RESOLUTION 10-102

A RESOLUTION OF THE COMMISSIONERS OF QUEENSTOWN ADOPTING THE QUEENSTOWN 2010 COMMUNITY PLAN

WHEREAS, on June 23, 1998, the Queenstown Town Commissioners adopted a town comprehensive plan known as the "Queenstown Community Plan"; and

WHEREAS, pursuant to Article 66B § 3.05(b) of the Annotated Code of Maryland, the Queenstown Planning Commission determined that the Queenstown Community Plan should be updated and amended in accordance with applicable provisions of Maryland Law; and

WHEREAS, in accordance with Md. Code Ann. Article 66B, § 3.07(b), after notices to all state and local agencies with planning jurisdiction, and after a duly advertised public hearing on June 16, 2010, an updated Community Plan for the Town of Queenstown was unanimously approved by the Queenstown Planning Commission, and was certified and recommended to the Queenstown Commissioners for adoption; and

WHEREAS, on October 12, 2010, the Queenstown Commissioners held a public hearing on the Queenstown 2010 Community Plan.

NOW, THEREFORE, BE IT RESOLVED by the Commissioners of Queenstown, that the Queenstown 2010 Community Plan, a copy of which is attached hereto and incorporated by reference herein, be and is hereby adopted as the Comprehensive Plan for the Town of Queenstown, Maryland. The 2010 Community Plan will replace the Town's 1998 Community Plan.

AND BE IT FURTHER RESOLVED that this Resolution be affixed to and be made a part of the Queenstown 2010 Community Plan.

Adopted this 23rd day of November, 2010.

WITNESS:	TOWN COMMISSIONERS FOR THE TOWN OF QUEENSTOWN:
Shirlee L. Callahan, Assistant Town Clerk	Perry A. Stutman, President
Shirlee L. Callahan, Assistant Town Clerk	Thomas B. Peregoy, Commissioner
Shirlee L. Callahan, Assistant Town Clerk	John M. Bowell, Commissioner

Queenstown 2010 Community Plan

Adopted by the Queenstown Town Commissioners on November 23, 2010

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PREFACE

This Community Plan is the result of several years of intense work on the part of Queenstown's Planning Commission and generous participation by our citizens and neighbors in a series of workshops. It articulates – for Queenstown's citizens, for our neighbors and for developers who would participate in growth of the Town – the Town's vision of the future.

Our vision, first of all, seeks to maintain balance in Queenstown's economic, aesthetic, environmental, cultural, and historic elements. This vision is built on commitment to growth at a pace that preserves the Town's special quality of life, preserves its diversity of citizenry and architecture, and preserves open space as well as the Town's historic character.

We choose to accept orderly, compact, phased, and compatible growth in our Planning Area as our alternative to the type of suburban sprawl, automobile-dependent development that has already consumed thousands of acres of Queen Anne's County farm and woodlands.

This vision includes a commitment to revitalization of the Town Center, to providing affordable housing and ongoing opportunities for economic development.

Our history is intimately connected to the water, yet our citizens have limited access to the treasure that is our waterfront. Our Plan provides improved access to our waterfront.

Queenstown and its logical Planning Area occupy land that has profound implications for the quality of our creek and the Chester and Wye Rivers. This Plan acknowledges our responsibility to these unique resources and includes an action plan to protect and improve them.

This vision includes a determination to improve the Town's access to Routes 50 and 301 and to mitigate the noise generated, particularly by Rt. 301. This Plan creates a community that is connected and includes features that will reduce our dependency on the automobile. It provides opportunities for walking and biking.

The Town is grateful to the Maryland Department of Natural Resources and the National Oceanographic and Atmospheric Administration for their financial support and encouragement. The Planning Commission wishes in particular to thank Ms. Sandra Olek and Ms. Laura Younger of Maryland DNR for their assistance and support.

Special thanks for this Community Plan should go to current and former members of the Planning Commission; Kathy Boomer, Alicia Calderon, Gloria Ferguson, Geoff Leech, Joe Miller, Don Regenhardt, and Betty White. Kathy Boomer developed the maps, a critical element of the Plan, and using her extensive professional experience prepared the very complex, State-required Water Resources Element. Clyde Dorset also devoted many hours and his considerable talent to soliciting citizen participation and laying groundwork for the Plan. His death was a loss to the community.

Special thanks should also go to Town Commissioners in office during the Plan's preparation, Mitch Keiler, Peter Robertson, Perry Stutman, and Tom Peregoy. Without support and advice by the Town Clerks, Amy Moore and Shosh Callahan the Plan would not have been completed.

The Town Planner, Bruce Galloway's advice helped the Planning Commission through many rough spots. His advice and guidance testified to his years of experience and his ability to develop solutions to difficult issues.

Thanks to Pat Faux and Stu Patz whose firms added very valuable design and economic feasibility analysis to the Plan. And thanks to Chris Jakubiak and Sarah Franklin of Jakubiak and Associates who performed portions of the assessments that stand behind the Plan.

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Executive Summary

Organization of the Plan

Chapter One is the Town's roadmap to the future. Its focus is land use. It summarizes the community's workshop results, describes the Plan's land use objectives, its vision for municipal growth, and provides the supporting rationale. Specific recommendations for implementation of the Plan are listed in this Chapter.

Chapter Two gives a general overview of the Queenstown area and contains information on issues relevant to managing growth and development including much of the newly-required Water Resources Element. This chapter also explains many of the assumptions used in efforts to forecast growth for the area over the next twenty years.

Chapter Three outlines the purpose and reasons for preparation and adoption of this Plan and establishes the background for planning in the Queenstown area. It also describes the community-based process used to prepare, review, and adopt this Plan.

Land Use

Land use is the foundation of the Plan. It is through the Land Use Plan that the Town intends to establish the pattern, type, and pace of growth, meaning Queenstown will grow thoughtfully and carefully over the next 30 years, with a strong emphasis on development that is environmentally responsible, aesthetically pleasing, and economically sound with a very deliberate and phased policy of annexation. The Town is also committed to preserving the area's agricultural heritage and to establishing a network of connected, natural lands within and beyond our Planning Area. The Plan also emphasizes our commitment to preserving our historic character, maintaining our diversity across a range of age and income levels, and setting high design standards.

The maintenance of its small-town, rural identity is a key element of Queenstown's community character and as future land use changes are carried out, Queenstown will insist on the highest quality of development. The preservation of its community character will involve a number of design principles, including:

• Mixed Uses Are Desirable – The Town wants to maintain a reasonable mix of residential, institutional, and commercial uses within and near our neighborhoods. It does not want to repeat errors of past decades, in which housing was located far from places to shop and work.

• Natural Features Should Determine Design – This means all development should be environmentally sensitive and that the natural character of land to be developed should be maintained. This includes development techniques commonly known as conservation design, and, at the lot level, environmental site design. Streams and wetlands are among the most sensitive features. They must have wide, protective natural buffers, and development must be designed not only to minimize impacts to these features, but also to restore natural functions. Environmentally sensitive development also means creating pedestrian-friendly streets so that people can walk to work, shop, or play.

• Development Will Improve Our Watershed – This means all development will be required to incorporate watershed management practices that will bring substantial benefits to our creeks and the Chester and Wye Rivers including strategies that minimize runoff and sediment transport generated by development as well as the possibility of using highly treated wastewater for irrigation and other approved purposes through a separate water distribution system.

• Automobiles Should Not Determine Design – The Town does not want garages to be the most prominent feature of houses, nor does it want streets that are overly wide and huge parking lots that are unrelieved seas of asphalt. Our streets will be designed to be shared by all potential users and be pedestrian-friendly so that people can walk to work, shop, or play.

• Ample Open Space Must Be Provided – This means that every developer must provide significant, usable open space as an integral part of projects and neighborhoods – not afterthoughts. This also means the Town will work to improve existing open space to create green corridors of connected open space.

• Substantial Landscaping Should Be Incorporated In Design – This will include a number of approaches, including requiring developers to leave as much existing forest as possible, requiring large, healthy nursery stock, native species, irrigation systems, and replacement and maintenance bonds. It will mean treating signage and lighting as landscaping elements and requiring maintenance agreements for care of common areas.

• Architecture Should Reflect Queenstown's Traditional Development – Very simply, new development in the Town should look to the Town's historic core for examples of what to emulate, e.g. scale, size, materials, form and quality. The Town will insist on high quality architectural diversity and will not allow itself to be surrounded by generic residential and commercial development. Community character is also shaped by the way residential, institutional and commercial buildings are located within our Town.

A central goal of our 2010 Community Plan is "to establish Queenstown as a leader on the Eastern Shore in environmental stewardship and community design by meeting or exceeding environmental regulations and requirements and actively promoting neighborhood design that reflects the rural, village-like characteristics of Queenstown."

The Queenstown Community Plan uses a watershed-based approach to land planning. By identifying sensitive areas where water resources would be impacted if development were allowed and subsequently directing and accommodating that development elsewhere, incorporating local expert knowledge, and deriving detailed maps of alternative development scenarios, the Plan is able to incorporate management and policy considerations, such as zoning, infrastructure costs, and economic impacts, with the science of understanding the functioning of watersheds. The approach is imperfect

because of its newness, but it demands commitments by all participants to work collaboratively to define the planning objectives and concepts proposed using a common terminology that blends the language of growth management with watershed science.

There are environmental restoration techniques and statutory initiatives that will award work done to create environmental improvement in terms of scientific functions and values. These techniques, such as conservation banking, wetland mitigation, nutrient reduction strategies, and forest preservation, may result in "credits" that are sold to fund the work undertaken. Queenstown encourages and authorizes the use of market-based ecosystem service credit tools to promote its underlying vision and help satisfy Chesapeake Bay Water Quality initiatives. Nothing is this Plan shall be interpreted to prevent the use of currently available and future credit tools to restore, protect and improve the environmental amenities of the Planning Area.

This Plan's core policies are:

• Repair and restore essential functions of the natural resource base and enhance water quality over the long term as targeted farmlands are converted to developed uses. Existing woodlands will be preserved and expanded to connect with nearby woodlands. Stream protective corridors and buffers will be enhanced or restored. Tributaries of Queenstown Creek and the Wye River will be protected.

• All development will be environmentally sensitive and the natural character of land to be developed will be maintained. This approach will use development techniques commonly known as conservation design, and, at the lot level, environmental site design. Streams and wetlands are among the most sensitive features and they must have wide, protective natural buffers, and development must be designed not only to minimize impacts to these features, but also to restore natural functions.

• Target growth projected by the Plan on approximately 30% of the available growth acreage and preserve the remainder as open space, farmland, stream buffers, and forests. Placing growth in a compact pattern, holding it to the highest environmental standards, and managing the preserved lands to protect and enhance the watershed will have a significant positive impact on the quality of the Chester and Wye Rivers and, ultimately, the Chesapeake Bay.

• Preserve and connect productive farmland, but promote agricultural Best Management Practices (BMPs) which minimize aquifer withdrawals and nutrient applications to protect coastal ecosystems.

In furtherance of these objectives the Community Plan incorporates a consolidated growth plan that minimizes impacts to our waterways and reduces infrastructure costs. The extent of the consolidated growth area was determined by estimating the number of building units potentially available to adjacent land owners and directing those units to growth areas adjacent to Queenstown with proposed building densities similar to the existing municipality. The growth will radiate out from Queenstown in multiple directions, resulting in a concentric configuration that minimizes infrastructure costs and impacts on the environment while incorporating or realizing the potential benefits of the regional traffic patterns. Developers will be encouraged to build complete communities or stand-alone portions of communities so that Queenstown growth is gradual and controlled rather than sprawling and speculative. A full-build out scenario is summarized below. For convenience, we refer to the name of the current owner of the property in describing the development type and density of each respective site, although the land use recommendations were based irrespective of property boundaries (See Figure 1-3). Properties are listed alphabetically and not in any order in which they are intended to be developed over time.

Callahan Farm –All or a portion of the Callahan Farm should be annexed and developed similarly to the Town with a mix of residential and institutional uses. The central location relative to regional transportation routes sets this area as an ideal location for educational and research campuses. The balance will remain as open space using a transfer of development rights or other mechanism. The developed portion of the farm should be given a flexible, mixed-use designation with the highest quality of design, highest level of public facilities, large amounts of functional open space, and strict protection of sensitive areas. This mixed use area is recommended as a transition between the Town and its surrounding rural areas.

Dudley Home Farm– All of the Dudley Home Farm should be annexed and, in the long term, developed as a residential neighborhood that feels like an addition to the Town and includes a mix of unit types and lot sizes. The development should incorporate an agricultural buffer from the resource extraction and landfill uses to the north. Approximately 209 acres should remain in agricultural and open space preservation**.**

Dudley North – It is recommended that this 64 acre area be annexed into Town and developed as a Town-scale mixed residential and commercial development. As a result, housing, shopping, transit, and jobs can be in close proximity. Development densities should be comparable to that in the vicinity of

Melvin Avenue and Dudley Avenue (currently 4 to 8 units per acre). The neighborhood character and street pattern is intended to be similar to the older sections of Town and shall reflect its best design characteristics. The commercial component could be concentrated at the eastern end of the Dudley North site to take advantage of access improvements at Rt. 301 and Greenspring Road. Several public uses in need of relocation could also be built within the commercial component including a new Fire Department facility. To this end approximately ten acres should be set aside for a "Queenstown Public Service and Safety Center".

Dudley South - This parcel of 147 acres includes farmland, a stream, and woodland. The Plan calls for annexation and development of a portion of this land to include a mix of regional commercial, institutional, and residential uses connected to Queenstown proper by a pedestrian/bicycle overpass. It also requires an extensive buffer on both sides of the property's stream and preservation of the adjoining woodlands.

McClyment Farm – The plan for this parcel is to acknowledge the currently approved development of 60 homes and to maintain the balance of the property in best management practices agriculture by transferring development rights (or another acceptable arrangement to compensate the owners) to other properties selected for growth. The Plan supports annexation of this property.

Rhodes Farm – The Plan allows the Rhodes farm to remain in best management practices agriculture as the result of the transfer of development rights (or another acceptable arrangement to compensate the owners) to the Dudley North, Dudley South, and Callahan properties described above. Plan supports annexation of this property.

Wheatland Farm - The Plan recognizes the Wheatland Farm as a suitable site for annexation and development. Development here requires special measures due to its location in the Critical Area and its proximity to the Wye River. Any development must receive Growth Allocation from the Town and Critical Area Commission approval as an Intensely Developed Area. This process will require a detailed understanding of the measures to minimize runoff into the Wye River and its tributary and the site's overall environmental impacts.

Town Details

Town Center - The Town Center needs to be revitalized and maintained as a traditional small town mixed-use area with historic and pedestrian-oriented character. Existing historic structures and sensitively designed infill development should accommodate a diverse mix of compatible residential, nonresidential, and public uses. Small-scale commercial businesses and services should be oriented to the needs of the community and to tourists. The restoration of the storefront that is part of the bed and breakfast on Main Street should be emulated by the other commercial properties, particularly those between Charity Lane and the Town Office. The Town Center should be a focal point and identifying feature of the Town for locals and visitors alike.

Town Docks – The two Town docks at the ends of Second and First Avenues retain Queenstown's historic ties to the water and provide an opportunity for visitors and citizens alike to enjoy the waterfront atmosphere and vistas afforded by their location. It is highly recommended that they be upgraded and maintained to serve multiple purposes.

Queenstown's Gateways – Rt. 18 at Rt. 301, Del Rhodes Avenue at Rt. 301, and Rt. 18 at the eastern end of Town are the principal gateways entering the community (See Figure 1-11). In addition, Rt. 301, after the Rt. 50 split, serves as an attractive approach corridor to the Town from the west. Although the Town entrance on Route 456 from Route 50 is not in the Town proper, it is a heavily used entrance to the Town and the Town and County should cooperate to improve the appearance of this area. Improvements are called for at all the gateways.

Little Queenstown Creek – This area needs special attention to extend pedestrian access and deal with flooding issues. Pedestrian access across the east end of Little Queenstown Creek should be improved in both directions to facilitate community access and neighborhood interactions. Ideally, the existing footbridge would link up with a footpath that skirts Queenstown Harbor development and facilitates access to the Queenstown Harbor Golf Course. Sidewalk and roadside improvements should also encourage pedestrian and bicycle thru-traffic to the playground park on the east side of Queenstown.

Old Creek Bed – Over the long term, the low lying land centered on Thompson and Melvin Avenues should be returned to its original state due to its location in the floodplain. Accumulating the necessary funding to acquire this land should be a long-term Town capital project. Under Town ownership the area should be returned to a more natural state as a Town Park comprised of wetlands and floodplain.

Transportation

A central goal of this Community Plan is to provide a safe, efficient, and attractive transportation system for the Town and region. Future development will require transportation improvements. These land use changes should be used as a catalyst for a regional assessment of transportation needs, a regional solution and regional political support. The State Highway Administration's current plans for the Queenstown area offer an inadequate and piecemeal solution to what is clearly a regional problem.

Queenstown must join with all municipalities in the region, local businesses, and residents in the region to advocate this regional solution to our collective transportation needs. Landowners and developers who benefit from growth in our neighborhood must contribute to the funding of the transportation solution. No new development will be approved within the Planning Area unless it addresses any traffic impacts generated by the new development. In addition, no new development will be allowed unless it can be determined that adequate public facilities and infrastructure are in place or are planned and funded for construction within a reasonable time period in conjunction with the proposed development.

Recreation and Open Space

The Town needs an aggressive approach to parks and recreation. An essential step was the establishment of a Parks and Harbor Board. The functions of the Board include the recommendation of standards for the style and quantity of parkland in new developments. It will also undertake measures to improve the beauty and recreational potential of existing Town parkland and prepare a Harbor Plan for adoption by the Town Commissioners. Queenstown has the opportunity establish an impressive park network that will add to its quality of life and attract people to the Town.

Public Safety

Recent efforts to make our streets safer for residents, walkers, and bicyclers should be continued. In all new developments, be they residential, commercial, or institutional, the street layout and design should include traffic calming provisions.

Educational/Research Facilities

Educational and research facilities are welcome in our Planning Area. When additional public schools are needed in the County, the Queenstown Planning Area provides an attractive location. The construction of a major educational facility would provide benefits to both the County and Town. Among them are a central location, recreation facilities for the Town, and an impetus and catalyst for transportation improvements that would benefit the region.

Public Facilities

The Town should demand public facilities impact studies as part of the development approval process and it should continue to require annexation as a condition for extension of public water and sewer service and establish hookup fees commensurate with actual cost. The Town should require preservation/creation of open space as parkland as part of the development approval process.

Sensitive Areas

The need to restore and protect environmentally sensitive areas is based on the fact that these resources are vital to the well-being of the community. State law requires that this Plan address protection in four sensitive areas: the 100-year floodplain, streams and buffers, habitats of threatened or endangered species and steep slopes.

The Town's recommended method to protect the 100-year floodplain is to halt any future development there and to encourage Town acquisition of properties in the flood plain so that they can be returned to an undeveloped state. Regarding streams and buffers, the Town's goal is to preserve and enhance these by identifying and mapping all streams and by seeking an optimum 300-foot buffer from each bank and by improving stormwater management in developed/developing areas. The Town recommends the restriction of new development within stream buffers and will prohibit disturbance of natural vegetation within buffers.

The existing Town boundary includes three protected habitats, the Great Blue Heron rookery, a bald eagle nesting site, and Delmarva Fox Squirrel habitat, all on the golf course property. Should habitats of other threatened or endangered species be discovered or included within the Town through annexation, such habitat will be protected accordingly.

Most of Queenstown is relatively flat but localized steep slopes occur adjacent to streams and are

protected by the proposed stream buffer requirements. The Town's goal is to direct development away from steep slopes and the Town will demand, when appropriate, topographic review of subdivision and site plans. It will prohibit development on slopes greater than 25 percent, and on slopes greater than percent if highly erodible soils are present, unless it can be demonstrated that the stability of such slopes would be improved and adverse environmental impacts mitigated.

Welcome to Queenstown

Indians were the original occupants of the lands of the Eastern Shore, including the entire Queenstown area, long before the first settlers arrived. The local Indians were named the Ozinis, a group belonging to the Matapeakes. The earliest settlers had to deal with Indian uprisings and when Henry Coursey settled a treaty with the Susquehannas of the Iroquois Confederacy he was granted a patent for as much land as he could cover with his thumb on a map of the time. What became known as the "Thumb Grant" was all the land comprised of Blakeford on Coursey's Neck, and My Lord's Gift, across the creek. Henry kept the land known as My Lord's Gift and gave his brother William the Blakeford property. The survey of My Lord's Gift in 1650 gave the size of the property as 1,050 acres.

Richard Bennett III came into significant land in the Queenstown area through both inheritance and his mother's remarriage after the death of his father. When he died in October of 1749 at the age of 83 he was considered the richest man on the new continent.

It was the arrival of a former British Naval surgeon in 1660, however, that gave the area that would come to be known as Queenstown its richest contribution of government officials. Their contributions included the effort needed in 1707 to formally establish Queenstown as the County seat of a new County to be named for Queen Anne of England. In a patent dated January 17, 1659, Dr. Richard Tilghman was granted ownership of the land called The Heritage. It was through the Tilghman efforts, together with several other individuals that the life of Queen Anne's County revolved around the new County government and its courthouse.

One of those other individuals responsible for helping establish Queen Anne's County, and Queenstown as its first County seat was John Hawkins, the owner of the estate called Bolingly. His deed of purchase went back to 1680. His prominence throughout the Eastern Shore was significant, and the combination of the Tilghman and Hawkins names was strong enough in Annapolis to assure the establishment of the new County. It was the "unanimous opinion" that the Bolingly estate was at the

heart of the new County carved out of Talbot and Kent counties. The new town was named Queenstown, in the new County named for Queen Anne.

During the last half of the 1700's, pressures began to build as complaints rose over the distances to travel to court in Queenstown. At the time the new revolution was underway against the occupation of the British, and as smallpox took over Queenstown, along with the fact that the County courthouse itself was in serious disrepair, voting for the new State Constitution was moved to a building at Chester Mill (now called Centreville). Within a few years, the new courthouse was built in Centreville, and Queenstown's position as County seat was lost.

Queenstown's harbor however was still a primary focus as a safe place for packet boats to and from Baltimore. Within a few short years it became the focus of British attention. In 1813 the British found the estate of Bolingly, owned then by Richard Hall, an attractive place for plunder to feed their troops. When prisoners from the Eastern Shore who had been taken from a packet boat in the Bay were returned to Queenstown, fear of attack became a major concern. Troops were sent to Queenstown in April of 1813 in preparation against attack.

However, the attack did not actually come until August of that year, and it came in a two pronged effort, by land and by water. The British had waded through the Bay waters at the Narrows, coming by foot from Kent Island. At the same time British sailors also came by water, some 40 boats. Unfortunately for the British, but fortunately for the Americans, the British had mistaken which waterfront property they were to invade. Thus they went to the Coursey's Neck side, and not directly to Bolingly. Nevertheless, they finally successfully completed their ransacking of the Bolingly estate, taking farm animals, (cattle and pigs), grain, household goods, and valuables. The Americans drove the British who had come on foot back across the Narrows, with no loss to the American militia.

From the end of the War of 1812 throughout all the 1800's, Queenstown was a significant transportation and commercial hub for the area. Steamers began to replace sailing boats as primary commercial vessels by 1817. Whether by water or rail, the huge amounts of peaches, tomatoes, and grain that were shipped out from Queenstown were flaunted in the local paper at every occasion. As a result of the increase in commercial activity, all the other services, especially the taverns developed as well. Bolingly, for a little while, became a tourist destination as a spring and summer hotel for Western Shore travelers. Horse races were held there, open to the public. While the first rail effort began just before the Depression of 1837, the ultimate impact of the railroad was extremely helpful to keep the port in Queenstown going as a means for farmers to get produce to Baltimore.

Beginning in 1888 the local paper, *The Queenstown News*, advocated the proper incorporation of Queenstown. It took a few years, and finally on April 7, 1892 the Maryland General Assembly approved incorporation, 185 years after Queenstown had been approved as the original County seat. The laws and by-laws of the Town reflected those required by the County. They dealt with the nuisances of horses, pigs, and cows and other private livestock wandering the streets, a common occurrence at the time. However, the fine was 50 cents cheaper in Queenstown.

By 1899 the strength of Queenstown as a commercial town was strong enough to support a new bank, incorporated first as the Queenstown Savings Bank of Queen Anne's County, and officially opened on July 1, 1899. In 1892, the same year of incorporation, a tavern in the center of Town caught on fire resulting in the destruction of a significant portion of the Town Center. In 1918, a part of that site was

acquired for the original bank building of the Queenstown bank where it remains to this day as a Town Center beacon.

Today there is no rail or marine transport operating out of Queenstown. The British have long gone, the County seat has moved. However, the traditions of courage in patriotism, strength in commerce, and openness in hospitality still exist as strong as ever.

Contributed by Mary Margaret Revell Goodwin of Centreville

CHAPTER 1: THE QUEENSTOWN PLAN

1.1 Purpose of the Plan

The Queenstown Community Plan establishes goals, objectives, and recommendations for a long-term growth management program for the incorporated Town of Queenstown and adjacent unincorporated areas of Queen Anne's County. It is the purpose of this Plan to chart a responsible and beneficial course for the future of Queenstown. It is a Plan that recognizes growth can either be Town-oriented, countryside-oriented, or a combination. This Plan adopts the philosophy of focusing growth in and around the existing Town, thus it is a plan for change -- managed change that will be compatible with, and improve upon, the existing character of Queenstown and the quality of life experienced by its residents.

Within its corporate limits, this Plan will serve as the Town's official Community Plan. It addresses all of the various planning requirements contained in the State's planning and zoning enabling legislation -

- Article 66B of the Annotated Code of Maryland. This Plan is intended to replace and update Queenstown's current Community Plan which was adopted jointly in 1998 by both the Town and County.

Much of the unincorporated area around Queenstown was designated as a "growth node" by the 1987 Queen Anne's County Comprehensive Plan and a "Growth Sub-Area" by the 1993 Queen Anne's County Comprehensive Plan. The County's 2002 Comprehensive Plan conformed with the goals, objectives, and policies of the 1998 Queenstown Community Plan as they related to "Growth Sub-Areas."

Implementation of this Plan will be phased in over a period of years based on community priorities, funding resources, and market pressures. The Plan establishes a long-term vision for the future of the Queenstown area that should act as a firm guide for public and private decisions and investments. However, the Plan is not perfectly rigid and may be revised as situations warrant and community objectives change over time. It is mandated by the State that this Plan be reviewed and updated as necessary every six years. It should be clearly understood that some recommendations contained in this Plan may take many years and/or additional study before they can be realized.

1.2 Our Planning Philosophy

Maryland's Visions

During the 2009 Legislative session, the eight planning visions of Maryland's 1992 Planning Act were replaced with twelve new visions to address a broader spectrum of issues. These new planning visions are the State's land use policy, and a local jurisdiction is required to include them in its comprehensive plan and implement them through zoning ordinances and other regulations. The primary growth management goals for the Town of Queenstown and the surrounding Planning Area are very well expressed by the twelve visions.

1. Quality of Life and Sustainability: A high quality of life is achieved through universal stewardship of the land, water and air resulting in sustainable communities and protection of the environment.

2. Public Participation: Citizens are active partners in the planning and implementation of community initiatives and are sensitive to their responsibilities in achieving community goals.

3. Growth Areas: Growth is concentrated in existing population and business centers, growth areas adjacent to these centers, or strategically selected new centers.

4. Community Design: Compact, mixed-use, walkable design consistent with existing community character and located near available or planned transit options is encouraged to ensure efficient use of land and transportation resources and preservation and enhancement of natural systems, open spaces, recreational areas, and historical, cultural, and archeological resources.

5. Infrastructure: Growth areas have the water resources and infrastructure to accommodate population and business expansion in an orderly, efficient, and environmentally sustainable manner.

6. Transportation: A well-maintained, multimodal transportation system facilitates the safe, convenient, affordable and efficient movement of people, goods and services within and between population and business centers.

7. Housing: A range of housing densities, types, and sizes provide residential options for citizens of all ages and incomes.

8. Economic Development: Economic development and natural resource-based businesses that promote employment opportunities for all income levels within the capacity of the State's natural resources, public services, and public facilities is encouraged.

9. Environmental Protection: Land and water resources, including the Chesapeake Bay and its coastal bays, are carefully managed to restore and maintain healthy air and water, natural systems and living resources.

10. Resource Conservation: Waterways, forests, agricultural areas, open space, natural systems and scenic areas are conserved.

11. Stewardship: Government, business entities, and residents are responsible for the creation of sustainable communities by collaborating to balance efficient growth with resource

protection.

12. Implementation: Strategies, policies, programs and funding for growth and development, resource conservation, infrastructure, and transportation are integrated across the local, regional, State and interstate levels to achieve these visions.

These visions make good common sense from a fiscal, environmental, and economic development perspective. They are designed to direct growth to areas where infrastructure already exists and discourage the rapid consumption of agricultural lands and environmentally sensitive areas in the predominantly rural sections of the County. These visions give local jurisdictions a succinct statement of Maryland's priorities for their plans. However, the visions are intended as the beginning of the planning process, not the end. Queenstown will start with the visions and interpret them to establish its priorities and directions.

Queenstown's Visions, Objectives, and Evaluation Measures

The Town's Visions

These overall Town visions directly lead to and complement the basic objectives of Queenstown as it prepares to meet the challenges ahead. These visions are:

• To control our destiny as a Town rather than being driven by piecemeal growth over which the Town would have no control. This requires that decisions be made by the Town and not for the Town.

