Opportunities to Incorporate Smart Growth in Rowan University's Master Planning Process

Report to the Rowan University
Master Planning Committee

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July 2003

Forward -

I would like to begin by expressing my appreciation to be able to present this study of Rowan's master planning initiatives and the implications for Smart Growth. My usual land analysis work is typically for development projects in which I have no personal involvement. So evaluating Rowan campus for Smart Growth carries a similar kind of awkwardness as providing a critique of one's own parent's household. Let me clarify right from the beginning that the following land development analysis of Rowan's master plan will bring up uncomfortable aspects about our current plans and the implications for sprawl and will no doubt raise difficult questions that may not have simple answers. However, my intention in making this presentation is not to be unnecessarily critical to Rowan in its plans for growth but to shed light on the implications of our current development trajectory in the context of New Jersey's land development crisis and the movement to address that crisis with a planning approach called "Smart Growth." My aim is to offer my professional input as a geographer and planner to some of the problematic aspect of our current planning directions so that the university will be more fully informed regarding the implication of how sprawl development may hinder or even impede Rowan's academic mission and how following principles of Smart Growth will result in a substantially more livable development outcome.

While there are many fundamental factors that will contribute to the success of Rowan's future position as the premiere university in South Jersey, most notably outstanding academics, the degree to which we fulfill our potential may hinge on how we physically develop our campus landscape. A critical look at Rowan's development plans will help to ensure that the most efficient, well designed, highly functional and environmentally responsible land development decision are made that will ultimately result in Rowan realizing its highest potential for accomplishing its public academic mission. As an academic and a planner, I am deeply committed to the growth and progress of Rowan University. I have very high expectation for where Rowan is going and the point of this report is to offer an analysis of how the land development patterns of Rowan's growth in themselves will impact the success of Rowan's progress and ultimate success.

My professional education, training and background stems from two disciplines, geography and urban planning. As a geographer, my research focuses on land development patterns. I utilize Geographic Information Systems (GIS) to examine what makes land development patterns and configurations problematic, inefficient, wasteful and dysfunctional (i.e. sprawl). As an urban planner, my interest lies in characterizing the ingredients of successful high-quality built environments. I explore what urban design elements, land use patterns and configurations result in the creation of places to which people are drawn, enjoy, feel safe and which land use patterns and configurations are the most functional, efficient and environmentally integrated.

This analysis of Rowan's master plan begins with the geographical analysis of Rowan's Smart Growth potential utilizing geospatial modeling techniques and concludes with the urban planner's viewpoint of Rowan's proposed master plan initiatives in the context of Smart Growth. My two main concerns are the proposed student townhouses, which have already been addressed in a previous memo, and the Rowan Technology Center, which is scheduled to be constructed on the West Campus in the near future. The eminence of these two projects is the motivation for following report.

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Rowan's Growth in the Context of New Jersey in the 21st Century

Rowan University stands poised to make some of the most important land use decisions in its history. The development of the Main and West campuses spelled it in its master plan will provide the much-needed capacity for Rowan to grow into South Jersey's premier academic institution. However, this development will not occur in isolation. Rowan exists within the locational context of its host communities of Glassboro, Mantua and Harrison; the South Jersey region; the Philadelphia metro area; and the state of New Jersey. At this point in history, the state of New Jersey is in crisis with land development. With only 5 million acres of total land area and being the most densely populated state in the nation and, New Jersey is experiencing powerful pressures for growth. At the current rate of development (over 16,000 acres per year), New Jersey will be the first state in the nation to reach build-out within the next several decades, a condition in which all available lands will have been utilized for development (Hasse and Lathrop 2001). The dramatic transformation of New Jersey's land base and the environmental, social and fiscal implication of this growth have led Governor McGreevy to make addressing urban sprawl his number one priority. (for an excellent layman's summary of New Jersey's land use crisis, see New Jersey Network documentary "The Race for Open Space")

More significant than the sheer rate of land development is the wasteful pattern of development labeled "suburban sprawl". Recent trends of growth in Garden State have become more spread out, land consumptive, haphazard in design, environmentally and socially impacting. New Jersey is particularly vulnerable to the costs and consequences of suburban sprawl which have been widely documented as impacting to New Jersey's social and economic cohesion, damaging to the environment, and highly detrimental to New Jersey's farming industry (Burchell et al., 1998, New Jersey Future 2002).

The social consequences of sprawl can be observed in the economic segregation of New Jersey's population. According to the most recent national census, New Jersey has become the wealthiest state per capita in the nation (www.census.gov). Ironically, New Jersey also contains several of the nations top 10 poorest cities. New Jersey's *home rule* system of land use control and a heavy reliance on real-estate taxes to fund local services such as schools has lead to vast inequalities in the social landscape which is highly connected to the patterns of suburban sprawl. Sprawl is also socially destructive due to its complete dependence on the automobile. Sprawl development caters only to those who can drive a car, disenfranchising the elderly, youth, low income and other people who might require or desire a non-automobile means of movement. Sprawl consumes open lands in the rural countryside while older towns and suburbs experience disinvestments and decay. Sprawl eventually decreases the quality of life as traffic congestion wastes valuable time, taxes escalate in order to cover increased expenses and degradation of the environment makes communities less desirable over the long run.

The environmental and ecological costs and consequences of sprawl are also being widely studied and documented in New Jersey. Some of the most significant findings include rapid loss of important land resources such as core forests, wetlands, grasslands, prime farmlands and aquifer recharge areas. Impacts on water quality associated to sprawl include increased impervious surface coverage, non-point source pollution, soil erosion, and increased flooding (Kaplan and Ayers 2002). Sprawl patterns of development are also detrimental to wildlife

habitat due to habitat fragmentation and loss of forest core area (Hasse and Lathrop 2003, Lathrop and Hasse 2003). New Jersey has some of the worst air quality in the nation with automobile emissions the single most significant contributor of airborne pollutants.

School Sprawl

To many people, sprawl is most often associated with large tracts of residential housing and highway strip commercial growth typified by large box retailers, fast food restaurants and neon store signs that creates a visually degraded an aesthetically unnerving "geography of nowhere" (Kunstler, 1993). However, schools and institutions can also exhibit land development patterns that can be characterized as sprawl. "School sprawl" has been documented (McMahon 2000) as the recent trend in school development where smaller and older schools located in neighborhoods are being replaced by large box institutions placed along the rural fringe. School sprawl exhibits a number of problematic consequences including 1) inability of students to walk to school, 2) increased requirement of busing systems, 3) requirement of larger parking facilities, 4) the disconnection of the school from neighborhoods where a school is often the center of many community activities, and 5) impacts to the rural environment.

On the university level, school sprawl is epitomized by single-story building construction spread out on large tracts of land isolated from other components of the campus. A number of important negative consequences attributable to school sprawl include: 1) increased the vehicle miles traveled for students and staff; 2) larger break times necessary between class periods; 3) increased need for security personnel as isolated building, connector roads and large parking locations must be patrolled; 4) increased maintenance and landscaping costs as larger areas between buildings increase the need for mowing, snow removal and general grounds keeping; 5) isolation of activities from the core of the university, 6) loss in campus community cohesion as meetings become more difficult, exposure to other departments and activities become less likely, unexpected gatherings and chance encounters occur less often.

Sprawl does have important implications for educational institutions and there is a growing trend for schools to reassess their development plans to avoid sprawl and embrace the principles of Smart Growth (see McMahon 2000).

Smart Growth: The Antidote to Sprawl

Patterns of dispersed development have been occurring in New Jersey for a number of decades. However, only in the past several years have the negative consequences of sprawl become so problematic that they are generating a substantial political demand for redress. In fact, Governor McGreevy has made fighting urban sprawl one of his most important platforms. In order to address this perennial and difficult issue, the governor is embracing the anti-sprawl movements often labeled "Smart Growth." Smart growth is an attempt to create policies for new development that avoid the undesirable costs and consequences of sprawl development. Smart Growth strives to make a more efficient, higher quality and environmentally and socially responsible built environment. Smart Growth embraces the concept of revitalizing and rebuilding existing communities while preserving open spaces.

The most basic tenant of Smart Growth is the principle of responsible land use. In order to accomplish responsible development under the guise of Smart Growth there is a hierarchy of land utilization goals that should guide the land acquisition and locational decision-making process. The hierarchy prioritizes principles for maintaining the greatest measure of land integrity as well as designs that result in highly livable communities. The ranking of these Smart growth principles helps to focus the land development process to consider more significant components before others. However, the hierarchy of order itself should not overshadow the ultimate goal of attaining the greatest overall landscape integrity with the best possible cumulative performance of all the principles

Redevelopment – the first rule in the Smart Growth hierarchy is redevelopment. Can the development goal be accomplished by redeveloping an already existing structure or urbanized property? The reuse of existing structures takes advantage of existing infrastructure and recycles land uses, which saves on the development of green space. Renovating existing properties saves on building materials and on the generation of waste. Vacant buildings and brownfield sites have already expended an environmental impact such as the creation of impervious surface and therefore redevelopment will induce little additional environmental cost. Many vacant properties are available within existing communities. Redevelopment allows those sites to be reutilized and revitalized maintaining economic health for the host community and enhancing the quality of life within existing towns. The newly redeveloped land use also benefits by being located within an already established community settlement and being able to take advantage of the community's existing amenities.

Infill – the second tier of Smart Growth priority is infill of never-developed lands within already developed areas. Infill development fills in the empty spaces within an existing settlement pattern to make it more connected and dynamic in an urban structural context. Many towns have potential for infill of properties that would substantially enhance the civic mosaic of land use.

Contiguous Growth – if redevelopment or infill development is not feasible, the next most desirable location for new growth is contiguous to the periphery of existing settlement. Development that occurs as an extension to an existing community takes advantage of all the amenities that are provided by the town and contributes an additional component to the town. Contiguous development builds on an existing town rather than developing a tract isolated in an empty field. New development is considered contiguous growth when it is within a walkable proximity to existing settlements.

Accessibility to Alternate Modes of Transit – Smart Growth should have access to non-automobile modes of transportation. This would ideally include public transit, bicycle paths and pedestrian walkways. While some forms of alternate transportation can potentially be added to any given site, the location of parcels near existing rail lines and stream corridors that might be utilized for bike and pedestrian paths should be considered in siting new development.

Mixture of Land Uses – segregated land use is often a result of Euclidean zoning where different land uses such as residential, commercial and industrial are considered incompatible and prohibited from being located together. This separation of land uses is a throwback to a time when industrial activities created environmental conditions that were highly impacting to local residents. However, there is a great advantage to having a mixture of different land uses within reasonable proximity to one another as it creates a dynamic settlement pattern. Residents can walk to local shops, community centers and professional offices. Today's economy is driven by service and technology sectors, which do not need to be separated on health or safety grounds and, on the contrary, thrive in a mixed land use situation.

Accessibility – one of the most problematic characteristics of sprawl development is the generation of traffic. Dispersed development patterns necessitate many distant trips by automobile, which is environmentally impacting and wasteful of time. Smart Growth development should occur in a location and with a site configuration that minimizes the generation of automobile traffic.

Accessibility to Community Nodes – community nodes are important likely destinations for the residents within a local community. Community nodes can include land uses such as libraries, emergency services, post offices, grocery stores, town halls, activity centers, recreational facilities etc. Measuring the distance to community nodes from a proposed new development provides an indication of vehicle miles that will be traveled for a member of the proposed development unit. The accessibility to community node component of Smart Growth holds implications for quality of life issues such as the number of hours spent in an automobile and the response time of emergency services.

Protection of Valued Land Resources – Smart Growth development should minimize the impact to the most valuable natural land resources necessary for environmental integrity. Some of the most significant land resources include, threatened or endangered wildlife habitat, wetlands, prime farmlands, core forest areas, areas of high biodiversity, steep slopes, scenic vistas, important wildlife corridors, aquifer recharge areas, flood planes among others. Smart Growth development should begin with an environmental inventory to map such important resources before planning schemes are initiated.

Minimization of Impervious Surface – impervious surface is one of the most significant environmental indicators regarding the impact of development on the environment. Impervious surface has a direct correlation to the quality of a watershed and an indirect correlation to many other environmental conditions. The creation of impervious surface is an unavoidable result of any land development. However, the amount of coverage, location of coverage and remedial measures can have a substantial affect on the degree to which

impervious surface impacts a watershed. The rule of thumb is that a watershed will be impacted if it is covered by more than 10% impervious surface. Smart Growth development should be designed and integrated with open space preservation so that the host watershed in which the development occurs does not exceed a total of 10% impervious surface at buildout.

Integration with Open Space Networks – Open space exists in a number of different forms from private farmland preservation parcels to wildlife management areas to passive and active recreational lands. The location of preserved open space lands and the greenway corridors that connect them are a vital component to Smart Growth. An inventory of the existing preserved lands as well as the potential to preserve additional open parcels and corridors is a necessary component of designing a plan for "Smart Conservation" (New Jersey Future 2003).

Consistency with State and Regional Planning – New Jersey has been struggling with the problems of sprawl for many decades. Because of its unprecedented population pressure, New Jersey has been in the forefront of developing a initiatives to address the impacts of sprawl. Some of the most important initiatives include: 1) the State Development and Redevelopment Plan which is a statewide plan developed to encourage redevelopment and infill of existing settled areas while discouraging development in rural and sensitive areas. The Pinelands Comprehensive Management Plan is a first in the Nation for coordinating land development in multiple jurisdictions. More recently, the New Jersey Department of Environmental Protection has developed a BIG regulatory map that proscribes regions of growth and redevelopment and flags regions of importance for preservation. Smart Growth should be consistent with these and other regional plans.

Green Building Practices – many advances have occurred in environmentally friendly building design. Smart Growth should employ the cutting edge of environmental design to create the most energy efficient buildings as well as to sensitively site buildings within the environmental parameters of its location.

Sustainability – sustainability is defined by the United Nations as the ability for current generations to exist in a manner that does not jeopardize the ability or quality of existence for future generations. Many land use patterns of development imposed today will remain entrenched for centuries to come. Land development patterns must avoid saddling future generations with poorly designed and disconnected land uses, wasteful of natural resources, impacting to the environment, aesthetically uninspiring, that create separation of social and economic classes. Development should not occur in a manner that jeopardizes the possibilities and opportunities for future generations to continue to develop and redevelop in a responsible manner. Buildings should be designed with the knowledge that their current use will likely change at some time in the future and therefore should facilitate redevelopment and renovation.

Rowan's Smart Growth Potential

GIS analysis of Rowan in the Spatial Context of Glassboro

Geographic Information Systems (GIS) provides geospatial tools for analyzing land utilization patterns. Rowan's Glassboro campus was digitized and digitally modeled to perform a geospatial Smart Growth Analysis. The analysis began with the development of a GIS database that included components of Rowan's campus in the context of its surrounding communities.

