
- The estimated 2,400 on-site employees at buildout will also have significant “buying power” for retail and food and beverage. ERA estimates gross employee-spending potential in the range of \$5.4

million per year. While this is not location-specific, it suggests that placing the retail uses in close proximity to the project’s employment core could be expected to enhance sales potentials and, hence, demand for retail uses.

Utility and Infrastructure Requirements

The major utility systems required for development of the subject property were investigated and the feasibility of extending each system to service the subject property has been analyzed. The utility systems investigated include water, sanitary sewer, storm sewer, natural gas, electricity and telecommunications. The investigation of each utility included the obtaining of information from each publicly and privately owned utility, relevant municipalities and authorities, the PA Department of Environmental Protection (PADEP) and Quad Three Group, Inc.’s engineering files relating to utility work performed in-and-around the subject property area. The analysis of each utility system’s capabilities and constraints is summarized below.

NOTE: The general area surrounding the subject property, including the utility infrastructure is expanding quite rapidly. Therefore this study will have to be re-evaluated if the subject property is not to be developed for several years. Also, to provide the subject property with utility services, as explained in this report, it is likely that multiple utility lines will

be required to cross beneath Interstate 81. Quad3 has consulted with the Pennsylvania Department of Transportation Officials concerning this matter and it was concluded that these utility crossings are feasible provided the following requirements are met:

- A PennDot Highway Occupancy Permit must be acquired prior to any boring or utility work beneath I-81.
- All applicable fees must be submitted, and
- All work must conform to the text and standards set forth in PennDot’s Title 67 Chapter 459, Occupancy of Highways by Utilities Code, including the recommendation that all utilities cross perpendicular (90°) to I-81.

Also, since I-81 is classified as “limited access” due to its interstate status, all permit applications may be reviewed by the Federal Highway Administration.

Water

Potable water is readily available to the subject property area via adjacent water systems owned and operated by the Pennsylvania American Water Company (PAWC).

The two most readily available systems for service to the subject property include the NPW System located along State Route 115 that currently serves the East Mountain Business Park, and the Mill Creek System,

which is located and services parcels along Highland Boulevard.

The Mill Creek System is able to adequately supply the subject property with potable water and would require a lesser main extension to service the site than the NPW System. Although, due to the increase in elevation of the subject property in comparison to Highland Boulevard a booster pumping station and a water storage tank would be required on the subject property to ensure adequate water supply and pressure.

Further testing would be required to determine if the NPW System would be capable of adequately supplying the subject property with potable water. The system currently supplies the East Mountain Business Park via booster pumps that may need to be upgraded to provide sufficient service to the subject property. Also, to utilize this system, a significantly longer main extension would be required to service the property then if the Mill Creek System would be utilized.

Due to the eventual necessity of a water storage tank for either system option, it appears to be more cost effective to extend the Mill Creek System from Highland Boulevard.

The costs associated with extending the Mill Creek System to service the subject property are included in Appendix 3.

| Utility Cost Estimates | | | | |
|---|-------------|----------|--------------|-----------------------|
| Water | | | | |
| | UNIT | QUANTITY | UNIT PRICE | COST |
| 1. Water Storage Tank (400,000 gal. elevated) | Lump Sum | 1 | \$850,000.00 | \$850,000.00 |
| 2. Booster Pumping Station | L.S. | 1 | \$250,000.00 | \$250,000.00 |
| 3. 12" DICL Water Main | Linear Feet | 17,200 | \$60.00 | \$1,032,000.00 |
| 4. Fire Hydrand Assemblies | Each | 26 | \$2,100.00 | \$54,600.00 |
| 5. 12" Gate Valves | Each | 19 | \$1,800.00 | \$34,200.00 |
| 6. 6" DICL Water Service (Retail & Office Services) | L.F. | 2,000 | \$35.00 | \$70,000.00 |
| 7. 6" Gate Valves | Each | 22 | \$800.00 | \$17,600.00 |
| 8. Copper Water Services (Residential Services) | Each | 86 | \$1,000.00 | \$86,000.00 |
| 9. Horizontal Boring (I-81 Utility Crossing) | Each | 1 | \$50,000.00 | <u>\$50,000.00</u> |
| Sub-Total | | | | \$2,444,400.00 |
| 15% Contingency | | | | <u>\$366,660.00</u> |
| Total | | | | \$2,811,060.00 |
| Sewer | | | | |
| | UNIT | QUANTITY | UNIT PRICE | COST |
| 1. 12" PVC SDR-35 Sewer Main | Linear Ft. | 17,200 | \$50.00 | \$860,000.00 |
| 2. 4'0 I.D. Precast Concrete Manholes | Each | 60 | \$2,500.00 | \$150,000.00 |
| 3. 8" PVC SDR-35 Sanitary Sewer Lateral (Retail & Office) | L.F. | 2,000 | \$35.00 | \$70,000.00 |
| 4. 6" PVC SDR-35 Sanitary Sewer Lateral (Residential) | L.F. | 7,500 | \$30.00 | \$225,000.00 |
| 5. Horizontal Boring (I-81 Utility Boring) | Each | 1 | \$50,000.00 | <u>\$50,000.00</u> |
| Sub-Total | | | | \$1,355,000.00 |
| 15% Contingency | | | | <u>\$203,250.00</u> |
| Total | | | | \$1,558,250.00 |
| Roadways | | | | |
| | UNIT | QUANTITY | UNIT PRICE | COST |
| | L.F. | 9,000 | \$180.00 | \$1,620,000.00 |
| Natural Gas | | | | |
| | UNIT | QUANTITY | UNIT PRICE | COST |
| | Cubic Yard | 4,130 | \$15.00 | \$61,950.00 |

Sanitary Sewer

The most readily available sewage treatment facility with sufficient available capacity to service the subject property is the Wyoming Valley Sanitary Authority (WVSA) located in Hanover Township along the Susquehanna River. The WVSA plant has a permitted treatment capacity of 32 MGD average and 60 MGD peak. Currently the plant receives an average flow of 24 MGD and a peak flow of 32 MGD. Projected 5-year flow estimates do not significantly increase above the current average and peak flows.

Estimated sewage flows from the subject property are as follows:

Office Use

Assumptions (for estimating purposes only):

- 464,000 ft2 estimated office space.
- 100 ft2 office area used per employee.
- 10 gallons of sewage produced per day (gpd) per employee (as per PADEP Title 25 Chapter 71).

464,000 ft2 100 ft2/employee = 4,640 employees
x 10 gpd/employee = 46,400 gpd office.

Retail Use

Assumptions (for estimating purposes only):

- Retail space will include four restaurants and four retail shops plus Visitor Center.
- Restaurants will have two seatings/day with 100 patrons per seating and the retail shops and Visitor Center will operate one public male and one public female lavatory each.
- 10 gpd per restaurant patron and 400 gpd per public lavatory in retail shops will be produced.

Two seatings/day @ 100 patrons per seating = 200 patrons/day x 4 restaurants = 800 patrons.

800 patrons x 10 gpd/patron = 8,000 gpd.

Four retail shops + visitor center = 400 gpd/public lavatory x 10 public lavatories = 4,000 gpd.

8,000 gpd + 4,000 gpd = 12,000 gpd retail and visitor center.

Single and Multi-family Housing

Assumptions (for estimating purposes only):

- 160 total units = 160 Equivalent Dwelling Units (EDUs).
- 1 EDU = 250 gpd sewage (as per PADEP Title 25 Chapter 71).

160 EDUs x 250 gpd/EDU = 40,000 gpd residential.

Total Estimated Sewage Flows = 98,400 gallons per day.

An existing 12-inch sewage conveyance line is located along Highland Boulevard, across I-81 from the subject property. The 4,800 linear feet of 12-inch interceptor on Highland Boulevard ties into a new 24-inch interceptor in Wilkes-Barre Township which conveys sewage flows into Hanover Township and the WVSA Treatment Plant. The discharge point for the subject property is the effluent discharge at the Susquehanna River from the Wyoming Valley Sanitary Authority.

NOTE: Further evaluation of the 12-inch sewage conveyance line along Highland Boulevard will be required to determine its capacity when the subject property is devel-

oped. The current developments along Highland Boulevard may maximize the 12-inch line's capacity thus requiring a further extension of the subject property's main to the 24-inch interceptor in Wilkes-Barre Township.

The estimated sewage collection and conveyance system costs required to service the subject property are summarized in the Utility Cost Estimates table and included in Appendix 3.

Natural Gas

PG Energy, Inc. is the current supplier of natural gas to Luzerne County including the adjacent areas surrounding the subject property. An analysis study was performed by PG Energy to determine the feasibility of supplying gas to the subject property. The results of the feasibility study are as follows:

The total natural gas consumption of the subject property has been estimated at 40,000 Cubic Feet per Hour (CFH).

As of this date, with the existing peak flow conditions, the intermediate pressure distribution system off of Highland Boulevard is able to adequately supply the proposed load with the proper main extension installed.

PG Energy and the developer would most likely share the cost associated with extending the gas service to the subject property. The developer would be responsible for the trenching and backfilling costs while PG Energy would endure the piping and piping installation/connection costs.

Estimated costs are summarized in the Utility Cost Estimates table and included in Appendix 3.

Electricity

Electricity is readily available to the site via the electricity supplier Pennsylvania Power and Light (PPL). PPL currently supplies power to all areas surrounding the site and owns multiple electric sub-stations in the site area.

The developer of the site would be partially responsible for the costs associated with extending service to the site. These costs would be determined once a final development plan is produced, and a final cost agreement with PPL would then be created.

Telecommunications

Verizon Communications is the prime provider of telecommunication services to Luzerne County including all areas adjacent to the subject property.

Verizon owns extensive communication networks throughout the subject property area and will provide the necessary extension lines to service developing areas. However, the owner and/or developer of the subject property would be responsible for the installation of any underground telecommunication lines if required.

NOTE: Other telecommunication service providers have recently been established in Luzerne County, including the surrounding areas of the subject property. These recently developed providers may be responsible for servicing the subject property area and each individual provider may have alternate fee requirements for the owner/developer.

Roadways

Excluding the main connector road, which will be funded and constructed by the PA Department of Transportation, the developer will be responsible for approximately 9,000 linear feet of roadway throughout the subject property. The estimated costs for construction of the infrastructure roadways, with no utilities included, are included in Appendix 3.

The Utility Cost Estimate table and a typical roadway detail are included in Appendix 3.