• To establish Queenstown as a leader on the Eastern Shore in environmental stewardship and community design by paying strict attention to environmental regulations and requirements and actively promoting neighborhood design that reflects the rural, village-like characteristics of Queenstown.

• To ensure that growth not only pays for itself, but that it also be a source of ongoing revenue for the current and future infrastructure needs of the Town.

The Town's Objectives

The overall objective is to maintain balance in Queenstown's economic, aesthetic, cultural, and historic elements. This notion is built on a commitment to change at a pace that preserves the Town's special quality of life, preserves its diversity of citizenry and architecture, and preserves open space and the environment, as well as the Town's historic character. We choose to accept orderly, compact, phased, and compatible growth in our Planning Area as our alternative to the suburban sprawl, automobile-dependent development that has consumed hundreds of thousands of acres of valuable lands across our country.

These objectives include a commitment to revitalization of the Town Center, to provision of affordable and workforce housing, and to creation of ongoing opportunities for economic development.

The Town's history is intimately connected to the water, yet our citizens have limited access to the treasure that is our waterfront. Our Plan provides improved access to our waterfront.

Queenstown and its logical Planning Area occupy land that has profound implications for the quality of Queenstown Creek and the Chester and Wye Rivers. This Plan acknowledges our responsibility to these unique resources and includes measures to protect and improve them.

These objectives also include a determination to improve the Town's access to Routes 50 and 301 and to mitigate the noise generated by traffic on Rt. 301. This Plan creates a community that is connected and includes features that will reduce our dependency on the automobile. It provides broad opportunities for walking and biking.

The final objective is a firm commitment to protect Queenstown from the fate that has befallen some other locales on the Eastern Shore – development of vast tracts of uncontrolled, unattractive generic housing that virtually obliterate a small town's character and surrounding open space. The Town is determined that it will not happen here.

The Town's Evaluation Measures

This Plan uses a watershed-based approach to land planning and watershed models provide some of our best tools for guiding land management decisions. By identifying sensitive areas where development is

more likely to adversely impact water resources, incorporating local expert knowledge, and deriving detailed maps of alternative development scenarios, the Plan is able to incorporate management and policy considerations, such as zoning, infrastructure costs, and economic impacts, with the science of understanding the functioning of watersheds. The approach is imperfect because of its newness, but it demands commitments by all participants to work collaboratively to define the planning objectives and concepts proposed using a common terminology that blends the language of growth management with watershed science.

The recommendations and directions contained in this Plan are designed to be flexible and should be periodically reviewed and revised as situations warrant. Implementation of these recommendations should be phased-in over time, based upon community priorities, funding, resources, and market pressures. Queenstown has taken over 300 years to evolve into the community it is today. Future change will occur at a natural pace and it may be many years before some of the recommendations contained in this Plan are realized. Certain fundamentals, however, will be observed as Plan recommendations are modified and adjusted and development proposals are evaluated. The fundamentals against which all proposals for change will be measured are:

CHANGE MUST FIT (be compatible with traditional Eastern Shore character and architectural identity). Traditional, historic Eastern Shore towns with integrated, multiple layers of land uses, will be used as a guide for new development.

CHANGE MUST FIX (provide overall environmental benefits). Responsible changes in land use patterns will result in health, safety, and environmental protection and enhancement, especially when stream buffers are restored, forested areas are connected, and areas prone to flooding are maintained or restored to their natural state.

CHANGE MUST PAY (needed infrastructure and service improvements will be offset). Changes in land use patterns must result in benefits and resolve problems. The market value realized through society's decisions to promote development (for example, through zoning, annexation, and infrastructure) will be directed toward a community vision of an improved quality of life and to offset initial costs and create substantial continuing revenue for the community.

CHANGE MUST SHARE (regional responsibilities will be acknowledged). Concern for the public interest, broadly defined to include current and future residents in our Town and region, will be an

integral consideration in changes to land use patterns.

These measures will be translated into a set of tools for directing future change and managing the pace of that change so that both new and existing communities enjoy the quality of life envisioned by the best of our planning efforts. The tools that make up such a system include:

- A list of essential public facilities and categories of environmental goals – transportation, schools, water quality, air quality, etc
- Standards for each listing
- Test or performance standards – e.g. levels of service, ratios or qualitative measurements
- Oversight mechanism
- Evaluation of effectiveness
- Feedback to planning and budgetary processes

There are environmental restoration techniques and statutory initiatives that will award work done to create environmental improvement in terms of scientific functions and values. These techniques, such as conservation banking, wetland mitigation, nutrient reduction strategies, and forest preservation, may result in "credits" that are sold to fund the work undertaken. Queenstown encourages and authorizes the use of market-based ecosystem service credit tools to promote its underlying vision and help satisfy Chesapeake Bay Water Quality initiatives. Nothing in this Plan shall be interpreted to prevent the use of currently available and future credit tools to restore, protect and improve the environmental amenities of the Planning Area. The Town recognizes that any credit banking program would require cooperation, consultation and approval by state and federal agencies having jurisdiction over the same.

The remainder of this Chapter is dedicated to a discussion of the alternatives considered by the Queenstown Planning Commission and a listing of objectives and implementation recommendations designed to achieve the Town's visions for the Queenstown Planning Area.

1.3 An Overview for Queenstown

1.3.1 Challenges and Opportunities

Change is underway in the Queenstown region and several potential challenges must be taken into account.

- Traffic growth may be expected to congest area highways and degrade the effectiveness of the

intersection access control strategy now in place. Major and costly improvements are planned to MD Rt. 50 and some initial engineering design work has commenced. However, no improvement has been funded for construction. Seasonal peak traffic congestion along MD Rt. 50 is made worse by the commercial development at Outlet Center Drive and the traffic signalization at that intersection.

• Current highway planning for the Rt. 50 corridor does not incorporate the access and circulation needs of development that could occur in the Planning Area. Nor does it address the circulation needs of Queenstown, most prominently the relationship between the area's two arterial highways, Rt. 50 and Rt. 301. No highway capacity improvements are planned to Rt. 301 through the study area.

• Area streams and rivers are not adequately protected from nutrient and sediment runoff. This includes streams which today drain cultivated farmlands. Past development practices have placed residential development within the most sensitive areas along the Wye River. Within the Town, some houses are located in low lying areas that are prone to flooding.

• Sea-level rise in the Chesapeake Bay region increases vulnerability to flooding, storm surge, and saltwater intrusion into drinking water systems. Sections of the Town, including residential areas, have flooded during major storm events and may be expected to flood on a recurring basis. These areas have been identified by the U.S. Corps of Engineers Flood Insurgence Map as areas with potential for tidal flooding and storm surge during Category 3 hurricanes.

• Municipal water and sewer demands are exceeding permitted capacities. The Town of Queenstown has a wastewater treatment plant (WWTP), which discharges into Little Queenstown Creek, and has at times operated over its design capacity. This Plan anticipates the need for an expanded wastewater treatment facility.

• Current County zoning promotes a land consumptive, low-density residential settlement pattern in the vicinity of Queenstown. Part of the Queenstown Planning Area already is undergoing such conversion. See Figure 1-1 for a description of regional land use. The Queenstown area has exceptional access and regional mobility possibilities. It is a regionally significant location and its conversion to low density residential development, which is facilitated by current zoning and subdivision rules, would represent a lost opportunity for the public interest in thoughtful, long-range development, conservation, and infrastructure planning.

Opportunities are especially apparent in the area of natural resource management but also in other areas:

• There is a significant opportunity to encourage compact, high quality residential, commercial, and institutional development using only a small portion of Queenstown's Planning Area. The Town will ensure that its goals and objectives are accomplished through mechanisms such as annexation agreements, the adoption of floating zones that promote and encourage the principles outlined in this Plan, and developer rights and responsibilities agreements. In addition, where applicable or feasible, this focusing of development may also be accomplished in a manner in which landowners are compensated for reductions in long-term development potential of their land through transfers or agreements with other development rights mechanism or other means of concentrating growth may be needed.

• Thoughtful conversion of targeted farmlands to developed uses could provide a unique opportunity to repair and restore essential functions of the natural resource base and enhance water quality over the long term. Existing woodlands can be preserved and expanded to connect with nearby woodlands. Stream protective corridors and buffers can be enhanced or restored. Tributaries of Queenstown Creek and the Wye River can be protected.

• Targeted preservation of agricultural and open space areas provides opportunities to connect and enlarge blocks of productive farmland, which could perpetually define the character and function of the larger area around Queenstown. Along with preservation, new programs are needed to encourage low impact farming practices that minimize nutrient additions to aquatic ecosystems.

• The recent expansion of the Town's municipal limits along the Chester River provides an opportunity for broad public access to the water and the development of a recreation trail system.

• The long-range aspect of State highway planning for grade separations and capacity improvements in the Rt. 50 corridor—and the lack of funding commitments—mean that it is time for reappraisal and adoption of more comprehensive transportation and land use planning ideas.

• The Queenstown area's location in the region and its accessibility and mobility advantages provide an opportunity to meet the needs of the larger community and region. The land is monetarily valuable, but its real estate market value is realized in part only through public decisions. The value created through

the Town's and the County's proactive planning, zoning, and infrastructure authority can be translated into measurable improvements to the health, safety, and welfare of area residents. The opportunity is to conserve and efficiently use public funds by concentrating development in areas where public infrastructure and services may be most efficiently provided.

1.3.2 Planning Area Land Use

The Planning Area considered by the community has changed from the 1998 Plan (See Figure 1-2). It is a larger area and includes land parcels adjacent to Queenstown (i.e. Dudley North), adjacent to Rt. 50 (i.e. Wheatland Farm and the largely SHA-owned property between Sportsmans Neck and Greenspring Roads along Rt. 50), and within the Rt. 50 and Rt. 301 triangle (i.e. Dudley South, McClyment Farm, Rhodes Farm, and Callahan Farm). These parcels are shown in Figure 1-3 along with two other important planning considerations. First, it shows lands that are presently deed restricted and preserved as open space within and adjacent to the Planning Area. Second, it shows lands which are or should be off-limits to development because of the presence of streams and wetlands.

In a series of community workshops held in the first part of 2007, participants were asked to list desirable changes that could occur over time within the Planning Area. Figure 1-4 shows the composite results of that discussion. The items in green (e.g. farmland preservation) were judged to have complete community acceptance as desirable objectives. On the other hand, the items in red, although mentioned by some as worthy to pursue, were judged not to have complete community acceptance and in need of further analysis. These subjective elements of the visioning discussions as well as more objective impact analyses were subsequently used to differentiate among the land use alternatives considered by the Planning Commission.

Guided by concepts derived from these community workshops, the Planning Commission developed and evaluated four land use alternatives. They included one that ceded control of all land outside the existing Town boundary to the County and three that involved annexation of neighboring properties and Town control of land use thereon. As the basis of further land use planning the "consolidated growth" alternative was selected. It focuses growth in constrained areas adjacent to the current municipality, resulting in relatively high development density in these areas. It also retains the current rural character outside this constrained growth area and results in a greenbelt of farmland and woodlands, much of it preserved, surrounding the growth area.

The next step in developing the land use plan was to conduct a study to quantify the type and pace of

growth that the marketplace would allow and to better define where and how an acceptable growth pattern could be achieved. As Queenstown grows to encompass new land areas separated from the current town by limited access roads, and access to these areas are changed by State highway plans, a more refined vision for the larger whole is needed to ensure that growth occurs in a manner that preserves and enhances the unique Town character of Queenstown and ensures its ongoing vitality. The study's objectives were to:

- Refine the boundaries of growth in the Plan's selected growth areas.
- Examine the marketplace for the amount and type of growth projected.
- Outline the design character of the selected growth areas.

Several key considerations emerged from the resulting economic study (prepared by S. Patz & Associates Inc. December 30, 2008). First, the Dudley Home Farm, because it will ultimately be adjacent to a developed portion of Queenstown, was identified as a logical candidate for annexation and development. Any such development would incorporate a buffer from the resource extraction and landfill uses to the north of the Home Farm.

Second, the study's projections of household growth and the number of occupied housing units, show demand for approximately 1,000 new homes in the County between 2009 through the year 2015. This projection assumes an average annual rate of new home construction at approximately 140 per year during these seven years. Much of this demand would be "attracted" to the Kent Island and Queenstown areas. With available land and active development sites, the post-2015 period could generate a slightly higher Countywide demand for new homes.

Third, there has been a net growth in jobs within the County during the 2001 to 2007 period. Net growth during this period has been 360+ new jobs per year on average. At a rough average of 450 square feet per job, the level of job growth since 2001 corresponds to the addition of 1.15 million square feet of commercial and industrial building space, or 190,000± square feet per year on average Countywide. Approximately 45% of the average increase in commercial/industrial building, or 90,000± square feet per year, would be the type that is planned for the Queenstown area.

Fourth, residential or commercial/industrial development in the Queenstown area is not likely to be feasible for another five years due to: (1) current national and local market conditions; (2) competition from well-located and active subdivisions and business parks/commercial properties; and (3) the ability

to develop the sites due to public utility availability and plan review.

Current County zoning allows approximately 605 additional dwelling units in the Planning Area. (See Figure 1-5). Clustering of this development is necessary to achieve the Plan's firm commitment to compact, high quality residential, commercial, and institutional development using only a small portion of Queenstown's Planning Area. Through the adoption and establishment of one or more floating zones or other zoning techniques, the Town will ensure that any development of large, vacant tracts of land will be consistent with this Plan and that development will comply with the Town's goals and objectives in terms of design and character, development density, protection of sensitive areas and open spaces, transportation patterns, and public infrastructure. The Town will ensure that development meets or exceeds these goals through annexation agreements, developer rights and responsibilities agreements, the application of a floating zone to a particular property or properties, and the approval of an associated development master plan. Another mechanism that the Town is considering is a transfer of development rights program whereby property owners are awarded bonus dwelling units or square footage beyond what is allowed by the base zoning if they agree to compact growth in limited areas. To build this incentive, the 605 dwelling units allowed under current zoning were increased to 1000 units with the extra units distributed in a way that supports this Plan's land use objectives. This creates a "bank" of development rights that can be transferred from property to property to achieve concentration and equitable landowner compensation.

All of this information was used to refine the Queenstown land use concept. This refinement reflects the Queenstown area accepting 25% of the projected annual County residential growth over a 30-year period or 1,000± dwelling units (25% x 4,200) and 25% of the projected annual commercial/industrial space or roughly 700,000± sq. ft. (25% x 90,000) over a 30-year period. Adding the planned Golf Resort gives a grand total of 885,000 sq. ft. The numbers set forth in this Plan are intended to be projections, goals and reasonable forecasts, and are not intended to be rigid, or inflexible. The Town will consider other figures or scenarios where the development proposals meet or exceed the goals and objectives of this Plan. The results are shown in the following table:

Table 1-1 Land Use Growth Recommendations

Parcels	Total Acreage	Dwelling Units	Commercial/ Office (sq ft)	Preservation Acreage
Town				
Town	Infill	30		
Golf Resort	Infill	0	185,000	205
Town Center	Infill	0	15,000	

Town Sub-Total	**872**	**+30**	**200,000**	**205**
Growth Areas				
Callahan	247	240	0	174
Dudley Home Farm	297	290	0	209
Dudley North	64	130	25,000	22
Dudley South	147	130	550,000	73
McClyment	174	60	0	114
Rhodes	270	0	0	270
Wheatlands Farm	143	150	110,000	87
Growth Areas Sub-Total	**1,342**	**1,000**	**685,000**	**949**
Town & Growth Areas Total	**2,214**	**+1,030**	**+885,000**	**1,154**

* Residential density is calculated at an overall average of 3.3 dwelling unit/acre except for McClyment which is calculated at one dwelling unit/acre; commercial coverage is calculated at 10,000 sq ft of enclosed space per acre

This land use plan adds approximately 400 "bonus" units to the base (County) zoning and provides a strong economic incentive to consolidate development in the targeted locations. Table 1-1 shows the number of dwelling units in the growth area and their proposed distribution. This Table will guide the design and composition of the planned growth areas and the minimum density to be achieved on each property. Town development regulations will be designed to allow implementation of Table 1-1. The spatial distribution of planned growth areas is shown in Figure 1-6 and is described in Section 1.4.1, Land Use in Queenstown and the Planning Area. The specific location and density of each planned growth area is not meant to be absolutely fixed and may be adjusted to conform to site and environmental considerations.

This approach is the most advantageous growth plan for Queenstown for the following reasons:

“Change Must Share” - Our projections show a Countywide demand for approximately 4,500 homes over the next 30 years (at a rate of 150± units per year after 2013). This plan accommodates roughly 23% of this residential growth. On the commercial and industrial space side, the County has added roughly 190,000 square feet annually since 2001. Approximately 45% or 90,000± square feet per year is the type of commercial space that is planned for the Queenstown development sites. This plan accommodates roughly 25% of the anticipated 90,000 sq. ft. of annual County commercial/industrial growth suitable for Queenstown over the next 30 years. These figures meet our self-imposed requirement to acknowledge our regional responsibilities.

“Change Must Fix” – The projected growth is accommodated on only 30% of the available growth acreage and preserves the remainder as open space, farmland, stream buffers, and forests. Placing

growth in a compact pattern, holding it to the highest environmental standards, and managing the preserved lands to protect and enhance the watershed will have a significant positive impact on the quality of the Chester and Wye Rivers and, ultimately, the Chesapeake Bay.

"Change Must Pay" – The market analysis prepared for the Plan shows that the planned land use will generate roughly $876,000 (2008 dollars) annually in net tax revenue at full "build-out." Up-to-date fiscal analyses will be required as developments are proposed.
The land use described in this Plan consolidates infrastructure, produces efficiencies of scale, and provides a significant revenue base for infrastructure improvements. It meets the requirement to offset the costs of infrastructure and create continuing revenue.

"Change Must Fit" - By designing neighborhoods in the tradition of the small towns and waterfront villages found throughout the Eastern Shore and employing Victorian, bungalow, cottage and traditional colonial architectural styles, we can capture a significant layer of the visual attraction of the Eastern Shore. By using tree-lined streets, service lanes providing access to garages behind houses, neighborhood parks and squares that unite with greenbelts and pedestrian paths, we can create a village that respects tradition and becomes the opposite of the typical disconnected, featureless subdivision. This compact alternative follows the historic pattern of Eastern Shore towns and meets the requirement to be compatible with the existing Queenstown community.

With a modest increase in population and land coverage, the land use described in this plan offers Queenstown and the County the best mix of development and preservation, jobs and revenue, and traffic and infrastructure solutions. It best meets the combined requirements to Fit, Fix, Pay, and Share.

1.3.3 Implementation

Implementing the Plan's land use concept will require a new approach to assembling, designing, and evaluating development proposals. First, a mechanism to move development among the Planning Area properties must be an integral part of the Town's zoning and subdivision regulations. If concentrated development, sensitive area protection, and rural preservation are to be achieved, some properties may have development, others may not. But all property owners must be able to benefit from the development potential created and this requires a creative regulatory mechanism.

Second, the ordinances developed to carry out the Plan must provide flexibility and performance

criteria which produce a choice in the types of living environment and living units available to the public; maximum open space and recreation areas; a pattern of development which preserves trees and habitat, the natural topography and geologic features, sensitive areas, and protects and improves water quality; a creative approach to the use of land and related physical development; an efficient use of land resulting in smaller networks of utilities and streets and lower housing costs; an environment of stability in harmony with the character of Queenstown proper; and a more desirable environment than would be possible through the strict application of predetermined height, area, and bulk regulations. These goals can be implemented through various land use tools and regulations, including, annexation agreements, development rights and responsibilities agreements, floating zones, and design guidelines.

Third, in recognition of the special character of Queenstown, development specifications will be kept to a minimum but will require intensive negotiations with the Town Commissioners and the Planning Commission to achieve the Plan's objectives for compact and efficient residential, business, and commercial development suited to the needs of each specific site. For example, through the implementation and adoption of one or more floating zones and associated development regulations, building setbacks, bulk standards, lot sizes, impervious coverage, height, landscaping, buffer yards, lighting, walkways, development density, and road standards shall be determined by the Planning Commission for each individual development in the Planning Area and approved by the Town Commissioners as part of the establishment of a floating zone and development master plan. The central reason for the Planning Commission's and the Town Commissioners need for wide authority in setting standards is to provide design flexibility, consistent with public health and safety, for properties that bring a range of differing physical and environmental concerns and for applicants who must develop property and construct buildings in accordance with a unified and coherent plan of development. When determining these requirements, the Planning Commission and the Commissioners should consider such factors as the proposed intensity of the development, use mix, design, compatibility with existing or anticipated development on surrounding lands, and compatibility with the lot density and character of Queenstown. The Commissioners and Planning Commission may also consider the current lot distribution of the Town as calculated in the following Table and shown in Figure 1-7.

Table 1-2 Current Distribution of Queenstown Property Acreages

Lot Size (acres)	% of Current Queenstown Properties
0.05	1
0.1	2.9
0.15	1.9
0.25	39.8
0.5	36.9
0.75	4.9
1	2.9
1.5	6.8
2	2.9

Fourth, preparation and approval of a master development plan will be required for any development proposal in the Planning Area. This is designed to achieve a unified scheme of development for an entire parcel which will be consistent with the provisions of the Town's Plan, its planning and zoning ordinances, and its growth policies. The unified development shall be master planned as an integrated project with well-designed and coordinated transitions between various land uses and adjacent existing land uses. A phasing plan for various components of the development shall be approved by the Planning Commission and the Commissioners as a component of the development master plan approval. Once approved, a developer will be obligated to comply with the approved development master plan when applying for subdivision approval for each phase of the development.

1.4 Queenstown's Planning Strategy

1.4.1 Land Use in Queenstown and the Planning Area

Land use is the foundation of the Plan. It is through the Land Use Plan that the Town intends to establish the pattern, type and pace of growth, meaning Queenstown will grow thoughtfully and carefully over the next 30 years, with a strong emphasis on development that is environmentally responsible, aesthetically pleasing, and economically sound with a very deliberate and phased policy of annexation. The Town is also committed to preserving the area's agricultural heritage and to establishing a network of connected, natural lands within and beyond our Planning Area. The Plan also emphasizes our commitment to preserving our historic character, maintaining our diversity across a range of age and income levels, and setting high design standards.

The maintenance of its small-town, rural identity is a key element of Queenstown's community

character and as future land use changes are carried out, Queenstown will insist on the highest quality of development. The preservation of its community character will involve a number of design principles, including:

• Mixed Uses Are Desirable – The Town wants to maintain a reasonable mix of residential, institutional, and commercial uses within and near our neighborhoods. It does not want to repeat errors of past decades, in which housing was located far from places to shop and work.

• Natural Features Should Determine Design – This means all development should be environmentally sensitive and that the natural character of land to be developed should be maintained. This includes development techniques commonly known as conservation design, and, at the lot level, environmental site design. Streams and wetlands are among the most sensitive features. They must have wide, protective natural buffers, and development must be designed not only to minimize impacts to these features, but also to restore natural functions. Environmentally sensitive development also means creating pedestrian-friendly streets so that people can walk to work, shop, or play. See Figure 1-8 for a depiction of sensitive areas in the Queenstown Planning Area.

• Development Will Improve Our Watershed – This means all development will be required to incorporate watershed management practices that will bring substantial benefits to our creeks and the Chester and Wye Rivers including strategies that minimize runoff and sediment transport generated by development as well as the possibility of using highly treated wastewater for irrigation through a separate water distribution system.

• Automobiles Should Not Determine Design – The Town does not want garages to be the most prominent feature of houses, nor does it want streets that are overly wide and huge parking lots that are unrelieved seas of asphalt. Our streets will be designed to be shared by all potential users and be pedestrian-friendly so that people can walk to work, shop, or play.

• Ample Open Space Must Be Provided – This means that every developer must provide significant, usable open space as an integral part of projects and neighborhoods – not afterthoughts. This also means the Town will work to improve existing open space to create green corridors of connected open space. See Figure 1-9 for a description of preserved lands and open space.

• Substantial Landscaping Should Be Incorporated In Design – This will include a number of

approaches, including requiring developers to leave as much existing forest as possible, requiring large, healthy nursery stock, native species, irrigation systems, and replacement and maintenance bonds. It will mean treating signage and lighting as landscaping elements and requiring maintenance agreements for care of common areas.

• Architecture Should Reflect Queenstown's Traditional Development – Very simply, new development in the Town should look to the Town's historic core for examples of what to emulate, e.g. scale, size, materials, form and quality. The Town will insist on high quality architectural diversity and will not allow itself to be surrounded by generic residential and commercial development. Community character is also shaped by the way residential, institutional and commercial buildings are located within our Town. See Figure 1-10 for examples of desirable community character.

Land Use Recommendations for Queenstown Proper

For the Town Center – From Charity Lane along Main Street to Short Street and from Main Street to Wall Street on Del Rhodes Avenue is the natural and historic Town Center. This area must continue to be its civic heart and a viable commercial center. Town Center already has become a very modest commercial area compared to its past circumstances. This is due largely to its low traffic flows, low visitor flows, low visibility, and the Town's small size. The Town Center currently serves four functions. Its largest role is as the daily civic center of Town. Townsfolk visit the Town Office, the post office, the bank and church, and staff the fire station. Second, a small group of businesses provide Queenstown residents with a modest array of daily goods and services. These businesses benefit from the traffic generated by the civic functions and immediate proximity of residents. Third, a small group of businesses and cultural attractions seek to attract visitors and tourists to Town. Fourth, the Town Center serves as community event venue as the Town and the fire department hold community events and fundraising activities.

New pressures on the vitality of Town Center will occur should Queenstown grow to include land on the other side of Routes 301 and 50 and should either the Town or the County approve more, newer, larger and more accessible and more visible commercial development in that area. Without diligent action, the current Town Center will become even less accessible, less visible, less vital, and less central to Town.

The current extent of the land area and lots comprising Town Center is illustrated in Figure 1-11. The Town Center consists of 42,778 sq ft of non-residential space. Of this, there is 22,240 sq ft of building area for institutional uses and 20,538 sq ft for retail and service uses. The Town Center anchors are the bank, Town Office, post office, and fire station. These draw people to the center during the work day. The Queenstown Pizzeria depends on this daily local traffic. The Bed & Breakfast and Museum both benefit from out-of-town traffic. Currently, most of the Town Center's commercial parking needs are met with on-street public parking and by informal shared use of parking lots owned by the bank.

Moving the Volunteer Fire Department from its present location to a new facility at the intersection of Greenspring Road and Main Street will free up new commercial space downtown and operate as a catalyst for revitalization. Reuse of the Fire Station complex could add 6,500 sq ft, would double the amount of retail, and help create a more viable critical mass of shops. New retail uses could fill the ground floor street front space and apartments or offices could use the second floor space and the building in the rear.

The Town Center must be revitalized and maintained as a traditional small town mixed-use area with historic and pedestrian-oriented character. Existing historic structures and sensitively designed infill development should accommodate a diverse mix of compatible residential, nonresidential, and public uses. Small-scale commercial businesses and services should be oriented to the needs of the community and to tourists. The restoration of the storefront that is part of the bed and breakfast on Main Street should be emulated by the other commercial properties.

Recommended actions to increase the critical mass of commercial uses in Town Center include:

- Assist Town Center property owners to explore development opportunities and help with cooperative public/private solutions.
- Investigate using the Bank parking lot frontage for new commercial uses.
- Facilitate fire station conversion to commercial and office uses and help provide parking to support these new uses.
- Facilitate conversion or redevelopment of the house between the Fire Station and the pizza shop into shops.
- Encourage new business uses along Rte. 18 and Del Rhodes.
- Encourage clean up of current business establishments along Rte. 18 and Del Rhodes.
- Encourage new retail along Rt. 301 on the Dudley site near the former Bob's mini-mart with a new connecting street to the retail planned for Dudley North.

For the Town Docks – The two Town docks at the ends of Second and First Avenues retain Queenstown's historic ties to the water and provide an opportunity for visitors and citizens alike to enjoy the waterfront atmosphere and vistas afforded by their location. They must be upgraded and maintained to serve multiple purposes. They should provide a place for active watermen to dock their boats and to carry out all the dockside activities required of their craft. They should also provide a place for citizens to dock their watercraft while at the same time being a location where residents and visitors may enjoy the waterfront and its varied activities. They should become a working waterfront in a park-like setting.

For Queenstown's Gateways – Rt. 18 at Rt. 301, Del Rhodes Avenue at Rt. 301, and Rt. 18 at the eastern end of Town are the principal gateways entering the community (See Figure 1-12). In addition, Rt. 301, after the Rt. 50 split, serves as an attractive approach corridor to the Town from the west.

Although the Town entrance on Route 456 from Route 50 is not in the Town proper, it is a heavily used entrance to the Town and the Town and County should cooperate to improve the appearance of this area.

1. Route 18 (Main Street) is the principal gateway into Queenstown. The Town will work with Queenstown Harbor Golf Course to landscape a distinctive gateway at the entrance from Rt. 301 to introduce the character of the Town to visitors and provide an attractive welcome to residents.

2. Del Rhodes Avenue is the second of four Town gateways. It should continue to provide a transition to the Town Center with a mix of commercial and residential uses. As it approaches Rt. 301 it should return to entirely commercial use. This entrance should also provide a welcoming gateway to Queenstown. Over time, the commercial establishments at the Del Rhodes Town entrance should be redesigned so that they present an attractive face to Rt. 301 and Del Rhodes Avenue. For example, if both sites continue as gas stations, they should be remodeled to better match the character and style of the Town and provide screening for the pump islands from both the highway and Town side.