Figure -1 depicts the current building layout of the Rowan Campus. Building land use type is color coded to depict the relative locations of academic, administrative and residential building uses. Important "nodes" or centers of activity are also highlighted as well as the corridors of pedestrian travel.

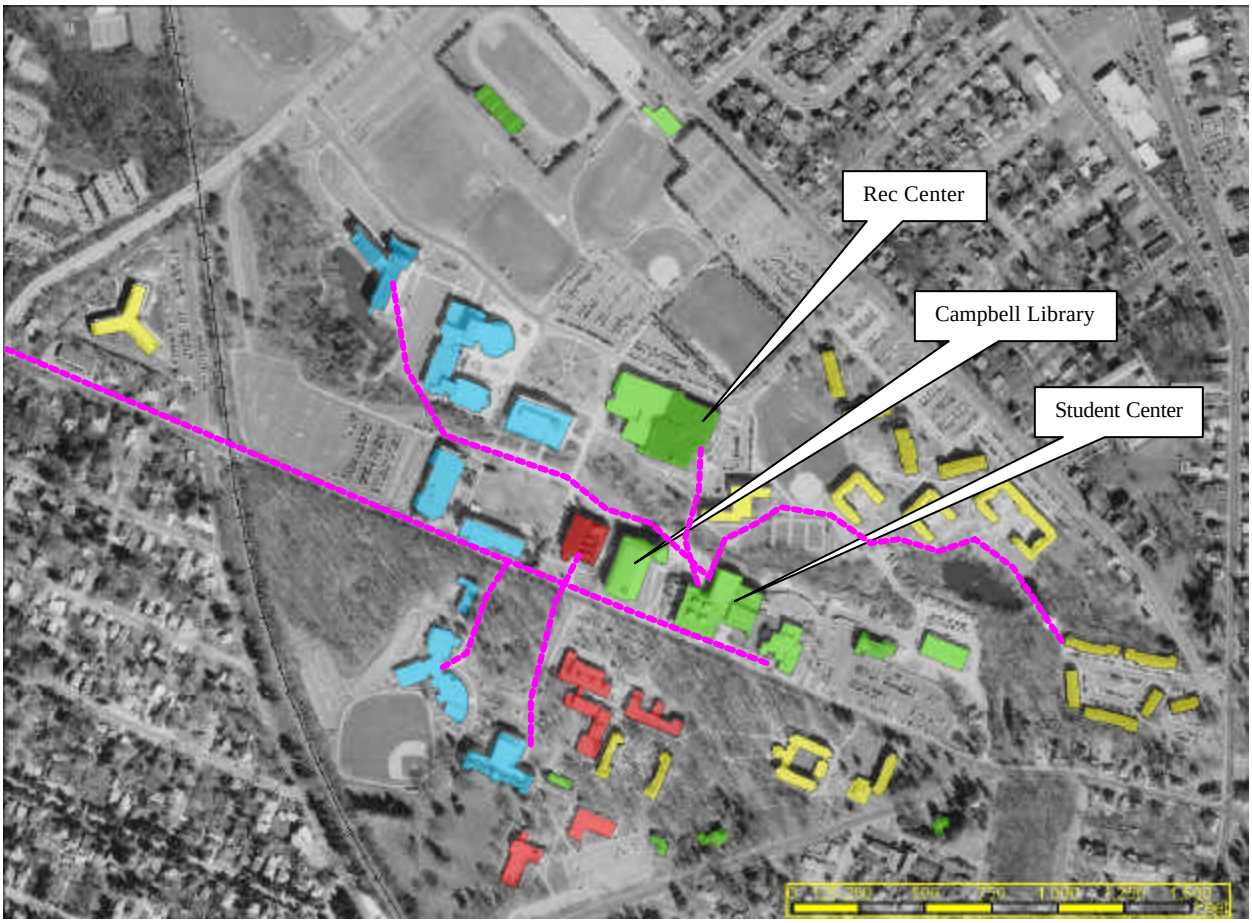

Figure – 1 Rowan Glassboro Campus. Buildings area color-coded into use type. (yellow = residential; blue = academic; red = administrative; and green = campus communal facilities) Major pedestrian travel corridors are purple-dashed.

Figure -2 represents the land use pattern of the Glassboro area. It portrays residential and commercial areas, important community nodes as well as major transportation routes.

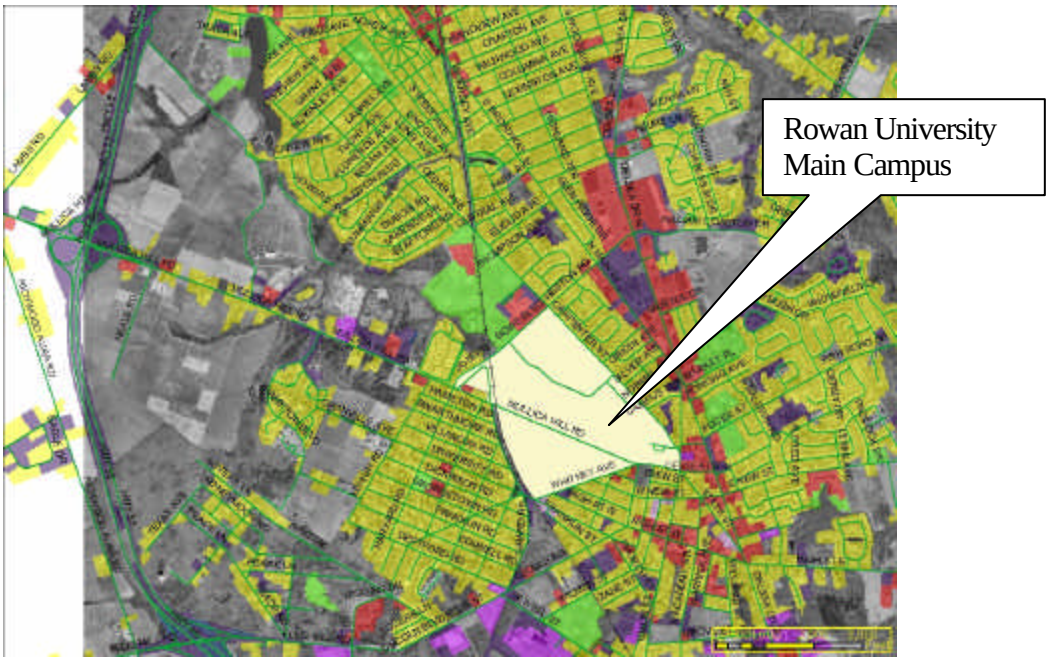

Figure – 2 Glassboro area land use patterns. (yellow = residential; red = commercial; purple = industrial; and green = parks / recreation).

Figure -3 depicts the potentially available lands in the Glassboro regions. It was generated from a map of land use for the region. The map depicts parcels that have vacant buildings or are brownfields consisting of formerly developed parcels. The map also depict parcels that have undeveloped land uses excluding wetlands. Map #3 is, in essence, the "empty spaces" map that provides opportunities for redevelopment or new development.

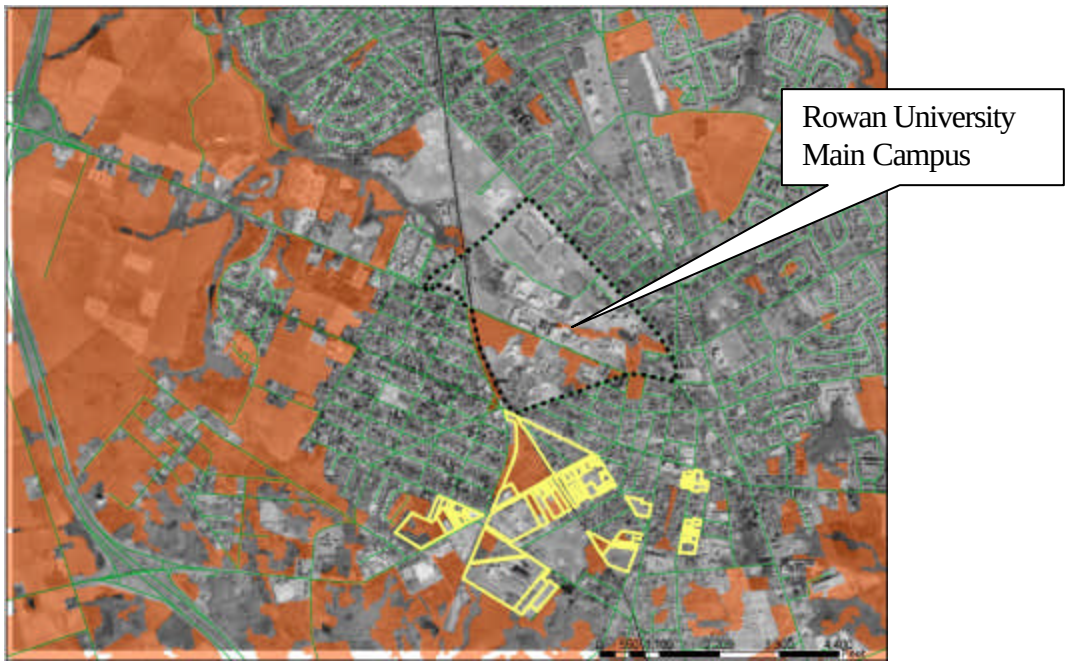

Figure –3 potentially available lands in the Glassboro area. Orange depicts undeveloped land as of 1995, yellow depicts parcels that hold potential for redevelopment

Geospatial Modeling of Smart Growth Potential for Rowan Campus

A geospatial analysis was conducted utilizing GIS to model the Smart Growth principles previously describe in order to provide a system of grading land in the vicinity of campus for its Smart Growth potential.

Redevelopment - vacant buildings and brown fields were identified a assigned a weighted value. (See Figure - 3)

Infill – Developed land was had a majority filter to 500 feet and then buffered 500 feet to create the redevelopment and infill layer (Figure - 4).

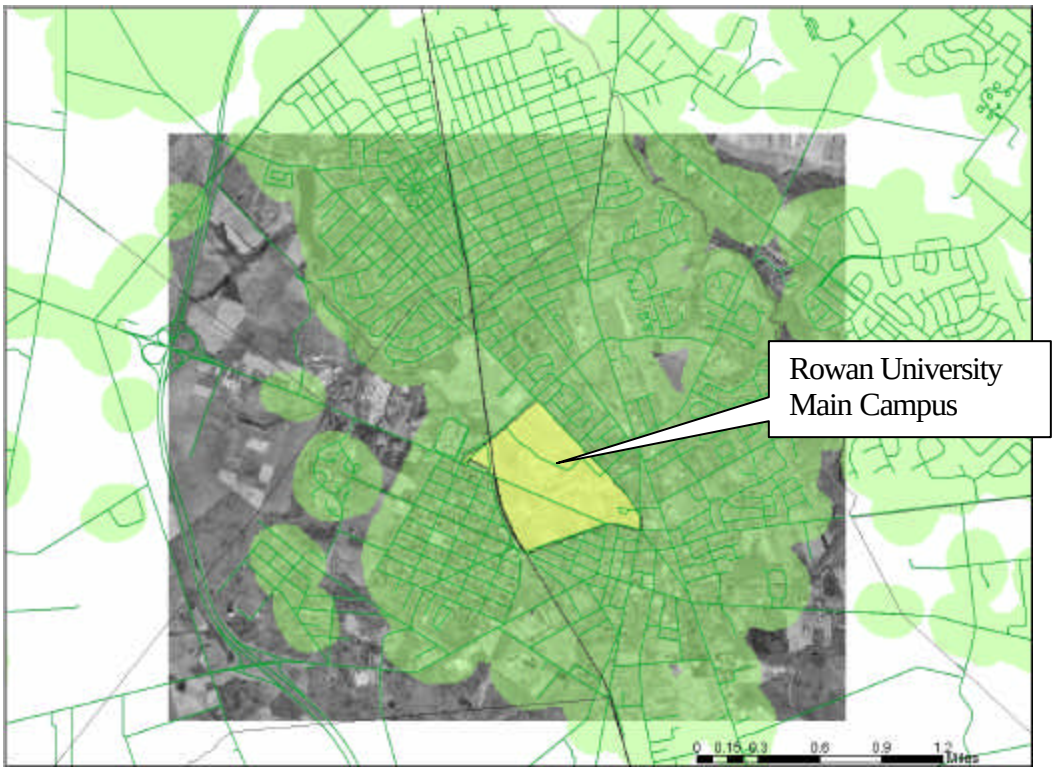

Figure – 4 points for infill near existing development. Majority urban filter at 500ft, buffered to 500ft. This map depicts the areas near and between existing development that would be ideal for infill and contiguous urban growth.

Adjacency to Campus (leapfrog) – the Rowan Main Campus was buffered 1500, 2600 feet (10 and 20 minute walk from the edge of the campus) and assigned a corresponding weighted value (Figure – 5).

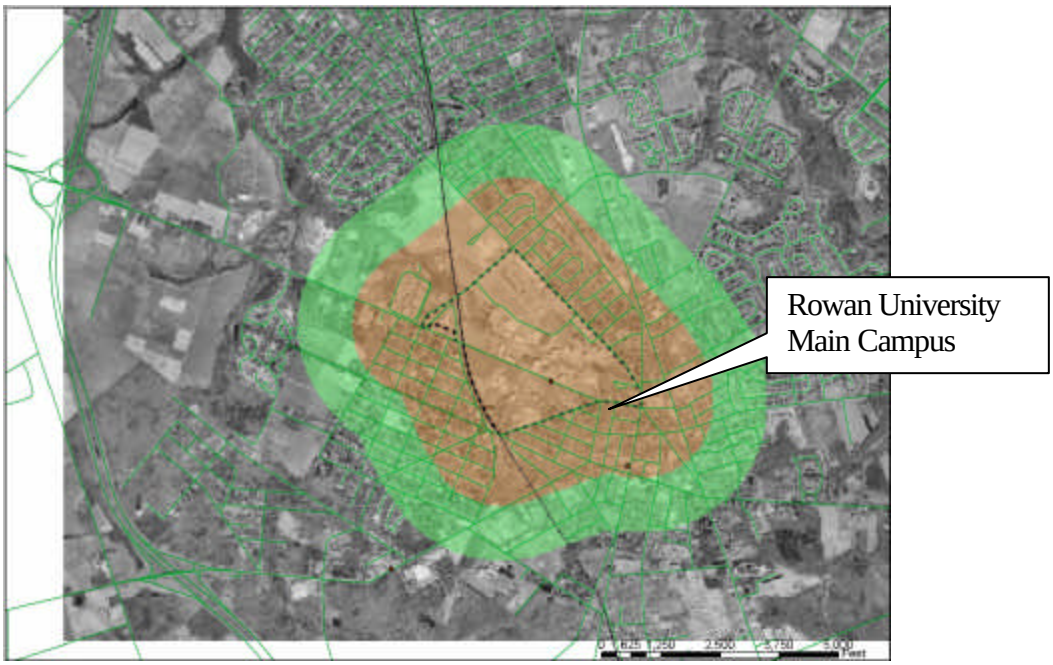

Figure – 5 pedestrian zone in the vicinity of the downtown campus. This map show the region around the Rowan Main Campus that would be accessible by a 10 minute (brown) and 20 minute walk (green).