Visitor Center

The County report identifies a total estimated building cost for the visitor center of \$945,000. Cost estimates for site work and interior furnishings were estimated at \$769,500 bringing the project total to \$1,714,500. A table indicating estimated building costs related to space requirements is included in Appendix 2 of this document.

Tubs Nature Area Information Center

A modest information center in the Tubs Nature Area might be expected to be about 300 square feet in size and range in cost from \$100,000 to \$125,000.

Stormwater Management

The project site lies within the Coal Brook Watershed. The Coal Brook Watershed has been analyzed in conjunction with the Mill Creek Act 167 Stormwater Management Plan. The Mill Creek Watershed Plan encompasses Coal Brook, Laurel Run and Gardner Creek. In accordance with the study, the runoff from the proposed project will be conveyed under I-81 through several culverts. The culverts will then discharge to a 108-inch diameter stream enclosure, which is being implemented as part of the Coal Brook Flood mitigation project.

According to the Mill Creek Stormwater Plan, the runoff from the proposed development cannot exceed the pre-development rate of runoff for the 100-year storm event. To accomplish this, on-site detention facilities will be required. The facilities can either be in the form of basins or underground pipe networks. Four culverts along I-81 exist within the project vicinity; therefore, a minimum of four basins will have to be constructed to reduce the post development runoff rate. The area between the ridgeline of Wilkes-Barre Mountain and the proposed residential development areas will need to be collected and conveyed to by-pass this offsite flow towards the existing culverts along I-81. With the complexity of the project, due to topography, longitudinal length, and upstream runoff, providing stormwater management measures for individual areas of development would essentially be a more cost efficient way of controlling the Post Development Runoff. The sixteen (16) parcel areas would be the individual areas along with the road system essential for each parcel development. The individual systems will be connected through a series of swales and storm sewers. The storm collection systems would in turn be smaller, and also have less impact on the environment. The individual stormwater systems will help maintain water quality during and after construction.

Soil Considerations

The project site is underlain by strip mine, Arnot, Mardin, mine dump (burned), Oquaga, Volusia and Wurtsboro soils. These soils are described in detail in Appendix 5.

The various soil types on the site pose constraints to development of this property. Strip mine and mine dump materials may pose structural concerns to buildings or, in some cases, roadways due to loosely compacted fill of weak bearing capacity. In some cases, areas may need to be reclaimed or regraded before construction activities can take place. Comprehensive subsurface geotechnical investigations are usually required in these types of conditions prior to construction or development. Runoff and erosion hazards from these materials are prone for generating leachates that are very acidic and contain high iron and sulfur levels. Stormwater management practices may need to be implemented to contain or reduce the impact of runoff from these areas to nearby streams and rivers.

Arnot, Mardin, Oquaga, Volusia and Wurtsboro soils are limited with respect to agriculture and cultivation. In most cases these soils require special conservation practices with a reduced choice of plants that can be cultivated. Typical uses may be restricted to pasture, range, woodland, or wildlife habitats. Being derived from glacial materials, these soils may also exhibit significant engineering restrictions. Glacial soils are typically fragmented with boulders, cobbles or gravel size materials that are mixed with tight restrictive clays. Localized zones of saturation (perched groundwater) and seasonal high water tables may cause drainage problems, require special design considerations for foundations, and create permeability concerns for on-lot septic systems. Bedrock depths at surface or a few feet below surface may necessitate blasting or ripping of bedrock for construction and development. This variance in soil properties usually requires site-specific geotechnical investigations prior to construction or development.

Topographic, Geologic, and Hydrogeologic Considerations

The Earth Conservancy owned parcel is located on the northwest side of Wilkes-Barre Mountain. The topography steeply slopes toward the northwest with elevations ranging from 1,600 feet above sea level (asl) on the southeast side of the site to 950 feet asl on the northwest side of the site. Given the topography and physical property location, unconsolidated, glacial overburden is expected to be thin. Rock beds and coal seam dips are expected to be fairly steep below this sloping hillside as they extend northwest toward the center of the Wyoming Valley. Specific detailed information about the site's geologic and hydrogeologic conditions is included in Appendix 6.

Areas of the site that are underlain by the Llewellyn and Pottsville Formations are most likely undermined by historical coal mining activities and the groundwater quality in these formations is generally considered to be poor. Acid mine drainage has rendered the groundwater table high in iron and sulfur. Groundwater would require treatment/softening in most cases. Utilization of a public water source in these areas is best recommended.

The Mauch Chunk and Pocono Formations have generally good water quality, however, these formations on the site may not yield appreciable amounts of water due to their location on a sloping hillside. Production wells at or near the top of a mountain or hillside generally have low yield potential for water supply. Utilization of a public water source is recommended in this area.

All of these formations are relatively stable with respect to seismic activity, and the property is considered to be in a low risk area for earthquake hazards. However, past coal mining activities in the Pottsville and Llewellyn Formations may have the potential to create mine subsidence hazards. An overview of mine workings on the property and their potential hazards is discussed in Appendix 6.

Should site development and construction be considered in these undermined areas, subsurface geotechnical investigations will be necessary to characterize and assess the condition of the mine workings and their potential limitations for site development and construction. The results of these investigations should be used to supplement design considerations, recommend remedial measures, and provide information on high-risk areas that should be avoided.

VI. DESIGN GUIDELINES

The following design guidelines for the Exit 168/Route 115 Connector Road Master Plan are intended to ensure a consistently high quality of architectural design sympathetically placed in a unique natural setting. These controls are intended to preserve confidence that the quality of the overall development will remain high and, therefore, that the economic and environmental values of locating in the development will be assured.

Open Space Guidelines

The open space guidelines are intended to provide a framework that will knit the various site elements together, ensure quality development throughout the site, and create additional value for individual development parcels.

To the extent possible, natural resource features and vegetation should be preserved on the site. Land uses should be oriented to maximize undisturbed natural land area.

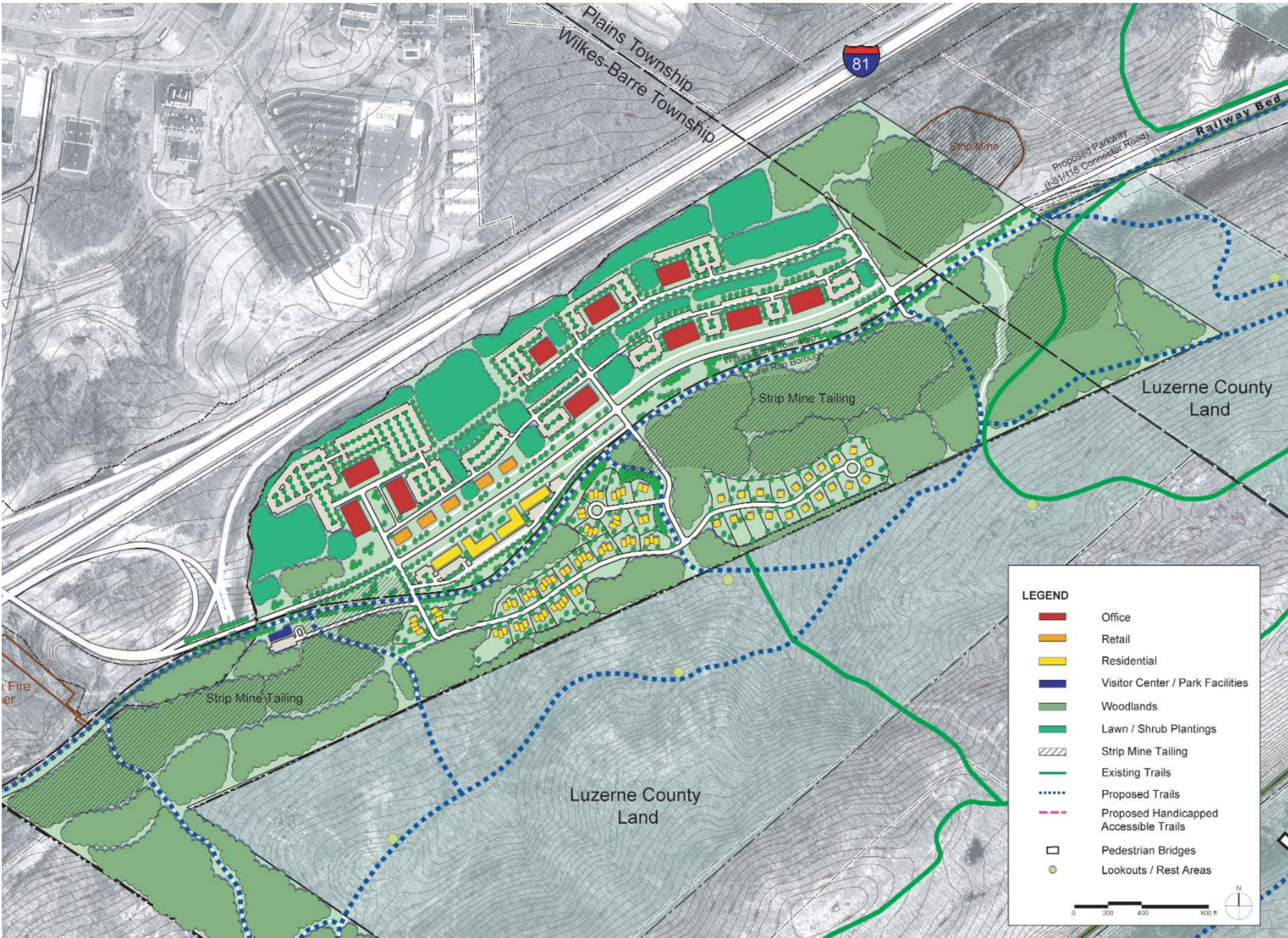


Figure 6. Master Plan Detail

Landscape Character

The site landscape should reinforce the intended character of each section of the site.

Across the site, a premium will be placed on the preservation of natural tree cover and other unique characteristics of the landscape to maintain the sense of natural amenity that will distinguish the property as a unique and attractive setting for business and research. Maintaining a mature, native tree cover will also preserve the site's value as wildlife habitat and protect against soil erosion and contamination by runoff to the streams on the site.

Planting along the "Parkway" should include lawn, groundcover, low native perennial plantings, and shade trees with an open understory to allow sweeping views.