3. The third gateway is where Main Street meets Route 18 arriving from Centreville. Relocating the Fire Station to the southwest corner of this intersection affords the opportunity to provide another attractive, as well as functional, entry.

4. The final visual gateway is the forest that borders the approach to Queenstown along Rt. 301 from the west. This forest is a desirable and attractive feature that must be protected and extended. Any development along Rt. 301 as it approaches and passes through Queenstown must include a berm and plantings to extend the roadside woodlands as both a visual amenity and to provide noise buffering for adjacent uses.

For Little Queenstown Creek – This area needs special attention to extend pedestrian access and deal with flooding issues.

1. Pedestrian access across the east end of Little Queenstown Creek should be improved in both directions to facilitate community access and neighborhood interactions. Ideally, the existing footbridge would link up with a footpath that skirts Queenstown Harbor development and facilitates access to the Queenstown Harbor Golf Course. Sidewalk and roadside improvements should also encourage pedestrian and bicycle thru-traffic to the playground park on the east side of Queenstown.

2. Old Creek Bed – Over the long term, the low lying land centered on Thompson and Melvin Avenues should be returned to its original state due to its location in the floodplain. Accumulating the necessary funding to acquire this land should be a long-term Town capital project. Under Town ownership the area should be returned to a more natural state as a Town Park comprised of wetlands and floodplain.

Land Use Recommendations for the Queenstown Planning Area

We have developed a consolidated growth plan that minimizes impacts to our waterways and reduces infrastructure costs. The extent of the consolidated growth area was determined by estimating the number of building units potentially available to adjacent land owners and directing those units to growth areas adjacent to Queenstown with proposed building densities similar to the existing municipality. The growth will radiate out from Queenstown in multiple directions, resulting in a concentric configuration that minimizes infrastructure costs and impacts on the environment while incorporating or realizing the potential benefits of the regional traffic patterns. Developers will be encouraged to build complete communities or stand-alone portions of communities so that Queenstown growth is gradual and controlled. Below, a potential realization of a full-build out scenario is described.

For convenience, the name of the current owner of the property is used in describing the development type and density of each respective site, although the land use recommendations were based irrespective of property boundaries. Properties are listed alphabetically and not in any order in which they are intended to be developed through time. Figure 1-5 should be used as a reference for individual properties and Figure 1-12 should be used as a reference for the proposed road and trail network improvements.

Callahan Farm –All or a portion of the Callahan Farm should be annexed and developed similarly to the Town with a mix of residential and institutional uses. The central location relative to regional transportation routes sets this area as an ideal location for educational and research campuses. This type of development could provide ideal opportunities to integrate residential neighborhoods and community resources, such as an athletic center and childcare facilities, with professional space that provides employment for local residents. The balance should remain as open space using a transfer of development rights or other mechanism such as a floating zone. The developed portion of the farm should be given a flexible, mixed-use designation with the highest quality of design, highest level of public facilities, large amounts of functional open space, and strict protection of sensitive areas.

This mixed use area is recommended as a transition between the Town and its surrounding rural areas. This property already has a zoning designation that allows for housing, but does not allow for the intensity of residential use and the non-residential uses proposed by this Plan. A mixed-use concept provides greater balance to the Town and County's tax base and provides a greater economic incentive for a developer to build in these areas versus rural areas. A combination of zoning initiatives, transfer of development rights from surrounding properties, and innovative approaches for infrastructure financing are all required to focus growth in areas selected for it and to preserve natural areas and farms selected as long-term open space.

To achieve the objectives articulated in this Plan, it is intended that development of this parcel will provide:

a. Approximately 240 dwelling units including apartments, townhomes, duplexes, and single-family units on lots ranging from 2000 sq. ft. to 1.5 acres.

b. Approximately 174 acres of land preservation

c. A site for an educational/research facility, and other community institutional uses

d. Small neighborhood commercial uses if feasible

Design recommendations for this site include:

1. A residential neighborhood that feels like an addition to Town rather than a separate place and includes a mix of unit types and lot sizes.
2. A Town-like street front along Greenspring Rd. without driveway curb cuts.
3. An open space spine including the pond, wetland, and farm house tying to the St. Peter's Church and the adjoining woodland.
4. A hiker/biker trail that links to the Town and the American Discovery trail towards Tuckahoe Park.
5. An entrance on the planned Rt. 50 frontage road with special treatment facing Rt. 50 that blends with the character of St. Peter's Church.
6. A street connection to Bloomingdale Rd. through the Rhodes farm.
7. Possible street connections to Warrenton Farm Road through the McClyment Farm if further development occurs there.

Dudley Home Farm– All of the Dudley Home Farm should be annexed and, in the long term, developed as a residential neighborhood that feels like an addition to the Town and includes a mix of unit types and lot sizes. The development should incorporate an agricultural buffer from the resource extraction and landfill uses to the north. The original home could be incorporated into the neighborhood as a bed and breakfast or other attraction.

To achieve the objectives articulated in this Plan, it is intended that development of this parcel will provide residential uses in a variety of configurations:

a. Approximately 290 residential units including town homes, duplexes, and single-family units.
b. 209 acres in agricultural and open space preservation

Design recommendations for this site include:

1. A Town-like street grid that connects to Cherry Lane and Rt. 18.
2. A Town-like frontage on one or both sides of Rte 18 with alley loaded homes facing the street.
3. A grade separated interchange at Greenspring Road.
4. A hiker/biker trail link through the site along Rt. 18.
5. Buffering homes from Rt. 301 with berms and trees for visual protection and sound

suppression.

6. Town access to the water at Salt House Cove.

Dudley North – It is recommended that this 64 acre area be annexed into Town and developed as a Town-scale mixed residential and commercial development. As a result, housing, shopping, transit, and jobs can be in close proximity. Development densities should be comparable to that in the vicinity of Melvin Avenue and Dudley Avenue (currently 4 to 8 units per acre). The neighborhood character and street pattern is intended to be similar to the older sections of Town and shall reflect its best design characteristics. This approach requires modest sized buildings that front on the street with coordinated building scales and roof forms (see Figure 1-10). To reduce the social barrier imposed by Rt. 301, community resources [i.e. local institutions including a library, elementary school, and/or community recreational center (e.g., YMCA, senior center)] could be integrated with development on both Dudley North and Dudley South properties.

The commercial component could be concentrated at the eastern end of the Dudley North site to take advantage of access improvements at Rt. 301 and Greenspring Road. Several public uses in need of relocation could also be built within the commercial component including a new Fire Department facility. This area represents an opportunity to accommodate Town-scale nonresidential development

which requires parking areas not available in the existing Town Center. Special care must be taken to integrate and visually protect the existing commercial uses along Route 301.

To achieve the objectives articulated in this Plan, it is intended that development of this parcel will provide:

a. Approximately 130 residential units of a Town-like mix of types and lot sizes including town homes, live work units, duplexes, and single-family.

b. Approximately 25,000 sq. ft. of office and retail uses.

c. A site for a fire station and other local institutional uses. To this end approximately ten acres should be set aside for a "Queenstown Public Service and Safety Center"

d. Approximately 22 acres of preserved land

Design recommendations for this site include:

1. A short mixed-use commercial street fronting Rt. 301 on the 8 acre in-Town parcel connecting to Rt.18 via the street network in the Dudley North parcel.
2. A double-loaded through street in place of Rt. 18 with routing through the center of the parcel and connection to a grid-like local street network with alleys serving most homes and businesses.
3. The roadbed of old Rt. 18 as part of the new street system.
4. A new Town gateway and roundabout at Rt.18 and Greenspring Rd.
5. A grade separated interchange at Greenspring Rd and Rt. 301.
6. A hiker/biker trail link through the site.
7. A Town green visible from Rt. 301 and faced by live work units and town homes
8. A buffer to screen the homes from Route 301 with berms and trees for visual protection and sound suppression.

Dudley South - This parcel of 147 acres includes farmland, a stream, and woodland. The Plan calls for annexation and development of a portion of this land to include a mix of regional commercial, institutional, and residential uses connected to Queenstown proper by a pedestrian/bicycle overpass. It also requires an extensive buffer on both sides of the property's stream and preservation of the adjoining woodlands.

To achieve the objectives articulated in this Plan, it is intended that development of this parcel will

provide retail, office, and residential uses in multi-story, mixed use arrangements as well as side-by-side mixed use arrangements, in the following fashion:

a. Approximately 150,000 sq. ft. office space

b. Approximately 400,000 sq. ft. retail space

c. Approximately 130 residential units including apartments, town homes, and live work units

d. Approximately 73 acres of land preservation

Design recommendations for this site include:

1. Preservation of the woodland triangle bounded by Greenspring and Del Rhodes and treatment as a woodland park.

2. A Town hiker/biker link though the woodland park as a part of the Town loop connecting the Sportsman Overpass and the Greenspring overpass.

3. A street linking the Sportsmans Neck Overpass and Del Rhodes Ave. exit from Rt. 50 to Greenspring Road to connect the Town to Rt. 50 westbound and eastbound.

4. A public street in the development area that connects Del Rhodes to Greenspring Road and has a Town-like streetscape along some segments.

5. A Town-like corner at Del Rhodes and Rt. 301.

6. A Town-like streetscape/ frontage along Del Rhodes Ave.

7. A grade-separated interchange at Greenspring Road and Rt. 301 with a Town-like streetscape along the Greenspring Road frontage.

8. A Town green visible from Route 301 with mixed use development facing it.

9. Sound suppression must be considered for the areas of the site close to Rt. 301.

McClyments Farm – The plan for this parcel is to annex the property, acknowledge the currently approved development of 60 homes, and to maintain the balance of the property in low impact agriculture by transferring development rights (or another acceptable arrangement to compensate the owners) to other properties selected for growth.

To achieve the objectives articulated in this Plan, it is intended that development of this parcel will provide:

a. Completion of the planned Bishops Meadow single-family subdivision of 60 units.

b. Preservation of the remainder of the property (114 acres).

Design recommendations for this site include:

1. A street connection from Warrenton Farm Road to the expanded Town street network on the Callahan site if further development occurs. This link would permit access to another Rt. 301 full intersection, to the Dudley Home Farm site, and to Cherry Lane across Rt. 301.

Rhodes Farm – The Plan calls for annexation and allows the Rhodes farm to remain in low impact agriculture as the result of the transfer of development rights (or another acceptable arrangement to compensate the owners) to other properties. Low impact farm practices would include those which minimize nutrient (fertilizer or manure) applications and erosion, such as pasture crops, organic farming, and horse farms or other low impact livestock operations.

To achieve the objectives articulated in this Plan, it is intended that development of this parcel will:

a. Place the total site (270 acres) in farm and open space preservation.

Design recommendations for this site include:

1. A street and trail connection from the Town street network in the Callahan site to Bloomingdale Rd.

Wheatland Farm – Opposite Rt. 50 from the Prime Retail Center is a strip of unincorporated commercial uses in the County's Suburban Commercial (SC) zoning district. Surrounding this commercial strip on three sides is a large waterfront farm (known as Wheatland Farm) that is in the County's Countryside (CS) zoning district and carries a Resource Conservation Area Critical Area designation. The owners of Wheatland Farm have petitioned the Town for annexation for use as a regional commercial facility on 81 acres and open space on the remaining 62 acres. Through the use of Queen Anne's County's Transfer of Development Rights Program three Critical Area development rights have been transferred to a subdivision on Kent Island from the 62 acre parcel. It is now preserved and encumbered by an easement that does not allow any development.

The Plan recognizes the Wheatland Farm as a suitable site for annexation and development. Development here requires special measures due to its location in the Critical Area and its proximity to the Wye River. Any development must receive Growth Allocation from the Town and Critical Area Commission approval as an Intensely Developed Area. This process will require a detailed understanding of the measures to minimize runoff into the Wye River and its tributary and the site's

overall environmental impacts.

Development of the site should also be contingent on confining building and parking impacts to a "development envelope" in the center of the site. The 62 acre portion, from which the development rights have already been transferred, will provide an open space buffer between any development and the Wye River. Further, native trees and shrubs must screen the site from the Wye River and the adjacent homes. The existing wooded area along the highway frontage of the site should also be retained in its natural state - not be cleared for development. Professional office space, retail, and a village-like community are examples of appropriate uses for this site.

It is the intent of this Plan that any annexation and subsequent development in the Queenstown Planning Area to the south of US Route 50 take into consideration the traffic flow of the development site with the existing and projected through traffic on Route 50.

To achieve the objectives articulated in this Plan, it is intended that development of this parcel will provide:

a. Approximately 110,000 sq. ft. of new office and commercial uses
b. Approximately 150 residential units
c. Approximately 87 acres of preserved land (62 are currently preserved and an additional 25 acres should be retained on the developed portion of the site)

Design recommendations for this site include:

1. Adjust SHA's current design for the new access road from Rte. 18 to allow mixed use commercial development along both sides of the access road.
2. Promote redevelopment/revitalization of the existing commercial development between the new access road and Rt. 50.
3. Treat the new right-in right-out entrance on Rt. 50 as a gateway to Queenstown. This will serve eastbound beach traffic.
4. Require that development have a village-like character. Multi-story mixed use buildings are preferred.
5. Consider creating a village green at the Rt. 50 entrance that opens to the Wye River buffer and is faced with mixed uses.
6. Consider the creation a Town waterfront park adjacent to the Wye River buffer, including a

hiker/biker trail through the park, and non-motorized boat access. Consider linking the hiker/biker trail to the Town trail network via Rt. 18 and the two planned Rt. 50 overpasses. Permit a self-contained, village-like residential development with strong connections to the park.

State Highway Administration Parcels adjacent to Rt. 50 – This land is largely in SHA ownership as part of the Rt. 50 improvement plans. It extends from Sportsmans Neck Rd. to Greenspring Rd. on both sides of Rt. 50 (See Figure 1-3). Although the land is currently in the County Suburban (SC) zoning district, any future development will be severely constrained by the presence of extensive wetlands, an historic farm, changes in access opportunities because of SHA highway changes, and the unsure timing of the SHA improvements. This Plan does not envision these properties as part of Queenstown's growth possibilities.

Queenstown Creek and Nesbit Road Properties - The 2010 Planning Area (See Figure 1-2) includes areas that are considered of interest to Queenstown for developing and preserving a greenbelt, for preserving a largely natural shoreline, and for preserving and enhancing the wooded western gateway to the Town. These areas include the Carroll properties adjacent to Queenstown Creek and the lands across Rtes 50/301 from the golf course, extending west to the County's Nesbit Road property. This Plan recognizes that the Town's interest in these areas can be accommodated either through annexation or by an agreement between the Town and County as to appropriate uses for these lands.

• The shoreline of Queenstown Creek is largely in its natural state. It is the objective of this Plan that this shoreline remain in a natural, undeveloped state and that a recommended 300-foot buffer be established along all of the shoreline that is not presently developed.

• Citizen participants in the Planning Workshops strongly agreed that preserving and developing woodlands along Rt. 301 should remain a priority. Washington Brick and Terra Cotta contributed significantly to this effort by providing a conservation easement placed on more than 200 acres of woodlands along the north side of Routes 50 and 301 adjacent to the Chester River. It is the Town's objective that the other half of the Town's wooded gateway, on the Wye River side in the Nesbit Road area, also be preserved.

Land Conservation Areas – This designation applies to lands (sensitive areas, conservation easements, and open space) within and surrounding the perimeter of the Planning Area that are meant

to retain rural character and remain undeveloped. These areas form a rural greenbelt around Queenstown and function as a growth boundary (See Figure 1-9). By directing regional growth into the Town and designated locations within the Planning Area, it is proposed that these conservation areas constitute permanent buffers in the landscape.

Lands designated for conservation will be open space sites available for public use or recreation; private lands under conservation easement or proposed to be placed under conservation easements for perpetual use as open space, farms, or woodlands; or known sensitive areas such as stream buffers, shoreline buffers, wetland areas, or important forested areas where future development should be significantly limited or prohibited.

Property owners in land conservation areas can be compensated in a number of ways. They are encouraged to participate in a transfer of development rights which would allow them to sell and move development rights from their property for use in areas designated for growth. Property owners in designated growth areas may be required to use development rights transferred from within the Planning Area to achieve the densities necessary for successful development. Property owners could also enter into annexation agreements and developer's rights and responsibilities agreements to vest their rights in a floating zone and corresponding development plan, which provides the property owners with certainty and also ensures that the development will comply with the Town's goals and objectives in terms of density, design, open space, protection of sensitive areas, traffic impacts, and public infrastructure. Other arrangements for concentrating development are possible and Queenstown looks to the creativity of its citizens and neighbors to bring this objective to fruition.

Owners in land conservation areas will also be urged to participate in any of the various land conservation programs available such as the Maryland Agricultural Land Preservation Foundation (MALPF) farm easement purchase program and the conservation easement programs offered by the Eastern Shore Land Conservancy (ESLC), the Maryland Environmental Trust (MET) and the Maryland Historic Trust (MHT). The MALPF and TDR programs allow rural property owners to derive equity from their lands without actually developing them in return for placing easements on the property which prohibit or limit its future development. The ESLC, MET and MHT conservation easement programs provide tax credits and estate planning benefits to property owners who voluntarily place their lands under easements prohibiting or limiting future development.

1.4.2 Economic Development

Our objectives include a commitment to revitalization of the Town Center, improved access to our waterfront, provision of affordable housing, and enhanced opportunities for economic development. Future development within the Town and Planning Area should maintain and build upon the traditional community character of Queenstown. Maintaining the stability of existing residential neighborhoods will be a primary focus. Taking advantage of any economic opportunities to revitalize the Town Center will also be a focus. Important public facilities such as the Post Office will remain in the Town Center. The Queenstown Bank occupies a central location in the Town and provides substantial employment within the Town Center. The Town plans to accommodate the Bank's growth needs while meeting the planning principles presented herein.

Several private enterprises play a large role in the Town today and have the potential to play an even larger role in the future – most notably the Queenstown Harbor Golf Course, Friel Enterprises, Queenstown Bank, and Prime Outlets. The plan to add a resort component to the golf course offers many benefits to the Town and region. Among them are more customers for Town Center businesses, regional business, and more visitors to spread the word about the Town's attributes. The Town should work with the owner of the golf course, Washington Brick and Terra Cotta, to speed the various approval processes while making sure that the project is complementary to the Town's character and of benefit to the health of local waterbodies. The development of appropriately configured walking trails connected to the Town is highly desirable.

If Prime Outlets wishes to expand, the Town will work with them to develop a plan that meets their needs and benefits the Town.

The Friel property south of Rt. 301, extending to Rt. 50 in places, is a close neighbor to the Town and is currently used as a hardware/home improvement retail store, a lumber yard, and a self-storage facility. Only a small portion of this site is within Town limits but the entire developed portion of the site is served by Town sewer. The Town portion is zoned Highway Commercial and the County portion is zoned Suburban Industrial. It is recommended that this entire site be annexed into the Town and rezoned Highway Commercial since it is already benefitting from Town services and functioning as a Highway Commercial use. The Town is open to any development possibilities that would be mutually beneficial.

The area along Del Rhodes Avenue and Friels Road on the east side of Rt. 301 is currently within Town limits and contains a few small-scale industrial uses and some single-family homes. It is zoned Industrial. The Town Limits presently cut through portions of properties in this area and it is recommended that Town annexation be used to bring these sites entirely within Town limits. Due to the predominance of wetlands in this area, it is not recommended that the existing industrial area be expanded beyond the recommendation above.

Economic Development Recommendations

The Town and County should encourage a balanced mix of residential and non-residential development within the Queenstown Planning Area so that the community, as it changes, does not become a

predominantly "bedroom" or commuter residential location. It cannot be overemphasized that if local commercial/tourism/industrial development does not occur, more reliance will be placed upon residential property taxes to pay for needed services affecting both present and future homeowners.

The Town and County should partner with the State and private sector to invest in the necessary and required infrastructure improvements to facilitate economic development within the Town and Planning Area. The Town and County will designate qualified parts of the Queenstown Planning Area as a "Priority Funding Area" in compliance with the "Smart Growth" Areas Act of 1997.

The Town and County should coordinate with the State to have the Queenstown Planning Area designated as a "Revitalization Area" in order to take advantage of the various business development grants, loans, and tax credits offered through this program. This State program is designed to target economic development funding to designated growth areas in accordance with the directives of the Maryland Economic Development, Resource Protection and Planning Act of 1992.

A comprehensive and detailed plan for revitalization of the Town Center should be developed with significant input from the community. This plan should identify specific physical design improvements (see p. 35 for detailed suggestions) as well as funding and marketing strategies intended to stimulate small-business development within the Center. A primary focus of the revitalization plan should be to preserve and capitalize on the historic character of the Town. Focus should also be accorded to developing strategies which link the Town Center to other development locations within the Planning Area. Revitalization objectives for the Town Center include:

- Protect Town Center functions against further diminishment as the Town grows larger.
- Improve visibility and traffic to the Town Center.
- Improve visitation/patronage by out-of-town customers by making the Town Center more of a destination.
- Aid the viability of existing businesses.
- Attract new businesses to create a more viable critical mass.
- Accommodate the long term needs of Town Center anchors, the Fire Department, and the Bank as key Town employers.
- Preserve and enhance the unique physical character of the Town Center.
- Encourage infill development.

Tourism is predicted to become a leading economic generator in this country and the Queenstown

Town Center has a unique opportunity to capitalize on its historic character. Studies have shown that historic tourism visitors stay longer, spend more money and return more often. Historic buildings seldom become truly obsolete. Their reuse may require innovative thinking, careful work and creative financing. The results are always worth the time and effort in the long run.

As a first priority for economic development, every effort should be made to preserve and bolster existing businesses and industries within the Planning Area. These businesses should be the foundation for future economic development in the Queenstown area. Particular emphasis should be placed on efforts to maintain and preserve opportunities for commercial watermen to continue using the Town docks and harbor for their activities. It is also recommended that the tourism/information center at Prime Retail inform visitors about local businesses and points of interest.

1.4.3 Transportation

The Town and County will work with the private sector and the State to plan, fund, and construct the community facilities, infrastructure, and transportation improvements necessary to correct existing inadequacies within the community and/or to facilitate development of the Queenstown Planning Area as a designated growth center within the County.

New development will pay its fair-share of the costs associated with community facilities, infrastructure, and transportation needs where demand is generated by the new development. Current residents, businesses, and property owners will not be required to fund capital improvement costs for community facilities, infrastructure, and transportation improvements necessitated by demands solely generated by new development.

No new development will be approved within the Planning Area unless it can be determined that adequate public facilities and infrastructure are in place or are planned and funded for construction within a reasonable time period in conjunction with the proposed development.

The timing and phasing of community facilities, infrastructure, and transportation improvements requiring public investment will occur over time in conjunction with coordinated Town and County Capital Improvement Programs and priorities for Town annexation. Improvements recommended for areas within the Town and proposed annexation areas should receive the highest public-sector funding priority.

Transportation Recommendations

A central goal of this Community plan is to provide a safe, efficient, and attractive transportation system for the Town and region. Future development will require transportation improvements. These land use changes also should be used as a catalyst for a regional assessment of transportation needs, a regional solution and regional political support. The State Highway Administration's current plans for the Queenstown area offer an inadequate and piecemeal solution to what is clearly a regional problem. See "Regional Transportation" in Chapter 2 for a discussion of our area's transportation needs and challenges.

In particular, SHA plans consist of replacing at-grade intersections with overpass interchanges without considering alternative road layouts which could improve traffic flow from communities adjacent to Rt. 301 and Rt. 50. The focus of SHA remains on improving traffic flow to ocean beaches rather than improving safety for the area residents who use these roads for local travel. Current plans call for five overpasses along Rt. 50, and its expansion to a six-lane highway, but no improvements to Rt. 301. Yet traffic flow has increased and tends to be more consistent on Rt. 301. This will only be intensified when Rt. 301 is connected to the I-95 northeast corridor via a limited access highway.

Queenstown must join with all municipalities in the region, local businesses, and residents in the region to advocate this regional solution to our collective transportation needs. Landowners and developers who benefit from growth in our neighborhood must contribute to the funding of the transportation solution. In addition, no new development will be allowed unless it can be determined that adequate public facilities and infrastructure are in place or are planned and funded for construction within a reasonable time period in conjunction with the proposed development.

The preparation of this Plan included meetings between the Planning Commission and the State Highway Administration (SHA). As a result the SHA is aware that the Town believes the administration's current plans for our area should be modified to achieve an integrated solution that meets the needs of the region. This Plan includes a proposal for a network of roads, interchanges, and overpasses that may solve current problems and provide the transportation infrastructure required by the land use proposed in the Plan.

This Plan includes a mix of residential, commercial and institutional development on the south side of Rt. 301. Therefore, it is essential that an overpass be constructed to carry Greenspring Road over Rt.

301 to avoid a feeling of two separate towns for both the current residents and future members of the Town. This overpass must include provisions for walking and biking. Given the cost of a Greenspring overpass, it may not be built until substantial development has taken place on both Dudley North and South. Accordingly, a pedestrian overpass connecting Dudley North and South should be constructed early in the development cycle as a means of connecting the mixed use development on the south side of Rt. 301 to a network of walking/cycling trails that link all parts of the Town.

A regional transportation proposal is shown in Figure 1-12. This mix of overpasses and roadway improvements solves current transportation shortcomings and serves the needs generated by the land use alternative recommended in this Plan. Of immediate importance, this transportation solution enables the Queenstown community to access Routes 50 and 301 in either direction without entering an at-grade intersection.

Specific recommendations for vehicular traffic in the Planning Area are:

1. Create a connected street network tying together all parts of Town without the use of Routes 301 or 50 for access.
2. Preserve and enhance the ability of people to get on and off Routes 301 and 50 and to all parts of Queenstown without excessive circuitous routes.
3. Combine public and private resources to achieve a full grade-separated interchange on Rt. 301 at Greenspring Road with an overpass that includes pedestrian and bike facilities to connect the old and new parts of Town.
4. Create a roundabout Town gateway at the intersection of Rt. 18 and Greenspring Rd.
5. Realign Rt. 18 from the roundabout to the current Town limit to create a double-sided Town-like street.
6. Link the Town street network to Bloomingdale Road via the Rhodes farm.
7. Designate the extended Greenspring Road link from Rt. 301 to the planned Rt. 50 right-in right-out on Del Rhodes as a collector and limit new curb cuts.
8. Consider linking the Town street network to Warrenton Farm Rd and its Rt. 301 access via McClyment Farm. Warrenton Farm Road would tie into Cherry lane on the other side of Rt. 301.
9. Link Del Rhodes to Route 18 via Dudley north.
10. Enhance the ability of people to find exits to Queenstown

The Town supports increased movement by walking and bicycle as a quality of life issue. Residential, commercial and institutional area roads must include streets that are bicycle and pedestrian safe. In addition, all new developments must include a combination of roads and pathways that make travel by walking or biking attractive, practical and safe. A suggested network is shown in Figure 1-12.

Specific recommendations for non-vehicular movement in the Planning Area are:

1. Inclusion of hiker/biker lanes on all overpasses.
2. A hiker/biker lane on the existing Rt. 50 overpass at Nesbit Rd. and through to the golf course property to tie Town Center to the regional trail network.
3. A second trail link along Rt. 18 and the old rail line to the County's trail network near Grasonville and back to the Wheatlands property.
4. A signed trail link through the Town Center along Rt. 18 to Centerville per the County plan.
5. A trail link from the Nesbit Road area south of Rts.50/301through the Wheatlands buffer preservation area connecting to the Dudley South property and then into the Town.
6. An off-road paved trail connection between Del Rhodes and Greenspring Roads.
7. A trail link to Tuckahoe State Park as part of the American Discovery trail through the Callahan and Rhodes farms per County plans.

This Plan anticipates the time when some form of public transit will be practical. Thus, all development in the region must anticipate the eventual realization of some form of public transportation – most

likely provided by minibuses.

Public, on-street parking in Town is limited and should so remain. In addition, the Town discourages large-scale parking lots. Where necessary for commercial buildings, they should include attractive landscaping with trees, shrubs, and ground cover. They will be designed to eliminate stormwater runoff. Where streetscape improvements are planned, on-street parking clusters should be separated at intervals with landscaping islands that contain shade trees and ornamental plantings. There should be landscaped bumpouts and crosswalks to increase pedestrian safety.

The Town has street design guidelines intended to integrate streets, street details, and land uses. The Town wants "livable" streets where new roads are proposed and wants to upgrade roads that are not pedestrian-friendly or have problems regarding access, signage and visual attractiveness.
The Town supports regional Transportation Demand Management, which includes strategies to reduce single occupant vehicle use and spread peak volumes into lower-demand hours. Specific strategies include satellite parking, ride-sharing, walking-bicycling facilities and flextime work schedules.

1.4.4 Public Facilities

The Plan's public facilities policy is to propose the most appropriate and desirable patterns for the location, character and extent of public and semipublic buildings, land and facilities on a schedule that extends far into the future.

Recreation and Open Space

The Town needs an aggressive approach to parks and recreation. An essential step was the establishment of a Parks and Harbor Board. The functions of the Board include the recommendation of standards for the style and quantity of parkland in new developments. It will also undertake measures to improve the beauty and recreational potential of existing Town parkland and prepare a Harbor Plan for adoption by the Town Commissioners.
Queenstown has the opportunity establish an impressive park network that will add to its quality of life and attract people to the Town. Suggested actions are:

1. A village green on the Dudley North site suitable for community events and visible from Rt. 301.
2. A woodland park on the Dudley South site.

3. A waterfront park with non-motorized boat access to Wye River on the Wheatlands site.

4. Explore establishing access to Salthouse Cove as part of the overall hiker/biker trail network.

5. A waterfront park as part of the improvements at the wastewater treatment plant site.

6. Consider the possibility of a linear park network along the Hiker/Biker Trail as it passes through significant green areas such as the Golf Course and other preserved parcels.