Accessibility to Campus Nodes – a 1500 foot buffer was created around individual building types identified as campus nodes including: all academic buildings, all residential buildings, all administration buildings, library, student center, school bookstore, all recreational fields. Points were assigned to each campus node type buffer and summarized into a cumulative campus node accessibility map (Figure – 6)

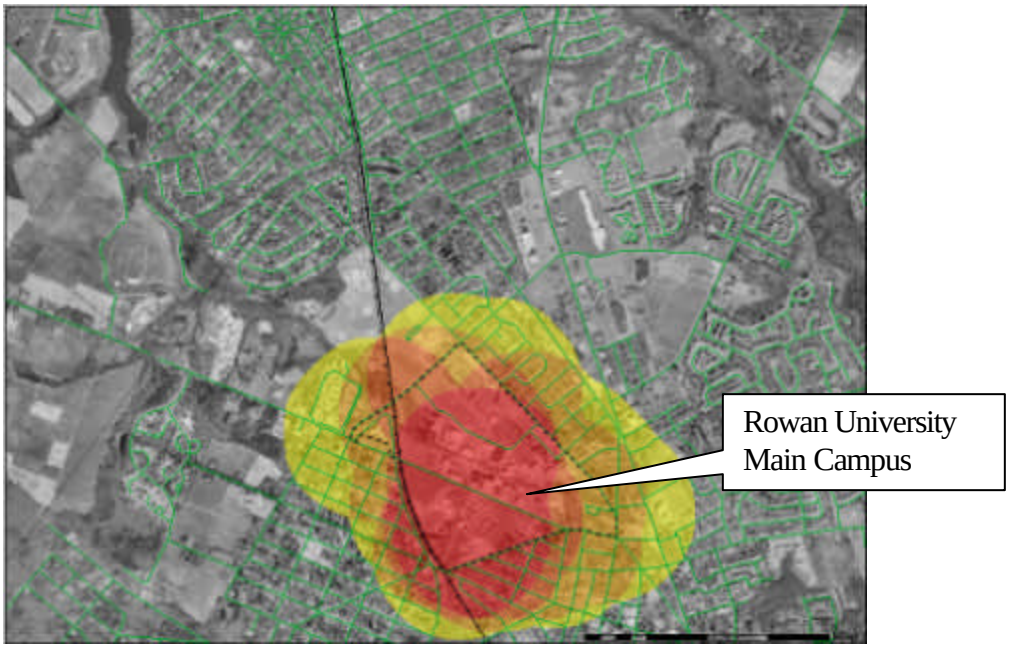

Figure – 6 cumulative campus node accessibility map. This map depicts the amount of different Rowan University nodes accessible from any particular location in the vicinity of the Main Campus. The darker the red the more different types of university functions are within a 10 minute walk.

Accessibility to Community Nodes – community nodes were identified including: municipal building, ambulance, fire hall, library, post office, grocery stores and restaurants. Each separate node type was buffered individually and then summed together to produce the community node accessibility map (Figure – 7)

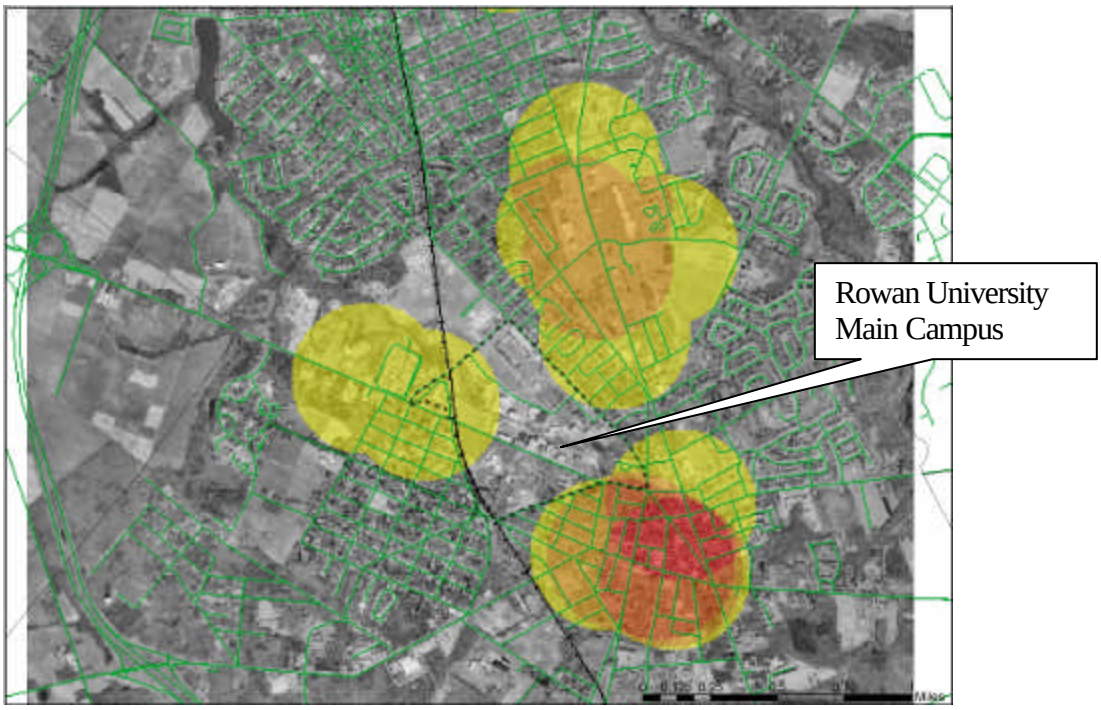

Figure – 7 community node accessibility map. This map depicts regions that are within a 10 minute walk of Glassboro community nodes including restaurants, grocery stores, the post office, emergency services, etc. The darker the color red, the more different community nodes are within a 10 minute walk.

Accessibility to Alternate Modes of Transit – Accessibility to alternate transportation includes a pedestrian buffer around existing bus stops. Future rail options were also added for the Conrail corridor as well as the centerline of route 55 (both possible options for a light rail connection to Glassboro). The existing bus routes were buffered separately at 1500ft and 2600ft representing a 10 minute and 20 minute walk. The possible rail corridors were also buffered separately at the same distances and combined to create the alternate transit mode accessibility map (Figure – 8)

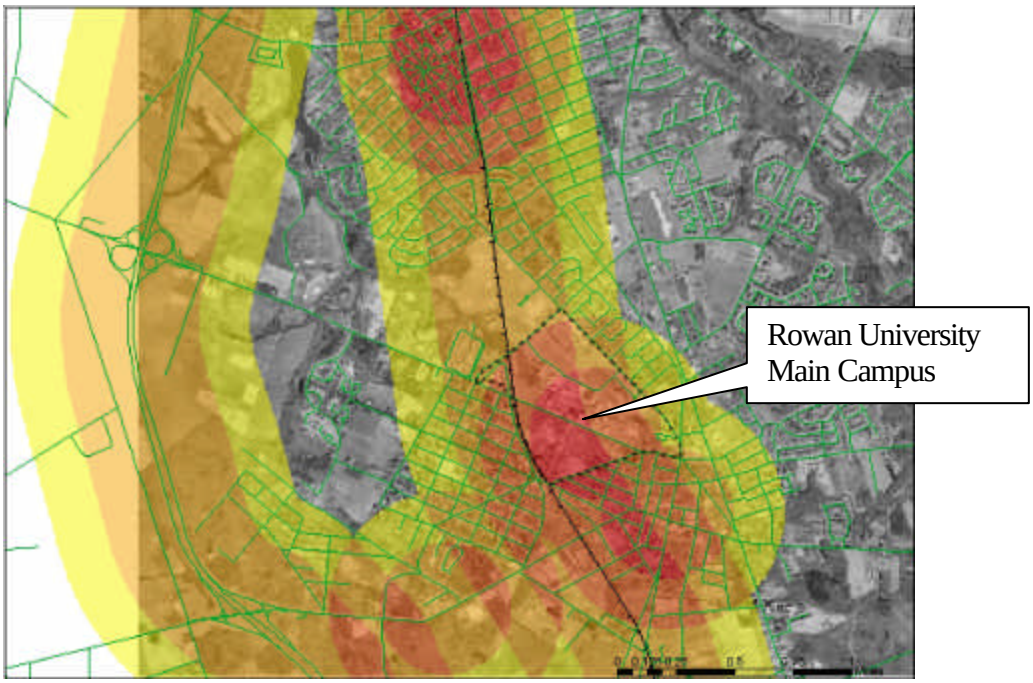

Figure – 8 alternate transit mode potential accessibility map. The darker the red color, the more accessible options for existing or possible future alternate transportation options at a walkable distance.

Mixture of Land Uses – the mixed land use measure is done on the scale of walkability. Developed land uses are measured at a1500 ft proximity to determine the number of different land uses within that distance. The mixed land use map (Figure – 9) portrays the weighted mixed land use pattern of the Glassboro area. Higher mixed land uses are more valued in the Smart Growth model.

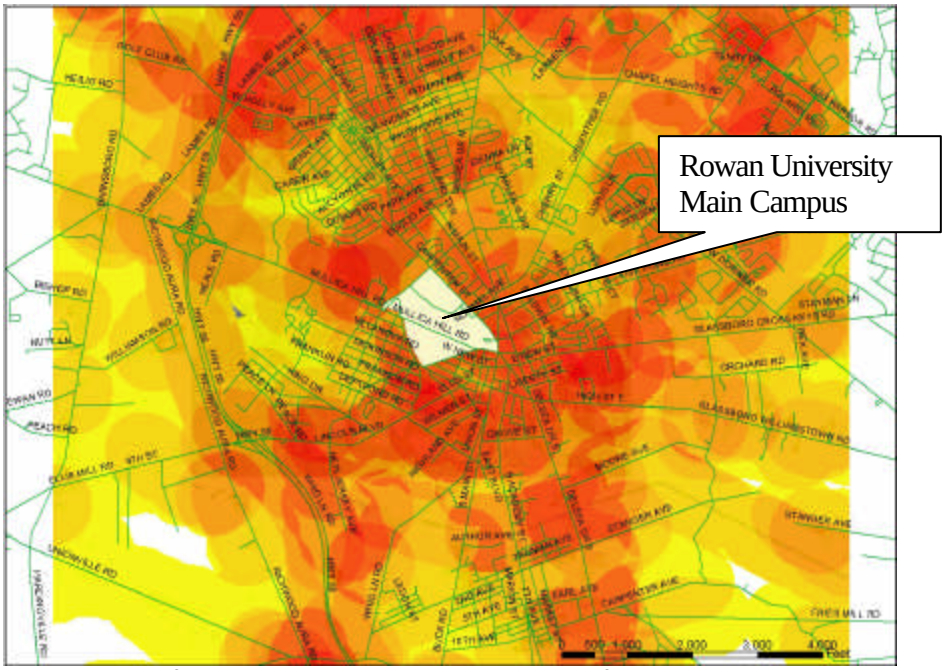

Figure – 9 mixed land use value for the Glassboro Area. Darker shades of red indicate that an area has a greater mixture of different kinds of land uses within a 10 minute walk.

Loss of Valued Land Resources - A number of important natural land resources were mapped including: prime farmland, wetlands, forest core areas, wildlife habitat, and aquifer recharge areas. The individual land resources were weighted and summed to create the land resource value map (Figure – 10). In the final cumulative summation the land resource value map is subtracted from the other Smart Growth parameter maps.

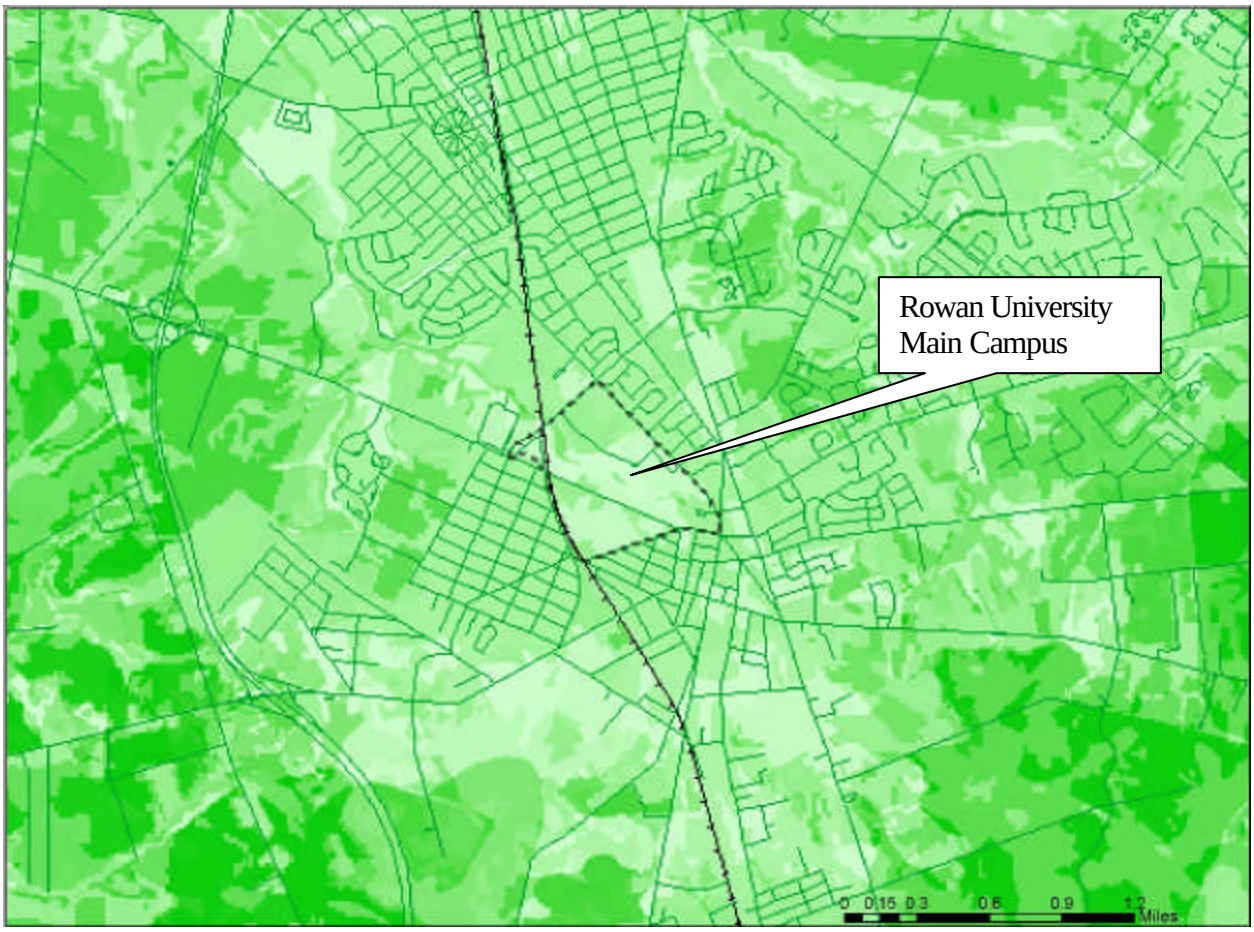

Figure – 10 Valued land resource map. Important land resources are depicted including: prime farmland, wetlands, aquifer recharge potential, and wildlife habitat. The various layers are added up so that the highest cumulative natural resource values are the darkest shades of green.