Along the site's Interstate 81 frontage, a screen of low evergreen vegetation should be planted along all building pads. This planting will provide partial screening of views down to the large-footprint commercial development and associated parking lots on the north side of I-81 while preserving visibility of these parcels from the highway.

Existing woodlands on the site shall remain intact to the extent possible. Strip mine tailings should maintain their wooded cover.

Street tree planting is intended to reinforce the geometric circulation system through the

commercial portion of the site, creating the experience of being "in town," in contrast to the upland residential part of the site. Street trees should be planted consistently and should be of the same native species on any single street.

In contrast to the suggested tree-lined streets, the landscape treatment in parks and common greens throughout the plan should generally be less formal in character.

Areas of the site that have been disturbed by strip-mining activity should be maintained as woodlands, and should be free of roads, but accessible by trails. These areas should be restored to their natural condition, in accordance with the ongoing reclamation efforts of the Earth Conservancy.

New planting on development parcels should complement the architecture, provide screening, and form an attractive transition to the natural landscape features of the site.

Plant Materials

Guidelines for the selection and location of plant materials include:

- Use vegetation to frame and enhance views.
- Use native landscaping instead of turf grass to enhance groundwater recharge, biological diversity, and wildlife habitat, reduce mowing, irrigating and chemical



Pavilions like that above will be used in the Seven Tubs Nature Area to provide shelter to visitors.

treatment, reduce soil erosion with soil-holding root systems and surface runoff, and reduce maintenance and infrastructure costs.

- Choose plants that are drought-tolerant, and that can shade buildings to minimize summer solar gain.
- Take advantage of existing mature vegetation to establish character and create shade.
- Plant deciduous trees in surface parking areas to minimize summer solar gain, and to "soften" the paved environment.
- No tree, shrub or other plant material greater than 6 feet should project into the sight lines for vehicles at any intersection or public right-of-way.

- Use drip irrigation systems instead of spray irrigation systems, if irrigation is needed, to minimize water consumption.
- Sod, rather than seed, shall be used in areas where water runoff would prohibit grass from growing.
- Groundcover, rather than maintained lawn, should be used on any surface with a slope greater than 1:3 where maintenance is difficult.
- Provide protection for significant existing trees that may be adversely affected by any construction project.

Maintenance of landscaping and plant materials shall be the responsibility of the owner at all times during each planting season. Dead or diseased plants shall be removed and replaced in a timely manner.

Pavilions

Modest pavilion structures may be located adjacent to parking areas in the Seven Tubs Nature Area to provide overhead shelter for picnicking visitors. Pavilions should be simple structures built with local materials that fit the outdoor context.

Parking Lots

The perimeter of surface parking areas should be screened to minimize views of cars below hood level. The internal area within surface parking areas should incorporate landscaped islands, divider islands, trees, and shrubs to minimize views of parked cars. Large shade trees are recommended in parking areas to provide a shaded environment. A minimum of one canopy shade tree should be planted per every ten surface parking spaces. Such trees should be planted in landscaped islands that are a minimum 10 feet wide and 20 feet long, or 200 square feet.

Tree Protection

Healthy trees with a minimum of 4-inch caliper (measured 6 inches above ground) are recommended for preservation. Buildings should be sited to preserve such trees to the extent possible. Building structures, roadways and paved areas should be set back at least 30 feet from the drip-line of wooded areas slated for preservation.

Construction activities and site alterations should not disturb the drip-lines or root systems of preserved trees. During construction, fences should be erected or other protective measures taken to ensure the preservation of particular trees.

Stormwater Management

In order to prevent erosion and to assure recharge of sensitive groundwater systems, each parcel's stormwater drainage should be collected and allowed to infiltrate on site or released to nearby detention areas at a rate equivalent to the natural site conditions prior to development.

Additional guidelines for stormwater management include:

- Use shallow vegetated roadside swales and parking lot islands instead of curb and gutter storm drainage systems to handle runoff and snow storage.
- Use porous surfaces on sidewalks and driveways.
- Fit the development to the terrain.
- Manage construction sites to control erosion and sedimentation.
- Use climate-suitable, low maintenance landscaping.
- Collect runoff from roofs when possible to use for irrigation and in water features.

The Trail Network

Trails can be used to provide convenient access to commercial and recreational destinations from neighborhoods and to provide opportunities for enjoying the site's natural setting. A network of trails should be located throughout the site and should connect to and

through the adjacent Tubs Nature Area as well as to the regional D&L Trail. A loop using the D&L Trail and the undeveloped southwestern portion of the site should also be created. Trails should be accompanied by signs reminding users to stay on the trail and educational markers explaining the natural systems.

The Visitor Center near the I-81 interchange will orient visitors to the D&L Trail, and provide some parking.

Trail Location and Alignment

The following guidelines should be used in the location and alignment of trails:

- Locate trails to facilitate circulation between activity centers.
- Locate trails to take advantage of scenic views and quiet natural settings.
- Locate trails in a meandering fashion (except along the railway) to create a more interesting recreational experience and decrease the general speed of travel.

- Locate trails along the natural contours of the land to minimize required grading and impacts to natural systems. Minimizing cut and fill will also help to lessen construction costs.

Rest Areas

Rest areas should be located periodically along the trail network for convenience and to take advantage of scenic views. These areas should consist of widened areas of path with tamper-proof benches and trash receptacles.

Accessibility

Due to the steep slopes throughout the site, it is not feasible to construct a completely accessible trail network. However, trails should be constructed to meet the guidelines of the Americans with Disabilities Act whenever possible. Trails with a maximum slope of

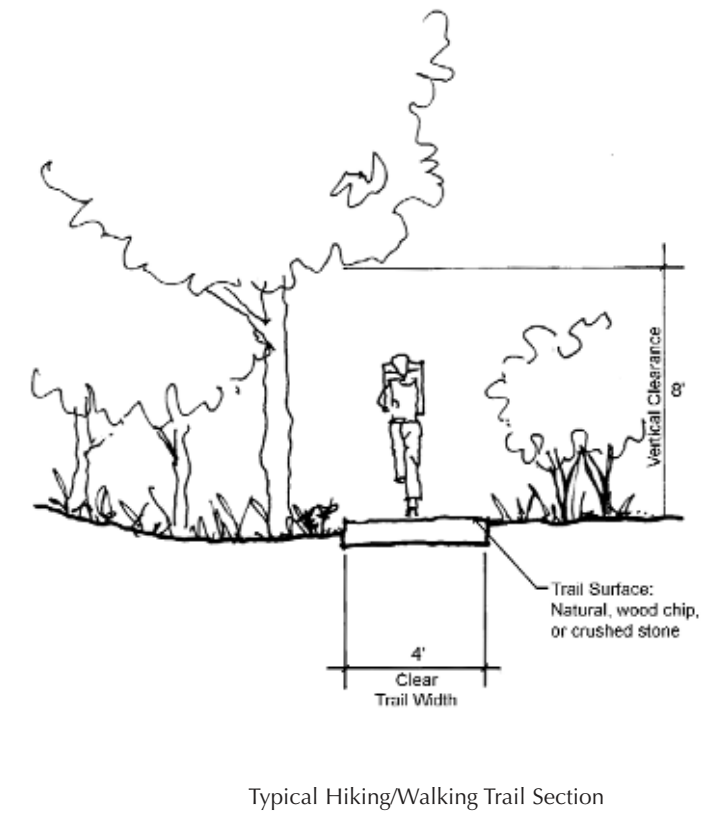
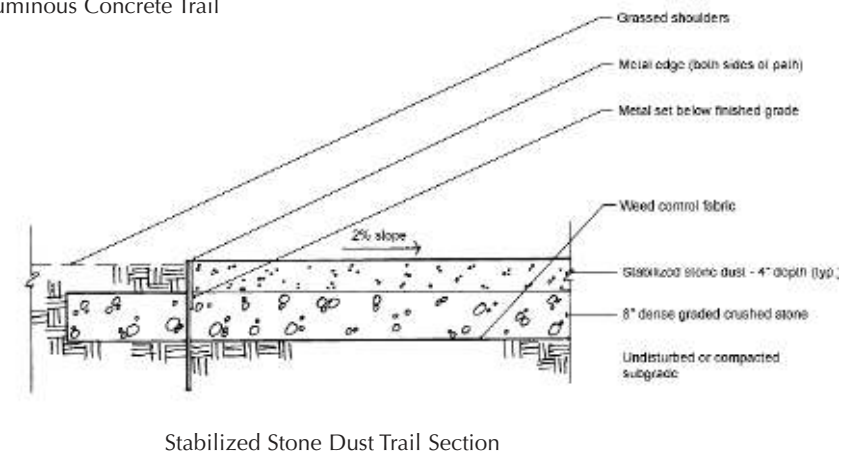
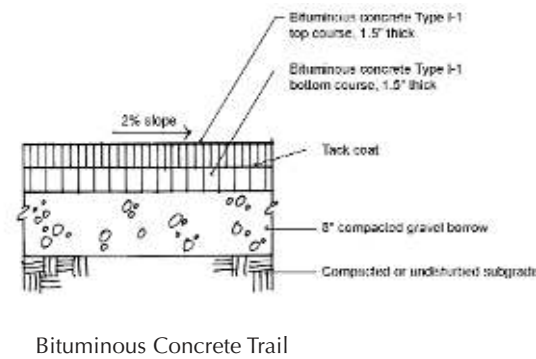
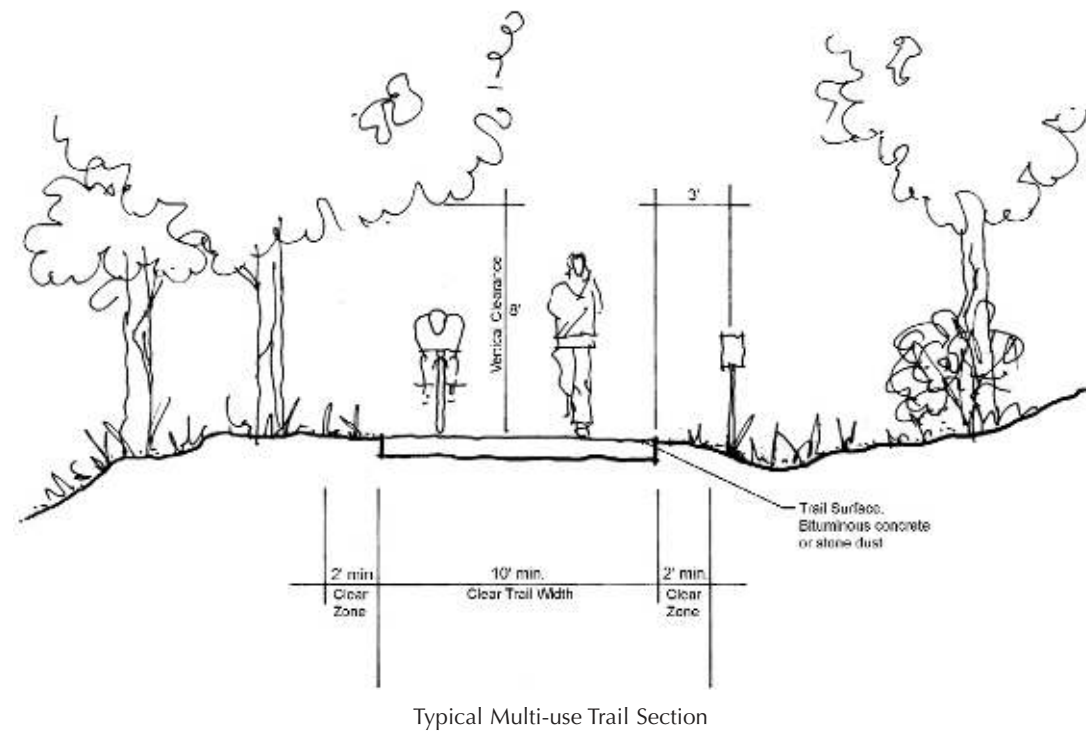
5% and a cross slope of 2% or less and a stable surface generally comply with ADA standards.