Public Safety

Our streets must be made safer for residents, walkers, and bicyclers. In all new developments, be they residential, commercial, or institutional, the street layout and design should include traffic calming provisions.

The Queenstown Volunteer Fire Department is Station 3 of the Queen Anne's County Fire Departments. The Fire Department is located on Main Street and has two engines, one engine tanker, one rescue truck, two ambulances, one boat, and a brush truck. There are seven line officers, 57 volunteers, and four administrative officers. The facility on Main Street should be relocated to a new larger facility with better access to Rt. 50 and Rt. 301. A recommended relocation site is the eastern end of the Dudley North site. Approximately ten acres should be set aside for a "Queenstown Public Service and Safety Center". The existing structure could be preserved for adaptive reuse. Alternative uses for the building include retail or a community center available for use by local youth organizations and other non-profit groups.

A new emergency medical facility will be located in the vicinity of Nesbit Road and will offer improved service to the entire Queenstown area.

Educational/Research Facilities

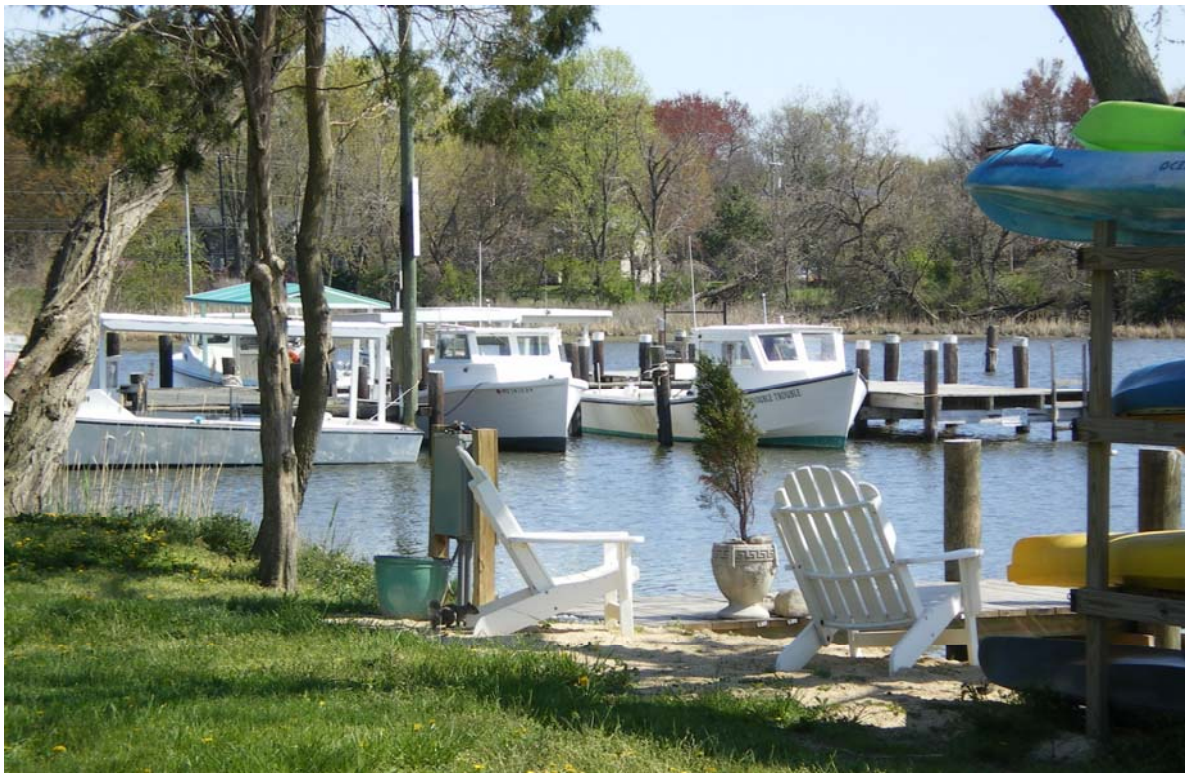
Educational and research facilities are welcome in our Planning Area. When additional public schools are needed in the County, the Queenstown Planning Area provides an attractive location. The construction of a major educational facility would provide benefits to both the County and Town. Among them are a central location, recreation facilities for the Town, and an impetus and catalyst for transportation improvements that would benefit the region.

Waterfront

The Town maintains a launching ramp on the wastewater treatment site. The Parks and Harbor Commission must determine how to maintain, manage, and control this Town asset to maximize its benefits to the Town.

Public Facilities Action Plans

The Town should demand public facilities impact studies as part of the development approval process and it should continue to require annexation as a condition for extension of public water and sewer service and establish hookup fees commensurate with actual cost. The Town should require preservation/creation of open space as parkland as part of the development approval process



1.4.5 Water Resources

This section was developed to evaluate impacts from development and other human stressors on water resources connected with the Queenstown Planning Area. It forms the basis of Queenstown's Water

Resources Element as mandated through House Bill 1141 approved by the Maryland State Legislature in 2006. The analysis is intended to provide the Maryland Department of the Environment with a foundation for evaluating the consistency of our Community Plan with Maryland general water resources program required by the State Environmental Article §5-203:

> "The Department shall develop a general water resources program which contemplates proper conservation and development of the waters of the State, in a manner compatible with multiple purpose management on a watershed or aquifer basis, or any other appropriate geographical unit."

The specific goals of incorporating the Queenstown Water Resources Element with the Community Plan include the following:

- Maintain a safe and adequate drinking water supply to accommodate the needs of the current Queenstown population as well as future generations.
- Invest in water and sewer infrastructure that will provide adequate treatment capacity for projected demand and reduce pollutant loading to the Chesapeake Bay and its tributaries in the Queenstown Planning Area.
- Protect and enhance the quality of surface water and groundwater resources connected with the Queenstown Planning Area, including wetlands, the Chesapeake Bay, and its tributaries.
- Promote coordinated planning between jurisdictions and agencies responsible for drinking water, wastewater, and stormwater management.
- Engage the public in watershed conservation and promote a stewardship ethic.

Accordingly, this Plan provides an overview of the hydrogeologic setting of the Queenstown Planning Area (see Chapter 2 – Section 2.1.2), and evaluates the impacts of current development as well as potential future build-out on drinking water supply, wastewater treatment, and environmental water quality. Results are based on current and future land use/land cover scenarios described in this Plan.

A central goal of this 2010 Community Plan is "to establish Queenstown as a leader on the Eastern Shore in environmental stewardship and community design by meeting or exceeding environmental regulations and requirements and actively promoting neighborhood design that reflects the rural, village-like characteristics of Queenstown."

The Queenstown Community Plan uses a watershed-based approach to land planning. By identifying sensitive areas where water resources would be impacted if development were allowed and subsequently directing and accommodating that development elsewhere, incorporating local expert knowledge, and deriving detailed maps of alternative development scenarios, the Plan is able to incorporate management and policy considerations, such as zoning, infrastructure costs, and economic impacts, with the science of understanding the functioning of watersheds. The approach has been imperfect because of its newness, but it has demanded commitments by all participants to work collaboratively to define the planning objectives and concepts proposed using a common terminology that blends the language of growth management with watershed science.

1.4.5.1 Water Supply and Demand

Overview of Current Water Supply and Demands: The Town currently has a permitted water appropriation of 77,000 gallons per day drawn from two production wells in the Aquia aquifer and one recently permitted in the Matawan aquifer. Between 2002 and 2006, demands exceeded the permitted rate by as much as 40 to 80 percent (30 to 60 thousand gallons per day) (Whitman, Requardt & Associates 2007). The relatively high average of 177 gallons per capita per day was due to a large commercial area (Queenstown Outlet Center) used by many visitors as a rest stop. The Town recently completed construction of a municipal supply well in the Matawan aquifer and obtained a permit from MDE to withdraw 70,000 gallons per day. Pump tests indicate higher yield capacity. The Town currently is seeking a permit to sustain withdrawal of 154,000 gallons per day; this supply will provide current residents and pending development projects, but the withdrawal rate will not provide for additional development described in the consolidated growth alternative of the Queenstown Community Plan. Further increasing the municipal water supply requires expanding the Town's waste water treatment capacity.

The following summarizes the history of the Queenstown water supply. In 1932, two municipal wells, one located on Del Rhodes Avenue and the other on Wall Street, replaced residential wells also drawing from the Aquia aquifer. In 1988, a third well located near the Outlet Center was brought online. In 1998, petroleum-based hydrocarbons were detected in the Wall Street well; the supply was disconnected from the system, and the well was grouted and sealed. More recently, arsenic concentrations in the Del Rhodes and Outlet Mall wells, ranging between 10 and 15 parts per billion (ppb) have exceeded the 10 ppb federal drinking water standard adopted in 2006. The contamination occurs naturally from groundwater exposure to ancient sea deposits. Because of the limited water

supply and arsenic contamination, Queenstown began investigating additional water supplies in 2008. An exploratory well installed in the Matawan aquifer indicated high production capacity (greater than 100,000 gallons per day) and overall excellent water quality (low iron and arsenic concentrations). In 2009, the exploration well was converted to a production well and currently is the Town's main water source. During peak demand periods, its water supply is blended with supply from the Aquia municipal wells to meet the federal drinking water standard for arsenic. The County and State have indicated the new production well will be permitted for up to 180,000 gallons per day, contingent on accompanying improvements and increased capacity of the wastewater treatment plant. Specifically, in August, 2009, Queen Anne's County amended its Comprehensive Water and Sewer Master Plan to allow Queenstown to increase its groundwater appropriations and its wastewater treatment capacity from current levels to 180,000 gallons per day. The State approved an appropriation from the Matawan Aquifer, but limited the total groundwater appropriation from the Matawan and the Aquia to the available wastewater treatment capacity plus ten percent for water not entering the wastewater stream.

Descriptions of the well locations, approximate capacities, installation dates, and current status are summarized in Table 1-3. Figure 1-13 shows the approximate location of the municipal supply wells including a schematic of the water distribution system.

The town has two elevated water storage tanks. The water tower at Wall Street is reported as a 50,000 gallon tank, although its dimensions (30 feet diameter, 35 feet height) suggest a capacity of 185,000 (URS Corporation, 2001). Water treatment consists of disinfection by the addition of sodium hypochlorite. The water tower at the Outlet well site is a 100,000-gallon tank. Water treatment consists of disinfection by the injection of a chlorine solution using chlorine gas. To ensure adequate fire flow, the Maryland Department of the Environment recommends a total storage of 432,000 gallons for municipalities with a population of less than 1000. A fire flow modeling analysis based on the water tank volumes, pipe distribution network, storage status, however, indicated that the existing water distribution system is adequately serving the Town's current population (URS Corporation 2001). Water storage volume for future development, however, should be close in size to the expected average daily demand.

Table 1-3. Summary of existing municipal wells in Queenstown. Additional information describing all wells non-municipal wells and municipal well construction (total depth, casing, and pump test results) are summarized by Whitman, Requardt & Associates, LLP (2007).

MDE Well Permit ID	Location	Date Installed	Aquifer (Depth)	Capacity in gallons/day	Current Status
QA79G010	Del Rhodes Avenue	1932	Aquia (220 to320 ft below land surface)	85,000	Requires management of elevated arsenic concentrations
	Wall Street	1932	Aquia (290 ft bls)	> 150,000	Well taken off-line in 1998 due to hydrocarbon contamination
QA71G007	Outlet Mall	1988	Aquia (245 to 285 ft bls)	150,000	Requires management of elevated arsenic concentrations
	Outlet Mall Observation well	1993			
QA2008G018-01	Outlet Mall Well #2	2009	Matawan (625 to 650 ft bls)	70,000 to >100,000	Main water supply. Current permitted capacity limited by wastewater treatment capacity.

Future water supplies: Pump tests indicated the capacity of the newest municipal well supplied by the Matawan aquifer can be increased to supplement the current combined yield and sustain the full build-out conditions described in the consolidated growth alternative presented in the Community Plan (see Table 1-1). The combined yield of the existing municipal supply wells is more than 300,000 gallons per day. To supplement and ensure future high quality water supply and capacity, the Town also is investigating the feasibility of constructing a second well in the Matawan aquifer. This would enable the Town to abandon the Aquia aquifer supply entirely. To enhance the public water supply, current withdrawal from the Mattawan aquifer by the Queenstown Golf Course, used mainly for irrigation, could be reduced by the use of reclaimed wastewater.

The Aquia aquifer has no potential for meeting future demands of the Queenstown community (see Drummond 2001). Strict limitations on groundwater withdrawal have been emplaced by MDE because of increased salt water intrusion, especially along the Chesapeake Bay shoreline of Kent Island. Any additional water supplies must be provided from deeper aquifers potentially including the Matawan, Magothy, or Patapsco aquifers. A review of hydrogeology reports and currently permitted wells in the vicinity of the Queenstown Planning Area suggest the confined aquifer system can provide adequate municipal water supplies in the future. Most wells permitted for more than 100,000 gallons per day are used for agriculture and irrigation and provide two to five times more water than the current supply and demand in Queenstown (Table 1-4). Elevated iron, manganese, and arsenic concentrations, however, will require treatment.

Table 1-4. Summary of water appropriations permits (greater than 100,000 gallons per day) within 50 square miles of the Queenstown Planning Area (MD Department of the Environment, Water Rights Division 2000, summarized by URS Corporation 2001).

Aquifer/Location	Average/Maximum Daily Yield (x1000 gallons per day)
COLUMBIA (SURFICIAL) AQUIFER	
Central Sod Farms of Maryland (irrigation)	100 / 400
Ball & Burlap Nursery, Inc. (irrigation)	135 / 450
McClyment, David. B (irrigation)	114 / 690
AQUIA FORMATION	
Armour Swift Eckrich (chicken processing)	100 / 125
S.E.W. Friel (food processing)	123 / 1,000
Central Sod Farms of MD (irrigation)	100 / 400
Ball & Burlap Nursery, Inc. (irrigation)	135 / 450
Schaefer, Louis (aquaculture/irrigation)	200 / 1,200
Queen Anne's County Sanitary District	88 / 175
Rhodes, Jr., Temple (irrigation)	247 / 1,498
Rhodes, Jr., Temple (irrigation)	97 / 587
Rhodes, Jr., Temple (irrigation)	109 / 659
Central Sod Farms of Maryland, Inc (irrigation)	411 / 720
J.L. Carroll (irrigation)	197 / 1,198
MAGOTHY FORMATION	
U.S. Fish & Wildlife Service	18 / 220
Queen Anne's County Sanitary District	98 / 144
Washington Brick & Terra Cotta Company	72 / 336
Queen Anne's County Sanitary District	342 / 513
PATAPSCO FORMATION	
Hunters Oak, LLC	62 / 285

Table 1-5. Estimated current and predicted future water demands under alternative growth scenarios presented in the Queenstown Community Plan. The current observed average daily demand by residents and commercial businesses is approximately 82,000 gallons per day (Whitman, Requardt & Associates 2007).

Land Use/Land Cover Scenario	Predicted Population[1] (Number of Residences)	Estimated Residential Demand[2] (gal/day)	Estimated Commercial Demand[3] (gal/day)	Total Water Demand[4] (gal/day)
Existing	675 (279)	69,750	32,400	102,150
Current – pending	745 (308)	77,000	71,500	149,000
County Zoning	2,154 (890)	222,500	73,000	300,000
Consolidated Growth (adopted)	3,165 (1,308)	327,000	200,000	527,000

[1] Calculated based on estimated number of dwelling units and assumed 2.42 persons per dwelling unit.
[2] Residential water usage rate: 250 gallons per day per dwelling unit.
[3] Weighted commercial flow rate (55% office at 0.09, 15% medical at 0.62, 30% retail at 0.05)
[4] Residential and total estimates under County zoning include private residential wells.

1.4.5.2 Wastewater

Current Status and Projected Future Demands: The current Queenstown Wastewater Treatment Plant (WWTP) was constructed in 1971 and continues to operate under an 85,000 gallon per day discharge permit. From July 2004 through December 2007, average daily flow was between 90 and 95 thousand gallons per day and the plant removed approximately 85% of the incoming nutrient loads prior to surface water discharge (Newfield 2006; Whitman, Requardt & Associates, LLP 2007). The high per capita flow discharge suggest other sources contribute to the effluent volume, possibly including groundwater infiltration, basement sump pump drains, roof leader drains, and flooded manholes (Newfields 2006). Indeed, the highest discharge volumes generally occur under seasonally wet conditions.

To protect Little Queenstown Creek, the Chester River, and the Chesapeake Bay, the Maryland Department of the Environment has limited the total annual nutrient loads from a point source to Little Queenstown Creek to 3,266 pounds of total nitrogen (TN) per year and 411 pounds of total phosphorus (TP) per year. Given the Town's current WWTP technology, effluent water concentrations cannot exceed 18 mg/L TN or 3.0 mg/L TP. MDE has stated that no additional nutrient loading will be

allowed; thus discharge volume may increase only with implementation of technology that can reduce concentrations enough to meet the MDE's loading rate. Current available technology, if installed, potentially should improve removal efficiency enough to justify a discharge permit for 350 to 400 thousand gallons per day.

Limited wastewater treatment capacity has curtailed development, especially within the past five years, primarily because average daily flows exceed the design capacity of the current plant and effluent discharge occasionally exceeds the State's mandated nutrient load limits. In addition, the current wastewater treatment plant is in need of major repairs and modernization. A summary of current loads and future predicted wastewater treatment demands is presented in Table 1-6. Pending development is contingent on increased WWTP capacity as sanitary flows are expected to increase to 128, 500 gallons per day, or about 1.5 times the currently permitted levels. Alternative treatment options considered by the Queenstown Task Force (November 2008) included reconditioning or replacing the plant at its current location, connecting with the County wastewater treatment plant on Kent Island, or relocating the Queenstown wastewater treatment plant to a new location.

Table 1-6. Estimated current and future sewer and septic contributions under current conditions and alternative future growth scenarios presented in the Queenstown Community Plan. Actual observed wastewater discharge ranges between 62 and 130 thousand gallons per day, with the highest discharge volumes occurring during wet seasonal conditions (Atlantic Coast Labs, unpublished data)

Land Use/Land Cover Scenario	Predicted Population (Number of Residences)	Residential WWTP Contributions (gal/day)	Commercial WWTP Contributions (gal/day)	Total Municipal WWTP Contributions (gal/day)	Number of Septic Tanks
Existing[1]	675 (279)	62,750	32,000	94,000	361
Current – pending[2]	745 (308)	56,980	71,500	128,500	361
County Zoning[2]	2,154 (884)	56,980	73,000	128,500	960[3]
Consolidated Growth[2] (adopted)	3,165 (1,308)	242,000	200,000	442,000	361

[1] Actual amounts vary depending on various factors.
[2] Sewage production rate with grinder pump: 185 gallons per day per residence.
[3] Existing plus all additional residences allowed under County Zoning

WWTP OPTION 1: Reconditioning the existing plant could meet the current municipal needs but would limit future growth. The plant could not be expanded because the site is fully developed and

constrained by developed properties on three sides with Queenstown Creek on the fourth. Refurbishing the plant would require major repairs and modernization including replacement of the waste grinder, two main pumps, the raw flow meter, the clarigester, media for biological contactors; and refurbishment of the chlorine and sulfate systems and sludge drying beds (URS, 2005). Additional improvements could increase the efficiency and effectiveness of the plant and allow the Town to meet some of its current and pending sewer allocation commitments, which currently total 128,500 gallons per day. As of 2005, the estimated cost for this option was approximately $825,000. The work could be completed within 12 months. Effluent concentrations of total nitrogen (TN) would be approximately 14 mg/L resulting in daily loads of approximately 10 pounds TN/day.

WWTP OPTION 2: Replacing the current plant with a completely new facility that includes a sequencing batch reactor (SBR) could increase maximum capacity up to 380,000 gallons per day. The design allows multiple processes, including aeration, settling, and denitrification, to occur in a single vessel, thereby improving the efficiency and effectiveness of the treatment. The cost of constructing a SRB WWTP, including integration of construction with plant operation, decommissioning and demolishing of existing facilities, 24-hour storage tank for shellfish protection, sludge dewatering facilities, and disinfection modifications, will cost approximately $4.4 million. This option, however, would accommodate approximately 80% of the full build-out under the consolidated growth option. Additional sewer capacity could be provided by implementation of a water reuse system (i.e. “a purple pipe system”), spray irrigation, or connection to another wastewater plant (e.g., the County’s WWTP located on Kent Island and known as the KNSG WWTP), or construction of a WWTP at an alternate location.

WWTP OPTION 3: A third option Queenstown could consider is to construct a pump station and force main to tie in with the Queen Anne’s County wastewater system. In 2007, construction at the KNSG WWTP was completed to replace the existing facility with an advanced tertiary treatment plant which uses an activated sludge process to remove nitrogen. Its total capacity is three million gallons per day, and currently the KNSG WWTP processes approximately 1.8 million gallons per day. Preliminary estimates of construction costs to connect the Town to the KNSG WWTP, including pipeline installation, construction of two pump stations, meter vault, demolition, and associated engineering costs, plus allocation fees approximate $6 to 7 million. Construction time would likely take three to four years. The most imposing limitation, however, is the available capacity. Due to pending obligations, the County can reserve only 200,000 gallons per day for Queenstown. Full build-out under the consolidated growth plan would require more than double this available allocation. In addition,

there is concern about the capacity of the pipeline from the proposed connection point at the interchange at Nesbit Road and Route 50 intersection to the WWTP on the western side of Kent Island near the Chesapeake Bay Business Park. A full feasibility study would be required before this option could be considered a viable alternative.

WWTP OPTION 4: Another option is to build a new state-of-the-art wastewater treatment facility at an off-site location. Costs of land acquisition and operating a forced pump system connected to an up-gradient location were deemed prohibitive by the Town engineer and Town Commissioners. Relocating the plant, however, would provide an opportunity to address flood concerns should a 9 to 12 foot storm surge occur. It also would provide the community with waterfront access and limit risks of residential exposure to odors or accidental gas leaks. These were all strong concerns expressed at community workshops held during the early stages of developing the Queenstown Community Plan.

Ultimately, a combination of approaches will be needed to accommodate the effluent discharge generated under full build-out of the consolidated growth plan. The Town has explored building a new WWTP at the current site behind the existing plant. This new plant would be designed to be expandable in stages, and it would incorporate improved treatment technology that would allow the discharge of up to 360,000 gallons per day into Little Queenstown Creek (see Figure 1-13). In this approach the current plant would remain on-line until the new facility is capable of handling the existing volume of wastewater.

An alternative approach has been proposed by Washington Brick and Terra Cotta, owner of the golf course. Washington Brick has proposed building a plant on golf course land to meet their immediate needs of 30,000 gpd and to dedicate land to the Town to add capacity to meet the Town's needs. In this approach the Town's current WWTP would continue to operate until the golf course plant has been expanded to accommodate Town needs. Capacity would be increased further to meet needs resulting from the growth described in this plan. Most of the effluent from this plant will be used for golf course irrigation, thus reducing the amount of effluent discharged into Little Queenstown Creek.

As development continues over the next 10 to 30 years, the Town will need to accommodate as much as 442,000 gpd without imposing any additional nutrient loads to Little Queenstown Creek. Effluent discharge into the creek may be reduced by reclaiming the highly treated wastewater through implementation of a "purple pipe system." The Town has explored the possibility of a reclamation facility which would meet state-mandated nutrient reductions year round, enabling the reclaimed water

to be used for irrigation and other non-potable uses such as flushing toilets in commercial buildings, air conditioning, car washes, and fire hydrant discharge.

The purple pipe system would provide the additional benefit of reducing demands on the public water supply. By enhancing the capacity of the wastewater treatment plant to remove nutrients and implementing a viable purple pipe system, the Town anticipates that it could provide the capacity to support the full build-out conditions described in the consolidated growth plan. The Town recognizes that any reclamation facility would require MDE approval, and that at the time of the adoption of this Plan, MDE is in the initial stages of promulgating regulations to address water reuse programs other than traditional spray irrigation and land application methods.

1.4.5.3 Stormwater and Non-Point Source Assessment

Development, industry, transportation, and agriculture all increase non-point source pollution to the Chesapeake Bay and its tributaries. Although residential and commercial development can decrease nutrient and sediment delivery to adjacent surface water bodies, increased storm runoff has been linked with higher rates of stream bank erosion and delivery of toxins. Agriculture, especially corn and soybean row crops, has been linked with elevated nitrogen and phosphorus loads and deteriorated water quality. The Queenstown Community Plan seeks to mitigate these impacts by consolidating growth, promoting rigorous stormwater management practices, and encouraging low impact agriculture in designated open space areas.

This section of the WRE first provides an overview of Queenstown's Stormwater Management Program. Second, it presents an evaluation of the alternate land use plans (current, County-zoned, and consolidated build out conditions) on impervious cover and non-point source loads to local Chesapeake Bay tributaries.

Stormwater Management Program: The primary goal of the Queenstown stormwater management program is to reduce flooding, stream channel erosion, and sediment, nutrient, and toxin delivery to the Chesapeake Bay and its tributaries. Proposed revisions to the current stormwater ordinance include aggressive strategies aimed at reducing runoff from development. Specific requirements include minimizing impervious surface cover, designing development to accommodate local topographic gradients and directing runoff to natural or restored wetlands where reduced flow rates will allow sedimentation prior to reaching flowing tributaries. Structural designs should include efforts to reduce

runoff by implementing strategies including but not limited to green roof systems, rain gardens, and permeable road surfaces. The Town recently adopted a stormwater management ordinance based upon the Stormwater Management Act of 2007 and the regulations promulgated by the Maryland Department of the Environment ("MDE"). The Town's ordinance, which was approved by MDE, will govern stormwater standards for new development.

The Stormwater Management Act of 2007 is based upon Environmental Site Design (ESD) Principles which attempt to mimic natural hydrology on developed sites. The Town's newly adopted stormwater management ordinance incorporates the core principles of Environmental Site Design which are:

1. Increase onsite runoff reduction volumes
2. Require a unified early ESD map
3. Establish nutrient–based stormwater loading criteria
4. Apply ESD technique to redevelopment
5. Integrate ESD and stormwater together at construction sites
6. Provide adequate financing to implement the Act and reward early adopters
7. Develop an ESD ordinance that changes local codes and culture
8. Strengthen design standards for ESD and stormwater practices
9. Ensure all ESD practices can be adequately maintained
10. Devise an enforceable design process for ESD
11. Establish turbidity standards for construction sites
12. Craft special criteria for sensitive and impaired waters of the state
13. Implement ESD training, certification and enforcement

Non-Point Source Assessment: Non-point source (NPS) pollution comes from many diffuse sources including excess fertilizers and pesticides from agriculture and development (e.g. residential lawn fertilizer), oil, grease, and toxins from development, sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks, and bacteria and nutrients from livestock, pet wastes, and septic systems. The NPS pollution is delivered to lakes, rivers, wetlands and coastal waters by groundwater discharge and surface water runoff. Excess loading rates have been linked with harmful effects on drinking water supplies, recreation, fisheries, and wildlife. In particular, elevated plant nutrient loads, including total nitrogen (TN) and phosphorus (TP) cause excessive algal blooms which ultimately can cause a reduction in dissolved oxygen concentrations. Survival of open water fish and shellfish requires dissolved oxygen concentrations consistently above 3.2 mg/L (MDE 2006b).

Ground water discharged from the surficial aquifer is the primary source of water and nitrate; whereas, sediment, phosphorus, and pesticides are delivered by runoff during storm events (Staver et al 1996).
The U.S. Environmental Protection Agency is working closely with state agencies, including the Maryland Department of the Environment, to adopt the use of Total Maximum Daily Loads (TMDL's) for managing human activities and improving surface water quality of impaired and threatened waters across the Chesapeake Bay watershed. A TMDL is a calculated amount of a pollutant that a specific stream, lake, estuary or other waterbody can receive without violating state water quality standards. The TMDL allocates the load to point sources and nonpoint sources, which include both anthropogenic and natural background sources of the pollutant. The federal effort to develop TMDLs highlights the urgency to control pollution impacts from future land use change, septic tanks and WWTP flows to prevent further degradation of a receiving waterbody. Pollution controls must outweigh impacts from development and also agriculture. In the Lower Chester River and tidal portions of the Wye River, designated uses (fisheries and recreation) are impaired from sediments, nutrients, and fecal coliform. Shellfish harvesting has been restricted mainly due to excessive fecal coliform derived from manure spreading, direct deposition from pets, livestock and wildlife, failing septic systems and associated drain fields, and discharge from recreational boaters. In the Chester River, approximately 8% of the fecal coliform is derived from faulty septic systems, 18% from pets, 20% from livestock operations, 11% from wildlife, and 42% from unknown sources (MDE 2008). In the Wye River, approximately 12% is derived from faulty septic systems, 24% from livestock operations, 4% from pets, and 60% from wildlife; monitoring data indicate that most of the biological pollution is derived from sources outside of the Queenstown Planning Area (MDE 2006). Nutrient TMDLs for the Lower Chester River, however, have been challenging to derive because of the difficulty in modeling the strong influence imposed by the Chesapeake Bay tides on water quality across the sub-estuary. The USEPA plans to publish nutrient and sediment TMDLs by December 2010 (Melissa Chatham, MD DNR, personal communication). TMDLs will not be set specifically for the Queenstown Harbor because of its small watershed area. The Queenstown Planning Area and its watershed occupy 1% of the of the entire Chester River watershed, for which TMDLs are being developed. Similarly, sediment and nutrient TMDL's will not be developed specifically for the Upper Wye River, a sub-basin which occupies 6% of the Wye River watershed. For the Wye River, a TMDL only for fecal coliform has been released; and TMDL's for nutrient and sediment will be released in December 2010.