Cumulative Smart Growth Locational GIS Modeling

The final Smart Growth Development Potential Map (Figure – 11) was created by summing the individual Smart Growth parameter maps (Figures 4 thru 9) - while subtracting the valued land resources map (Figure – 10). The map shows the most highly ranked locations for smart growth in the shades of brightest yellow and the least highly ranked location in the darkest shades of red. This map depicts the most ideal land areas in terms of Smart Growth development.

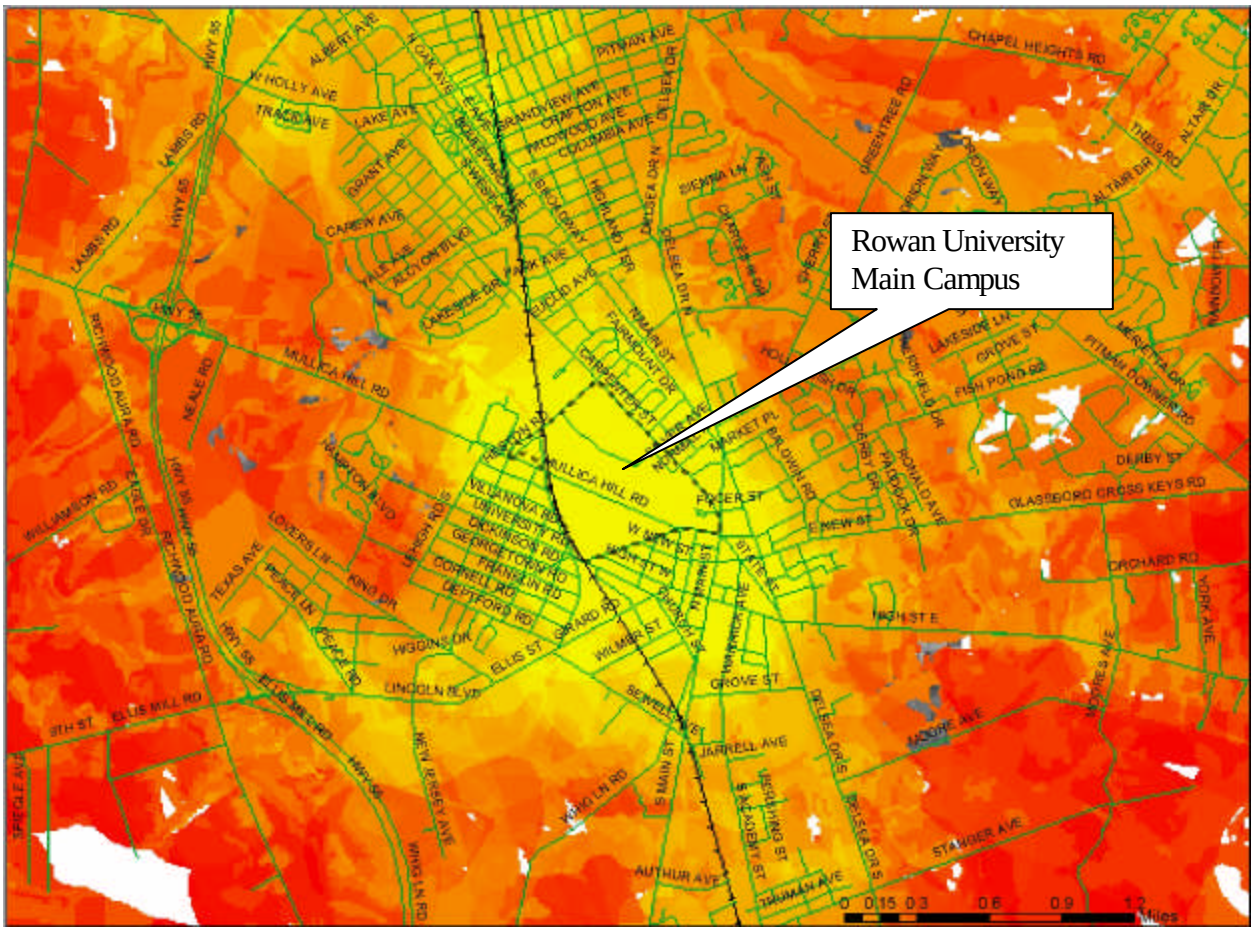

Figure – 11 Cumulative Smart Growth locational modeling for the Rowan Campus region. The most ideal areas for Smart Growth development are depicted in shades of yellow, the most sprawling are in shades of red.

A Smart Growth Critical Review of Rowan's Current Planning Projects

Proposed Student Townhouses

The proposed student townhouses hold a number of import problematic aspects from a Smart Growth perspective. The major concern is the loss of a climax forest ecosystem of the site and the missed opportunity to redevelop / infill near Rowan's other residences and the downtown redevelopment area. This climax forest tract contains an intact ecosystem and scores of trees over 150 years of age. No other forest tract anywhere on the Main or West Campus contains a similar stand of forest of this age and the development of this tract is a regrettable lost ecological asset for the main campus. These concerns have been documented in more detail in a previous memorandum to the master planning committee (See previous memo available upon request).

For future student housing needs, the Smart Growth modeling geospatial analysis (Figure 11) reveals that lands adjacent to the existing student residential areas and proposed Glassboro downtown redevelopment district would be the most ideal location for future housing (Figure 12). Rowan should make efforts to acquire properties and infill in this area for development of future student housing needs.

Figure 12 Region of Rowan main campus most ideal for location of student residential facilities.

Proposed Technology Park

The South Jersey Technology Park is a visionary plan to establish a center for technology development in the heart of southern New Jersey. The plan is modeled on a number of other technology research and business incubator projects including: Idaho State University, Pittsburg State University, University of Louisiana – Lafayette, University of Wisconsin – Stout, Central Michigan University, University of Delaware, University of Maryland – Baltimore, Tech Center of New Jersey.

The master plan for Rowan's South Jersey Tech center has it set on 140 acres of land located west of the main campus in Mantua and Harrison Townships (Figure – 13). The master plan calls for a series of single story buildings arranged along an interior grassed axis. An arterial access road that enters Route 322 at a traffic light and a loop road that runs around the perimeter of the main parcel will service the park.

Figure – 13 The concept plan for the proposed South Jersey Technology park

Major Concerns to the Plan

While the underlying vision for a South Jersey Technology Center is bold and holds great potential for the future of Rowan and the economic vitality of the region, there are a number of urban sprawl / Smart Growth-related flaws and concerns related to the physical master plan as presented. These problematic characteristics of the proposed master plan run counter to the Smart Growth approach to responsible land development that the State of New Jersey is struggling to achieve. The ultimate concern is that the Tech Center as proposed will result in a less-than-ideal land development pattern that will diminish the potential success of the technology center. Each concern is subsequently spelled out.

Low Density Land Use – The most striking characteristic of the proposed park is the dispersed nature of the planned land use (Figure – 14). Single story buildings widely spread out over a 140 acre campus is an inefficient use of New Jersey's limited land base. The Technology Center Portion of the West Campus will occupy more land area than the entire main campus (Figure – 15). The amount of built space depicted on the plan compared with the amount of land consumed for the park gauged against the other parks, demonstrates the land inefficiency of the Rowan plan (Figure – 16).

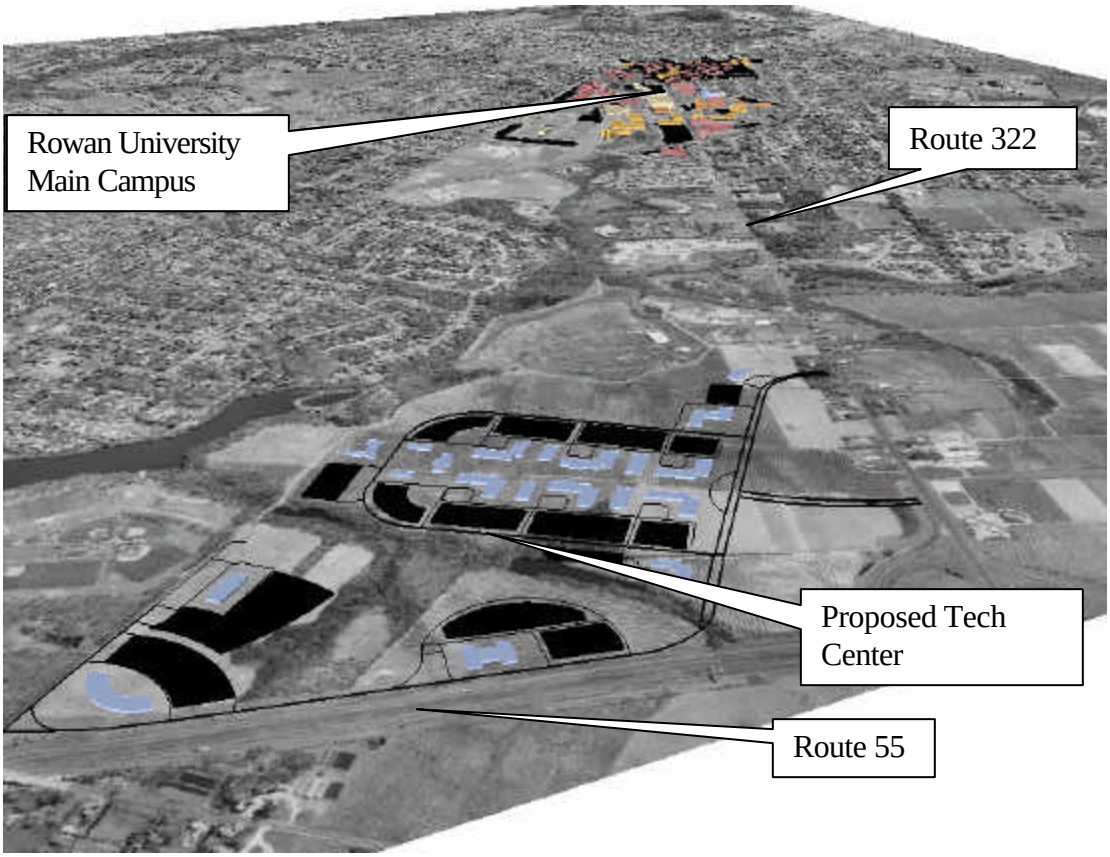

Figure – 14 Birdseye perspective of the Rowan Tech Center site layout as depicted in the master plan. Route 55 is visible in the foreground and Rowan Main campus is situated in the background.

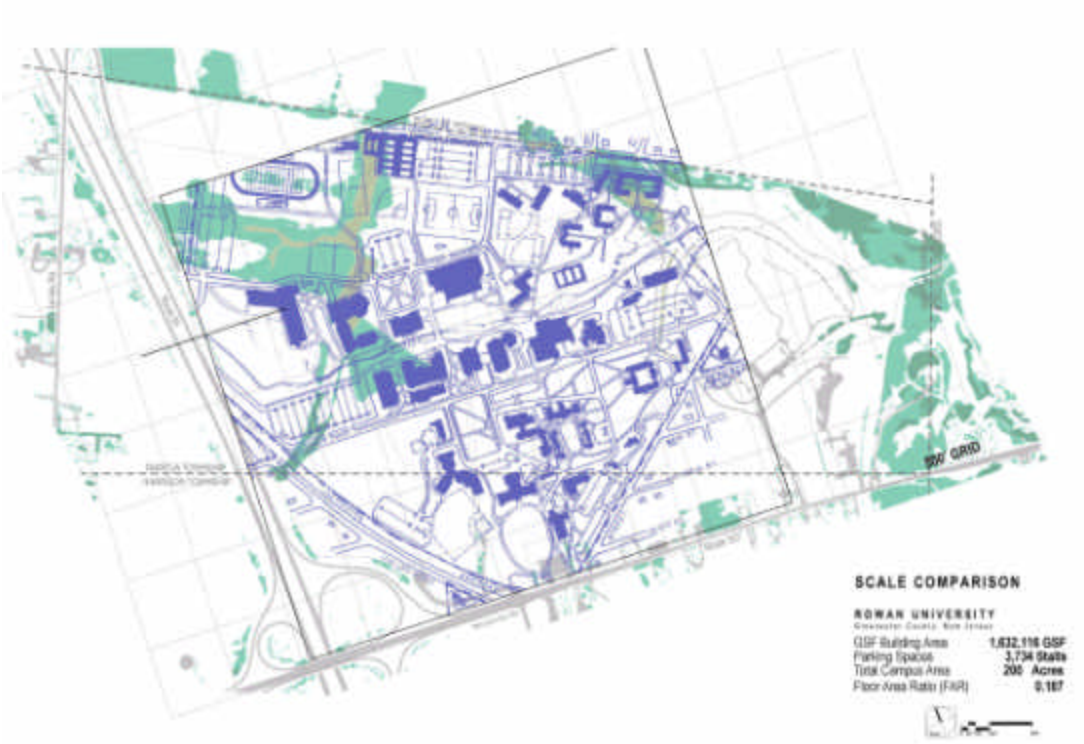

Figure – 15 The Rowan Tech Center land area compared with the entire Rowan main campus (blue outline).