Trail Types

Trails within the site and its surroundings can be divided into two basic types: multi-use trails and hiking/walking trails. In general, trails within the developed areas of the site and along the railway corridor should be multi-use trails, accommodating cyclists and pedestrians. Trails through undeveloped natural areas of the site should generally be hiking/walking trails. Both multi-use and hiking/walking trails should be located within the Tubs Nature Area. Guidelines for each type of trail are provided below.



Scenic Views Along Trails



Multi-Use Trails

Multi-use trails, which accommodate biking, walking and jogging, should be located along the railway and along connectors between destinations within the development. When possible, trails should be constructed in complete loops of varying size to provide users with convenient and interesting travel routes. Trail sections expected to receive the most use, such as those along the railway, should be 12 feet wide. Connector trails where lighter traffic is anticipated can be 10 feet wide.

- **Trail Surface:** Where slopes are below 5%, such as along the railway, multi-use trails should be surfaced with stabilized stone dust, which has a natural appearance and is more resilient and maintained than bituminous concrete (asphalt). In areas with steep slopes or very tight turning radii, it is more appropriate to use asphalt. Asphalt reduces path erosion on steep slopes, provides more traction than stabilized stone dust in tight curves, and allows the painting of a centerline, making the trail less problematic and safer to use in steeply sloped areas.

- **Dimensions:** Multi-use trails should have a minimum of 2-foot-wide shoulders and be clear of any obstructions. The lateral clear distance to any tree, pole, wall, fence, etc. should be 3 feet or greater. Vertical clearance to overhead obstructions, such as tree limbs, should be a minimum of 8 feet. Where the path is adjacent to a slope greater than 1:3, a 5-foot separation from the top of the slope to the edge of the pavement is desirable. Where this is not possible, a physical barrier, such as a guardrail, dense shrubbery or chain link fence should be provided. The trail should have an 18-foot minimum buffer.

- **Drainage:** Multi-use trails should have a 2% cross slope to ensure that surface water and debris do not accumulate on the trail. Where a trail is cut into a hillside, a drainage swale should be placed on the high side of the path (see trail cross section illustrations).
- **Lighting:** Lighting of the multi-use trails should be considered, as it will increase safety and encourage evening use; however it would significantly increase the construction cost.

- **Intersections:** The number of street crossings should be minimized to ensure safety. Where multi-use trails intersect roadways, changes in paving material, signage, and line painting should be used to warn users of upcoming crossings.

Hiking/Walking Trails

Hiking/walking trails, limited to pedestrian use, will be located in natural areas on and around the site. The entire length of the trail along the narrow land spur to the west should be a hiking/walking trail.

- Trail Surface and Dimensions: Hiking/walking trails can be surfaced with wood chips or crushed stone or not paved at all. When no surface material is added, the earth should be compacted. Boardwalks should be used to traverse wet areas. In general, hiking/walking trails should be a minimum of 4 feet wide and cleared of tree branches and other major obstructions. Periodic widened areas where users can pass each other are desirable. It is desirable to provide a vertical clearance of at least 8 feet along hiking/walking trails, however, this can be flexible as users are generally moving at a slower speed than along multi-use trails.
- Drainage: Hiking/trails that follow the natural contours of the land are less likely to cause erosion. Where hiking/walking trails are relatively flat, they should have a 2% cross-slope. Swales should be constructed on the uphill side of trails that sit into slopes.
- Trail Grade: No more than one-third of the total length of hiking/walking trails should exceed 8.3%. Where trails traverse steep slopes, frequent switchbacks should be used to minimize grade.

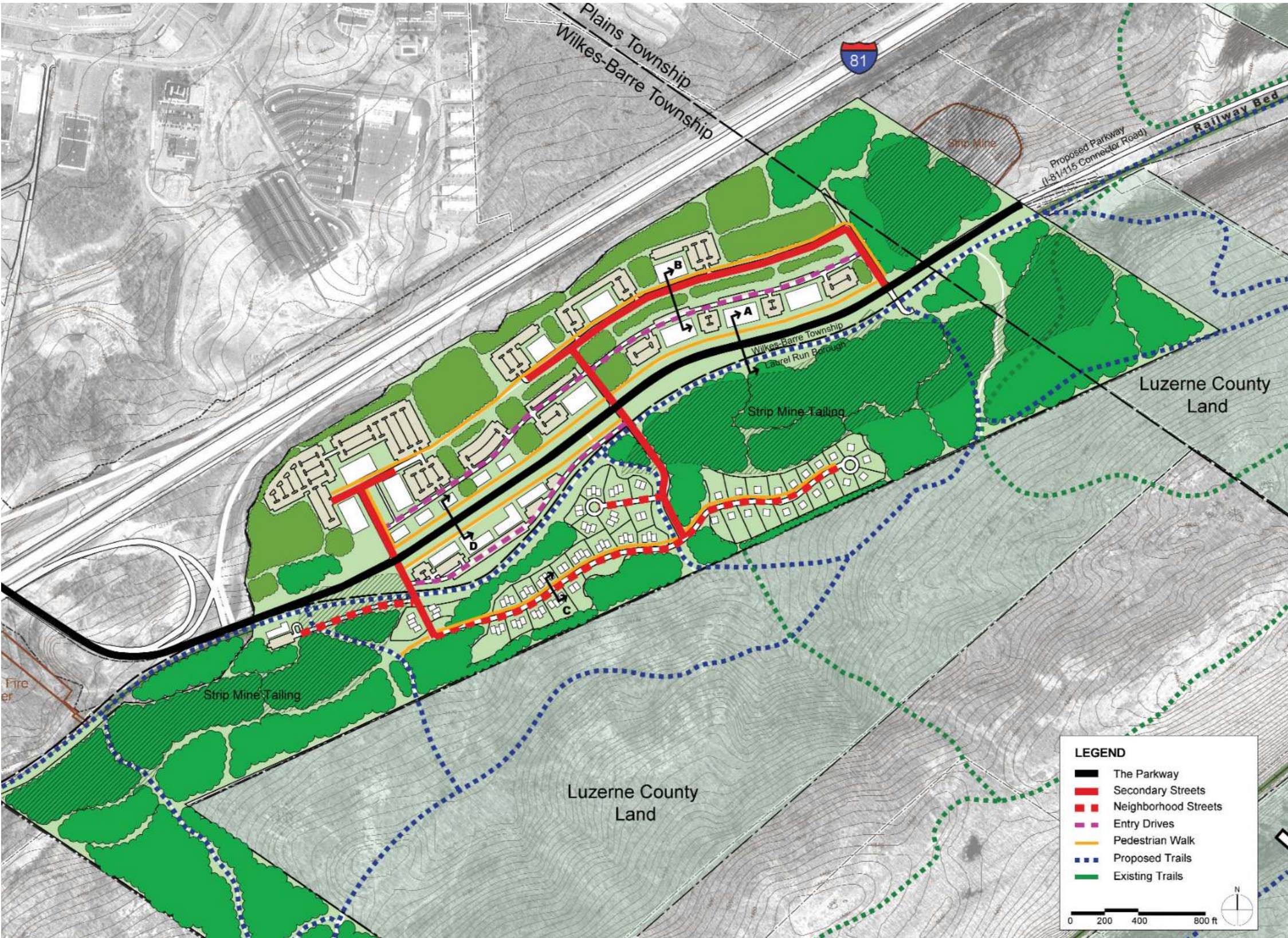


Figure 7. Circulation



Scenic Parkway

Roadway Guidelines

The Parkway

It is recommended that the alignment of the Parkway (Exit 168/Route 115 Connector), the vehicular spine of the development, be gently curving to enhance views and encourage a slower travel speed. As PennDOT completes alignment studies in 2004, this curving alignment should be advocated. While the Parkway will serve primarily as a highway connector, which may be used by all vehicle types at relatively high speeds, the Parkway will need to serve the local neighborhood as well. The Parkway will function as an entry road to both a residential neighborhood and an office park, generating high traffic volume during peak hours daily. The

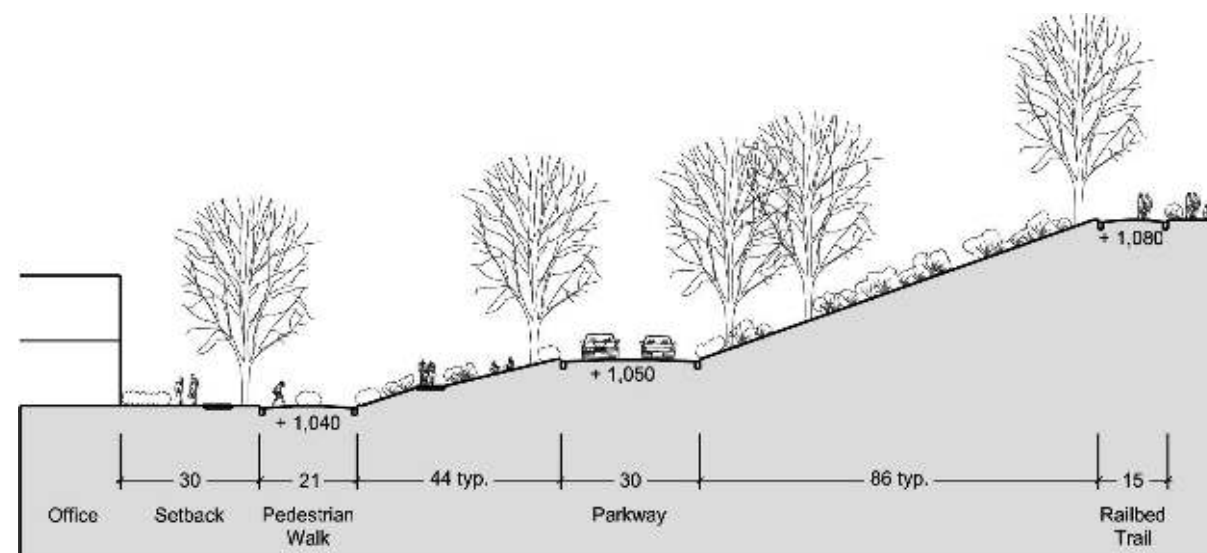
complexity of these functions creates a need for careful roadway design and planning to accommodate the three different user groups and minimize conflicts among them.