To determine how growth trends and land cover/land use will affect nutrient loadings to the Queenstown Creek and Upper Wye River, we used the Maryland Department of Planning's Nutrient Assessment Spreadsheet. Total nutrient loads were generated for current conditions and future growth

scenarios by multiplying loading coefficients and acreages specific to different land cover classes. Within a land cover class, different loading coefficients are applied for pervious and impervious surfaces. Loading coefficients were provided by the Maryland Department of Planning and derived from down-scaling results of the Chesapeake Bay Program Watershed Model (Phase 4.3) for the Upper Eastern Shore. This modeling approach introduces additional uncertainty when applied to the local planning (i.e., property-level) scale. Resulting estimates should be compared to evaluate the relative impacts of alternative growth plans; results should not be considered as accurate estimates of nutrient loads from specific hydrologic units.

Watershed and hydrologic unit delineations were developed from a hydrologic analysis of fine-scale (2m resolution; 15 cm vertical accuracy) topography data (see Figure 1-14). Land cover acreage estimates were summarized for each hydrologic unit based on the 2002 Maryland Department of Planning Land Use/Land Cover dataset (MDP LULC) provided by Queen Anne's County; spatial datasets describing future LULC growth scenarios were developed by modifying the 2002 MDP LULC dataset (see Figure 1-15). The intersection of land use/land cover data and the hydrologic units was used to estimate total nitrogen and phosphorus loads (Appendix A). Information regarding the number of public sewer and conventional septic system connections were extracted from the Queen Anne's County properties database. None of the septic systems were identified as denitrifying units.

Additional assumptions specific to the Queenstown Planning Area were incorporated in the nutrient loading analysis. First, for the County-based, distributed and consolidated growth scenarios, contributions from the WWTP point source are assumed to remain the same as the current loading rates; any additional development will require adoption of wastewater treatment technology that enables the Town to maintain its current nutrient loading cap as defined by the Maryland Department of the Environment (MDE). Second, for the consolidated growth scenario, we acknowledged the potential for increased impacts from the proposed higher density of mixed residential and commercial development (0.2 acres per residential unit) in the incorporated municipal limits by assuming higher loading rates typical of medium-density housing. According to MDE LULC data, the density of housing in the current Queenstown municipality and the proposed consolidated growth plan actually is considered low density development or the equivalent of development which would occur under current zoning. For the future scenario assessments, we assumed urban and agricultural best management practices are implemented across the Queenstown planning area, as prescribed in the Community Plan and reflected in the Town's adopted stormwater management ordinance. Accordingly, we used MDP's tributary loading coefficients for these land areas.

Impervious Surface Cover: Impervious surface cover, including rooftops and pavement, prevents rainwater from infiltrating the ground and adversely affects stream habitat and water quality by increasing peak storm flow, reducing base flow conditions, and increasing toxin loads from industry and automobiles (e.g., salts, heavy metals, and volatile organic chemical compounds). Stream biotic integrity and water quality generally decline when more than ten percent of a watershed is developed. For the Queenstown region, impervious surface cover was determined according to the proportion of impervious area associated with different land use/land cover classes (Maryland Department of Planning 2009). In the Queenstown Creek watershed, impervious surfaces occupy 83.1 acres or 3.2% of the entire land area. In the Upper Wye watershed, impervious surfaces currently occupy 175.3 acres or 3.0% of its entire land area. The distributed growth scenario would increase impervious surface cover to 4.8% in both watersheds whereas the consolidated growth option, at full build-out, increases impervious surfaces in the Queenstown Creek watershed to 5.1% and 4.2% in the Upper Wye River watershed (Table 1-7). Although the consolidated growth plan would have more impervious cover, it also accommodates more households than the other scenario, and should prevent impervious acreage in other parts of the watersheds.

Table 1-7. Impervious area (acres) and percent cover in the Queenstown Planning Area estimated from the 2002 MD LULC data and alternative growth scenarios.

Land Use / Land Cover Scenario	Queenstown Creek	Upper Wye River
Current/Limited Growth	83.1 (3.2%)	175.3 (3%)
County Zoning	124.2 (4.8%)	285.2 (4.8%)
Consolidated Growth (adopted)	131.1 (5.1%)	247.2 (4.2%)

Nutrient Pollution: Current nutrient loading rates estimated for the Upper Wye and Queenstown Creek are similar to those estimated for the Delmarva Peninsula and are relatively high compared with other areas across the Chesapeake Bay watershed (Preston and Brakebill 1999). The high proportion of agriculture and proximity to water largely account for the high loading rates. The estimated delivered yield of total nitrogen ranged between 9 and 20 lbs per acre per year with the lowest rates occurring where the highest proportion of development including urban grasslands (e.g., segments QT01, QT09

and QT11) occurs (Figure 1-16). Estimated delivered yield of total nitrogen in other areas across both watersheds ranged between 13 and 19 pounds per acre per year. Under the County-based distributed growth scenario, total nitrogen loads are reduced by approximately six percent (Table 1-8), primarily because of cropland conversion to development. Delivered nitrogen loads remain high in the Upper Wye River basin because of septic system inputs across the study area. By consolidating growth and requiring implementation of urban and agricultural best management practices across the Queenstown Planning Area, total nitrogen loads would be reduced by eight percent. Again, this assumes that development is concentrated on a small portion of each watershed and that low impact agriculture is emplaced. Nitrogen loading rates remain relatively high, however, because croplands still occupy a large proportion of land areas up-gradient of the Queenstown Planning Area in each watershed.

Table 1-8. Total nitrogen loads (in pounds per year) and percent change from current conditions (indicated in parenthesis) estimated for Queenstown Creek and Upper Wye River watersheds. Estimates are based on Maryland's non-point source assessment spreadsheet (MDP 2009). The Queenstown WWTP contributes an additional 3,266 lbs TN per year, which will remain the maximum annual point source load (MDE, personal communication).

Land Use / Land Cover Scenario	Queenstown Creek	Upper Wye River
Current/Limited Growth (2002 MDP LULC)	45,158	91,710
County Zoning	42,337 (- 6%)	91,308 (+ 0%)
Consolidated Growth (adopted)	41,367 (- 8%)	84,704 (- 8%)

The estimated delivered yield of total phosphorus ranged between 0.6 and 1.1 lbs per acre per year with the lowest rates occurring in areas where the highest proportion of forest (e.g., segments QT03 and QT09) (Figure 1-17). The total phosphorus load to Queenstown Harbor/Lower Chester River under current conditions is approximately 2,662 pounds per year (see Table 1-9). In the Wye River, which is twice the size of the Queenstown Creek watershed, the annual total phosphorus load is estimated to be approximately 4,623 pounds per year. Cropland conversion to development and implementation of best management practices would decrease loads in the consolidated growth area (e.g., QT03, QT07, and QT09). Summarized results for each hydrologic unit in the Queenstown Planning Area are provided in Appendix B.

Table 1-9. Total non-point source phosphorus loads (lbs/year) and percent change from current conditions (indicated in parenthesis) estimated for Queenstown Creek and Upper Wye River watersheds. Estimates are based on the Maryland's non-point source assessment spreadsheet (MDP 2009). The Queenstown WWTP contributes an additional 411 lbs TP per year, which will remain the maximum annual point source load (MDE, personal communication).

Land Use/Land Cover Scenario	Queenstown Creek	Upper Wye River
Current/Limited Growth (2002 MDP LULC)	2,662	4,623
County Zoning/ Distributed Growth	2,495 (- 6%)	4,614 (0%)
Consolidated Growth	2,318 (- 13%)	4,302 (- 7%)

1.4.5.4 Water Resources Recommendations

The Water Resources Element of the Queenstown Community Plan summarizes potential impacts from human activities across the Planning Area under current conditions and full build-out of contrasting growth scenarios. Based on this analysis and also an evaluation of impacts on infrastructure costs, traffic patterns, and socio-economic factors, the consolidated growth scenario is adopted as the preferred growth strategy in the Queenstown Community Plan. Current population trends suggest that full build-out of the 1,308 residences will take more than 50 years. In the short term, Queenstown likely will include 350 to 500 residences by 2020 (10 to 20% of full build-out capacity), and 420 to 700 residences by 2030 (15 to 40% of full build-out capacity). There currently are 279 residences within the municipality. Figure 1-19 maps a time-line that highlights increases in water and sewer demand as the population increases. Recommended town actions to accommodate the growth also included.

This Water Resources discussion highlights several constraints currently limiting development in the Planning Area. Specifically, the Town urgently needs access to additional water supplies and expanded wastewater treatment capacity. The extended shoreline and small tributaries in the Planning Area increase concern for management of non-point source pollution.

To address these issues, the Town recommends the following actions.

- *Water Supply:* Pursue existing plan to increase capacity of municipal wells to 300,000 gallons per day. Develop an additional municipal well in the Matawan, Magothy, or Patapsco Formations to supply projected demand of approximately 300,000 gallons per day. Developing additional municipal supply wells will require pursuit of additional or expanded groundwater appropriation permits.
- *Wastewater Treatment:* Proceed with building a modern wastewater treatment plant either at the current site or at a site on the golf course property and continue to work with MDE to explore the development of a "purple pipe system" to reclaim wastewater for non-potable uses as appropriate under MDE regulations.
- *Stream Buffer Protection:* Consider regulations which would restrict or limit development within 300-feet of mapped (1:24,000 scale) streams and within 100 feet of mapped wetlands (see Figure 1-8). Similarly, restrict development within 300 ft of shorelines of the Chesapeake Bay and its tributaries.
- *Flood Protection:* To accommodate storm surges, rising sea level, and climate change, consider regulations that restrict development in mapped flood zones for category 3 storms and restrict development in areas less than 12 feet above current mean sea level (see Figure 1-18).
- *Stormwater Management*: Require developers to adopt aggressive efforts to reduce sediment, nutrient and pollution delivery to flowing streams and the Chesapeake Bay by employing Environmental Site Design (ESD) techniques.
- *TDR policy to maintain green belts:* Consider legislation to adopt a workable Transfer-of-Development-Rights program or other mechanism, such as floating zones, which will encourage development in core growth areas while providing land owners across the Planning Area with equitable profits.

Wastewater treatment capacity ultimately has the greatest potential to limit growth in Queenstown. With respect to water supply, hydrogeology investigations (e.g., Drummond 2001) together with the high production rates of irrigation wells completed in the Magothy aquifer indicate strong potential for Queenstown to accommodate future water demands. The non-point source nutrient assessment indicates little change to overall nutrient loading rates regardless of land cover conditions. An aggressive stormwater management ordinance and efforts to limit development in sensitive areas, however, will limit adverse impacts from future growth on surface water quality across the Planning Area. In contrast, the modernized wastewater treatment plant, currently in the funding phase, will meet

approximately 90% of the total discharge anticipated with full build-out under the consolidated growth scenario. Spray irrigation and other approved non-potable uses for the remaining 10% discharge volume (30,000 gallons per day) are viable, especially if the wastewater is treated first. Ideally, spray irrigation should occur in the eastern portion of the Planning Area, where silty soils slow infiltration and allow great opportunity for further biodegradation of contaminants prior to discharging in local waterways and the Chesapeake Bay. Costs for other alternatives, such as building a second plant or connecting to the County WWTP, likely will be prohibitive.

When non-point source nutrients loads were calculated for the Queenstown Planning Area under the adopted consolidated growth scenario and without consideration to watershed boundaries, resulting estimates indicated that the TN load will decrease by approximately 5% while TP will remain largely unchanged. In sub-estuaries of the Chesapeake Bay, enhanced nitrogen availability primarily causes algae blooms and declines in water quality. These trends suggest that strategies which reduce TN loads, such as consolidating growth and limiting high impact agricultural practices will have the most beneficial effects on surface water quality. Aggressive urban stormwater management practices will be mandated, further reducing runoff and limit total phosphorus loads.

Missing Data: When the Water Resources Element is updated in six years, additional information about the local groundwater system, wastewater treatment options, and response of aquatic ecosystems to watershed activities and anthropogenic influences will improve the basis for future policy decisions.

Water Supply Issues and Uncertainty: Additional information describing groundwater resources in the Queenstown Planning Area will provide a stronger basis for planning sustainable growth. In particular, a synthesis of historic boring logs recorded during well explorations or development would provide a more accurate description of the local groundwater resources. Results would provide invaluable information for future well explorations. More specific description of the contamination from petroleum derivatives (benzene, toluene, ethylbenzene, and xylenes, or BTEX chemicals), including the source and extent also would be helpful for maintaining the current water system and locating future wells. In addition, the community is concerned with impacts from an existing landfill adjacent to the Town Planning Area and immediately up-gradient of Queenstown Creek. Information describing the near-surface hydrogeology of the site would be useful for evaluating impacts on surface water and shallow groundwater quality.

A 2001 report (URS Corporation) identified several outstanding data gaps in Queenstown's water supply infrastructure. There remains conflicting information about the Del Rhodes water tank size. Resolving the discrepancy will be critical to ensuring access to adequate water supply during emergency situations. The Town also would benefit from locating leaks in the distribution network.

Wastewater Treatment Capacity: Currently, increasing wastewater treatment capacity represents the most challenging water resource issue for the Town of Queenstown. The existing plant is outdated and operating near its treatment capacity. External funds are urgently needed to modernize the plant and protect the Queenstown Harbor as well as the Chesapeake Bay. Expanding the waste water treatment capacity is necessary for Queenstown to prevent suburban sprawl and eliminate impacts from septic systems that would otherwise be installed in outlying areas if the Town could not annex those properties. Further, without increasing treatment capacity and enabling the Town to annex properties, the Town would not have jurisdiction to manage stormwater runoff. The huge cost of refurbishing or rebuilding the existing plant has resulted in a management focus primarily on the short-term financial impacts to citizens of Queenstown. While this consideration is critical, ideally the selection criteria should include an evaluation of how potential alternatives meet other long-term objectives of the Queenstown and the Chesapeake Bay Watershed communities, including the following: provide capacity required to support full build-out conditions; provide capacity to incorporate new wastewater treatment technology that will improve water quality discharged to the Chesapeake Bay (e.g., advances in nutrient retention and or removal of toxins including endocrine disrupters); minimize environmental risks, especially due to sea level rise, potential gas leaks, and odor); and provide community waterfront access.

Stormwater Management and Non-Point Source Pollution: To evaluate impacts from alternative growth scenarios and best management practices, the Maryland Department of Planning's Non-Point Source Assessment Spreadsheet provided a tool for downscaling predictions generated from the Chesapeake Bay Program's watershed model. The prescribed loading rates are constant across the Planning Area. In reality, the efficiency and rate of nutrient transfer depends on additional landscape factors including topography and soil characteristics (e.g., soil permeability and erodibility), which vary considerably across the Queenstown Planning Area. Additional information describing the uncertainty in the model predictions would provide a stronger basis for incorporating results in land management decisions. Queenstown currently is working with researchers from the Smithsonian Environmental Research Center to compare nutrient loads predicted from a suite of watershed models,

including the Chesapeake Bay Program's Hydrologic Simulation Program – Fortran (HSPF) watershed models (Phase 4.3 and 5.0), a tool which is the primary basis for developing TMDL's across the Chesapeake Bay watershed. The resulting range of predictions will provide an initial basis for describing the uncertainty in the model predictions and better understanding potential impacts from development and agriculture. In addition, the Town of Queenstown also is seeking funding to implement a continuous stream monitoring program designed to evaluate how well the modeling tools and especially the adopted growth plan and implemented best management practices influence surface water quality. The size of the Queenstown Planning Area is comparable to most municipalities in the Chesapeake Bay watershed. Considering the scale of the Planning Area and impending growth pressure due to its proximity to the Washington - Baltimore metropolitan area, Queenstown provides a unique opportunity to implement an adaptive management strategy that ultimately will provide other municipalities with a better understanding of how land management decisions affect water resources.

A central goal of our 2010 Community Plan is "to establish Queenstown as a leader on the Eastern Shore in environmental stewardship and community design by meeting or exceeding environmental regulations and requirements and actively promoting neighborhood design that reflects the rural, village-like characteristics of Queenstown."

The Queenstown Community Plan uses a watershed-based approach to land planning. By identifying sensitive areas where water resources would be impacted if development were allowed and

subsequently directing and accommodating that development elsewhere, incorporating local expert knowledge, and deriving detailed maps of alternative development scenarios, the Plan is able to incorporate management and policy considerations, such as zoning, infrastructure costs, and economic impacts, with the science of understanding the functioning of watersheds. The approach is imperfect because of its newness, but it demands commitments by all participants to work collaboratively to define the planning objectives and
concepts proposed using a common terminology that blends the language of growth management with watershed science.

The Town's core policies include the following:

- Repair and restore essential functions of the natural resource base and enhance water quality over the long term as targeted farmlands are converted to developed uses. Existing woodlands will be preserved and expanded to connect with nearby woodlands. Stream protective corridors and buffers will be enhanced or restored. Tributaries of Queenstown Creek and the Wye River will be protected.
- All development will be environmentally sensitive and the natural character of land to be developed will be maintained. This approach will use development techniques commonly known as conservation design, and, at the lot level, environmental site design. Streams and wetlands are among the most sensitive features and they must have wide, protective natural buffers, and development must be designed not only to minimize impacts to these features, but also to restore natural functions.
- Target growth projected by the Plan on approximately 30% of the available growth acreage and preserve the remainder as open space, farmland, stream buffers, and forests. Placing growth in a compact pattern, holding it to the highest environmental standards, and managing the preserved lands to protect and enhance the watershed will have a significant positive impact on the quality of the Chester and Wye Rivers and, ultimately, the Chesapeake Bay.
- Preserve and connect productive farmland, but promote low impact farming practices which minimize aquifer withdrawals and nutrient applications to protect coastal ecosystems.

Specific actions that the Town will take to carry out these policies include:

- Implement Environmental Site Design Principles in updated stormwater management regulations. All development will be required to incorporate watershed management practices

that will bring substantial benefits to our creeks and the Chester and Wye Rivers including strategies that minimize runoff and sediment transport generated by development.

- Consider a “water reclamation facility.

- Prepare, as part of its package of implementation tools such as the Zoning Ordinance and the Subdivision Regulations for this Community Plan, a set of environmental performance standards that will establish quantitative or qualitative measures as appropriate to weigh the impact of proposed change on the productive functioning and repair or enhancement of the natural environment. If the changes fail to improve the environmental resources of the Planning Area, they will not be allowed to occur.

- Adopt regulations which require a carefully delineated development buffer for all sensitive areas such as perennial streams, intermittent streams, wetlands, wildlife habitat, and other areas needing protection. The Town will also adopt regulations that assure the continuity and integrity of natural systems such as forests and drainage ways when their surroundings are considered for development.

1.4.6 Sensitive Areas

Implementation of the Town and County's Chesapeake Bay Critical Area Programs will continue within the Planning Area. These programs will continue to be amended to remain consistent with State objectives for growth management and the recommendations contained in this Community Plan. Environmentally sensitive areas outside of the Chesapeake Bay Critical Area will also be protected from the adverse effects of development.

As part of its package of implementation tools such as the Zoning Ordinance and the Subdivision Regulations for this Community Plan, Queenstown will prepare a set of environmental performance standards that will establish quantitative or qualitative measures as appropriate to weigh the impact of proposed change on the productive functioning and repair or enhancement of the natural environment. If the changes fail to improve the environmental resources of the Planning Area, they will not be allowed to occur.

The Town and County currently have extensive regulations in place designed to protect the environment and sensitive areas as development occurs. State and Federal agencies also have jurisdiction over certain sensitive areas such as tidal wetlands and nontidal wetlands. The

recommendations contained in this section are designed to address identified gaps in the Town's and County's overall environmental protection programs.

The need to protect environmentally sensitive areas is based on the fact that they are vital to the well-being of the community. State law requires that this Plan address protection in four sensitive areas: the 100-year floodplain, streams and buffers, habitats of threatened or endangered species and steep slopes.

The Town's method to protect the 100-year floodplain is to halt any future development where possible and to encourage Town acquisition of properties in the flood plain so that they can be returned to an undeveloped state. Regarding streams and buffers, the Town's goal is to preserve and enhance these by identifying and mapping all streams and by establishing a minimum 300 foot buffer from each bank and by improving stormwater management in developed/developing areas. The Town's goal will restrict new development within stream buffers and will restrict disturbance of natural vegetation within buffers (See Figure 1-8).

The existing Town boundary includes three protected habitats, the Great Blue Heron rookery, a bald eagle nesting site, and Delmarva Fox Squirrel habitat, all on the golf course property. Should habitats of other threatened or endangered species be discovered or included within the Town through annexation, such habitat will be protected accordingly. As for steep slopes, most of Queenstown is

relatively flat. Localized steep slopes mainly occur adjacent to streams, and therefore are protected by the proposed stream buffer requirements. The Town's goal is to direct development away from steep slopes and the Town will demand, when appropriate, a topographic review of subdivision and site plans. It will prohibit development on slopes greater than 25 percent, and on slopes greater than 15 percent if highly erodible soils are present, unless it can be demonstrated that the stability of such slopes would be improved and adverse environmental impacts mitigated.

Regarding nontidal wetlands, it is the Town's intent to protect such wetlands by establishing "nondisturbance" buffers around such areas. Identification of wetlands and buffers will be part of the development review process. Agricultural easements are an important tool for protecting environmental quality and the character and quality of life in Queenstown. The open agricultural character of land adjoining the Town defines the location and appearance of the Town within the County and the Town will coordinate closely with County and State officials on these areas.

Sensitive Area Recommendations

The Town will adopt regulations which require a carefully delineated development buffer for all sensitive areas such as perennial streams, intermittent streams, wetlands, wildlife habitat, and other areas needing protection. The Town will also adopt regulations that assure the continuity and integrity of natural systems such as forests and drainage ways when their surroundings are considered for development.

Development in the Critical Area will be held to the highest standards of planning, design, and regulation to ensure that any proposed changes enhance the environmental quality of the water, the shoreline, and the 1000-foot Critical Area envelope.

The Town will prepare a detailed Harbor Plan which outlines how the harbor can best be utilized for boating traffic, docking, and mooring with the least amount of environmental impact. The Parks and Harbor Board will prepare a Harbor Plan for adoption by the Town Commissioners.

1.4.7 Community Design

The design of future development throughout the urban portions of the Planning Area will enhance, extend where possible, and be compatible with the existing community character seen in the Town Center and other historic sections of Queenstown.

The design form of development within the Planning Area will extend and link to the existing character of Queenstown but also should reflect and compliment the existing rural setting of the area.

The aesthetic quality of new development within the Town and Planning Area should be of prime importance during the development review process. Development that does not conform to this Plan or is not deemed to add value to the community will not be allowed.

Development designs and layouts which will result in disjointed residential subdivisions and typical highway strip commercial development will not be permitted.

Historic structures and sites along with important scenic view corridors will be preserved.

Community Design Recommendations

New residential areas will be planned to link with existing Town streets and features and should encourage pedestrian use of streets and sidewalks. Residents should have the ability to walk to the Town Center and other Town commercial areas. Modified grid street patterns, traditional Town lot layouts, and integrated open spaces are encouraged. Dead end streets and cul-de-sacs should be avoided. Sidewalks and street trees are required. Community open spaces must be functional and

useable.

Proposed Town commercial areas should be designed to use groupings of clustered buildings versus standard strip commercial configurations. Parking and pedestrian spaces should be integrated within the project rather than neatly separated from buildings and structures. All building facades visible from adjoining properties or streets should carry an architectural theme and appearance, including the creation of "multiple building fronts." Facades should reflect vernacular architectural styles. Figure 10 illustrates several of these themes.

Parking areas should be located in and around building masses and should be heavily landscaped with shade trees. On-street parking, where possible, should be encouraged. Adequate signage should be permitted and the focus should be more on aesthetics versus overall size. All mechanical equipment and service areas should be screened from public view.

Town Commercial and Business Parks should be planned and approved in an integrated manner, where the total site, rather than the individual parcel, is evaluated and designed. Individual stormwater management facilities, and individual forest conservation or other environmental mitigation should be avoided. Each of these factors should be solved on a total site basis. These Parks should incorporate internal access sized to accommodate the planned users. Perimeter landscaping and highway corridor buffering should be planned and implemented. Exterior storage areas should be discouraged and only permitted with adequate screening.

Planned development areas should be designed to build on existing Town linkages, streets, trails, greenways, park systems, etc., and should be designed as connected, mixed use neighborhood communities. The sprawling "spaghetti" land planning techniques popular in the 1970's should be eschewed for land planning techniques that integrate, not separate, different uses, that connect streets in some organized, understandable manner, and that allow and encourage residents to interact with neighbors. Open spaces should be incorporated along a pedestrian system and should include usable tot lots, small open field play areas, and larger regional parks along with environmental and sensitive area protection zones.

The Town recently adopted a Green Buildings Ordinance for all new public, business, commercial, and industrial enterprises covering more than 30,000 square feet of impervious surface using the LEED rating system. In preparing the implementing ordinances in response to this Plan, the Town will

consider other LEED initiatives.

- LEED for Homes is a rating system that promotes the design and construction of high-performance green homes. A green home uses less energy, water and natural resources; creates less waste; and is healthier and more comfortable for the occupants. Benefits of a LEED home include lower energy and water bills; reduced greenhouse gas emissions; and less exposure to mold, mildew and other indoor toxins.

- Less known than LEED for Homes is LEED for Neighborhood Development. It is a rating system that integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design. LEED certification provides independent, third-party verification that a development's location and design meet accepted high levels of environmentally responsible, sustainable development.

Greenways and Trail Systems should be planned and implemented as development occurs in and around the Town. At the very least, existing sidewalks should be extended when new development abuts and appropriate portions of planned trails should be implemented as outlying growth occurs. Greenway and other trail systems should be planned to tie recreation areas together and should be planned to tie to Countywide greenway systems.

Street Standards should be adopted that reflect "village scale" development needs and respond to emerging trends in engineering thought related to street design and traffic calming. The proposed development form outlined previously requires an ordered, hierarchial street system, where larger street types handle different traffic requirements than smaller, neighborhood-only type streets. Streets should be designed to accommodate safe traffic for the adjoining use proposed. They should also function as a corridor for pedestrian walk/trail systems. All street sections should require street trees and lighting scaled to the need and land use to be served.

Detailed design guidelines, standards, and new district designations should be incorporated into the zoning ordinance as recommended in this Plan. The guidelines and standards should be based on the general concepts described in this Plan.
Appendix C contains a more detailed set of design standards to be used when considering the future growth and revitalization of Queenstown and its Planning Area.

CHAPTER 2: COMMUNITY PROFILE AND GROWTH ASSUMPTIONS

This look at existing conditions focuses on the Town of Queenstown and the lands surrounding the Town. It is designed to be a point of departure for creation of a community-wide vision and is grounded in an assessment of the region's natural resource base.

Today, with respect the natural resource base, we have new and important information on the -

• Extent of storm surge related to hurricanes,

• Amount and rate of sea-level rise in the Chesapeake Bay region,

• Impacts of farming on water quality,

• Relationship of forest size to bird habitat and biodiversity,

• Required area for adequate stream buffers, and

• Amount of carbon removed from the atmosphere through conversion to forests

What we have learned is that vulnerabilities and liabilities underlie our current situation and opportunities exist to improve and enhance our natural and cultural landscape as change occurs. What we conclude is that it is shortsighted to contemplate change without understanding how change can help bring about area wide benefits.

2.1 The Region

Queenstown is a Chesapeake Bay coastal town surrounded by water and the natural energies, influences, constraints, and beauty that such a location entails. It is located on the Chester River near its confluence with the Bay. The historic, eighteenth century Town is oriented to Little Queenstown Creek—a tributary to the Chester River. The Town's Planning Area includes the Wye River and its tributaries making Queenstown a factor in two watersheds.

The Town's location can be referenced to transportation routes. There were two transportation networks significant to Queenstown's development. Historic farm to market (farm to water landing) routes were used to deliver agricultural products and seafood to shipping vessels that transported goods primarily to Baltimore. Queenstown also was connected to other Eastern Shore communities and farms by Route 18 (Main Street) and a rail line. Today, a modern, regional highway system exists immediately adjacent to Queenstown; in recent decades, the municipality expanded to fill the area where Routes 301 and 50 come together. Queenstown is a highly accessible regional focal point.

2.1.1 Queenstown Planning Area

The Queenstown Planning Area is not limited to the municipal limits of Queenstown (See Figure 1-2). Instead, the Planning Area is drawn to encompass the land and natural resource features of significance to the future of Queenstown. Generally, the Planning Area is bounded on the west by the Chester River, Nesbit Road / Wolsey Creek. It encompasses the lands between Routes 50 and 301 to points east of Bloomingdale Road, roughly to the tributary stream associated with the Wye East River. To the north, the study area extends about one-half mile past Rt. 301 and to the south, it extends about one-half mile past Rt. 50.

The Planning Area encompasses the area adopted by the Town in the 1998 Town of Queenstown Community Plan and later adopted by the County in the 2002 Queen Anne's County Comprehensive Plan as the Queenstown Designated Growth Area. The Planning Area in this Plan includes two areas that were not included in the 1998 Plan. They are an area around Queenstown Creek and the area

across Rt. 50/301 from the golf course extending west toward Nesbit Road.

In 2004, Queen Anne's County adopted an amendment to the 2002 County Comprehensive Plan noting the County's intention to delay implementation of the land use recommendations concerning the designated growth area until the Town revised the Queenstown Community Plan. The County zoning of lands within the boundaries of the designated growth area has remained as it was prior to 1997.