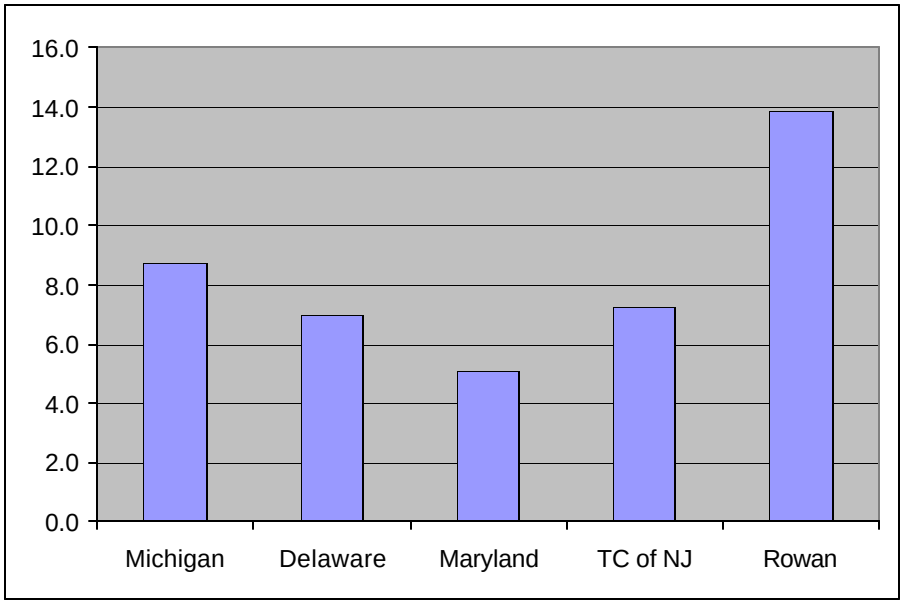

Figure – 16 Floor area ratios of Rowan's tech center compared with other university technology parks. This number depicts the amount of building floor area gained for the amount of land consumed to accommodate the building. (Source: Rowan Precondition Report)

A second measure by which to gauge the inefficient use of land proposed by the master plan is comparison to the physical plan of other campuses. One such technology park mentioned in

Rowan's preconditions report as model to which Rowan should "emulate" is Cambridge University's science and technology campus. The Cambridge technology park is integrated with private companies anchored by Intel and Microsoft. Evident in the photo (Figure – 17a), this technology campus is a far more efficient in its use of land with most building being at least 3 stories in height, in close pedestrian proximity to one another, and imposing a much lower scale of impervious parking overall. As the Rowan Siting Report states, "what is striking about the [Cambridge] plan is the total integration of this mix of uses. This is a model that Rowan could emulate, should it wish to." However, the Rowan Technology Park, as proposed, is not integrated with any other surrounding land uses and is located in an isolated fashion wasteful of land.

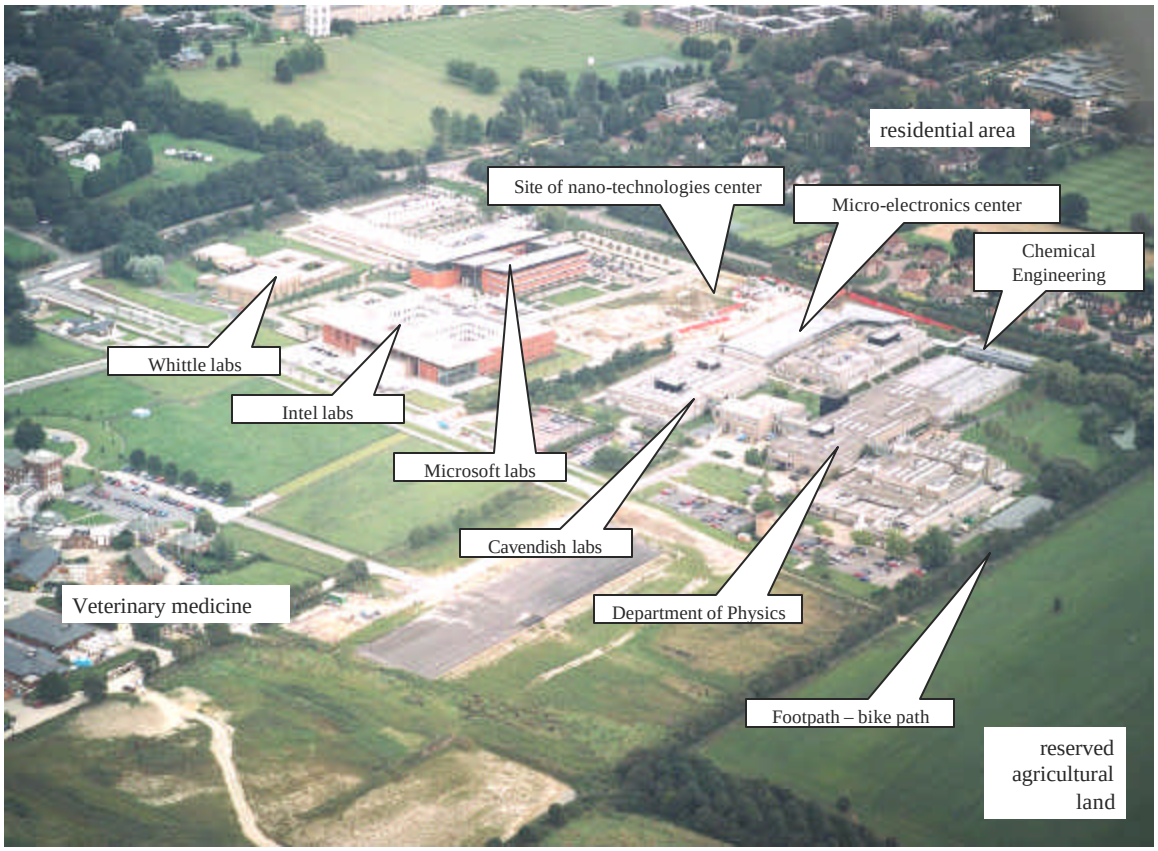

Figure – 17a The Cambridge University Science and Technology Center is anchored by collaborative relationships with high-tech companies including Intel and Microsoft. This technology park demonstrates a much more efficient utilization of land than the proposed Rowan Technology Park. It also shows the integrated plan for land use much more common in Europe where residential, agricultural and urban land uses are thoughtfully planned in order to compliment one another.

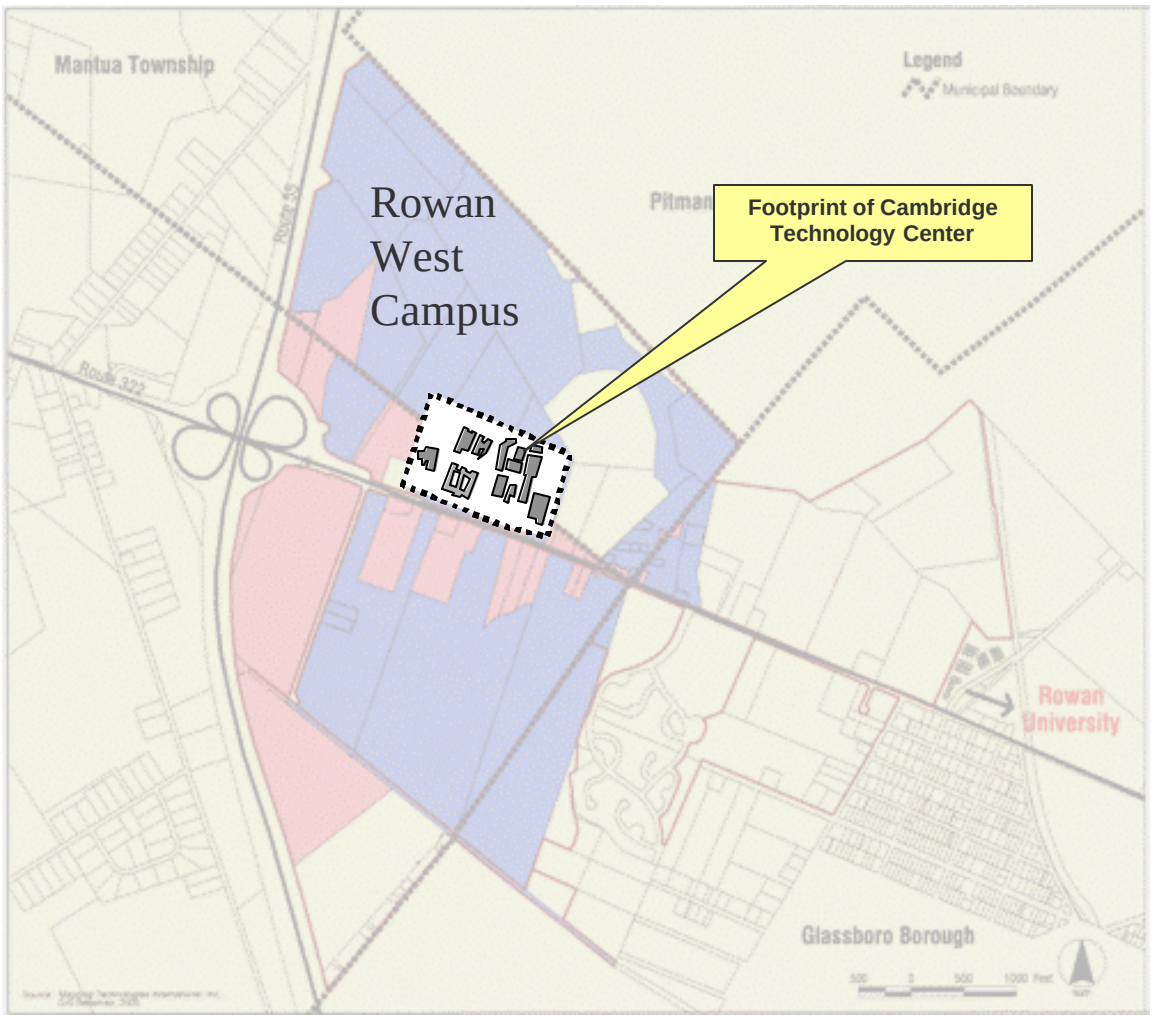

Figure 17b This map depicts the 30 acre footprint of the Cambridge University Technology Center shown in the aerial photograph (Figure-17a) super-imposed on the Rowan West Campus plan map. This image portrays the dramatic difference in the amount of land consumed for the Rowan Tech Center compared with the Cambridge Center.

Leap Frog – The Second most problematic characteristic about the proposed technology park master plan is its distance from main campus. As is stated in site planning report "the ideal situation for a university-related park is immediate proximity to the sponsoring institution, allowing university faculty to walk to research facilities and vise versa." In spite of this recommendation, the location of the first planned building in the Rowan Tech park will be about 2 miles from the Rowan Student Center. At such a distance an automobile will be required for every activity whether it is to meet with university colleagues, go to lunch, go to the gym, etc. The master plan siting leapfrogs away from Rowan's Glassboro campus into productive agricultural fields, fragmenting local farming viability, increasing traffic and creating energy and time wasting development patterns. In order to provide a means of gauging the magnitude of the distance between the main campus and the tech center, Figure 18 provides an overlay of the Washington DC Mall at the exact same scale as an aerial image depicting the main and west campuses. The distance in traveling from the center of main campus to the center of the technology park is equivalent to traveling from the Lincoln Memorial to the Capital Building.

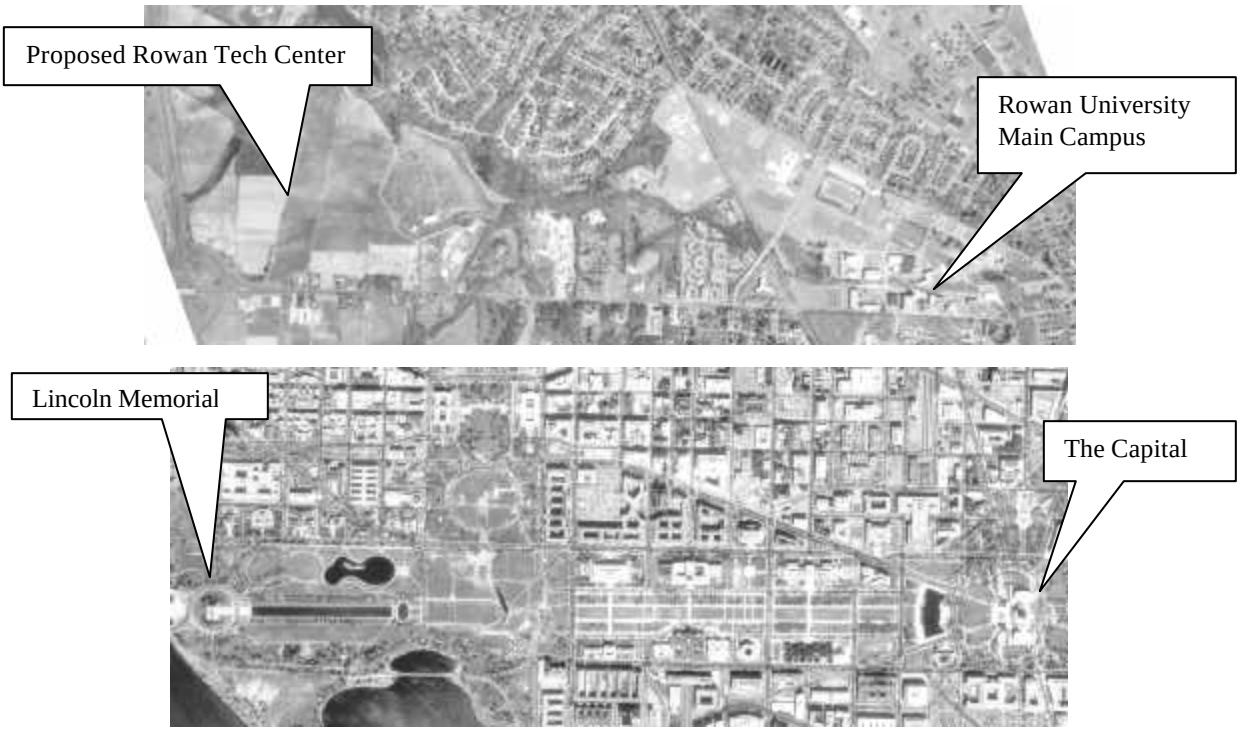

Figure – 18 The distance between the center of the Rowan Main and proposed west campus is the equivalent of the entire Washington DC Mall.

Accessibility – One of the major advantages of the site location mentioned in the siting study was accessibility to Highway 55. While this accessibility would be a major advantage if the pending land use was to be a shopping center or industrial park, it is arguably less important for a technology center. The most important consideration for a tech center as is accessibility to the Rowan Main campus and services such as restaurants, hotels, etc. These are all located within the town of Glassboro, which is only accessible to the west campus via Route 322. There are no alternate roads or established paths between the West Campus and Glassboro, which will increase traffic on an already busy Route 322. The Route 322 traffic will be predictably exacerbated as students and faculty traverse back and fourth between campuses. Furthermore, if light rail should be revisited in South Jersey, it is likely that the existing Conrail tracts that run adjacent to campus will be the corridor in which it runs. Although there has been discussion about a rail line down the median of route 55, which would benefit the proposed Tech center if built, this option is not likely to be feasible due to the excessive costs and limited projected ridership.