It is recommended that traffic calming measures be used, if feasible, to ensure residents' safety and high residential quality, and that the roadway be 30 feet wide with one travel lane in each direction. No on-street parking should be allowed. Stop signs or traffic lights with proper timing control systems should be installed at all intersections along the Parkway.

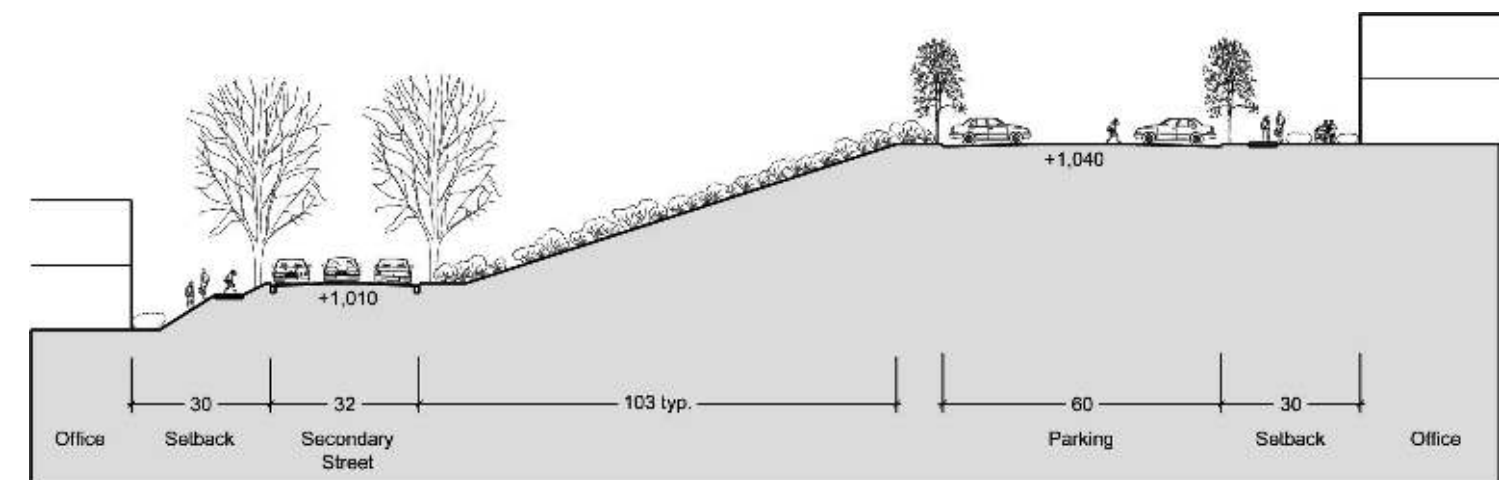
Because of the trail that runs along the railway bed, a pedestrian sidewalk is not needed. The difference in grade between the trail and road will help to buffer pedestrians from traffic.

Secondary Streets

Secondary streets run through the commercial areas and serve as major roadways for the office users. The roadways should be 32 feet in width with one travel lane in each direction and a parking lane on the building side of the street. This lane will act as a traffic-calming element, providing the perception of security for people on sidewalks, and creating a pedestrian friendly environment. A sidewalk along the entire roadway is mandatory.



Section A. The Parkway (see figure 7)



Section B. Secondary Streets (see figure 7)

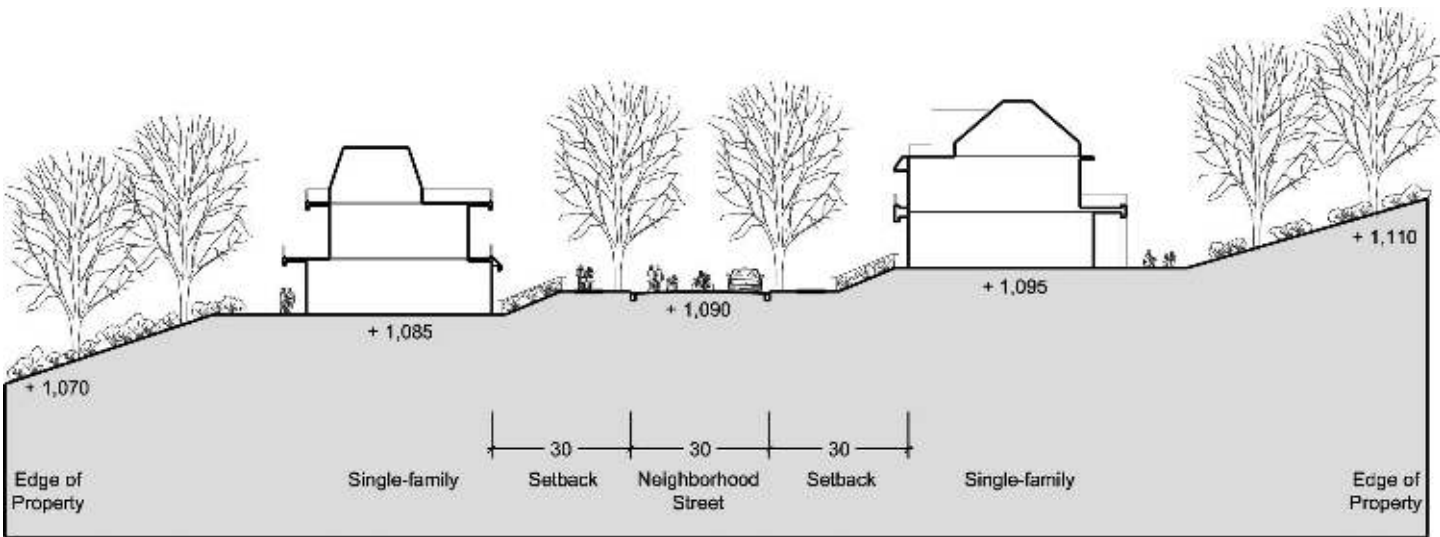
Neighborhood Streets

Neighborhood streets need to be safe and suitable for residential use. Some portions of these streets could serve as children’s play areas at certain times of the day. Alternative materials or colors other than asphalt could be used in street paving to provide an indication to drivers that the streets serve multiple uses. Neighborhood streets are 30 feet wide, with one travel lane in each direction and one lane for temporary on-street visitor parking. Sidewalks on at least one side of the street are mandatory. Street curbs are optional.

Entry Drives and Areas

The number of curb cuts on the connector road will be limited due to its high traffic volume and design speed. For this reason, when buildings are located along the connector road, the pick-up and drop-off drives are located behind the buildings. The entry drives shall be designed to serve as both parking entries and high quality drives that lead to corporate offices. Special consideration should be given to materials, layouts and planting along these drives to create identifiable images for the offices.

Because commercial architecture requires a substantial amount of parking, it is important to design parking areas carefully to ensure the development’s integrity while accommodating the necessary parking.



Section C. Neighborhood Streets (see figure 7)

Off-street Surface Parking

- The majority of off-street parking shall be located to the rear of buildings where possible, while portions may be located on the sides of buildings. No off-street parking will be permitted in front of buildings. Shared parking lots are encouraged. Parking areas should be set back 30 feet from the closest building face. Multiple entrances to each parking area, where possible, are encouraged to minimize stacking on adjacent streets.
- Appropriate and sufficient landscape shall screen all parking from view at eye level between parking aisles. Large shade trees are recommended in parking areas to provide a shaded environment. (See Open Space Design Guidelines above). Pavement and parked cars shall not be visible from streets or adjacent buildings. Pedestrian walks shall connect off-street parking to adjacent buildings.

- Pervious pavement in parking areas is strongly recommended to ease stormwater runoff.

Garage Parking

While parking will generally be accommodated in on-surface lots, some garage parking could occupy portions of the ground level of office buildings, as needed. This structured parking should be located on the rear portion of the building footprint, and should not be visible from the front façade of office buildings.

On-Street Surface Parking

- Parallel parking is strongly encouraged and shall be provided on the side(s) of the street as designated. No angled on-street parking will be permitted.



Corporate Entry Drive



A visitor center should be welcoming to visitors.



The architectural style of the visitor center should suit its context.

Building Guidelines

Luzerne County Visitor Center

Architectural Character

- The character of the Visitor Center shall reflect the history, culture and environment of the area, and may make reference to the region's industrial and geological history. The buildings' architectural form, materials and siting should reflect its context and should create a distinct character that it is memorable to all visitors.

Building Siting and Massing

- Buildings shall be sited to be visible from Interstate 81 and close to the Parkway.
- Public parks and other adjacent open space are encouraged to provide recreational opportunities and a scenic setting.
- View corridors shall be preserved to provide visitors viewing opportunities toward the city, mountains and significant historic sites.
- Identifiable landmark elements shall be incorporated in the building.

Building Height

- The minimum building height for the Visitor Center is 15 feet.