2.1.2 The Natural Setting

The following discussion provides an overview of Queenstown's regional hydrogeologic setting and its linkages with local water resources in the Queenstown Planning Area. The discussion includes a summary of climate and sea level changes likely to affect the Queenstown community, population growth trends, current land use and land cover conditions, and future growth scenarios.

Geology: Queenstown is located within the Atlantic Coastal Plain physiographic province, which extends from New York, across Florida, and through the Gulf Coast (Figure 2-1). The region is characterized by nearly flat surface topography superimposed on deep, unconsolidated (loose) layers of sand, silt, and clay. The sediments accumulated under varying depositional environments imposed by fluctuations in mean sea level which controlled the pattern in distribution and texture of materials deposited across the region. The resulting interbedded geologic layers impose a strong influence on current water resources in the Queenstown Area.

In the mid-Atlantic region, the Coastal Plain wedge of sediments increases in thickness from a featheredge near the Piedmont Fall Zone to more than 2.5 miles thick under the continental shelf. The sediments rest on an eroded surface of metamorphic, crystalline rock formed more than 230 million years ago (Sheridan and Grow 1988). The oldest and deepest overlying sediments include Cretaceous clay, sand, and gravel stripped from the Appalachian Mountains and deposited in deltas to the newly formed Atlantic Ocean basin approximately 100 million years ago. These vastly thick (as much as 4,500 feet), ancient deposits were able to form because the Delmarva Peninsula occurred along an extremely active continental plate boundary (DNREC 2001). Approximately 35 million years ago, a large meteorite interrupted this deposition pattern, creating a crater more than 55 miles in diameter in the southern portion of the Chesapeake Bay. Since its impact, more than 1000 feet of additional sediment accumulated, mostly during warm interglacial periods and high sea level conditions similar to today's climate. Across the Atlantic Coastal Plain, the long-term geologic history continues to control the effects of climate fluctuations on surficial features, such as shorelines, waterways, and wetlands.

Topography: Relatively recent climate events have controlled the redistribution of younger sediment deposits across the Atlantic Coastal Plain and topographic features visible today (Figure 2-2). During the Pleistocene epoch, approximately 1.8 million to 10,000 years ago, four glacial ice ages resulted in widely fluctuating sea water levels and land surface elevations. During warm inter-glacial periods, sea levels increased to as high as 100 to 130 feet above current mean sea level (Hobbs 2004), resulting in shoreline erosion along interior, upland areas, and forming a terraced landscape with step features dropping down to the coast and major rivers. In the Queenstown area, the Talbot terrace can be recognized by the modestly steep increase in elevation of approximately 25 feet, visible along Greenspring Road and Bloomingdale Road. During colder periods, continental glaciers significantly reduced sea level to as much as 300 feet below current sea level, resulting in the ancient Susquehanna River extending as far as beyond present Cape Henry and Cape Charles in Virginia (Figure 2-3; Colman et al 1990). During these interglacial lows, stream incision along tributaries to the Susquehanna and the Chesapeake Bay formed most of the steeper, east-west topographic features. The Chesapeake Bay in its current condition was created 5000 to 6000 years ago, when the lower course of the Susquehanna River was flooded as melt water from the large Pleistocene continental glaciers raised sea level.

Climate Conditions: Queen Anne's County has a humid, temperate climate with mild winters and warm, moist summers (Matthews and Reybold 1966). Average temperatures range from 35° F in January to 75°F in July. Extremes have been recorded as low as -13° F (January 28, 1935) and as high as 107° F (July 22, 1957). Precipitation is distributed fairly evenly throughout the year, though it is more variable during July and August when thunderstorms often produce two to three inches of rain per storm. Total annual rainfall is approximately 45 inches (Matthews and Reybold 1966).

Soils: The interaction between climate and geology and its effects on topography primarily controlled soil development across the Atlantic Coastal Plain and in the Queenstown study area. In coastal areas, shoreline erosion during high sea level events removed much of the rich, silty-loam soils that still occur in higher elevations across the Delmarva Peninsula. These fertile upland soils are also highly erodible. Deeper soils exposed by shoreline erosion and by stream incision typically have a higher sand content than terrace top soils and are less susceptible to erosion; however, the higher permeability increases the potential for contamination of near surface groundwater systems that discharge to the Chesapeake Bay. Figure 2-4 indicates the soil types across the Queenstown Planning Area and highlights soil permeability, which increases with sand content. The potential for groundwater contamination is

greatest where the soils are most permeable. In contrast, soil erodibility increases with silt content.

Ground Water Resources: The sand, silt, and clay sediments across the Atlantic Plain form a layered aquifer system, which provides water supply across the Delmarva Peninsula. Near Queenstown, five major aquifer systems have potential to supply municipal and residential water demands, including the shallow, unconfined Columbia aquifer, the Aquia, Matawan, and Magothy aquifers, and the Potomac Group confined aquifers (Figure 2-5; Drummond 2001). Bedrock underlying the Coastal Plain sediments is not considered a potential water supply. The following highlights the most significant features of the aquifer system, especially with regard to providing water supply to the Queenstown Planning Area.

- The Columbia aquifer is a surficial, unconfined (i.e., water table) aquifer which generally occurs within ten feet of the land surface in sediments from the Pliocene/Pleistocene Series (i.e., deposited 10,000 to five million years ago). Recharge to the aquifer is through direction infiltration of rainwater. Groundwater discharge from the aquifer occurs primarily to local tributaries, wetlands, and the Chesapeake Bay. Only three percent of the surficial aquifer recharges deeper, confined aquifers (Ator et al., 2005). The water supply is heavily relied upon for irrigation of nursery stock and farms, as well as for domestic and small commercial supplies. Because of its vulnerability to surface contamination and dewatering during droughts, however, use of these deposits is now rare (Drummond, 1988a, b).

- The shallowest confined aquifer is the Aquia, which supplies most of the County's water demand and a portion of Queenstown's current municipal supply. The formation includes fine to coarse glauconitic quartz sand with varying amount of clay, typically within 110 feet of the land surface. These sediments are part of the Eocene Series deposited 35 to 56 million years ago. Recharge to the Aquia occurs where the formation outcrops in a belt from the District of Columbia to the mouth of the Magothy River. Some exposures also are found in Kent County, near the Sassafras River (Vokes and Edwards 1974). Since 1980, water levels in the Aquia have declined with usage at a rate of approximately six inches per year. As a result salt water intrusion has increased, especially along the Chesapeake Bay shoreline of Kent Island and further allocations are limited. In addition to quantity, the naturally occurring arsenic (10 to 15 ug/L) and iron (0.3 ug/L) present challenges to its use as a domestic water supply (e.g., see Whitman, Requardt, & Associates, LLP, 2007).

- The Matawan aquifer underlies the Aquia aquifer in western Queen Anne's County and possibly elsewhere. It occurs approximately 610 to 650 ft below the land surface in an upper Cretaceous marine deposits formed 65 to 100 million years ago. The Matawan Formation is composed mainly of silt and clay, but pockets of sand provide enough water to supply wells on Kent Island and two the Queenstown area. As a result, in some locations the Matawan aquifer is indistinguishable from the underlying Magothy aquifer (Drummond 2001). Withdrawal at the Queenstown Harbor Golf Course averages 72,000 gallons per day; the maximum yield has been as high as 336,000 gallons per day. Water tests indicate low iron and arsenic concentrations and generally excellent water quality (Drummond 2001).

- The Magothy Aquifer occurs approximately 900 to 950 feet below the land surface, and includes a broad lateral distribution of mixed materials including organic material, pyrite, marcasite, and finely banded white sands (Drummond 2001). These sediments are older than the Matawan deposits but were also deposited during the upper Cretaceous, 65 to 100 million years ago. Water quality of this aquifer is generally good except for its high iron content, which ranges between 12 and 19 parts per million (ppm); iron concentrations exceeding the state 0.3 mg/l drinking water limit can cause red, brown, or yellow staining of laundry, glassware, and household plumbing fixtures. Recharge to the aquifer primarily occurs along northern Anne Arundel County, along the Patapsco sub-estuary (Klohe and Kay 2006).

- The Potomac Group includes the Patapsco, Arundel, and Patuxent Formations, part of the Lower Cretaceous Series formed 100 to 145 million years ago. Sediments consist of interbedded sand, silt, and clay deposits. It is the deepest aquifer with potential for providing municipal water supply. The Upper Patapsco aquifer underlies the Magothy aquifer and supplies water for domestic, commercial, and municipal uses on Kent Island and eastward to Grasonville. The Upper Patapsco aquifer is very productive but has severely elevated iron and manganese concentrations (28 and 0.4 mg/L, respectively) (Drummond 2001). The water quality issues become less severe to the east and south. In Talbot County, iron concentrations do not pose a treatment problem, and the aquifer is used as a municipal supply without any treatment. The Lower Patapsco aquifer underlies the Upper Patapsco aquifer on Kent Island, and probably elsewhere in the study area. It has been used for part of the public supply system on Kent Island since late 1999, but nowhere else on the Eastern Shore of Maryland south of Cecil County. Although water from the Lower Patapsco aquifer requires treatment for iron, concentrations are much lower than in the Magothy and Upper Patapsco aquifers. Recharge to

the Patapsco aquifer occurs in a broad area along the Piedmont fall line, from Washington, DC, across northern Anne Arundel County and Baltimore Harbor, up into Harford County (Klohe and Kay 2006). Aquifer tests have shown that the Lower Patapsco aquifer is very productive, and provides an excellent alternative to shallower aquifers, in spite of its great depth (1,445 feet below sea level at Stevensville). The deeper Middle Patapsco and Patuxent aquifers are potential ground-water sources, but have not been tested thoroughly for use for water supply in Queen Anne's County.

In south-eastern Queen Anne's County, the Miocene and Piney Point Aquifers occur between the surficial Columbian aquifer and the Aquia aquifer. Local drilling logs, however, reinforce reports indicating that these sources do not exist in the Queenstown Planning Area (Drummond 2001).

Surface Water Resources: The Queenstown Planning Area straddles two watersheds, including a sub-catchment of the lower Chester River and the Upper Wye River (Figure 1-14). The contributing area to the lower Chester River through Queenstown Creek and Little Queenstown Creek includes 2644 acres, of which approximately 2,098 acres occur within the Planning Area. The remaining 45 percent of the Queenstown Planning Area (1700 acres) is part of the Upper Wye River watershed, which includes 6,178 acres. A large portion of the Wye River watershed occurs up-gradient of the Queenstown Planning Area and the Sportsman's Neck Peninsula. Elevations in both watersheds range up to approximately 30 feet above sea level. The topographic relief consists of broad, gently sloped uplands and deeply incised stream channels. Water table depths range from the land surface, near surface water features, to approximately 20 feet below the land surface in interior areas near the watershed divide.

Sensitive Areas: Sensitive areas considered in the Queenstown Community Plan include riparian buffers, wetlands, flood-prone areas, and the Chesapeake Bay Critical Area (Figure 1-8). Riparian buffers improve water quality by reducing the delivery of sediment, nutrients and other contaminants to streams and estuaries. Expanded buffer widths more than 150 feet have a greater likelihood of removing nitrate (Mayer et al. 2007) or reducing stream flow velocity and thereby enhancing sediment deposition and phosphorus removal. Accordingly, the Queenstown Community Plan discourages developments from areas within 300 feet of mapped streams (National Hydrographic Data 1:24,000 resolution) and 100 feet away from mapped wetlands (National Wetlands Inventory and MD Department of Natural Resources wetland inventory, 1:24,000 resolutions). The additional width also encompasses the flood zone from a 9 to 12 foot storm surge (i.e., Category III Hurricane). Development also will be limited in the Chesapeake Bay Critical Area which extends 1000 feet from

the shoreline; development within 300 feet of the shoreline is discouraged.

Climate Change and Sea Level Rise: Climate change and its effects on sea level continue to impose a primary influence on shoreline erosion and other landscape processes across the region. Average air temperatures are predicted to increase by approximately 2°F by 2030 and nearly 9°F by 2100 (Polotz et al 2000). Precipitation trends are less certain, but could increase by as much as 25% of the current annual average precipitation rates (Polotz et al 2000).

A comparison of current shoreline features to colonial maps reveals significant loss of land area during the past 300 years due to sea level rise and land subsidence (Figure 2-6). Currently, the tidal range near Queenstown is approximately 20 inches (NOAA 2006). Sea level of the Chesapeake Bay has increased at a rate of 1/10 of an inch per year (about 1 foot per century). Climate change together with land subsidence will continue increasing sea level rise across the Chesapeake Bay at a faster rate than is occurring globally. Over the next century, sea level is expected to increase by two to three feet along Maryland's shoreline. Consequently, low lying areas currently impacted by category I hurricanes or similar storm events (two to three feet above normal) will flood more regularly.

Impacts from storm surge will increase with sea level rise. Currently, flood surges from major storms including Category I hurricanes range up to five feet above normal. In 2005, Hurricane Isabelle, a category II storm, caused a flood surge of nine feet. Models indicate that a Category III hurricane could cause a storm surge of 9 to 12 feet along Queen Anne's County shoreline, and a Category IV hurricane could surge 14 to 16 feet above normal. A Category V Hurricane, with winds greater than 155 mile per hour could produce a storm surge of more than 18 feet above normal. From 1851 to 2005, five hurricanes passed within approximately ten miles of the Maryland state boundary; all of these storms were Category I or II (http://www.csc.noaa.gov/hez_tool/states/maryland.html; accessed 9/5/09). To protect the community from the combined impacts of sea level rise and future storm surges, the Queenstown Community Plan therefore directs future development to occur outside of areas flooded by a Category III storm (9 to 12 feet storm surge). Identifying these areas, however, is challenging because Federal Emergency Management Agency (FEMA) flood maps available through the Maryland Department of Natural Resources identified impact areas from storm surges only as high as ten feet. The Town identified potential flood zones based on identification of land areas less than 12 feet above normal sea level using fine-scale topography data (2 m resolution; 15 cm vertical accuracy; Figure 1-18).

2.1.3 Land Use/Land Cover

Population Growth: Between 1990 and 2000, Queen Anne's County population increased by approximately 20%, from 33,953 to 40,563 (US Census Bureau 2000). Through 2030, the Maryland Department of Planning has projected that the population could increase by as much as 50% from the 2000 Census population, with much of the growth concentrated in areas closest to the William Preston Lane, Jr., Memorial Bridge, including Queenstown. As of the 2000 Census, The Town of Queenstown included 617 residents comprised of 194 families, 255 households, and 279 housing units (US Census http://factfinder.census.gov). The average household size was 2.42 persons. Since 2000, the population of Queenstown has increased only by 2.9%, largely because municipal infrastructure primarily related to wastewater treatment capacity has limited development. Analyses of future water resource demands are based on the 20 and 50 percent population growth rates derived from extrapolation of the census data, and also by MDP projections. Accordingly, by 2030 the Queenstown population could range between 1,000 and 1,600 persons or approximately 150 to – 450 additional households (James Palma, MDP; personal communication).

Current and Future Land Use/Land Cover Patterns in the Queenstown Planning Area: Current County land use designations are shown in Figure 1-1. Beyond the municipal limits of Queenstown, the dominant land use is farming. Croplands are planted primarily in corn and soybeans. Along Rt. 301, bordered to the south by Cherry Lane and the north by John Brown Road, the area is dominated by sod farming. Expansive farming tracts along Bloomingdale Road are permanently preserved for farming through easements.

Lands that could not be converted to farming use because of wetlands, poor soils, or the presence of streams are largely in wooded conditions. These areas largely occur in linear arrangements along tributaries to the Wye River. No timber production currently occurs in the region.

Suburban (low) density residential development is located in the study area on private well and septic systems. As shown on the Land Use Map (Figure 1-1), residential lots are located along nearly the entire main branch of the Wye River in a pattern which would largely be prohibited by today's land use planning polices and environmental regulations. Additional residential development is located along Rt. 18 south of Rt. 50. Smaller concentrations of residential lots have been subdivided from farm fields and developed along portions of Del Rhodes Avenue and Greenspring Road. A newly approved residential subdivision is under development along the south side of Rt. 301, opposite its intersection

with Cherry Lane. Industrial areas are located in the study area along Rt. 301 immediately opposite the Town and along Bloomingdale Road. This latter industrial use is abandoned, as is the rail line, which ran past it. Northeast of Queenstown along Rt. 18, sand and gravel excavation is underway. The land there is also being used as a solid waste disposal site.

Land cover and land /land use in both watersheds consists primarily of low- to medium- density residential development and high intensity croplands (soybean and corn rotations). According to the 2002 MD LULC dataset, the Chester River watershed portion of the Queenstown Planning Area is 30% development, 49% croplands, and 20% forest (Figure 1-15). Croplands occur mainly along Queenstown Creek while development is concentrated within the municipal boundaries along Little Queenstown Creek. The Upper Wye River watershed is 12% development, 60% croplands, and 26% forest. Most of the development occurs along the tidal portion of the Upper Wye River on the Sportsman's Neck peninsula. Forested areas occur mainly along the non-tidal reaches of the Wye River. Remaining areas in both watersheds were identified as barren or herbaceous wetlands. With the exception of the Sportsman's Neck peninsula, the Wye and Chester River tributaries typically have forest buffers more than 50 feet in width.

Four land use alternatives were studied in preparation of Queenstown's Community Plan. The first alternative assumed no future growth but included pending commercial development projects; impacts to water resources from development are assessed based on Maryland State's current land use/land cover (LULC) inventory (Maryland Department of Planning, 2002). The second alternative, described as the Distributed Growth Alternative, assumed full build-out capped by current County zoning; housing density would range between 1 and 20 acres per residential unit, and development would occur across the entire Planning Area. The third scenario is referred to as the Consolidated Growth Alternative; development is directed to occur in designated growth areas adjacent to the current municipality. The designated growth areas were defined based on proximity to the current municipal boundaries, access to infrastructure, limited impacts to natural resources, and maximal benefits from the regional traffic patterns. In return for this relatively high density of development, approximately 70% of the Queenstown Planning Area would remain as open space. The full build-out is capped by a 50% increase of the build-out under the County zoning scenario and includes mixed use development to sustain the Town's economic viability as well as promote pedestrian-friendly communities where people can work and live. The full build-out capacity was determined partially on an economic analysis to identify incentives for engaging landowners in a Transfer of Development Rights (TDR) program or other strategies which would assist Queenstown with its efforts to preserve open space.

The fourth "green" scenario assumed all land in the Planning Area could be included in easements to prevent any future development. This scenario was not included in the current analysis because the resulting land cover description was so similar to the first alternative, and also because the necessary easement arrangements are highly unlikely. A comparison of residential densities and commercial square footage, as well as land cover proportions are presented in Tables 2-1 through 2-3. Table 2-4 summarizes changes in land use by hydrologic unit.

Table 2-1. Summary of current conditions and potential growth scenarios in the Queenstown Planning Area, including current population and projected population under full build-out, total number of residences, and residential and commercial area as presented in the Queenstown Community Plan.

Land Use/Land Cover Scenario	Population (Number of residences)	Total Residential Acres (Square footage)	Commercial/ Institutional Acres (Square footage)	Total Municipality Acreage[11]
Existing	675[1] (279)	120[3] (401,238)	742[3] (382,500[8])	877
Current – pending (30 infill lots + golf course, Royal Farms)	740[2] (308)	135[3] (446,200[4])	742 (490,000[9])	877
County Zoning (605 additional residences)	2,154[2] (913)	650[5] (2,019,200[6])	742 (490,000)	877
Consolidated Growth (adopted; 1000 additional residences)	3,140[2] (1,308)	470[7] (1,700,000[7])	1,670[8] (1,250,000[10])	2080

1 (http:/www.mdp.state.md.us/msdc/pop_estimate/estimate08/municipal/popest_muni08.shtml
2 Current or pending + number of infill lot or build-out residences * average 2.42 residents per residence
3 Queen Anne's County property database (2009)
4 Number of infill residences * 1,500 square feet/residence (current Queenstown average)
5 Pending + sum of residential acres based on full build-out under current County zoning
6 Pending + 605 new residences * 2,600 square feet/residence (current countryside residence average)
7 Pending + 1000 residences * current weighted average lot size (0.3 acres), reflecting proposed distribution of lots under TDR policy. Square footage estimates also were based on current weighted average of residences in Queenstown (1,500 ft^2 per residence)
8 The Faux Group (2008)
9 Current commercial square footage plus proposed Queenstown Links Resort (100,000 ft^2) and Royal Farms convenience store (5,100 ft^2)
10 Commercial development rate: 10,000 ft^2 per acre
11 Includes residential and commercial development, and open space.

Table 2-2. Current (2002) and future land cover acreages (percent of total area) in the Queenstown Creek/Lower Chester River watershed.

Land Use/Land Cover Scenario	Development	Agriculture	Forest
Current/No Growth	783.3	1256	526.5
County Zoning	927 *(+18%)*	987.8 *(-21%)*	651.1 *(+24%)*
Consolidated Growth (adopted)	817.7 *(+ 4%)*	1097.1 *(-13%)*	651.1 *(+24%)*

Table 2-3. Current (2002) and future land cover proportions (percent of total area) in the Upper Wye River watershed.

Land Use/Land Cover Scenario	Development	Agriculture	Forest
Current/No Growth	675.6	3529.4	1554.4
County Zoning	1452.8 *(+115%)*	2665.9 *(-24%)*	1638.4 *(+ 5%)*
Consolidated Growth (adopted)	934.1 *(+38%)*	3228.7 *(- 9%)*	1594.4 *(+ 3%)*

Table 2- 4. . Land cover acreages by hydrologic unit in the Queenstown Planning Area (see Figure 1-15). In HUC 04, 05, 06, 08, 10, 12, and 13 future scenario land cover conditions did not change in comparison to current conditions by more than 5 percent.

Watershed	HUC	Current and Use and Land Cover			County-Based, Distributed Growth			Consolidated Growth		
		Agriculture	Development	Forest	Agriculture	Development	Forest	Agriculture	Development	Forest
Queenstown	QT01	24.4	58.9	16.7	0.0	83.3	16.7	24.3	59.1	16.7
Queenstown	QT02	77.4	7.0	15.5	23.0	61.5	15.5	38.7	45.8	15.5
Queenstown	QT04	67.9	2.1	30.0	67.9	2.1	30.0	67.9	2.1	30.0
Queenstown	QT11	7.5	84.1	8.4	7.5	67.1	25.4	7.5	67.1	25.4
Wye	QT03	38.3	14.1	47.6	0.8	47.6	51.5	7.3	45.1	47.7
Wye	QT05	63.0	5.7	31.3	62.9	4.6	32.4	63.0	4.6	32.4
Wye	QT06	78.9	2.4	18.6	78.9	2.4	18.6	78.9	2.4	18.6
Wye	QT07	76.1	4.8	19.2	20.7	57.9	21.5	66.8	11.8	21.5
Wye	QT08	65.8	17.0	17.2	60.0	22.8	17.2	65.8	17.0	17.2
Wye	QT09	24.2	31.6	44.2	0.5	51.5	48.0	0.5	51.5	48.0
Wye	QT10	49.8	34.0	16.1	44.4	34.0	21.6	49.8	34.0	16.1
Wye	QT12	63.6	23.3	13.1	63.6	23.3	13.1	63.6	23.3	13.1
Wye	QT13	61.4	6.9	31.7	57.9	10.4	31.7	61.4	6.9	31.7

2.1.4 Regional Transportation

The Maryland State Highway Administration maintains a functional classification of roads and highways. The classification is an approach to organizing and prioritizing the role of each major highway segment in the statewide network. SHA has classified Routes 50 and 301 as principal arterial highways (Figure 1-12). Arterial highways are intended to carry large volumes of regional traffic at relatively high speeds between activity centers. SHA has classified MD Route 18 as a Major Collector and MD Route 456, Del Rhodes Avenue, as a Minor Collector.

The arterial highways are approaching capacity, and along Rt. 50, traffic volume exceeds capacity during peak travel times. For example, Rt. 50 between Outlet Center Drive and Sportsman's Neck Road carried more than 46,000 vehicles per day on average in 2005, indicating that this section of highway has effectively reached its design capacity. During peak summer travel times capacity is stretched further with a seasonal estimated average daily traffic peak of 60,100 vehicles per day—130% of yearly average—in August of 2005. In 1995, the same section of highway carried 28,275 vehicles per day. Throughout the ten year period of 1995 to 2005, traffic volumes grew an average annual rate of 5 percent, almost twice the annual rate typical of similar arterial highways.

The capacity of Routes 50 and 301 will be seriously exceeded over the next decade. Small disruptions in the flow of traffic - minor accidents, breakdowns, etc.—will cause substantial congestion in the study area and beyond on normal travel days. While improvements are being designed for the Rt. 50

corridor, no funding commitments have yet been made for construction. Therefore, during seasonal peak travel times over the next decade and beyond, Rt. 50 can be expected to be gridlocked.

The Transportation Map (Figure 1-12) also shows that several intersections along Route 301 have been restricted in an attempt to safely manage access to the highways and facilitate the unimpeded movement of regional traffic. The conflict between turning vehicles and through traffic however cannot be eliminated altogether through at-grade intersection improvements and median crossovers. As traffic continues to increase, the viability of at-grade intersections will be weakened. Areas where traffic conflicts occur between high-speed through traffic and slower merging and crossing local traffic include:

- Outlet Center Drive and Rt. 301
- Outlet Center Drive and Rt. 50
- Del Rhodes Avenue and Rt. 301
- MD Route 18 and Rt. 50
- Sportsman Neck Road and Rt. 50

The planned improvements to the Rt. 50 corridor are outlined in Table 2-5. The State Highway Administration has prioritized these improvements based on input provided by the Queen Anne's County Board of County Commissioners.

Table 2-5: MD State Highway Administration Priorities for Rt. 50/Ocean Gateway Corridor Improvements

Project Description	Priority	Status
Carmichael Road Overpass	1	Funded for Design
Sportsman's Neck Road Overpass	2	Funded for Design
MD 404 Interchange	3	Funded for Design
MD 213 Interchange	4	Funded for Design
Route 18 Overpass	5	Funded for Design
Rt 50 Widening to 6 Lanes:	6	Funded for Design Rt 301-MD 404

At over $10 million in construction costs, overpasses represent a substantial investment of public funds. Currently, the MD SHA's two highest priorities include overpasses at Carmichael Road and Sportsman's Neck Road. Carmichael Road leads to the Wye Island Natural Resource Management Area and is sparsely populated. Sportsman's Neck consists of low-density residential and agricultural land uses. Given the high density of residents and increasingly heavier traffic volumes within the Queenstown municipality, the SHA priority list does not reflect local circulation needs nor does it the

adequately address the access needs of Queenstown with respect to MD Route 18. Traffic congestion under hazardous conditions will intensify as development proceeds within the Queenstown Planning Area.

The primary transportation issues center on:

- Lack of access to the Town to and from the Rt. 50 corridor.
- The inadequacy of the intersection configurations in light of projected traffic increases and seasonal peaks.
- The conflict between slower moving/turning traffic especially on Rt. 50 near the Outlets and the higher speed traffic on Rt. 50.
- Properly adjusting SHA improvement priorities to reflect the needs of the traveling public in the Rt. 50 corridor and the needs for improved accessibility in the Queenstown area.

2.2 The Pattern of the Town

This section summarizes baseline information pertaining to the Town's current municipal limits. It addresses population, land use, historic properties, and community facilities and services.

2.2.1 Population and Population Trend Lines

A population trend for Queenstown through 2030 is presented in Table 2-6. The trend line shown in the solid red color is an "average share" line: that is, it is tied to the Town's historic average share of County population. Queen Anne's County is projected by the State of Maryland to grow from 40,560 in 2000 to 61,900 by 2030. Since 1960, the Town's share of County population has ranged from a high of 2.1% in 1960 to about 1.5% in 2000, for an average of decennial census years approximating 1.74%. The "average share" line assumes the Town's population remains at its historic average of about 1.74%. The second trend line, shown in a blue dashed line, is the "historic average annual rate" line. Between 1960 and 2000, Queenstown has grown at an average annual rate of 1.39%, from 355 residents in 1960 to 617 in 2000. These trend lines give a slightly lower population expectation than the Maryland Department of Planning projections referred to above. The population growth by decades for both the Town and County is shown in Table 2-7.

Table 2-6: Historic and projected population trends for Queenstown, MD

[redacted]

Table 2-7: Population growth in Queenstown and Queen Anne's County by decade

	1960-1970	1970-1980	1980-1990	1990-2000	2000-2005	1960-
Queenstown						
Percent Change	9.01	26.87	-7.74	36.20	3.40	-
Rate of Growth	0.87	2.41	-0.80	3.14	0.67	1.31
Queen Anne's County						
Percent Change	11.18	38.46	33.11	19.47	12.45	-
Rate of Growth	1.07	3.31	2.90	1.79	2.37	2.28

Source: U.S. Census Bureau and Jakubiak & Associates, Inc

Resident work location choice is shown in Table 2-8 below. Each day 85% of the total workforce in Queenstown commutes to locations outside of the Town, and 48% commute outside of Queen Anne's County.

Table 2-8: Resident work location choices in 2002

	Queenstown		Queen Anne's County	
	Workers	% of total	Workers	% of total
Total	343		20,852	
work in Queenstown	51	15%		
work in Queen Anne's County	179	52%	8,379	40%
work in Maryland	318	93%	18,974	91%

Source: U.S. Census Bureau and Jakubiak & Associates, Inc

The make up of households is an important indication of community character. In Queenstown, 147 households, or about 58% of all households, were family-households in 2000—that is, they were

composed of persons related to the householder by birth, marriage, or adoption. About 28% of households were considered "non-family households." Children were part of 80 households.