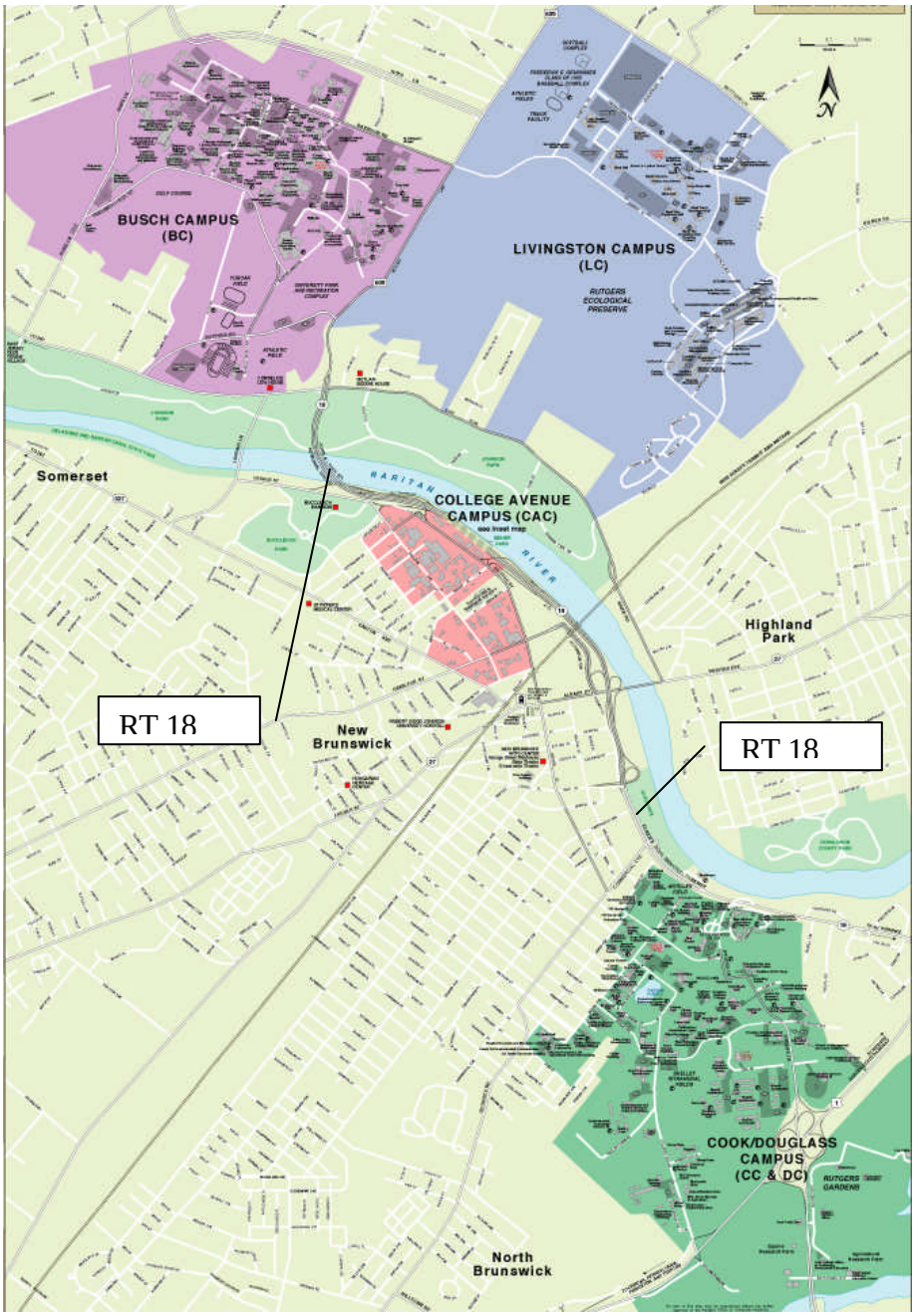

Figure – 19 Rutgers University's five New Brunswick campuses are isolated from one another with major implications for traffic and accessibility. Route 18 is the major roadway connecting the Rutgers Campuses.

Rutgers University, New Brunswick is a case study on the challenge of accessibility between distant campuses. The dispersed layout of the five Rutgers campuses necessitates a major university bus system to connect the Livingston and Busch Campus with the College Avenue, Cook and Douglas Campuses (Figure – 19). The main connecting road is Route 18, a similar state highway to South Jersey's Route 322. The traffic on Route 18 (Figure - 20) is distressing to it's users but necessary to endure for connecting between campuses. The Livingston campus is especially isolated and the least-favored campus for classes and resident students.

Figure – 20 Traffic congestion is exacerbated at Rutgers New Brunswick, on Route 18 due to the dispersed campuses. Route 322 in Glassboro can expect a substantial increase in traffic with the development of the West Campus.

A study conducted by the Rutgers Planning School found that traffic congestion and the inefficiency of the busing system between the Rutgers campuses to be the single most important issue of concern for students and faculty alike. It is not an exaggeration to say that students 'fervently dislike' the Rutgers bus system and that the inaccessibility between campuses significantly degrades the educational atmosphere at the state's flagship university. Rowan's expansion should study the Rutgers campuses to avoid creating similar accessibility problems.

Environmental Impacts – The proposed Rowan Technology Park embodies a number of avoidable environmental impacts. The traffic implications have been previous mentioned and carry a number of associated environmental impacts such as air pollution and energy inefficiency. Other major environmental impact include excessive amounts of impervious surface, loss of prime agricultural lands, loss of wildlife habitat, loss of open space and loss of ground water aquifer recharge capacity. The most significant environmental indicator is creation of impervious surface (Brabec et al. 2002, Arnold and Gibbons 1997). The proposed technology center plan consists of single story buildings encircled by excessive amounts of parking. The acreage of parking depicted in the plan is 5,025 parking stalls consuming an estimated 42 acres, of questionable need for a technology park.

Another inadequate aspect with the proposed Technology Park Master Plan is the absence of environmental design principles. There is little relation of the design to the natural topography or environmental features of the landscape other than the stated protection of the wooded

wetlands (which is required by state and federal law). There have been significant advances in green building designs, solar orientation, and ecological land development principles. For example, Oberlin college recently created an award-winning environmental science building based on Principles of Green Design. Another architect who has created cutting edge environmental designs is William McDonough. These are just a few of the models that Rowan can emulate.
<Bill McDonough, architect http://www.mcdonough.com/#>
<David Orr, Oberlin College http://www.oberlin.edu/envs/ajlc/Default.html>

Segregated Land Use Disconnected from Campus – Another Smart Growth shortfall of the proposed Rowan Tech Center is isolated and segregated land use. This is problematic for both the Tech Center's own viability and the continued vitality of the main Rowan campus. The core university activities will remain at the main campus for the foreseeable future. Inefficient access to the main campus, restaurants/retail, proposed hotel and other community nodes will create a disconnect for the Tech center that will make it less desirable for potential high-tech tenants, researchers and students who demand a superior quality of life to be attracted to a location.

Likewise, the four-fold expansion of the Rowan campus in the manner proscribed in the West Campus concept plan may negatively impact Rowan's main campus. Additional resources are needed for land acquisition, construction and the cost of maintaining four times the amount of landscaping, security, facilities maintenance, bussing etc. Having "two fronts" will dilute Rowan's resources, which may result in less capacity for maintaining and improving the main campus. The academic atmosphere may also suffer on the main campus if there develops a feeling of disconnect and rivalry between campuses (as occurs between Rutgers's New Brunswick campuses). While the Rowan Sports Complex makes good sense to be located on the West Campus properties, placement of other academic and residential uses should be very carefully considered in order to avoid the negative aspects of an isolated location.

Inconsistency with Regional / State Planning- New Jersey is one of the nation's strongest "home rule" states regarding land use regulation. Most of the land management power is vested in the 566 municipalities. This results in the haphazard and parochial land development pattern that is creating the sprawl crisis in New Jersey. In spite of this, New Jersey has some of the most innovative land management initiatives under development at the state and regional level. The Office of Smart Growth and the New Jersey Department of Environmental Protection each have a independent but integrated land management initiatives under development.

The New Jersey Office of Smart Growth (formerly the Office of State Planning) has been developing the *State Development and Redevelopment Plan* (informally known as *the State Plan*) as a master plan for guiding New Jersey's future development. The West Campus is in a zone labeled PA-2 *Suburban Development Area*. The following is a description for the PA-2 from the State Plan documentation.

> "The intent of the State Plan regarding the Suburban Planning Area (PA-2) is to reverse the current trend towards further sprawl and to guide both redevelopment and new development into more efficient and serviceable patterns. …New development in the Suburban Planning Area should not promote additional sprawl. It should focus on existing Centers before moving to greenfield sites. Internally oriented, mixed-use

> Centers will ensure a higher quality of life and heightened community identity, while promoting fiscal responsibility, efficient and effective infrastructure, reasonable-cost housing, reduced congestion and balanced economic development."
> <http://www.nj.gov/dca/osg/plan/stateplan.shtml>

The New Jersey Department of Environmental Protection has been developing it's own environmental management map titled the BIG (Blueprint for Intelligent Growth), based on the environmental constraints of the various regions of the state. The plan provide 3 zones (Green-light, Yellow-light and Red-light), in which the environmental conditions proscribe the degree to which development will be encouraged (Green-light), approached with caution and added care (Yellow-light), and lands which are important land resources to be preserved or at least developed with extreme environmental sensitivity (Red-light). The proposed site for the west campus is designated *RED Light* by the DEP BIG map (Figure 21).

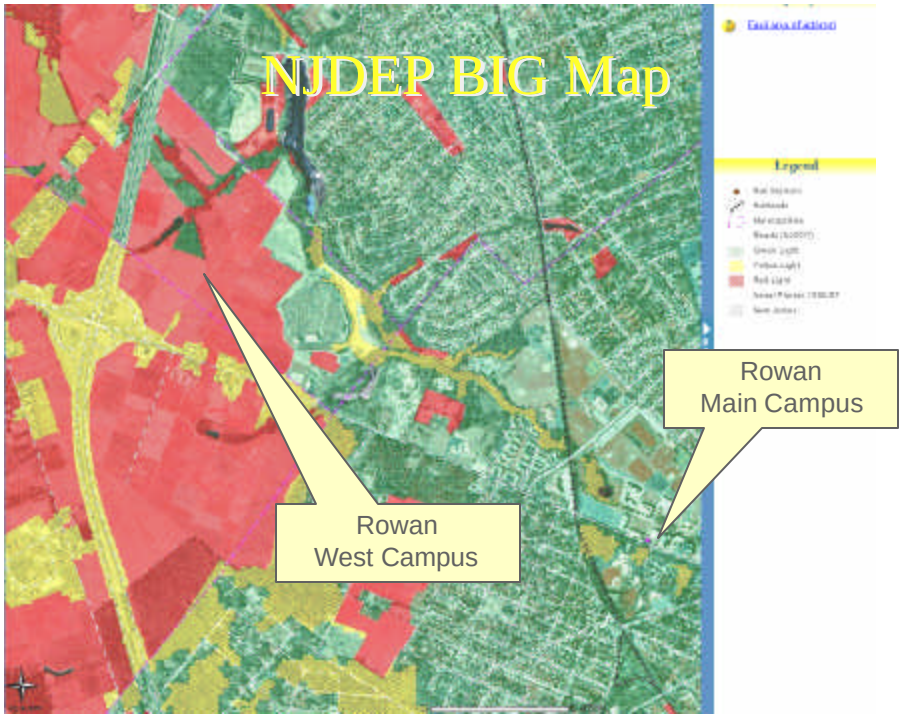

Figure – 21 the Rowan West Campus is situated in the NJDEP BIG map in a *Red-light* area (to be handled with elevated environmental sensitivity. The Rowan Main Campus is situated in a *Green-light* area (areas where development and redevelopment are encouraged).

Findings on the Proposed Tech Center –The flaws in the proposed Rowan Technology Center Master Plan are not flaws in the overall concept for a South Jersey Tech center but flaws in the manner in its approach to land use. The technology center will not exist in isolation from the main university, the community of Glassboro, the quality of life for the people who will occupy it, the environment in which it will share the landscape and the State in which it's located. But these factors are not adequately reflected in the Tech Center master plan as proposed.

According to the siting report, the rational for building the park in a sprawling manner on the north side of the West Campus is primarily based on accessibility and visibility to Route 55 and sewer availability. However, these should be subordinate factors compared with the actual functionality of the overall development plan design. It's true that the tech center will have an expedited sewer connection and easy access to Route 55. But the functionality and success of the center is not likely to hinge on those factors.

As an analogy, if Rowan were trying to develop a design for a new automobile, it would not likely base its design around the exhaust pipe and paint job while disregarding the function of the engine. Nevertheless, the proposed tech center design disregards its engine to prioritize sewers and highways. The engine of the Rowan Technology Center will be its people and research excellence. High tech people demand a high quality of life; a high livability standard; social and environmental responsibility. The sprawling technology center master plan as proposed is appropriate for tractor-trailers but not for people. It over emphasizes the importance of visibility to highway 55 and gives the impression of turning its back on the community of Glassboro.

The design of the Rowan Technology Park would be appropriate for a 1950's industrial park. However, there is little rational in a technology center for expansive single story dispersed buildings, large truck docking bays and turnarounds, separation of buildings from university activities, residential areas, restaurants and services. The main commodity that will be entering and exiting the center will not be on tractor-trailers but in fiber optic cables. Furthermore, the pace at which technology is changing makes it difficult to predict what types of facilities will be needed for the research and tech incubation over the next ten years let alone the next 50 or 100 years. The Tech Center design should be developed in a manner that allows for inevitable building redevelopment and adaptive reuse over time. The massive buildings proposed are mostly suited for reused as warehouses and manufacturing facilities of which there is an already over-saturated market in New Jersey.

The Rowan Technology Center master plan as proposed misses the opportunity to be a cutting edge example of environmental design, Smart Growth, responsible land development, open space preservation and community revitalizing redevelopment. There is little in the proposed design that is likely to attract innovative entrepreneurs except for an easy commute on Route 55. These shortfalls in the master plan in terms of land use and Smart Growth may prove to diminish the overall potential success of the entire South Jersey Rowan Technology Center venture.

Alternate Options for the West Campus Concept Plan

The previous critical review of the proposed Technology Park is intended to shed light on shortcomings that could substantially diminish the functionality and success of the future west campus. The mission of the west campus is to provide room for the university to expand and to create the South Jersey Technology Research Center. There is reasonable logic for Rowan to move its sports facilities to the West Campus in order to provide room for Rowan to develop and improve the main campus. However, the Technology Park and any academic or residential expansion should be very thoughtfully considered in terms of Smart Growth.

Rowan University and the city of Glassboro have some of the ripest potential to develop and expand in a manner that follows the principles of Smart Growth and in doing so create a highly livable community that attracts the highest caliber students, faculty and research entrepreneurs. One of the most important ingredients in Smart Growth is open space preservation or "Smart Conservation."

Open Space

The silver lining in west campus efforts to date is the remarkable land acquisition that has already occurred and the potential for preserving substantial tracts of open space. The proposed Rowan Sports Complex can be the foundation of an unparalleled campus open space plan. The Southern New Jersey region is rapidly developing at a rate that is outpacing the increase in population of the state as a whole. In the decade of the 1990's alone, Gloucester County developed over 10,000 acres of open lands into suburban development. The trends will continue into the foreseeable future with implications for substantial increase in traffic, loss of agricultural lands, degraded rural landscapes, diminished environmental conditions and diminished quality of life for Gloucester County residents. If the Glassboro region wants to get a glimpse of what the area will look like in the coming decades, one only need to drive north to Cherry Hill, Mount Laurel, West Windsor Township an so on. Similar growth patterns in the Glassboro region can be expected in the coming decades.