Office

Architectural Character

- It is recommended that office buildings have a contemporary architectural style, which would establish a high-tech character and create an identifiable presence on Interstate 81.
- At least two types of wall materials shall be incorporated. Translucent curtain walls or massing with appropriate solid/opaque material patterns throughout the building's exterior are recommended. Translucent materials offer contemporary and high-tech appeal and sufficient sunlight to building interiors. Solid/opaque materials soften the industrial feel that translucent materials project.
- Translucent materials are encouraged in facades facing the Parkway and where major entries are located.
- Appropriate shade structures or shading fixtures shall be considered to create an ecologically-friendly architecture.
- The façades of buildings where there is significant pedestrian traffic shall be designed in human scale and be appropriate to their adjacent residential and retail context.



Offices should be sited to create common open spaces.



A Variety of Building Materials



Contemporary Office Architecture

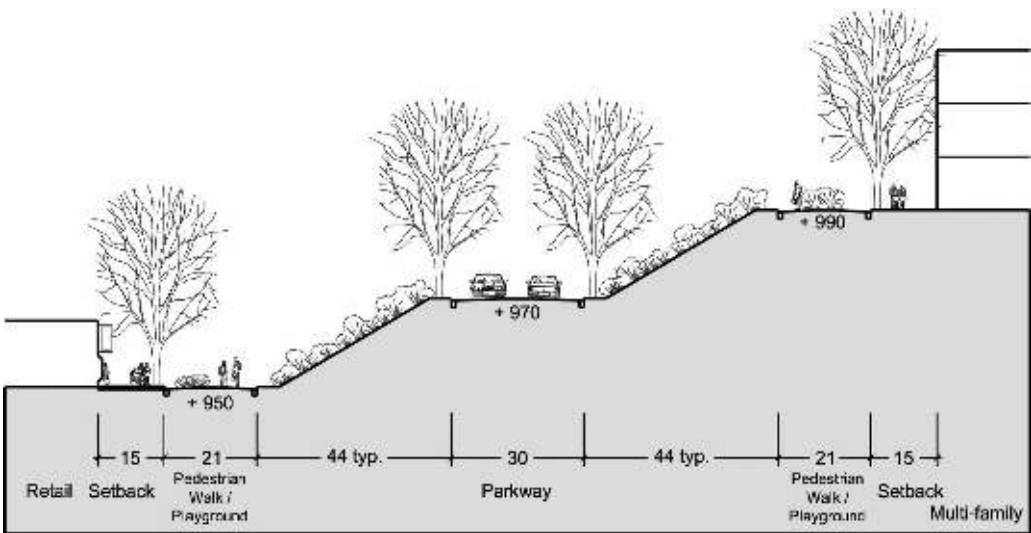
Building Siting and Massing

- The long façade of buildings shall be sited close and parallel to the Parkway, and along green spaces where possible. Courtyard buildings are encouraged when feasible.
- Parking should be located behind the buildings and away from their main access streets (see Parking Areas above).
- Buildings longer than 100 feet shall incorporate vertical architectural elements to break up façades.

- It is recommended to locate taller architectural massing such as tower elements or special architectural features at street corners or pedestrian focal points. These elements will serve as landmarks and help to create identifiable building and corporate images.

Setback (Build-to) Lines

- A 30-foot setback from a parcel's major access drives and pedestrian walk along the Parkway (edge of pavement) is required for all buildings. (see Section A and B)



Section D (see figure 7)

Building Height

- In order to create a sense of place and a campus atmosphere, moderate building massing and density are desired. The minimum building height in this area is 28 feet, and buildings shall not be lower than two stories. Where possible, architectural landmark elements are encouraged.

Retail

Architectural Character

- Buildings shall express a town-center character with pedestrian-friendly design. A majority of façade areas facing the Parkway and the areas where major entries are located shall be glass display windows. The windows should provide visual connections between indoor and outdoor activities, attracting patrons and providing a sense of a neighborhood center.
- Colors and materials should be carefully selected to create a vivid, pleasant and active commercial environment.
- Store signage and lighting may need to be coordinated to establish consistency between all retail vendors. Signage and lighting fixtures shall be designed in accordance with the area's special historic or environmental character. Store signs shall be visible from the Parkway.
- Outdoor activity should be encouraged with appropriate outdoor seating or street



Public open spaces with a variety of seating are encouraged in retail areas.

furniture near the major entries. Special pavement in these outdoor areas should be coordinated between stores.

- No Service area shall be located near the Parkway.

Building Siting and Massing

- Buildings shall be sited close to the Parkway and along green spaces where possible. A consistent street edge should be created by aligning all buildings to a unified build-to line. This will reinforce the commercial presence and retail image of vendors. Parking should be located behind the buildings.
- Where possible, outdoor seating and out-

door activities are encouraged along the Parkway.

- Special landmark elements are encouraged at street corners or pedestrian focal points.

Setback (Build-to) Lines

- A 15-foot setback and build-to line from each building's major access streets and pedestrian walk/playground along the Parkway (edge of pavement) is required. (see Section D).

Building Height

- The minimum building height for all retail buildings is 15 feet.



Residential streets should be designed to accommodate special community events and children's play.

Multi-Family

Architectural Character

- Multi-family buildings shall be clustered to create a sense of neighborhood. Courtyard housing is encouraged. No motel type residential building is allowed. Brick or stone masonry materials are encouraged. Large windows should be designed to face the foothills along the frontage street to provide viewing opportunities.
- Common architectural residential elements, such as balconies, entry canopies, bay windows, porches and shade structures shall be incorporated into the design so that residential character is reinforced.
- Building entries shall be located both in the front façade and the back area adjacent to parking areas. Proper landscape shall be implemented in all courtyards and sidewalks (see Open Space Guidelines above).

Building Siting and Massing

- Buildings shall be sited close to the Parkway and along green spaces where possible. The building's long façade shall be located parallel to the Parkway to create a street edge and enclose the space across the Parkway. Any courtyard shall orient towards frontage streets.
- Residential entries shall be emphasized with appropriate building massing or

architectural elements such as canopies and stairs. Street corners or pedestrian focal points shall be composed of large glass openings with balconies marked by special landmark massing elements.

Setback (Build-to) Lines

- A 15-foot setback and build-to line from the pedestrian walk/playground (edge of pavement) is required. (see Section D)

Building Height

- The minimum building height for multi-family buildings is 36 feet.

Single-Family Detached or Attached

Architectural Character

- Because the single-family area is separated from the major traffic routes and will have limited through-traffic, it is important to reinforce the quiet and safe character of the neighborhood and take steps to promote a sense of community.
- Single-family detached or attached homes shall be clustered where possible. A local vernacular residential style is encouraged. A variety of architecture styles, materials and colors shall be arranged and coordinated to create a general consistency, while at the same time creating a diversified residential character. Elements such as raised finished floor elevations, variety in pitched roof forms, repetitive window

and door opening patterns, front porches and detached garages are recommended for all residential architecture. Front porches, in particular, are encouraged to animate the street.

- Careful street treatment is encouraged to create a street area suitable for children's play and special neighborhood events. The street treatment may include special pavements, colors and carefully designed street layout to minimize vehicular traffic conflicts and assure pedestrian safety.
- To increase street activity, small pocket areas shall be created along sidewalks with landscaping and street furniture such as benches, trash receptacles and special street lighting.

Building Siting and Massing

- Buildings should be sited parallel to the street and should not exceed 45 feet in width. All buildings shall be sited in a manner that is sensitive to the surrounding geography.

Setback (Build-to) Lines

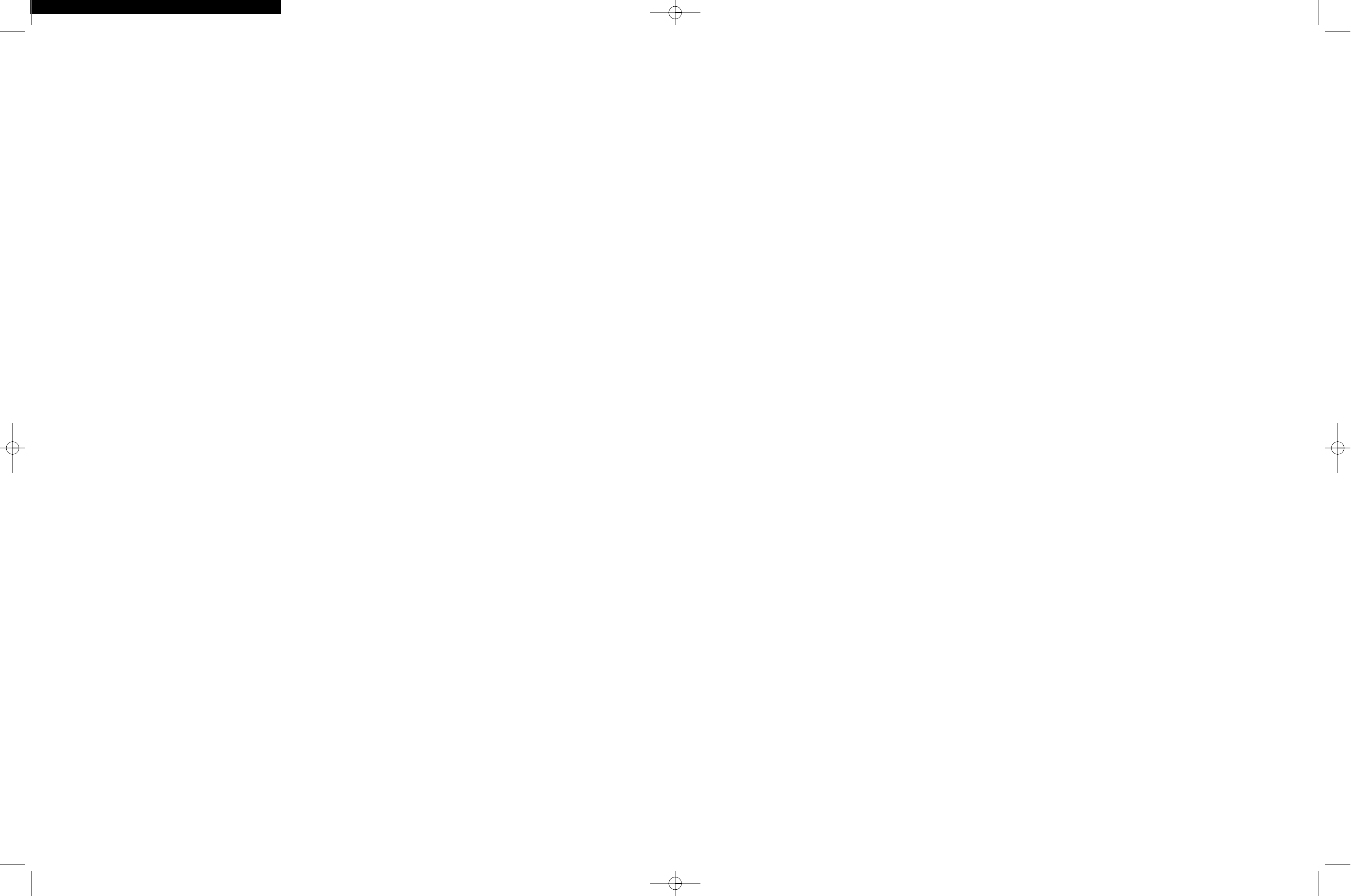
- A 30-foot setback from a parcel's access street (edge of pavement) is required where possible. (see Section C).