Table 2-9: Households in Queenstown in 2000

Households	Children in Household		Sum	% of Total Households
	Yes	No		
Family Households				
Married Couple Families	52	95	147	57.6%
Male Householder, no wife	6	3	9	3.5%
Female Householder, no husband	21	7	28	11.0%
subtotal	79	105	184	72.2%
Non-Family Households	1	70	71	27.8%
Total Households	80	175	255	100.0%

Source: U.S. Census Bureau and Jakubiak & Associates, Inc

In 2000, slightly less than three-quarters of the housing stock in Queenstown was owner-occupied. Rental housing was found in 19% of available housing units. The Town has a slightly higher vacancy rate than that of Queen Anne's County. The vacancy rate for the County and the Town can be partially attributed to seasonal housing, which makes up 4% of housing for both Queenstown and Queen Anne's County.

Table 2-10: Tenure status of housing units in 2000

	Queenstown	Queen Anne's County
Owner Occupied	74%	77%
Renter Occupied	19%	17%
Vacant	9%	8%

Source: U.S. Census Bureau and Jakubiak & Associates, Inc

2.2.2 Town Land Use

Historic Queenstown is a traditional small town with a mix of residential, intuitional, and commercial uses along quiet streets. Residential neighborhoods are located near the center of Town within walking

distance of the Town Office. The majority of the residences consist of single-family detached housing with only a few attached townhomes at Queenstown Harbor and a few scattered duplexes and single-family home conversions into apartments. The predominant lot size throughout Town is less than 0.2 acres (See Figure 1-7).

Commercial land use within the Town makes up approximately 17% (35 acres) of the land area excluding the golf course. Most of this area is associated with Prime Retail and is disconnected from the residential areas by Rt. 301. Commercial uses are concentrated along Del Rhodes Avenue and near the Town Center. However, these businesses provide only a small percentage of Queenstown's commercial area. Public facilities are scattered throughout the Town. These include two Town Docks located on Little Queenstown Creek, the wastewater treatment plant site, a Town Office, the historic courthouse building, the Post Office, and the Queenstown Volunteer Fire Department. Town park, recreation and open space uses account for about two and a half acres. These areas include the Town Park on Old Wharf Lane, the boat landing area near the wastewater treatment plant, and the small public access where Old Wharf Lane meets Queenstown Creek.

Nearly one-quarter of the Town's land, excluding the lands of Washington Brick and Terra Cotta annexed in 2006, is undeveloped (about 44 acres). However, a significant portion of the undeveloped property is unbuildable because it is used for open space associated with adjacent development or it contains extensive wetlands which significantly limit or prohibit any future development. There are only a few small, undeveloped areas within the pre-2006 annexation Town boundaries that could possibly be developed in the future. Land for approximately 30 additional houses and five businesses is available.

Historic Queenstown is physically disconnected from the Rt. 50 corridor, even though it is in close proximity. The State's intersection control along Rt. 301 has curtailed the role of Del Rhodes Avenue as a vital gateway from points south into the Town Center. The intensive and site-referenced planning of the retail shopping center (at Outlet Center Drive) has curtailed another option for improved circulation to and from Rt. 50.

Outside of Town, the land remains largely undeveloped in agricultural or woodland use. Development is concentrated along Rt. 50 and 301, mostly consisting of older highway retail strips. Industrial land use occurs primarily on Bloomingdale Road. Scattered, single-family residential lots also occur with a concentration in the Sportsman's Neck Road vicinity. There is no multi-family residential development in the unincorporated Planning Area.

Other features of note include:

• Southwest of the traditional Town Center, the municipal limits have recently been enlarged and now include the Queenstown Harbor Golf Links located along the Chester River.
• Public access to the shoreline of Queenstown Creek is allowed only at the boat landing adjacent to the municipal wastewater treatment plant.
• The Town's northern expansion is constrained by deed restricted open space bordered roughly by the Salthouse Cove, MD Route 18, and Queenstown Creek.
• The Town's close proximity to Rt. 301 creates noise pollution experienced by many residents.
• A dominant gateway to the Queenstown area and indeed to the Eastern Shore is provided by the heavily forested highway buffers which line Routes 50 and 301.
• Two Town Docks on Little Queenstown Creek are used both by Town commercial watermen for docking and unloading of seafood and by residents for recreational boats. Mooring areas for other commercial and recreational craft are provided in Little Queenstown Creek.

2.2.3 Historic Properties

While Queenstown's origins are eighteenth century (or even seventeenth), the historic area of the Town is essentially nineteenth century. Surviving structures from the 1700's include Bowlingly (1733) and the colonial courthouse/Town Hall (c. 1708). No additional eighteenth-century buildings within the Town limits have been identified.

The demise of Queenstown's earliest structures over time is typical of colonial-era towns. During this period, economic development was insufficient to support construction of buildings from materials other than timber which could have endured to present times. Table 2-6 lists the structures that are included on Maryland's Historic Places Inventory and their locations.

Table 2-11: Queenstown Historic Places

Site	Address
Bowlingly (Bollingly), Neale's Residence, Ferry House	111 Bowlingly Circle
Queenstown Courthouse	Main Street (MD 18) & Del Rhodes Avenue
My Lord's Gift	Links Lane
Wheatland Farm	Kirkely Road
St. Peter's Roman Catholic Church	Ocean Gateway (US 50)
St. Luke's Episcopal Church	Main Street (MD 18) & Dudley Road
Nationwide Insurance Agency	Main Street (MD 18)
Canterbury House (Probable site of Queenstown Jail)	6923 Main Street (MD 18)
Sherwood House (Caroline T. Wilson House)	7120 Main Street (MD 18)
Burnt Tavern (Chester House Hotel, Gabler House)	7200 Main Street (MD 18)
Stone Granary	7133 First Avenue
Robert Price, III Residence	200 Del Rhodes Avenue
Queenstown News Building	7001 Main Street
Crescent House	7009 Main Street
Denny-Bishop-Hane House	6915 Main Street

Historic structures in Queenstown are of three general types in terms of construction, siting, and architectural character. Close to the Town's historic main crossroads are buildings which have had or continue to have a commercial function and are sited at the front property line, with a commercial-type facade.

Adjoining and nearby residences on Main Street and Del Rhodes Avenue consist of or mixed-use structures. Many of these structures have a townhouse siting, close to the front lot line, with vertical massing. The architecture and lot layout are appropriate for the small lots and compact layout of the pedestrian-oriented commercial core.

Outside the central area homes tend to be placed further back on lots, with residences on larger lots oriented to their own landscaped yards rather than to streets.

While there is considerable variety in the size and shape of the homes in Queenstown, reflecting the varying dates of construction and lot sizes, the traditional homes exhibit the common features of vertical massing, brick construction or frame with wood siding, roofline prominence such as gables, window shutters and other wall decorations, and frequent indoor-outdoor transition spaces such as verandas or porches.

Several of the older farmhouses within the unincorporated Planning Area may have historical or architectural significance but have never been extensively studied for purposes of historic preservation. Queen Anne's County does not have a formal historic preservation program or historic district regulations.

The housing styles, vegetation, walking scale, and overall visual quality of Queenstown are among its greatest assets. These assets should be protected and enhanced for future generations. Educational guidelines for architectural and historic appearance should be established. They should not be intrusive but rather should seek to provide guidance for individual owners on how to blend with or extend the visual qualities of Queenstown. In 1991, the Town adopted a Historic District as a component of its Zoning Ordinance. The intent of this district was to preserve historic landmarks, areas and buildings within a specially designated district within the Town. The adopted historic district regulations were not based on State-enabling legislation and were never successfully implemented because of procedural problems and uncertainties in interpretation of the regulations.

The property containing Bowlingly was voluntarily placed under deed restrictions limiting development with the National Trust for Historic Preservation by its former owners. This easement prohibits additional development of the site. A large agricultural field directly adjacent and north of

Town which was once associated with the Bowlingly property is also under restrictive easement with the National Historic Trust. Control of these easements has been transferred from the National Historic Trust to the Maryland Environmental Trust.

The "Heritage Area and Tourism Areas" Act of 1996, Chapter 601 of the Laws of 1996 requires that each jurisdiction included in a certified heritage area contain in its Plan, by reference, the management plan for the heritage area. The Maryland Heritage Area Authority has certified, with conditions, "The Stories of the Chesapeake Heritage Area," thereby recognizing heritage areas in Kent, Queen Anne's, Talbot, and Caroline Counties and their municipalities and offers a mechanism for coordinated and enhanced heritage tourism in these counties. Queenstown recognizes and references "The Stories of the Chesapeake Heritage Area Management Plan" as a means to further opportunities for heritage tourism and economic development.

2.2.4 Key Local Natural Resources

Queenstown's location on the lower Chester River of the Chesapeake Bay requires careful consideration of its natural features that influence local and regional water quality including stream networks and adjacent floodplains, riparian buffers, wetlands, and forested areas. Figure 2-7 highlights the local features which influenced the conceptualization of the Community Plan and will be considered prior to future development.

Riparian Buffers

Vegetated areas adjacent to streams can improve water quality significantly by retaining or transforming plant nutrients, sediment, and other contaminants prior to stream delivery (Table 2-12). In addition, these areas can mitigate flooding and provide important wildlife habitat. A riparian wetland's potential to perform these functions depends largely upon the buffer width and the influence of local geology and topography. Recent studies suggest buffer widths set at 300 ft or greater have a strong potential to maximize riparian function, without consideration of more complicated factors. For high-quality riparian wetlands, Maryland State Department of Natural Resources (MD DNR) recommends that the buffer be at least 600 feet wide. In the Queenstown region, a 300 foot buffer best captures floodplain areas definable from fine-scaled (LiDAR) topography data (Figure 2-8). Accordingly, this Community Plan recommends a 300-foot buffer for all streams in the Planning Area as a starting point for subsequent adjustment to local conditions.

County land use maps indicate a large proportion of the streams in the Queenstown Planning Area can

be considered exemplary based on naturally vegetated buffer widths (Figure 2-9). A small proportion of stream reaches, however, are devoid of natural vegetation due to cultivation (e.g., headwaters of the Wye River) or shoreline development (e.g., eastern shoreline of the Wye River). Efforts should be made to reestablish natural vegetation in these areas to restore riparian wetland function. A full inventory of riparian wetlands in the Queenstown Planning Area was included in the "Baseline Report" (a product of Plan preparation work in 2007) and is summarized in Appendix D.

Table 2-12: Buffer Functions

Function	Description	Buffer Requirement
Flood and Storm Surge Protection	Riparian vegetation minimizes down river flooding	70 – 200 ft
Sediment Control and Stream Stability	Sedimentation is controlled by vegetative buffers which trap sediments before they reach the stream channel. Reduced sedimentation combined with the forest structure helps to stabilize streams and prevent excessive erosion.	50 – 100 ft
Nitrogen/Phosphorous Removal	Nitrogen is removed from water entering the stream channel through vegetative consumption of nitrogen and through the conversion of nitrogen into nitrogen gas. The sediment control function also helps to reduce phosphorous as sediments often contain phosphorous	50 – 100 ft
Pesticide Reduction	Bacteria in the soil of riparian buffers help to reduce the pesticides in streams and rivers.	45 ft
Food Production	The rich organic matter provided by natural vegetation supports fish stock and other river inhabitants that are dependent on it for food.	25 ft
Habitat for Wildlife	Forested areas provide a habitat for birds and mammals. Certain species can exist in smaller forests; however, most species require forest interior dwelling areas.	300 – 1,600 ft

The Water Quality Improvement Act of 1998 requires that all farmers grossing $2,500 or more in Maryland have Nutrient Management Plans in place to address nitrogen and phosphorus inputs. Nutrient Management Plans are in place for 100% of all farms in Queen Anne's County. Annual implementation reports are required after the initial plan is developed and 81% of farmers are in compliance with annual submittals of progress towards these plans in the County.

Wetlands

Wetlands are land areas inundated or saturated by surface or ground water often enough to support a vegetative or aquatic life that requires these saturated or seasonally saturated soil conditions for growth and reproduction. These include swamps, marshes, bogs, wet meadows, river overflows, mud flats, and ponds. Wetlands play a pivotal role in regulating the interchange of water within watersheds. Most wetlands in the Queenstown Planning Area are associated with stream networks (i.e., riparian wetlands) (see Figure 2-7).

Within the Planning Area, many wetlands have been lost by conversion to agricultural fields. When land use changes from agriculture to development, an opportunity is presented to mitigate for the lost ecological functions of wetlands and ephemeral and first order streams. Where possible, emphasis will be placed on mitigating for these losses to include stormwater conveyance through restored wetlands and steam channels. Addressing natural hydro/ecological functions when land uses are changed will be part of master plan, subdivision, site plan, and stormwater management review for projects within the Planning Area.

Forested Areas

Forested areas occupy 18% of the Queenstown Planning Area. Most tracts consist of reestablished woodlands that have developed during the past 100 years (see Figure 2-7). Native species important for wildlife habitat include white oak, red oak, hickory, blackgum, red maple, black oak, scarlet oak, chestnut oak, sweetgum, loblolly pine, beech, Virginia pine, laurel, sassafras, holly, and mountain laurel. Due to the strong habitat benefits of connected (non-fragmented) forests, which were reviewed in the "Baseline Report," the Community Plan aims to preserved existing woodland tracts, as well as expand these areas and foster interconnections (Table 2-13). An assessment of forest areas in the Queenstown Planning Area is provided in Appendix E.

Table 2-13: Optimal Forest Size by Function

Function	Recommended Size
Protecting forest interior dwelling species (FIDS)	Minimum 500 contiguous acres. (can range up to 6,250 acres for some birds)
Provide habitat for mammals	2.5 - 25 acres

2.3 THE ADOPTED REGULATORY "PLAN"

A "Plan" is in place for the unincorporated portions of the Queenstown Planning Area. The Queen Anne's County Zoning Ordinance and Subdivision Regulations govern it. It is impacted by State Highway Administration plans for access control and overpasses. It is not dependent on public water and sewer services because private on-site wells and septic system are viable throughout most of the study area.

Generalized County zoning in the Planning Area is shown in Figure 2-10. Generally, the current County Zoning promotes low-density, land consumptive suburban subdivisions. Lands within the County's Agriculture zoning district may also be developed in a low density residential pattern and are eligible to "receive" development rights that are transferred from other farm parcels in the County. Within the triangle formed by Del Rhodes Avenue, Rt. 301 and Rt. 50, industrial and commercial uses are permitted.

Table 2-14 - County Zoning

Zoning Category	Intent	Allowable Density/Uses
Neighborhood Conservation (NC-1 & NC-1T)	Preserve the character of existing neighborhoods while allowing infill to occur.	- Minimum lot 1.0 acres - All Housing Types: Total site area divided by the minimum large-lot subdivision - Increase to base density using (Transfer of Development Rights) TDRs - NC-1T districts also allow singlewide manufactured homes
Suburban Residential (SR)	Low-density development that will provide a variety of housing types	- Single Family Cluster: 2.0 units/acre - Multifamily: 3.4 units/acre - Manufactured Home Community: 3.65 units/acre - Large-lot subdivisions: Total site area divided by minimum large-lot area - Increases of 25 percent in the Growth Area allowed with TDRs
Suburban Estate (SE)	Low density or cluster development to preserve open space	- Single Family Cluster: 1.25 units/acre - Multifamily: 1.5 units/acre - Manufactured Home Community: 1.75 units/acre - Large-lot subdivisions: Total site area divided by minimum large-lot area

Zoning Category	Intent	Allowable Density/Uses
		- Increases of 25 percent in the Growth Area allowed with TDRs
Estate (E)	Very low density or cluster development, preserving a significant portion of the land for open space	- Single and multi-family clusters: 0.5 units/acre - Large-lot subdivisions: Total site area divided by minimum large-lot area - Increases of 25 percent in the Growth Area allowed with TDRs
Suburban Industrial (SI)	Office, commercial, warehouse, and light industrial uses	- Agricultural support, large commercial, warehousing, effluent disposal, day care, greenhouses, light industrial, extraction, institutional, parking, forestry
Suburban Commercial (SC)	Commercial and limited light industrial uses. Not served by public water and sewer	- Agricultural support, auctions, restaurants, lodging, retail, convenience stores, effluent disposal, day care, farmers markets, fraternal organizations, funeral homes, commercial, warehousing, institutional, parking, recreation
Countryside (CS)	Preserve open space within the Chesapeake Bay Critical Area	- Residential development: 0.2 units/acre - Large-lot subdivisions: Total site area divided by minimum large-lot area - Sliding scale subdivision: one new lot up to 100 acres of a site and one new lot for each additional 100 acres - Increase to base density using TDRs
Agriculture (AG)	Land in agricultural preservation	-Single Family cluster: 0.125 units/acre -- Large-lot subdivisions: Total site area divided by minimum large-lot area - Sliding scale subdivision: one new lot up to 100 acres of a site and one new lot for each additional 100 acres

CHAPTER 3: THE STATE AND COUNTY PLANNING CONTEXT, AND THE QUEENSTOWN PLANNING PROCESS

3.1 Maryland Economic Growth, Resource Protection and Planning Act of 1992

The Maryland Economic Growth, Resource Protection, and Planning Act took effect on October 1, 1992, and have reshaped how citizens, developers, the State, counties, and towns think about planning, growth, and resource protection.

Most local jurisdictions in the State establish priority areas for growth and corresponding areas for resource protection. The Act encourages building on that base with consistent development regulations and targeted infrastructure investment by the State. A premise of the Act is that the comprehensive plans prepared by counties and towns are the best place for local governments to establish priorities for growth and resource conservation, and that once those priorities are established, it is the State's responsibility to back them up.

The Planning Act requires that county and municipal Plans be implemented by laws, ordinances, and regulations that are consistent with the Plan and the eight visions contained in the Act. It also requires that funding decisions for public sector projects--both local and State--be consistent with the Plan and the visions. The fundamental concept of "consistency" under the Act is that land use regulations and land use decisions should agree with and implement what the Plan recommends and advocates. A consistent regulation or decision may show clear support for the Plan. It may also be neutral--but it should never undermine the Plan.

In short, the Act requires local governments to reduce sprawl development, concentrate growth in and around existing developed areas, promote economic development and protect sensitive natural resources. The Act also requires that State and local government investments in infrastructure (roads, sewer, water, schools, etc) are consistent with well-considered and adopted local growth management plans. Making these policies part of Maryland's planning and zoning enabling legislation gives local jurisdictions a succinct statement of Maryland's priorities for their plans. During the 2009 Legislative session, Maryland's eight planning visions were replaced with twelve new visions to address a broader spectrum of significant issues of relevance to all Marylanders. These new planning visions are the State's land use policy, and a local jurisdiction is required to include the visions in the local comprehensive plan and implement them through zoning ordinances and other regulations. However, the policies are intended as the beginning of the planning process, not the end. Queenstown will start with the policies and interpret them to establish its own priorities and directions.

3.2 Queenstown and Queen Anne's County Planning History

The Town's first Community Plan and Zoning Ordinance was adopted in 1971. The next Community Plan and Chesapeake Bay Critical Area Program were adopted in 1989. A revised zoning ordinance with overlay zoning for the Chesapeake Bay Critical Area was adopted in 1991. The current Plan was adopted in 1998 and revised zoning and subdivision regulations followed in 1999.

1993 Comprehensive Plan for Queen Anne's County: Queen Anne's County was the first local jurisdiction in Maryland to update its comprehensive plan and development ordinances to be consistent with the Economic Growth, Resource Protection and Planning Act of 1992. The County's Plan identified six "Growth Sub-Areas" where development should be encouraged to concentrate so as to discourage continued patterns of environmentally-insensitive and fiscally-irresponsible sprawl development throughout rural areas.

The designated "Growth Sub-Areas" are: Stevensville, Chester, Kent Narrows, Grasonville, Queenstown and Centreville. Each of these developed areas or towns is an existing population center with infrastructure already in place. Each of these communities has been previously identified in earlier County comprehensive plans (1964 and 1987) as areas where future development and growth should be directed.

The County's 1993 Comprehensive Plan acknowledged that previous planning efforts to manage growth and direct it towards specified growth centers have not been entirely successful despite the adoption of disincentives to develop in rural areas. In 1987, the County completed a comprehensive re-zoning process that downzoned agricultural areas from approximately one house per acre to one house per every eight acres with requirements that development be clustered on fifteen percent (15%) of the property so that 85 percent was reserved as permanent open space. In 1989, the Chesapeake Bay Critical Area regulations downzoned most undeveloped waterfront areas, defined by the Ordinance as all lands within 1,000 feet of the shoreline or tidal waters, to one house per every twenty acres.

Recent comprehensive downzonings, as cited above, have greatly contributed to a reduction in the overall long-term development prospects for Queen Anne's County, but they have not been entirely successful in discouraging development in rural areas and directing it to designated growth areas. The County's residential real estate market still shows a strong preference for rural and waterfront housing. Many developers have commented that it is still easier and more profitable to subdivide and develop farmland on private septic systems and wells rather than develop in towns or areas with existing sewer and water service. The previous rural development disincentives must be supplemented by proper growth area development incentives if the County is ever to influence market preferences so that people will want to live in our towns and villages. Despite best intentions, developers typically build only what the market will support.

In an effort to stem further sprawl development and provide appropriate incentives to encourage growth to locate in and around the existing villages and towns, the County's 1993 Comprehensive Plan recommends that detailed growth management plans for designated growth areas be prepared and adopted. These plans are intended to specifically focus on issues related to land use, development, environmental protection, community facilities and infrastructure and community design. The challenge is to plan for quality, liveable communities that will be attractive to existing and future residents and businesses.

In 1993/94 the County Planning Department initiated a US 50/301 Corridor Study to begin the process of growth sub-area planning. It was evident from this consultant study that each of the growth sub-areas within the County's development corridor were unique and each required its own community-based planning process in order to develop effective local growth management recommendations.

2002 Comprehensive Plan for Queen Anne's County: The 2002 Plan states that it "is a guide for the location, character and extent of proposed public and private development in Queen Anne's County. The Plan's policies and recommendations will be implemented over time through many distinct decisions including the rezoning and subdivision of land and the construction of public improvements. The Plan provides the policy basis for the integration and coordination of these decisions and actions. The County's land use ordinances are to be amended to be consistent with the Plan.

"The County has been implementing the recommendations of the 1993 Comprehensive Plan Update and those contained in the Community Plans for Stevensville, Chester, Grasonville, Kent Narrows, Queenstown and Centreville. This 2002 Comprehensive Plan builds on the policies and recommendations of the 1993 Plan. The recommendations of the Community Plans (Growth Area Plans), as adopted, still remain valid and are included as a part of this Plan except as superseded by any inconsistent recommendations of this 2002 Comprehensive Plan.

"The Plan seeks to continue to address and resolve two overarching themes, which reaffirm the County's long-standing growth management policies and recommendations in effect since the 1987 Comprehensive Plan. These are framed as interrelated questions:

- How can the County encourage and direct growth to existing communities and within designated Growth Areas? and
- How can the County continue to keep its rural areas rural and preserve agricultural lands?"

The Plan goes on to say "During the public process associated with the development of the draft Comprehensive Plan, there has been significant discussion related to the size of the Growth Area boundaries in 1993 versus the boundaries shown on the 2002 Comprehensive Plan Maps...

"As a result of the adoption of the Community Plans outlined earlier in this Chapter (Queenstown Community Plan in 1998), the boundaries of the Growth Area were revised to accurately reflect the decisions made during those separate planning processes." The generalized Growth Area boundaries

shown in 1993 for Queenstown covered 1,350 acres. The Growth Area boundaries refined by the 1998 Queenstown Community Plan and reflected in County Plan covered 2,840 acres.

The 2002 Plan offered further guidance for the Queenstown area stating: "Within the six existing designated Growth Areas, the maximum theoretical buildout would permit approximately 20,000 dwelling units and 13,000,000 square feet of non-residential floor area. Full buildout of these areas within the next 20 years is unrealistic. Nevertheless, over time there will be pressure to modify or expand the existing boundaries for a variety of reasons. This pressure could include the need to address new State land use initiatives, the need to address/correct public health, safety and welfare issues, County policy objectives or development pressure."

To implement this policy guidance, the Plan requires that "During the next planning update period, the east side of the Kent Narrows, Grasonville, Queenstown, and Centreville growth area boundaries shall be determined through their respective individual community plan update process. Significant enlargements/adjustments to a growth area boundary should be supported by a land demand analysis that clearly provides necessary justification for the change."

2002 Comprehensive Plan for Queen Anne's County (amended): In 2004, the County Commissioners amended the 2002 Comprehensive Plan to

• eliminate the "Planned Development" designation for land within the Town's growth area boundary;
• revise the Water and Sewer Service maps to indicate that the Queenstown growth area (then planned for water and sewer service by 2012) was not planned to be served by public water or sewer service; and
• add text stating "The zoning maps adopted by the County in January 6, 2004 of the Queenstown Growth Area maintain the zoning districts, land use categories and residential densities set forth in the zoning maps adopted in 1997. The County determined that further study and reflection on the future of lands within the Queenstown growth area was prudent. Therefore implementation of the land use policies of the 2002 Comprehensive Plan with respect to the Queenstown Growth Area will be delayed until such time as a new Queenstown Community Plan is adopted or the existing Queenstown Community Plan is revised."

The consequence of these actions is that the 2002 County Plan as amended contains no policy for planning the Queenstown Growth Area other than to maintain the 1997 status quo.

3.3 The Current Planning Process

A series of community workshops was held over the first six months of 2007 where baseline information and development implications were discussed with the community. The remainder of 2007 was used by the Planning Commission to create and examine various alternatives for development within the Town and in the surrounding area. In the course of this examination, all major property owners in the vicinity of Queenstown were invited to present their ideas for the future use of their property. All owners took advantage of the opportunity. Based on ideas generated during the workshop, the Planning Commission developed four land use alternatives for further discussion and presentation to the public. Following a public meeting in December, 2007, a preferred development alternative was selected. In 2008 and 2009 this alternative was refined based on an economic and design analysis and is described in detail in Chapter 1.