One of the most difficult components of Smart Growth is the preservation of substantial tracts of open space in the appropriate locations. Rowan's purchase of the lands along 322 and Route 55 no doubt saved those lands from becoming another banal and degraded landscape of commercial and industrial land uses. Rowan's image as a rural university campus would have dramatically changed if those lands had become the commercial and industrial uses for which they are zoned. However, with the purchase of substantial tracts of land and the creation of the proposed sports complex, Rowan has put itself in the position of becoming the regions most influential land management stewards. Rowan has the opportunity to design a west campus that preserves a majority of the acquired land for open space and ultra long-range future university development.

The Rowan land acquisition provides the opportunity to create a green belt zone on the periphery of Glassboro and the main campus that is on par with the Green Belt plans surrounding London, Portland Oregon and many other European and American cities. In the nineteenth century, the Olmstead brothers designed internationally acclaimed plans for land preservation that led to the creation NYC's Central Park, the Washing DC Mall and Philly's Fairmont Park long before the lands surrounding those cities became congested with development. These true visionaries knew

that the creation of those green spaces would be impossible in the future and intentionally designed those parks when it was still feasible.

No doubt, future generations of Rowan students will value the legacy of significant tracts of open space far more than a sprawling tech center that imposes an unnecessary landscape impact and presents a visual image little different from the commercial/industrial land uses that it prevented. A comprehensive open space plan and ecologically-based landscape design should be the starting point for any west campus concept plan. Then the development of lands should avoid leapfrogging by taking place in a phased manner from the edge of existing settlement consecutively outward. Rowan's land holdings should be fervently protected and sensitively developed over the time scale of centuries.

Many other universities have substantial tracts of preserved or reserved open space. The ideal configuration is exemplified by Princeton University in which the highest building density and high activity is along the north side of campus along Nassau Avenue (Figure - 22). Hundreds of acres of preserved lands buffer Princeton to the south along Carnegie Lake.

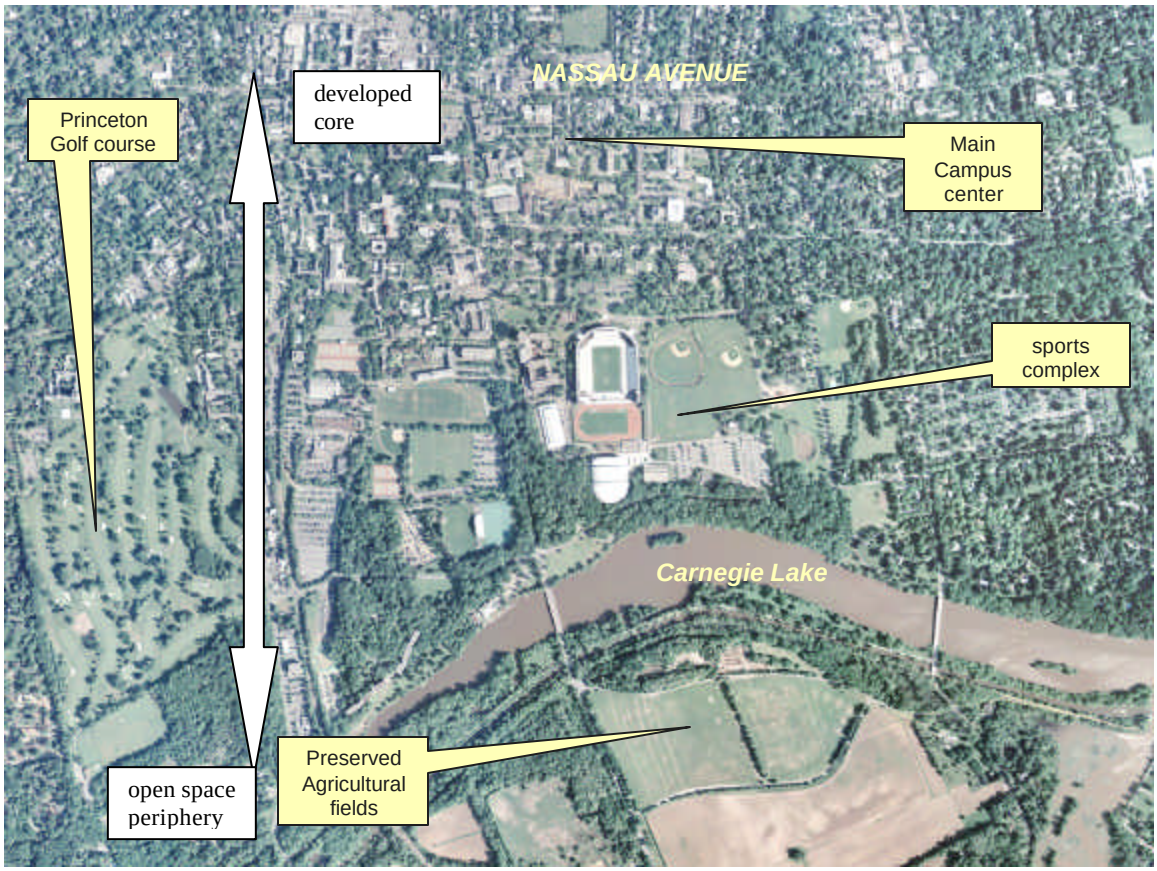

Figure – 22 Princeton University contains substantial tracts of open space integrated into a highly functional campus design with high-density building clustered along the vibrant Nassau Avenue in the North and large tracts of recreational, active and passive open space situated in the south along Carnegie Lake. The development pattern runs along a gradient from a densely developed core to preserved open space along the southern periphery

Rutgers University, New Brunswick also contains substantial tracts of preserved and reserved open space distributed among its five individual campuses (Figure - 23). Cook and Douglass

campus have agricultural experimentation fields, botanical gardens that host many events such as weddings, and Hellier Woods, a section of old growth forest with hiking and biking trails and plots of land available for any Rutgers student to practice organic gardening. Livingston campus has a 400-acre tract of forest that is protected as an ecological reserve Busch campus contains extensive tracts of open space, athletic fields, bike trails and a golf course.

Figure – 23 Rutgers University, New Brunswick, boasts substantial tracts of preserved open space among all five of its campuses. This aerial photo of Cook Campus depicts the open space consisting of nature reserves, botanical gardens, agriculture experimentation fields, student gardens and numerous sports fields.

Rowan could emulate the open space stewardship of other New Jersey campuses by planning to preserve the majority of the west campus lands as open space and help preserve a piece of the garden in the rapidly diminishing Garden State.

Rethinking the Location of the Technology Center

Option I: Redevelopment and Infill

In rethinking the Rowan Technology Center from a Smart Growth perspective, the most ideal location would be within walking distance to the main campus. The multiple advantages of such proximity cannot be over emphasized. There are a number of redevelopment and infill

opportunities for locating within proximity to the Main Campus. Viewing the geospatial Smart Growth modeling map (Figure – 11), lands and vacant building should be sought that have the highest Smart Growth modeling values. It is not necessary for all the Technology Center buildings to be grouped on a single property. In fact, it may make for a more interesting and dynamic land plan if the technology center grew among other complementary land uses.

Baring this in mind, there are a number of potential sites for technology center building available in excellent proximity to Rowan's main campus (Figure - 24). The vacant rail yard triangular parcel adjacent to Bunce green and the Conrail easement is immediately evident as an attractive location to initiate the technology center. This parcel is contiguous to the main campus and its 8.6 acre size could accommodate several state-of-the-art buildings. Immediately adjacent to this parcel is the vacant mushroom processing building that is currently for sale. At 20,000 square feet, this building is exactly the size of the first proposed technology park building (Figure – 25a). Another interesting building that would make an exciting option for hosting some or all of the Rowan Technology Center is the old Glassboro glass factory (Figure - 25b). What a symbolic gesture for revitalizing Glassboro to make the South Jersey's premiere technology center in a building with such a rich connection to the economic history of the town and region. There are also other vacant properties and building within this quasi-industrialized area of Glassboro that could potentially house other buildings of the South Jersey Technology Center.

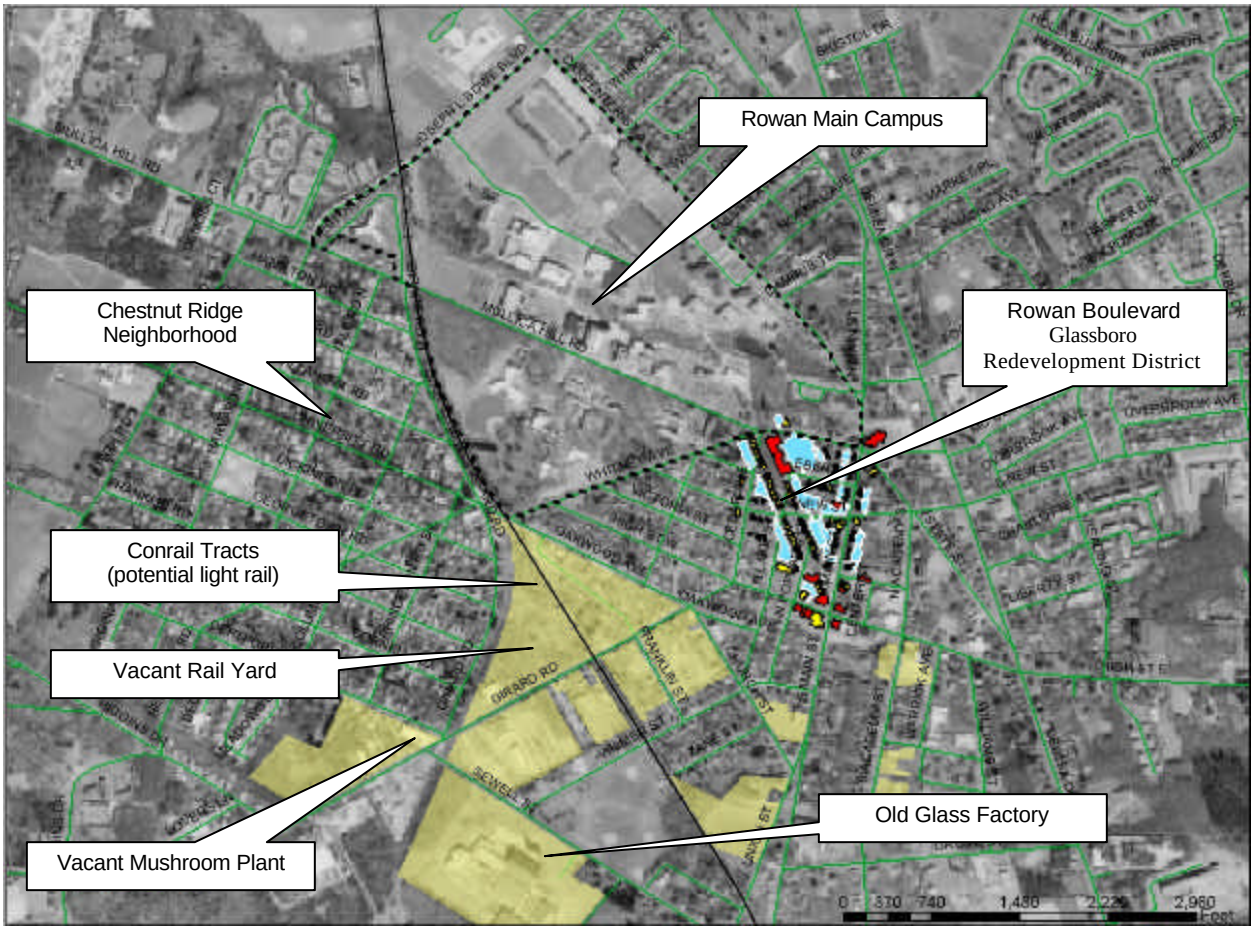

Figure – 24 map showing potential infill and redevelopment sites (yellow) for a technology center located within Glassboro in close proximity to the main Rowan campus as well as the downtown redevelopment area.

Figure – 25a The old mushroom factory is a building that could be redeveloped as part of a technology center.

Figure – 25b – The old Glassboro glass factory would make an excellent redevelopment site for the south Jersey technology park. It is within close proximity to the main campus, the downtown redevelopment district and potential light rail on the existing Conrail tracks.

Focusing the technology center as a series of adjacent or semi-adjacent buildings in this section of the town provides a measure of revitalization for Glassboro's lagging industrial sector, has excellent access to route 55 via Ellis Street, is within walking distance to the Rowan Main campus and the Glassboro downtown redevelopment district (including a proposed hotel) as well as many residential neighborhoods. Furthermore, if the Conrail tracks are renovated into a South Jersey light rail line (which is the most viable corridor for such a line), buildings in this section of town would have excellent accessibility for a transit connection to many communities and residential neighborhoods in Gloucester County as well as connections to Camden, Philadelphia, the airport, Trenton and New York City. With the tech center occupying the old glass factory buildings of Glassboro, the town may someday have to be renamed "Technologyboro."

Option II: Growing the West Campus Contiguously

In terms of Smart Growth development, redevelopment and infill are the most ideal circumstances. The industrial sector of Glassboro holds prime potential for redevelopment and infill with excellent proximity to the downtown redevelopment and the Rowan Main campus. With the possibility of being serviced by light rail, it is difficult to imagine a setting more ripe for Smart Growth. However, if redevelopment and infill within Glassboro are not acceptable options, then ideally the west campus should grow westward from the existing edge of the main campus/Glassboro. This would allow a maintained connection of new buildings to the existing structure of the community as well as allow the incremental expansion of utilities and services. Pedestrian and bicycle accessibility would be feasible to the main campus and Glassboro community with phased contiguous growth outward. Contiguous growth would be more advantageous than leapfrogged growth. The third option would be to create new growth as a pedestrian scale "center" or village of new development with plans for an integrated, mixed-use land systems design.

Mapping the Green Infrastructure

Regardless of any plan for the west campus, the importance of ecologically based land system design necessitates an inventory of the existing geobiological conditions. This is best done from a watershed perspective as a watershed is the natural organizing unit of the environment. The majority of Rowan's main and west campus falls within the Chestnut Branch Watershed of the Mantua Creek (Figure – 26). A green infrastructure mapping (Figure - 27) depicts the natural and human made "green" components of the watershed. Already preserved parks and recreational areas are depicted in bright green, wetlands in light blue, forest stands in light green and habitat in orange cross-hatch.