Building Height

- The maximum building height for single-family residential buildings is 36 feet.

I-81 Exit 168/Rte 115 Connector Road | Luzerne County, PA

A P P E N D I C E S



APPENDIX 1: VISITOR CENTER SPACE REQUIREMENTS AND COST ESTIMATE

| | |
|---|-----------------------|
| Welcome Area(restrooms, counters, brochure space, transwall, etc.) | 40 x 40 ft. |
| Conference Room (including kitchenette unit) | 20 x 20 ft. |
| Executive Director's Office | 12 x 15 ft. |
| Sales and Marketing Office | 12 x 12 ft. |
| Secretary's Office | 12 x 12 ft. |
| Cubicle Office Space(including 6 8x8 custom offices, walk space around cubicles) | 16 x 24 ft. |
| Communications/Public Relations(including space for media, web development, material storage, etc.) | 12 x 15 ft. |
| Office Storage for Supplies | 10 x 20 ft. |
| Fulfillment Center(storage for visitor's guides, postage machine, member's brochures, etc.) | 40 x 40 ft. |
| Retail Marketing(rental space for souvenir retailer) | 20 x 40 ft. |
| Additional Space Allowance | 32 x 32 ft. |
| Janitor's Room | 6 x 10 ft. |
| | |
| TOTAL | +/- 7,000 Square Feet |
| \$135/sq. ft. x 7,000 sq. ft. | \$945,000 |

Cost estimates for site work and interior furnishings were estimated at \$769,500.
Source: "Building and Growing in Travel Marketing," Luzerne County Convention and Visitors' Bureau

APPENDIX 2: UTILITY COST ESTIMATE BREAKDOWNS

Water

| | Unit | Quantity | Unit Price | Cost |
|--|-------------|----------|------------|------------------|
| 1. Water Storage Tank (400,000 gal.) | Lump Sum | 1 | \$850,000 | \$850,000 |
| 2. Booster Pumping Station | Lump Sum | 1 | \$250,000 | \$250,000 |
| 3. 12-inch DICL Water Main | Linear Feet | 17,200 | \$60/ft. | \$1,032,000 |
| 4. Fire Hydrant Assemblies | Each | 26 | \$2,100 | \$54,600 |
| 5. 12-inch Gate Valves | Each | 19 | \$1,800 | \$34,200 |
| 6. 6-inch DICL Water Service (Retail & Office) | Linear Feet | 2,000 | \$35/ft. | \$70,000 |
| 7. 6-inch Gate Valves | Each | 22 | \$800 | \$17,600 |
| 8. Copper Services (Residential) | Each | 86 | \$1,000 | \$86,000 |
| 9. Horizontal Boring (I-81 Utility Crossing) | Each | 1 | \$50,000 | <u>\$50,000</u> |
| Sub-Total | | | | \$2,444,400 |
| 15% Contingency | | | | <u>\$366,660</u> |
| Total | | | | \$2,811,060 |

Sanitary Sewer

| | Unit | Quantity | Unit Price | Cost |
|---|-------------|-----------|------------|------------------|
| 1. 12-inch PVC SDR-35 Sewer Main | Linear Feet | 17,200 | \$50/ft. | \$860,000 |
| 2. 4'-0" I.D. Precast Concrete Manholes | Each | 60 | \$2,500 | \$150,000 |
| 3. 8-inch PVC SDR-35 Sanitary Sewer Lateral (Retail & Office) | Linear Feet | 2,000 ft. | \$35/ft | \$70,000 |
| 4. 6-inch PVC SDR-35 Sanitary Sewer Lateral (Residential) | Linear Feet | 7,500 ft | \$30/ft | \$225,000 |
| 5. Horizontal Boring (I-81 Utility Crossing) | Each | 1 | \$50,000 | <u>\$50,000</u> |
| Sub-Total | | | | \$1,355,000 |
| 15% Contingency | | | | <u>\$203,250</u> |
| Total | | | | \$1,558,250 |

Natural Gas

Estimated trenching and backfilling costs = \$15 per cubic foot

Trenching required to service subject property infrastructure = 4,900 yds3

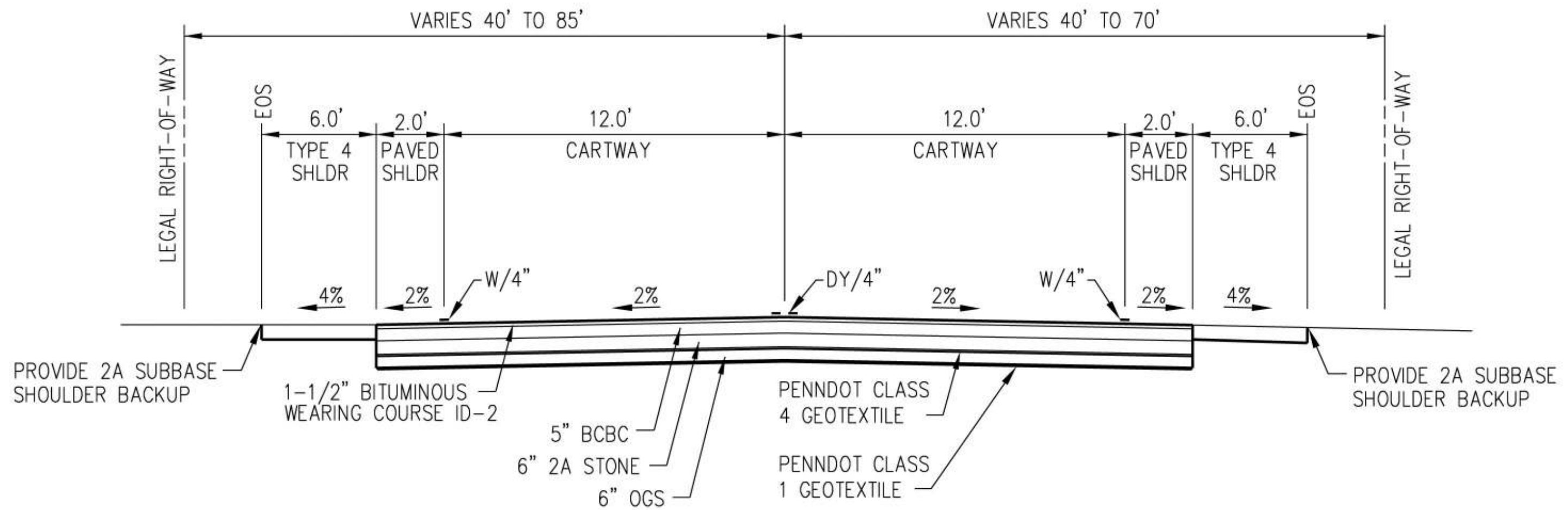
\$15 x 4,130 yds3 = \$61,950

Roadways

9,000 feet of roadway x \$180/ft. = \$1,620,000

APPENDIX 3: ROADWAY DETAIL

The following roadway detail was used as the basis for roadway cost estimates. The most appropriate specific design will not be determined until PennDOT has completed further studies.



APPENDIX 4: SOIL DESCRIPTIONS

Strip Mine Soils

Strip mine is a nearly level to very steep mixture of the bedrock and unconsolidated soil and rock material through surface mining to expose anthracite coal. This soil appears consistent with strip-mined areas identified on the property.

Mine Dump (Burned)

Mine dump (burned) is a level to very steep mixture of reddish white and dark colored cinder from burned coal and carbonaceous rock material. A very small amount of this material is present on the extreme southwest side of the property that apparently borders an area that was the subject of a mine fire.

Arnot

Arnot soils consist of rock outcrop complexes that range from 0 to 25% slopes or very steep. These soils are on convex tops and sides of hills, knolls and mountain ridges. They formed in glacial till derived from sandstone, conglomerate and shale. The surface layer is 3 inches of dark brown flaggy silt loam. The subsoil is 14 inches of yellowish brown channery silt loam with bedrock present at 17 inches. This soil is present in various areas throughout the site.

Mardin

Mardin very stony silt loam (8 to 25% slopes) consists of deep, moderately well drained gently sloping to moderately steep soils. These soils are on the smooth, slightly concave uplands of broad rolling mountaintops and intermountain basins. They formed in thick glacial till material derived from sandstone and shale. The surface layer is a dark brown channery silt loam about 8 inches thick. The upper 11 inches of the subsoil is light olive brown channery silt loam and channery loam, and the lower 31 inches is firm and brittle yellowish brown and dark yellowish brown channery loam. The underlying material to a depth of 64 inches is yellowish brown channery loam. This soil is present in a very small area on the southwest end of the site.

Oquaga

Oquaga extremely stony silt loam, 3 to 25% slopes, consists of moderately deep, well drained, gently sloping to very steep soils. These soils are on the convex tops and sides of hills, knolls, and mountain ridges of broad rolling mountaintops and intermountain basins. They formed in moderately thick glacial till material weathered from sandstone, shale and conglomerate. The surface layer is 4 inches of dark reddish brown channery silt loam. The subsoil is dark reddish brown and dark red channery silt loam, channery loam, and very channery loam about 26 inches thick. The underlying material to a depth of 35 inches is dark reddish brown very channery loam. Shale bedrock is at a depth of 35 inches. These soils are present along the east and south ends of the site.