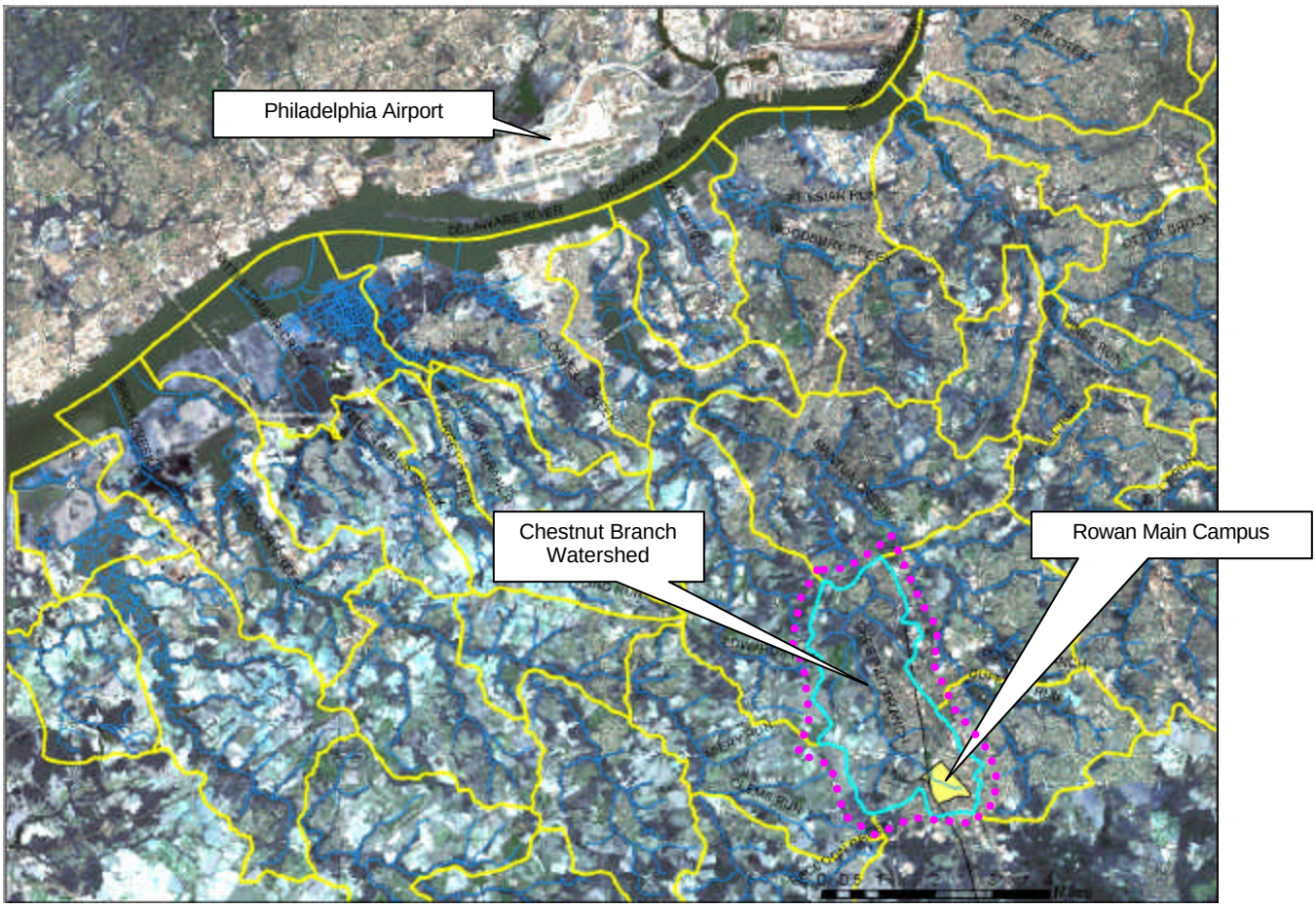

Figure – 26 Satellite image of Gloucester County showing watersheds that drain into the Delaware River. Rowan University (yellow polygon) is located in the Chestnut Branch Creek watershed highlighted in blue (outlined in purple dots). Watersheds are the natural land unit of the environment. Responsible development must consider impacts to the entire watershed.

A primary goal in ecological land systems design is to create connections between the significant tracts of green infrastructure. Greenways should be designed to create functional networks for both wildlife and people to move safely throughout the watershed. Often theses greenway networks are along stream corridors and existing vegetated areas. The quality of Chestnut branch would be greatly enhanced with a preserved greenway buffer along its extent through the

north boundary of the west campus. Furthermore, pedestrian and bicycle pathways along this corridor would connect the various components of the campus as well as the numerous sports fields, school yards and parks that already exist adjacent to the Chestnut Branch on both the Glassboro and Pitman sides of the Creek.

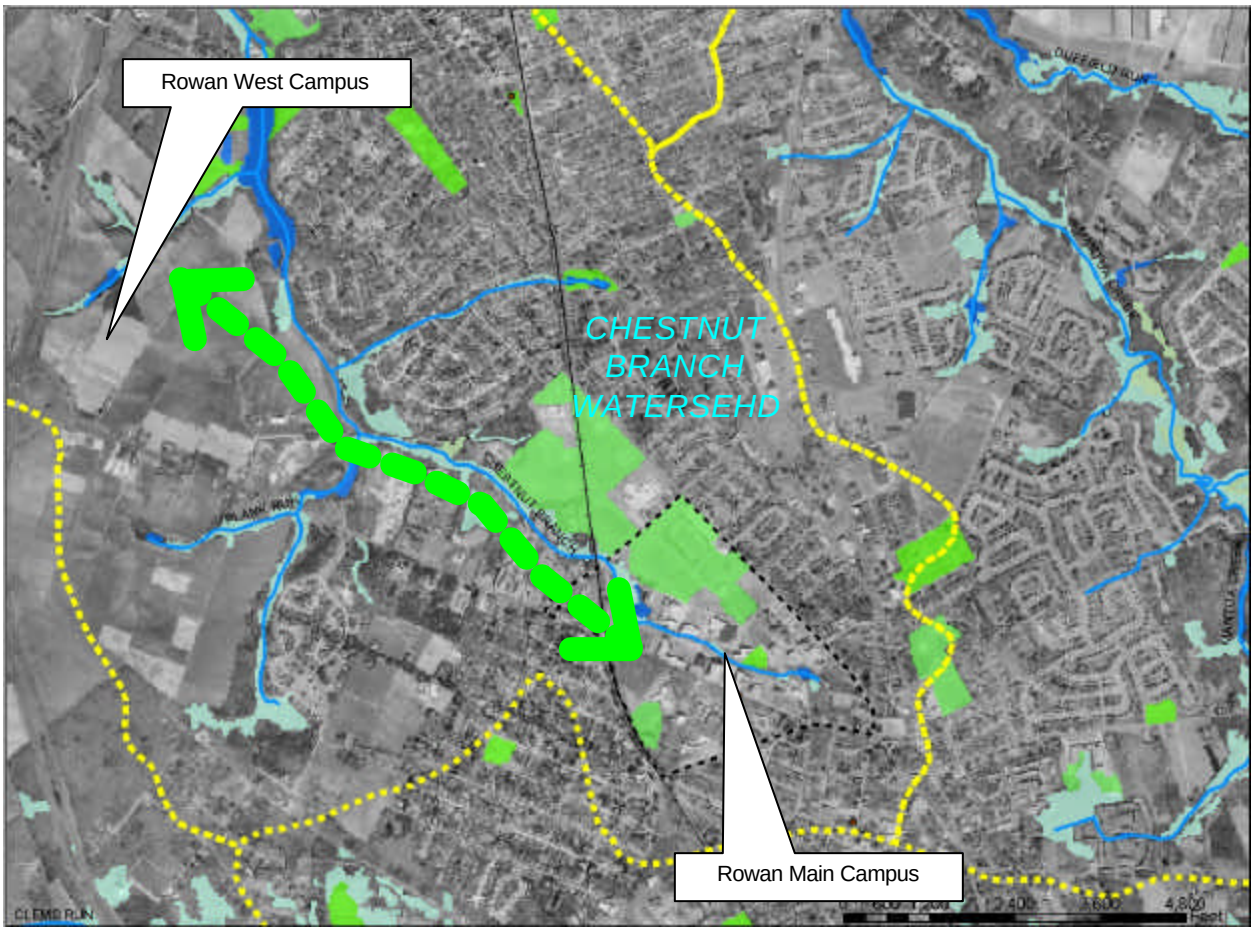

Figure – 27 Green infrastructure potential of West Campus. This map depicts the existing parks, recreational fields and wetlands along Chestnut Branch Creek and demonstrates the potential for a Greenway (green arrow) to connect the West Campuses to the Main Campus along the creek.

Revaluating the Location of the Rowan Sports Facilities

Examination of the Green Infrastructure map (Figure - 27), reveals that a number of parks, sports fields and schools already exist along the northern shore of the Chestnut Branch Creek. Even if the Technology Park remains leapfrogged out into the West Campus, serious consideration should be given to switching the proposed future Rowan sports facility to the north side of Route 322 and the Technology Park to the south. From a land use perspective, the south side of campus is adjacent to a light industrial zone of Glassboro, which has just recently expanded its sewer service. This is a more compatible and complimentary land use for the technology park than the north tract. It may be feasible to connect the technology center buildings to the expanded Glassboro sewer lines. The south-side location for the Tech Center would also result in greater visibility from Route 55 as recommended by the siting report.

Locating the sports complex along the north side of Route 322 would have a substantial advantage from a community planning perspective, as the sports facilities are much more of a *public* land use than the tech center. Adjacency to the already existing schools, parks and recreational areas along the north side of Chestnut branch would be a major advantage to both the existing community recreational areas as well as Rowan's future recreational facilities and its users. If the sports facilities were located on the north side of west campus, students at the main campus could access the Rowan fields via a bicycle path greenway along Chestnut Branch. Furthermore, the Rowan sports complex would be accessible from the Pitman side providing alternate routes to the complex other than Route 322 alone. Such siting of the Rowan sports facilities would be clustered and coordinated with the existing Pitman and Glassboro sports facilities and schools. This would create, in essence, a Chestnut Branch Green Belt consisting of preserved areas, nature trails, bike paths and sports fields. Such an integrated Green Belt along Chestnut Branch would be an important measure of ensuring the preservation of the stream water quality.

Lipari Landfill – A Potential Asset?

Another component in Smart Growth is Brownfield redevelopment. In ecological land systems approach the entire watershed is planned for the maximum functionality. The Lipari landfill, once the nation's number one superfund site, is conspicuously visible in most of the Smart Growth maps presented in this report. This land parcel will be Rowan's neighbor forever (Figure 28). Since this parcel is already a scar on the watershed, a creative approach might be taken into how to most responsibly incorporate this damaged land into a watershed-wide development plan. This parcel may hold potential as a Brownfield's redevelopment site of which Rowan could take advantage. At the very least, it may be considered for Rowan parking for whatever land uses are finally situated on West Campus. This land already is capped with an impervious layer and such a parking facility may be the most appropriate re-use of this damaged parcel. Many questions would yet have to be answered about the parcel but it is worth Rowan's consideration since it will be completely surrounded by Rowan property and would be an excellent example or responsible land usage.

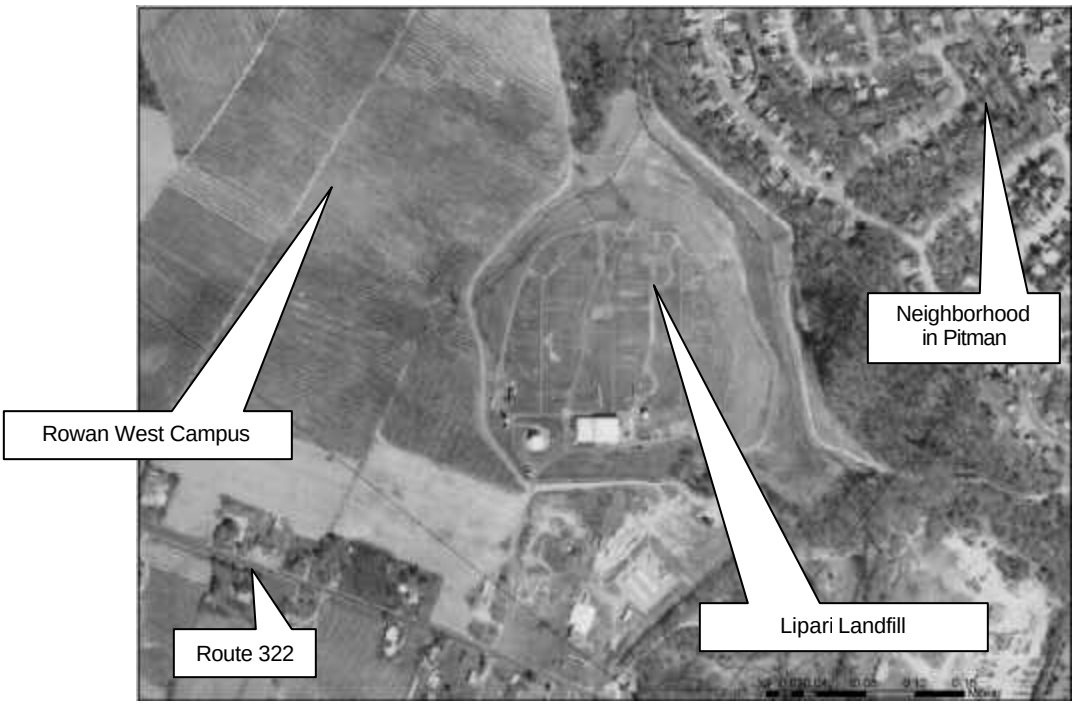

Figure 28 Lipari landfill is surrounded by Rowan property may hold potential for adaptive reuse as parking or other Brownfield's redevelopment use.

Concluding Remarks on West Campus

Rowan University is poised to become the premier academic institution of South Jersey. The planned expansion of the campus to accommodate the South Jersey Technology Center and the related Rowan sports facilities holds promise to ensure Rowan's success. However, if poorly executed in a pattern of suburban sprawl, the west campus expansion could actually be detrimental to Rowan's ultimate mission.

A land development plan that results in Rowan creating a university version of sprawl will not foster the greatest success for Rowan's future. Sprawl will result in exacerbated traffic, programs will be disconnected from the main campus, excessive costs will be incurred to maintain the widely expanded facilities, and the environment will be measurably and unnecessarily degraded. Conversely, a master plan that results in Smart Growth will create the kind of highly inviting social, ecological and academic landscapes that will attract the brightest students, top researchers and innovative high-tech companies who demand nothing less than an excellent quality of life. Rowan could champion Smart Growth and be the states poster child with how to do it right. Or Rowan could simply follow in the footsteps of uncoordinated and short-sighted sprawl development and create a landscape that is as banal as every other sprawling corner of North Jersey. Rowan can step back and redirect it's master planning process to not only create excellent facilities but to create an excellent and responsible land development plan that makes the Glassboro community the most desirable high-tech center in the region. Following the principles of Smart Growth is one of the keys for Rowan to accomplish that future success.

Additional Resources

a. Smart Growth Network - <smartgrowth.org>
b. New Jersey Future – <www.njfuture.org>
c. NJDEP – <www.state.nj.us/dep>

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