Volusia

Volusia channery silt loam consists of deep, somewhat poorly drained, and nearly level to sloping soils. These soils are in the smooth, concave depressions and drainageway of broad rolling mountaintops and intermountain basins. They formed in thick glacial till material weathered from sandstone and shale. The surface layer is a grayish brown channery silt loam about 9 inches thick. The subsoil to a depth of 60 inches is 11 inches of mottled pale olive and light olive gray channery silt loam and channery heavy silt loam, and 40 inches of very firm and brittle olive channery loam. Volusia soils are located in a small area on the northwest side of the site.

Wurtsboro

Wurtsboro channery loam and extremely stony loam consist of deep, moderately well drained, gently sloping to moderately steep soils. These soils are on the smooth, slightly concave uplands of broad rolling mountaintops and intermountain basins. They formed in thick glacial till material derived from sandstone and conglomerate. The surface layer is 2 inches of black channery loam. The subsurface is 3 inches of grayish brown channery fine sandy loam. The subsoil to a depth of 60 inches is 17 inches of yellowish brown channery loam and channery sandy loam, and 38 inches of firm, brittle, very dark grayish brown channery loam. Wurtsboro soils are located in various areas throughout the entire site.

APPENDIX 5: GEOLOGIC AND HYDRO-GEOLOGIC CONDITIONS

The subject site is located in the Valley and Ridge Physiographic Province of the Appalachian Mountain Section in Pennsylvania. The topography of the Valley and Ridge Province is a series of northeast-southwest trending mountains and valleys. The geology in the area of the subject property is described as being underlain by Llewellyn, Pottsville, Mauch Chunk and Pocono Formations (Newport, 1977). These formations, in ascending order, are present from the northwest to the southeast as the topography rises up the side of Wilkes-Barre Mountain.

The Pennsylvanian age Llewellyn Formation is 2,200 feet thick, and is composed of interbedded light gray, quartz-pebble conglomerate; light to medium gray, fine to coarse-grained sandstone; light to dark gray shale and siltstone; medium gray claystone; very dark gray carbonaceous shale; and anthracite coal beds. The Llewellyn Formation occupies a small area along the northwest side of the site and crops out just southeast of Interstate 81. The Llewellyn Formation has been folded into a deep trough in the Wyoming Valley. Water quality is gener-

ally very poor, and unfit for ordinary use due to oxidation of iron pyrite in coal and associated shale. Well depths range from 115 to 900 feet with yields ranging from 2 to 50 gallons per minute.

The Pennsylvanian age Pottsville Formation is composed chiefly of hard coarse quartz conglomerate, white and gray sandstone, brown sandstone and a few thin seams of coal. This 300 feet thick formation forms a ridge around the Wyoming Valley coal basin and has been folded into a large syncline. The Pottsville Formation has a point of contact with the Llewellyn Formation to the northwest and the Mauch Chunk Formation to the southeast. The Pottsville Formation yields moderate to large supplies of good water with a relatively small amounts of dissolved mineral matter. The median well depth is 185 feet with yields ranging from 5 to more than 150 gallons per minute.

The Mississippian age Mauch Chunk Formation is composed of red and greenish gray shale and red and green sandstone. This 2,000 feet thick formation thins and disappears northeast of the Wyoming Valley. The Mauch Chunk crops out around nearly all the anthracite fields, and shares points of geologic contact with the

Pottsville Formation to the northwest and the Pocono Formation to the southeast. It forms valleys because it is soft and lies between two exceptionally hard rock formations. The Mauch Chunk Formation is one of the better water bearing formations in the county with good water quality and low dissolved solids. Wells drilled in shale and sandstone have a median depth of 203 feet with well yields ranging from less than 5 to 250 gallons per minute.

The Mississippian age Pocono Formation is composed of hard, massive, very fine to very coarse-grained sandstone, conglomeratic sandstone, and some shale layers; thin coal seams may be present locally. The formation is 600 feet thick with sandstone ranging in color from yellowish gray to greenish gray. High ridges of the Pocono surround all the coal basins with a point of geologic contact to the northwest that is shared with the Mauch Chunk Formation. Water quality is generally good in the Pocono Formation with low dissolved solids. Generally, wells penetrating several fractures below the water table will yield more water. Median well depths are 355 feet with yields ranging from 3 to 133 gallons per minute. The median yield has been estimated to be 20 gallons per minute.

Geologic maps reviewed for the site included the Geologic Map of Luzerne County (Newport, 1977) and the Geologic Map of Pennsylvania (Socolow, 1980). Aside from the above identification and description of the formations that underlie the site, these geologic maps were reviewed to identify the location of localized bedrock faults pertinent to the subject site. Fault data was identified to be present on both maps reviewed for the project. The geologic maps indicate very little faulting to be present on the site. One fault tracing was visible on the northwest end of the site where points of geologic contact are present between the Llewellyn and Pottsville Formations (See Geologic Map). Although not described in detail, the faulting appears to be normal or reverse dip/slip faulting along points of contact with these two formations. Faulting appears to be present only along the northwest side of the site along Interstate 81.

Mine Subsidence Investigation

The subsurface mine workings were examined for the subject site located in Wilkes-Barre Township and Plains Township, Pennsylvania. The review was conducted at the U.S.

Department of Interior, Office of Surface Mining (OSM), Wilkes-Barre, Pennsylvania. The purpose of the review was to make an initial determination as to the potential for mine subsidence on the property, and the amount of property footage that has been affected by historical mining operations. Specifically, mine maps were examined to determine the number of mined workings below the property, and their present state with respect to how they were historically abandoned when active mining operations concluded. This investigation did not intrusively determine the physical conditions of the mine workings below the property. The conclusions presented here are based on an interpretation of historical references made publicly available by OSM.

The mine workings below the site consist of a total of two mined seams present in the Llewellyn Formation and possibly the edge of the Pottsville Formation. These seams as part of the Baltimore Colliery consist of, in descending order, the Bottom Ross and Bottom Red Ash. All of these coal seams were mined using the room and pillar method where pillars of coal were left in place to support the roof of the mine. A description of each seam taken

from mine map folios 4XX, 4XXX, 4WW, and 4WWW, along with its potential affect on the property, is as follows:

Bottom Ross

The Bottom Ross seam is only present in the extreme northwest corner of the site. Dates observed on the mine map folios suggest that the Bottom Ross, in this location, was mined in the mid to late 1920s. The seam outcrops approximately 700 feet southeast of Interstate 81. Based on surface elevations and mine working elevations, the depth to the Bottom Ross mine is at approximately 100 feet below ground surface at its deepest point along the southeast side of Interstate 81. Bottom Ross mine workings are listed as being robbed out and surface stripped at the outcrop, as indicated on the topographic map.

Bottom Red Ash

The Bottom Red Ash is below almost half of the site along the northwest side. Dates observed on the mine map folios suggest that the Bottom Red Ash, in this location, was mined in the mid to late 1920s with surface stripping completed in the late 1930s. Topographic and mine map folios indicate that this seam outcrops approximately 1,500 feet southeast of Interstate 81. The seam appears to dip steeply toward the northwest with mine working elevations somewhere around 400 feet below ground surface near Interstate 81. Bottom Red Ash mine workings are listed as

being robbed out and surface stripped at the outcrop, as indicated on the topographic map. A rock tunnel connecting the Bottom Red Ash to the Red Ash is also present in the working.

The southwest portion of the Bottom Red Ash mine folio indicated a flushed and grouted sand seal barrier in response to an adjacent mine fire (“Laurel Run Mine Fire”) southwest of the site. The mine fire does not appear to be present in workings below the site. The barrier appeared to be placed in an effort to seal off the mine fire in other workings southwest of the site.

Hydrogeologic Conclusions and Discussion

Given the results of this investigation, four geologic formations are present over the project site. The northwestern half of the property contains the Llewellyn and Pottsville Formations that have been associated with anthracite coal mining. The geologic maps reviewed for the site identify faulting on the northwest side near Interstate 81 where points of geologic contact occur between the Llewellyn and Pottsville Formations. Faulting is most likely normal or reverse dip/slip. The northwest half of the site has been undermined and strip-mined as far back as the 1920s and ‘30s. The two mined seams present, the Bottom Ross and the Bottom Red Ash, outcrop in this area.

Adjacent mine map folios to the southwest

make reference to a flushed and grouted sand seal barrier. Although not specified in any written information reviewed, this barrier is believed to have been placed in the Bottom Red Ash working as a result of an adjacent mine fire in workings to the southwest. There was no indication of a mine fire present in the workings below the site.

The Bottom Ross, is located approximately 100 feet below ground surface along the northwest corner of the site. This vertical distance does not afford much cover over this working; when looking at the potential frequency for mine subsidence below the property. Additionally, the mine map folios indicate robbing of pillars in these workings along with strip-mining activities associated with removal of coal at the outcrop. This area could be potentially unstable with respect to mine subsidence and collapse/failure of the rock formation or mine ceilings along the bedding plane. In addition to avoiding direct development and construction along the outcrops, a subsurface investigation should be conducted to characterize and assess the condition of the mine workings and their potential limitations for site development and construction.

The Bottom Red Ash seam has more vertical cover near Interstate 81, however, the potential for mine subsidence and structural failure is still a concern across the northwestern portion of the site. Due to strip-mining and robbing of coal pillars in this area, potentially

unstable conditions with respect to mine subsidence and collapse/failure of the rock formation or mine ceilings can occur along the bedding planes. In addition to avoiding direct development and construction along the outcrops, a subsurface investigation should be conducted to characterize and assess the condition of the mine workings and their potential limitations for site development and construction.

Given the above information, the northwest side of the site has been extensively mined by both surface and subsurface methods. Should site development and construction be considered in these undermined areas, subsurface geotechnical investigations will be necessary to characterize and assess the condition of the mine workings and their potential limitations for site development and construction. The results of these investigations should be used to supplement design considerations, recommend remedial measures, and provide information on high-risk areas that should be avoided.

APPENDIX 6: REFERENCES

- American Association of State and Highway Transportation Officials, Guide for the Development of Bicycle Facilities, 1999.
- Federal Highway Administration (U.S. Department of Transportation), Manual of Uniform Traffic Control Devices, December 2000.
- Iowa Department of Transportation, Iowa Trails 2000, 1998.
- Lakeside Corporate Center at Pen Mar—Design Guidelines, Sasaki Associates, Inc., 1997.
- Princeton/Forrestal Center Design and Development Criteria, Sasaki, Dawson, DeMay Associates, Inc., 1973.
- Oregon Department of Transportation, Oregon Bicycle and Pedestrian Plan, 1995 (Second Edition).