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Appendix A1. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under current land cover conditions (MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT01	11	Low Density Residential	9.9	14%	9.0	7.9	1.3	0.5	88.1	11.9
QT01	11	Low Density Residential	84.5	14%	9.0	7.9	1.3	0.5	748.9	101.0
QT01	12	Medium Density Residential	6.1	28%	9.0	7.9	1.3	0.5	52.8	6.6
QT01	14	Commercial	2.0	72%	9.0	7.9	1.3	0.5	16.7	1.5
QT01	14	Commercial	0.3	72%	9.0	7.9	1.3	0.5	2.8	0.2
QT01	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.0	0.3
QT01	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.1	0.3
QT01	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.7	0.6
QT01	14	Commercial	2.5	72%	9.0	7.9	1.3	0.5	20.1	1.8
QT01	16	Institutional	0.0	34%	9.0	7.9	1.3	0.5	0.2	0.0
QT01	16	Institutional	0.7	34%	9.0	7.9	1.3	0.5	5.7	0.7
QT01	16	Institutional	1.0	34%	9.0	7.9	1.3	0.5	9.0	1.1
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.8	0.3
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.5	0.3
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.2	0.3
QT01	18	Open Urban Land	0.1	9%	9.0	7.9	1.3	0.5	0.8	0.1
QT01	21	Cropland	45.5	0%	15.7	0.0	1.1	0.0	715.1	49.2
QT01	41	Deciduous Forest	20.7	0%	1.5	0.0	0.0	0.0	30.7	0.5
QT01	41	Deciduous Forest	1.9	0%	1.5	0.0	0.0	0.0	2.8	0.0
QT01	228	Deciduous Forest	1.3	0%	1.5	0.0	0.0	0.0	1.9	0.0
QT01	41	Deciduous Forest	0.4	0%	1.5	0.0	0.0	0.0	0.7	0.0
QT01	41	Deciduous Forest	6.3	0%	1.5	0.0	0.0	0.0	9.4	0.1
QT01	43	Mixed Forest	0.4	0%	1.5	0.0	0.0	0.0	0.6	0.0
QT02	11	Low Density Residential	15.1	14%	9.0	7.9	1.3	0.5	133.4	18.0
QT02	14	Commercial	1.6	72%	9.0	7.9	1.3	0.5	12.7	1.1
QT02	16	Institutional	0.2	34%	9.0	7.9	1.3	0.5	1.5	0.2
QT02	16	Institutional	1.6	34%	9.0	7.9	1.3	0.5	13.6	1.6
QT02	16	Institutional	1.2	34%	9.0	7.9	1.3	0.5	10.5	1.3
QT02	17	Extractive	9.2	2%	9.0	7.9	1.3	0.5	83.2	11.9
QT02	21	Cropland	315.8	0%	15.7	0.0	1.1	0.0	4962.4	341.5
QT02	22	Pasture	1.0	0%	9.7	0.0	1.4	0.0	9.9	1.5
QT02	41	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT02	41	Deciduous Forest	31.0	0%	1.5	0.0	0.0	0.0	46.1	0.7
QT02	41	Deciduous Forest	17.8	0%	1.5	0.0	0.0	0.0	26.4	0.4
QT02	43	Mixed Forest	7.7	0%	1.5	0.0	0.0	0.0	11.5	0.2
QT02	60	Wetlands	5.5	0%	1.5	0.0	0.0	0.0	8.2	0.1
QT03	11	Low Density Residential	9.0	14%	9.0	7.9	1.3	0.5	79.6	10.7
QT03	11	Low Density Residential	0.4	14%	9.0	7.9	1.3	0.5	3.9	0.5
QT03	12	Medium Density Residential	8.7	28%	9.0	7.9	1.3	0.5	76.0	9.4
QT03	12	Medium Density Residential	6.9	28%	9.0	7.9	1.3	0.5	60.3	7.5
QT03	14	Commercial	5.5	72%	9.0	7.9	1.3	0.5	44.9	4.0
QT03	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.5	0.6
QT03	14	Commercial	0.2	72%	9.0	7.9	1.3	0.5	2.0	0.2
QT03	14	Commercial	3.3	72%	9.0	7.9	1.3	0.5	27.2	2.4
QT03	14	Commercial	10.8	72%	9.0	7.9	1.3	0.5	88.2	7.8
QT03	14	Commercial	15.0	72%	9.0	7.9	1.3	0.5	123.1	10.9
QT03	21	Cropland	2.7	0%	15.7	0.0	1.1	0.0	41.7	2.9
QT03	21	Cropland	90.7	0%	15.7	0.0	1.1	0.0	1425.1	98.1
QT03	21	Cropland	63.2	0%	15.7	0.0	1.1	0.0	993.3	68.4
QT03	41	Deciduous Forest	203.1	0%	1.5	0.0	0.0	0.0	301.3	4.6
QT03	41	Deciduous Forest	1.8	0%	1.5	0.0	0.0	0.0	2.6	0.0
QT03	242	Agricultural Buildings	8.2	2%	9.7	0.0	1.4	0.0	78.1	11.5
QT04	14	Commercial	0.2	72%	9.0	7.9	1.3	0.5	1.9	0.2
QT04	17	Extractive	26.1	2%	9.0	7.9	1.3	0.5	235.0	33.7
QT04	21	Cropland	153.9	0%	15.7	0.0	1.1	0.0	2418.7	166.4
QT04	21	Cropland	395.9	0%	15.7	0.0	1.1	0.0	6221.1	428.1
QT04	21	Cropland	42.7	0%	15.7	0.0	1.1	0.0	671.0	46.2
QT04	21	Cropland	148.1	0%	15.7	0.0	1.1	0.0	2326.3	160.1
QT04	21	Cropland	82.1	0%	15.7	0.0	1.1	0.0	1290.2	88.8
QT04	22	Pasture	15.8	0%	9.7	0.0	1.4	0.0	153.1	22.5
QT04	41	Deciduous Forest	3.4	0%	1.5	0.0	0.0	0.0	5.1	0.1
QT04	41	Deciduous Forest	210.4	0%	1.5	0.0	0.0	0.0	312.1	4.7
QT04	41	Deciduous Forest	125.2	0%	1.5	0.0	0.0	0.0	185.7	2.8
QT04	41	Deciduous Forest	16.9	0%	1.5	0.0	0.0	0.0	25.1	0.4
QT04	41	Deciduous Forest	4.5	0%	1.5	0.0	0.0	0.0	6.7	0.1
QT04	41	Deciduous Forest	2.8	0%	1.5	0.0	0.0	0.0	4.2	0.1
QT04	60	Wetlands	6.8	0%	1.5	0.0	0.0	0.0	10.1	0.2
QT05	14	Commercial	5.2	72%	9.0	7.9	1.3	0.5	42.5	3.8
QT05	17	Extractive	25.1	2%	9.0	7.9	1.3	0.5	225.8	32.4
QT05	21	Cropland	8.1	0%	15.7	0.0	1.1	0.0	128.0	8.8
QT05	21	Cropland	328.5	0%	15.7	0.0	1.1	0.0	5162.0	355.2
QT05	41	Deciduous Forest	71.2	0%	1.5	0.0	0.0	0.0	105.6	1.6
QT05	41	Deciduous Forest	96.5	0%	1.5	0.0	0.0	0.0	143.1	2.2

Appendix A1. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under current land cover conditions (MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT06	11	Low Density Residential	18.7	14%	9.0	7.9	1.3	0.5	165.8	22.4
QT06	21	Cropland	603.3	0%	15.7	0.0	1.1	0.0	9480.2	652.4
QT06	41	Deciduous Forest	44.2	0%	1.5	0.0	0.0	0.0	65.5	1.0
QT06	41	Deciduous Forest	61.0	0%	1.5	0.0	0.0	0.0	90.6	1.4
QT06	41	Deciduous Forest	37.1	0%	1.5	0.0	0.0	0.0	55.0	0.8
QT07	17	Extractive	41.9	2%	9.0	7.9	1.3	0.5	377.3	54.2
QT07	21	Cropland	44.1	0%	15.7	0.0	1.1	0.0	693.0	47.7
QT07	21	Cropland	85.0	0%	15.7	0.0	1.1	0.0	1336.0	91.9
QT07	41	Deciduous Forest	41.6	0%	1.5	0.0	0.0	0.0	61.7	0.9
QT08	11	Low Density Residential	4.2	14%	9.0	7.9	1.3	0.5	37.2	5.0
QT08	14	Commercial	8.0	72%	9.0	7.9	1.3	0.5	65.2	5.8
QT08	15	Industrial	33.3	53%	9.0	7.9	1.3	0.5	280.0	29.3
QT08	21	Cropland	160.0	0%	15.7	0.0	1.1	0.0	2513.7	173.0
QT08	21	Cropland	15.9	0%	15.7	0.0	1.1	0.0	250.2	17.2
QT08	41	Deciduous Forest	44.4	0%	1.5	0.0	0.0	0.0	65.9	1.0
QT08	41	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT09	11	Low Density Residential	5.8	14%	9.0	7.9	1.3	0.5	51.6	7.0
QT09	11	Low Density Residential	1.3	14%	9.0	7.9	1.3	0.5	11.9	1.6
QT09	11	Low Density Residential	18.1	14%	9.0	7.9	1.3	0.5	160.6	21.7
QT09	12	Medium Density Residential	10.2	28%	9.0	7.9	1.3	0.5	88.8	11.0
QT09	12	Medium Density Residential	3.7	28%	9.0	7.9	1.3	0.5	32.1	4.0
QT09	14	Commercial	57.7	72%	9.0	7.9	1.3	0.5	472.7	41.9
QT09	14	Commercial	2.7	72%	9.0	7.9	1.3	0.5	22.0	2.0
QT09	16	Institutional	2.0	34%	9.0	7.9	1.3	0.5	17.4	2.1
QT09	18	Open Urban Land	3.4	9%	9.0	7.9	1.3	0.5	30.0	4.2
QT09	21	Cropland	27.9	0%	15.7	0.0	1.1	0.0	438.5	30.2
QT09	21	Cropland	1.0	0%	15.7	0.0	1.1	0.0	15.9	1.1
QT09	21	Cropland	1.8	0%	15.7	0.0	1.1	0.0	27.9	1.9
QT09	21	Cropland	49.8	0%	15.7	0.0	1.1	0.0	782.3	53.8
QT09	41	Deciduous Forest	8.4	0%	1.5	0.0	0.0	0.0	12.4	0.2
QT09	41	Deciduous Forest	67.7	0%	1.5	0.0	0.0	0.0	100.5	1.5
QT09	41	Deciduous Forest	42.8	0%	1.5	0.0	0.0	0.0	63.5	1.0
QT09	41	Deciduous Forest	3.8	0%	1.5	0.0	0.0	0.0	5.6	0.1
QT09	60	Wetlands	17.9	0%	1.5	0.0	0.0	0.0	26.5	0.4
QT09	60	Wetlands	6.0	0%	1.5	0.0	0.0	0.0	8.9	0.1
QT10	11	Low Density Residential	153.0	14%	9.0	7.9	1.3	0.5	1355.0	182.8
QT10	11	Low Density Residential	7.3	14%	9.0	7.9	1.3	0.5	64.5	8.7
QT10	11	Low Density Residential	0.0	14%	9.0	7.9	1.3	0.5	0.1	0.0
QT10	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.4	0.6
QT10	14	Commercial	10.0	72%	9.0	7.9	1.3	0.5	82.0	7.3
QT10	21	Cropland	14.1	0%	15.7	0.0	1.1	0.0	221.9	15.3
QT10	21	Cropland	174.5	0%	15.7	0.0	1.1	0.0	2741.5	188.7
QT10	21	Cropland	0.0	0%	15.7	0.0	1.1	0.0	0.4	0.0
QT10	41	Deciduous Forest	68.4	0%	1.5	0.0	0.0	0.0	101.4	1.5
QT10	41	Deciduous Forest	12.5	0%	1.5	0.0	0.0	0.0	18.6	0.3
QT10	60	Wetlands	0.1	0%	1.5	0.0	0.0	0.0	0.1	0.0
QT10	60	Wetlands	0.2	0%	1.5	0.0	0.0	0.0	0.2	0.0
QT10	242	Agricultural Buildings	61.8	2%	9.7	0.0	1.4	0.0	587.4	86.3
QT11	18	Open Urban Land	74.6	9%	9.0	7.9	1.3	0.5	665.2	92.2
QT11	60	Wetlands	3.9	0%	1.5	0.0	0.0	0.0	5.8	0.1
QT11	60	Wetlands	6.4	0%	1.5	0.0	0.0	0.0	9.5	0.1
QT11	18	Open Urban Land	127.7	9%	9.0	7.9	1.3	0.5	1138.6	157.7
QT11	60	Wetlands	8.5	0%	1.5	0.0	0.0	0.0	12.7	0.2
QT11	18	Open Urban Land	246.4	9%	9.0	7.9	1.3	0.5	2197.3	304.4
QT11	21	Cropland	55.2	0%	15.7	0.0	1.1	0.0	867.5	59.7
QT11	41	Deciduous Forest	17.8	0%	1.5	0.0	0.0	0.0	26.4	0.4
QT11	41	Deciduous Forest	0.7	0%	1.5	0.0	0.0	0.0	1.1	0.0
QT11	60	Wetlands	8.6	0%	1.5	0.0	0.0	0.0	12.7	0.2
QT11	11	Low Density Residential	2.5	14%	9.0	7.9	1.3	0.5	22.6	3.0
QT11	11	Low Density Residential	5.8	14%	9.0	7.9	1.3	0.5	51.4	6.9
QT11	12	Medium Density Residential	7.3	28%	9.0	7.9	1.3	0.5	63.7	7.9
QT11	16	Institutional	0.2	34%	9.0	7.9	1.3	0.5	1.7	0.2
QT11	16	Institutional	0.4	34%	9.0	7.9	1.3	0.5	3.2	0.4
QT11	18	Open Urban Land	153.7	9%	9.0	7.9	1.3	0.5	1370.3	189.8
QT11	41	Deciduous Forest	6.7	0%	1.5	0.0	0.0	0.0	9.9	0.2
QT11	41	Deciduous Forest	6.7	0%	1.5	0.0	0.0	0.0	9.9	0.1
QT11	41	Deciduous Forest	2.6	0%	1.5	0.0	0.0	0.0	3.8	0.1
QT12	11	Low Density Residential	11.2	14%	9.0	7.9	1.3	0.5	99.1	13.4
QT12	11	Low Density Residential	79.4	14%	9.0	7.9	1.3	0.5	703.8	94.9
QT12	11	Low Density Residential	10.5	14%	9.0	7.9	1.3	0.5	93.0	12.5
QT12	11	Low Density Residential	13.3	14%	9.0	7.9	1.3	0.5	117.7	15.9
QT12	14	Commercial	2.1	72%	9.0	7.9	1.3	0.5	17.4	1.5
QT12	16	Institutional	1.8	34%	9.0	7.9	1.3	0.5	15.7	1.9

Appendix A1. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under current land cover conditions (MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT12	21	Cropland	20.2	0%	15.7	0.0	1.1	0.0	317.4	21.8
QT12	21	Cropland	145.6	0%	15.7	0.0	1.1	0.0	2287.0	157.4
QT12	21	Cropland	157.2	0%	15.7	0.0	1.1	0.0	2470.8	170.0
QT12	41	Deciduous Forest	31.2	0%	1.5	0.0	0.0	0.0	46.3	0.7
QT12	41	Deciduous Forest	19.6	0%	1.5	0.0	0.0	0.0	29.0	0.4
QT12	42	Evergreen Forest	1.5	0%	1.5	0.0	0.0	0.0	2.3	0.0
QT12	60	Wetlands	6.8	0%	1.5	0.0	0.0	0.0	10.1	0.2
QT12	60	Wetlands	7.2	0%	1.5	0.0	0.0	0.0	10.7	0.2
QT13	11	Low Density Residential	0.4	14%	9.0	7.9	1.3	0.5	3.1	0.4
QT13	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.0	0.3
QT13	14	Commercial	1.3	72%	9.0	7.9	1.3	0.5	10.8	1.0
QT13	18	Open Urban Land	79.5	9%	9.0	7.9	1.3	0.5	708.7	98.2
QT13	21	Cropland	8.4	0%	15.7	0.0	1.1	0.0	131.7	9.1
QT13	21	Cropland	849.6	0%	15.7	0.0	1.1	0.0	13349.6	918.7
QT13	21	Cropland	12.3	0%	15.7	0.0	1.1	0.0	193.7	13.3
QT13	41	Deciduous Forest	37.9	0%	1.5	0.0	0.0	0.0	56.2	0.9
QT13	41	Deciduous Forest	447.1	0%	1.5	0.0	0.0	0.0	663.3	10.0
QT13	41	Deciduous Forest	5.6	0%	1.5	0.0	0.0	0.0	8.4	0.1
QT13	41	Deciduous Forest	0.7	0%	1.5	0.0	0.0	0.0	1.0	0.0
QT13	60	Wetlands	21.1	0%	1.5	0.0	0.0	0.0	31.4	0.5
QT13	60	Wetlands	8.4	0%	1.5	0.0	0.0	0.0	12.4	0.2
QT13	242	Agricultural Buildings	4.0	2%	9.7	0.0	1.4	0.0	37.6	5.5
QT13	242	Agricultural Buildings	9.7	2%	9.7	0.0	1.4	0.0	92.1	13.5
QT14	11	Low Density Residential	1.9	14%	9.0	7.9	1.3	0.5	16.5	2.2
QT14	11	Low Density Residential	18.6	14%	9.0	7.9	1.3	0.5	164.6	22.2
QT14	11	Low Density Residential	13.9	14%	9.0	7.9	1.3	0.5	123.6	16.7
QT14	14	Commercial	1.8	72%	9.0	7.9	1.3	0.5	15.0	1.3

Appendix A2. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under distributed, county-based growth scenario (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT01	11	Low Density Residential	9.9	14%	9.0	7.9	1.3	0.5	88.1	11.9
QT01	11	Low Density Residential	45.2	14%	9.0	7.9	1.3	0.5	400.3	54.0
QT01	11	Low Density Residential	0.3	14%	9.0	7.9	1.3	0.5	2.7	0.4
QT01	12	Medium Density Residential	6.1	28%	9.0	7.9	1.3	0.5	52.8	6.6
QT01	12	Medium Density Residential	84.5	28%	9.0	7.9	1.3	0.5	734.9	91.4
QT01	14	Commercial	0.3	72%	9.0	7.9	1.3	0.5	2.8	0.2
QT01	14	Commercial	2.0	72%	9.0	7.9	1.3	0.5	16.7	1.5
QT01	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.0	0.3
QT01	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.7	0.6
QT01	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.1	0.3
QT01	14	Commercial	2.5	72%	9.0	7.9	1.3	0.5	20.1	1.8
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.2	0.3
QT01	16	Institutional	1.0	34%	9.0	7.9	1.3	0.5	9.0	1.1
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.8	0.3
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.5	0.3
QT01	16	Institutional	0.7	34%	9.0	7.9	1.3	0.5	5.7	0.7
QT01	16	Institutional	0.0	34%	9.0	7.9	1.3	0.5	0.2	0.0
QT01	18	Open Urban Land	0.1	9%	9.0	7.9	1.3	0.5	0.8	0.1
QT01	41	Deciduous Forest	1.3	0%	1.5	0.0	0.0	0.0	1.9	0.0
QT01	212	Deciduous Forest	6.3	0%	1.5	0.0	0.0	0.0	9.4	0.1
QT01	41	Deciduous Forest	0.4	0%	1.5	0.0	0.0	0.0	0.7	0.0
QT01	41	Deciduous Forest	20.7	0%	1.5	0.0	0.0	0.0	30.7	0.5
QT01	41	Deciduous Forest	1.9	0%	1.5	0.0	0.0	0.0	2.8	0.0
QT01	43	Mixed Forest	0.4	0%	1.5	0.0	0.0	0.0	0.6	0.0
QT02	11	Low Density Residential	57.6	14%	9.0	7.9	1.3	0.5	510.5	68.9
QT02	11	Low Density Residential	64.1	14%	9.0	7.9	1.3	0.5	568.0	76.6
QT02	11	Low Density Residential	100.9	14%	9.0	7.9	1.3	0.5	893.8	120.5
QT02	12	Medium Density Residential	15.1	28%	9.0	7.9	1.3	0.5	130.9	16.3
QT02	14	Commercial	1.6	72%	9.0	7.9	1.3	0.5	12.7	1.1
QT02	16	Institutional	1.2	34%	9.0	7.9	1.3	0.5	10.5	1.3
QT02	16	Institutional	1.6	34%	9.0	7.9	1.3	0.5	13.6	1.6
QT02	16	Institutional	0.2	34%	9.0	7.9	1.3	0.5	1.5	0.2
QT02	17	Extractive	9.2	2%	9.0	7.9	1.3	0.5	83.1	11.9
QT02	21	Cropland	86.5	0%	15.7	0.0	1.1	0.0	1359.2	93.5
QT02	21	Cropland	6.5	0%	15.7	0.0	1.1	0.0	102.9	7.1
QT02	22	Pasture	1.0	0%	9.7	0.0	1.4	0.0	9.9	1.5
QT02	41	Deciduous Forest	31.0	0%	1.5	0.0	0.0	0.0	46.0	0.7
QT02	41	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT02	41	Deciduous Forest	17.8	0%	1.5	0.0	0.0	0.0	26.4	0.4
QT02	43	Mixed Forest	7.7	0%	1.5	0.0	0.0	0.0	11.5	0.2
QT02	60	Wetlands	5.5	0%	1.5	0.0	0.0	0.0	8.2	0.1
QT03	11	Low Density Residential	40.2	14%	9.0	7.9	1.3	0.5	356.0	48.0
QT03	11	Low Density Residential	5.0	14%	9.0	7.9	1.3	0.5	44.4	6.0
QT03	11	Low Density Residential	0.4	14%	9.0	7.9	1.3	0.5	3.9	0.5
QT03	11	Low Density Residential	85.5	14%	9.0	7.9	1.3	0.5	757.8	102.2
QT03	11	Low Density Residential	11.2	14%	9.0	7.9	1.3	0.5	98.8	13.3
QT03	11	Low Density Residential	2.4	14%	9.0	7.9	1.3	0.5	20.9	2.8
QT03	11	Low Density Residential	9.0	14%	9.0	7.9	1.3	0.5	79.6	10.7
QT03	12	Medium Density Residential	8.7	28%	9.0	7.9	1.3	0.5	75.9	9.4
QT03	12	Medium Density Residential	6.9	28%	9.0	7.9	1.3	0.5	60.3	7.5
QT03	14	Commercial	5.5	72%	9.0	7.9	1.3	0.5	44.9	4.0
QT03	14	Commercial	10.8	72%	9.0	7.9	1.3	0.5	88.2	7.8
QT03	14	Commercial	3.3	72%	9.0	7.9	1.3	0.5	27.2	2.4
QT03	14	Commercial	0.2	72%	9.0	7.9	1.3	0.5	2.0	0.2
QT03	14	Commercial	15.0	72%	9.0	7.9	1.3	0.5	123.0	10.9
QT03	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.5	0.6
QT03	21	Cropland	3.6	0%	15.7	0.0	1.1	0.0	55.8	3.8
QT03	41	Deciduous Forest	16.5	0%	1.5	0.0	0.0	0.0	24.5	0.4
QT03	41	Deciduous Forest	203.4	0%	1.5	0.0	0.0	0.0	301.8	4.6
QT03	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT03	41	Deciduous Forest	1.8	0%	1.5	0.0	0.0	0.0	2.6	0.0
QT04	14	Commercial	0.2	72%	9.0	7.9	1.3	0.5	1.9	0.2
QT04	17	Extractive	0.0	2%	9.0	7.9	1.3	0.5	0.2	0.0
QT04	17	Extractive	26.1	2%	9.0	7.9	1.3	0.5	234.9	33.7
QT04	21	Cropland	395.7	0%	15.7	0.0	1.1	0.0	6218.1	427.9
QT04	21	Cropland	148.0	0%	15.7	0.0	1.1	0.0	2325.3	160.0
QT04	21	Cropland	42.7	0%	15.7	0.0	1.1	0.0	670.7	46.2
QT04	21	Cropland	82.1	0%	15.7	0.0	1.1	0.0	1289.7	88.8
QT04	21	Cropland	0.0	0%	15.7	0.0	1.1	0.0	0.4	0.0
QT04	21	Cropland	153.9	0%	15.7	0.0	1.1	0.0	2417.7	166.4
QT04	22	Pasture	15.8	0%	9.7	0.0	1.4	0.0	153.1	22.5
QT04	41	Deciduous Forest	3.4	0%	1.5	0.0	0.0	0.0	5.1	0.1
QT04	41	Deciduous Forest	4.5	0%	1.5	0.0	0.0	0.0	6.7	0.1

Appendix A2. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under distributed, county-based growth scenario (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT04	41	Deciduous Forest	125.1	0%	1.5	0.0	0.0	0.0	185.6	2.8
QT04	41	Deciduous Forest	2.8	0%	1.5	0.0	0.0	0.0	4.2	0.1
QT04	41	Deciduous Forest	16.9	0%	1.5	0.0	0.0	0.0	25.1	0.4
QT04	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT04	41	Deciduous Forest	210.3	0%	1.5	0.0	0.0	0.0	312.0	4.7
QT04	60	Wetlands	6.8	0%	1.5	0.0	0.0	0.0	10.1	0.2
QT05	11	Low Density Residential	0.1	14%	9.0	7.9	1.3	0.5	1.0	0.1
QT05	14	Commercial	5.2	72%	9.0	7.9	1.3	0.5	42.4	3.8
QT05	17	Extractive	19.4	2%	9.0	7.9	1.3	0.5	174.5	25.0
QT05	17	Extractive	0.1	2%	9.0	7.9	1.3	0.5	1.0	0.1
QT05	21	Cropland	8.1	0%	15.7	0.0	1.1	0.0	127.9	8.8
QT05	21	Cropland	328.2	0%	15.7	0.0	1.1	0.0	5156.4	354.9
QT05	21	Cropland	0.1	0%	15.7	0.0	1.1	0.0	1.7	0.1
QT05	41	Deciduous Forest	102.1	0%	1.5	0.0	0.0	0.0	151.5	2.3
QT05	41	Deciduous Forest	71.1	0%	1.5	0.0	0.0	0.0	105.5	1.6
QT05	41	Deciduous Forest	0.1	0%	1.5	0.0	0.0	0.0	0.2	0.0
QT06	11	Low Density Residential	18.7	14%	9.0	7.9	1.3	0.5	165.8	22.4
QT06	21	Cropland	603.1	0%	15.7	0.0	1.1	0.0	9476.1	652.1
QT06	41	Deciduous Forest	61.0	0%	1.5	0.0	0.0	0.0	90.5	1.4
QT06	41	Deciduous Forest	37.0	0%	1.5	0.0	0.0	0.0	55.0	0.8
QT06	41	Deciduous Forest	44.2	0%	1.5	0.0	0.0	0.0	65.5	1.0
QT07	11	Low Density Residential	23.9	14%	9.0	7.9	1.3	0.5	211.5	28.5
QT07	11	Low Density Residential	29.1	14%	9.0	7.9	1.3	0.5	257.6	34.7
QT07	11	Low Density Residential	27.0	14%	9.0	7.9	1.3	0.5	239.1	32.2
QT07	11	Low Density Residential	0.0	14%	9.0	7.9	1.3	0.5	0.2	0.0
QT07	11	Low Density Residential	0.0	14%	9.0	7.9	1.3	0.5	0.0	0.0
QT07	17	Extractive	37.2	2%	9.0	7.9	1.3	0.5	334.8	48.1
QT07	17	Extractive	0.0	2%	9.0	7.9	1.3	0.5	0.0	0.0
QT07	21	Cropland	32.0	0%	15.7	0.0	1.1	0.0	503.3	34.6
QT07	41	Deciduous Forest	63.3	0%	1.5	0.0	0.0	0.0	93.9	1.4
QT07	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT07	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT08	11	Low Density Residential	4.2	14%	9.0	7.9	1.3	0.5	37.2	5.0
QT08	11	Low Density Residential	15.4	14%	9.0	7.9	1.3	0.5	136.3	18.4
QT08	14	Commercial	8.0	72%	9.0	7.9	1.3	0.5	65.2	5.8
QT08	15	Industrial	33.3	53%	9.0	7.9	1.3	0.5	279.9	29.3
QT08	21	Cropland	0.5	0%	15.7	0.0	1.1	0.0	8.5	0.6
QT08	21	Cropland	159.9	0%	15.7	0.0	1.1	0.0	2512.6	172.9
QT08	41	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT08	41	Deciduous Forest	44.4	0%	1.5	0.0	0.0	0.0	65.9	1.0
QT09	11	Low Density Residential	18.1	14%	9.0	7.9	1.3	0.5	160.5	21.6
QT09	11	Low Density Residential	68.3	14%	9.0	7.9	1.3	0.5	605.0	81.6
QT09	11	Low Density Residential	1.3	14%	9.0	7.9	1.3	0.5	11.9	1.6
QT09	11	Low Density Residential	1.0	14%	9.0	7.9	1.3	0.5	9.0	1.2
QT09	11	Low Density Residential	5.8	14%	9.0	7.9	1.3	0.5	51.6	7.0
QT09	12	Medium Density Residential	3.7	28%	9.0	7.9	1.3	0.5	32.1	4.0
QT09	12	Medium Density Residential	10.2	28%	9.0	7.9	1.3	0.5	88.7	11.0
QT09	14	Commercial	2.7	72%	9.0	7.9	1.3	0.5	22.0	2.0
QT09	14	Commercial	57.7	72%	9.0	7.9	1.3	0.5	472.5	41.9
QT09	16	Institutional	2.0	34%	9.0	7.9	1.3	0.5	17.4	2.1
QT09	18	Open Urban Land	0.0	9%	9.0	7.9	1.3	0.5	0.0	0.0
QT09	21	Cropland	1.8	0%	15.7	0.0	1.1	0.0	27.9	1.9
QT09	41	Deciduous Forest	3.8	0%	1.5	0.0	0.0	0.0	5.6	0.1
QT09	41	Deciduous Forest	67.7	0%	1.5	0.0	0.0	0.0	100.4	1.5
QT09	41	Deciduous Forest	8.4	0%	1.5	0.0	0.0	0.0	12.4	0.2
QT09	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT09	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT09	41	Deciduous Forest	50.7	0%	1.5	0.0	0.0	0.0	75.2	1.1
QT09	41	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT09	43	Mixed Forest	3.4	0%	1.5	0.0	0.0	0.0	5.0	0.1
QT09	60	Wetlands	17.9	0%	1.5	0.0	0.0	0.0	26.5	0.4
QT09	60	Wetlands	6.0	0%	1.5	0.0	0.0	0.0	8.9	0.1
QT10	11	Low Density Residential	0.0	14%	9.0	7.9	1.3	0.5	0.1	0.0
QT10	11	Low Density Residential	7.3	14%	9.0	7.9	1.3	0.5	64.4	8.7
QT10	11	Low Density Residential	152.9	14%	9.0	7.9	1.3	0.5	1354.5	182.7
QT10	14	Commercial	10.0	72%	9.0	7.9	1.3	0.5	82.0	7.3
QT10	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.4	0.6
QT10	21	Cropland	14.1	0%	15.7	0.0	1.1	0.0	221.8	15.3
QT10	21	Cropland	146.8	0%	15.7	0.0	1.1	0.0	2307.4	158.8
QT10	21	Cropland	0.0	0%	15.7	0.0	1.1	0.0	0.4	0.0
QT10	41	Deciduous Forest	12.5	0%	1.5	0.0	0.0	0.0	18.5	0.3
QT10	41	Deciduous Forest	68.3	0%	1.5	0.0	0.0	0.0	101.4	1.5
QT10	41	Deciduous Forest	27.6	0%	1.5	0.0	0.0	0.0	40.9	0.6

Appendix A2. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under distributed, county-based growth scenario (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT10	60	Wetlands	0.1	0%	1.5	0.0	0.0	0.0	0.1	0.0
QT10	60	Wetlands	0.2	0%	1.5	0.0	0.0	0.0	0.2	0.0
QT10	242	Agricultural Buildings	61.8	2%	9.7	0.0	1.4	0.0	587.1	86.2
QT11	18	Open Urban Land	74.6	9%	9.0	7.9	1.3	0.5	664.9	92.1
QT11	60	Wetlands	3.9	0%	1.5	0.0	0.0	0.0	5.8	0.1
QT11	60	Wetlands	6.4	0%	1.5	0.0	0.0	0.0	9.5	0.1
QT11	18	Open Urban Land	125.5	9%	9.0	7.9	1.3	0.5	1119.3	155.1
QT11	43	Mixed Forest	2.1	0%	1.5	0.0	0.0	0.0	3.1	0.0
QT11	60	Wetlands	8.5	0%	1.5	0.0	0.0	0.0	12.7	0.2
QT11	18	Open Urban Land	125.8	9%	9.0	7.9	1.3	0.5	1121.6	155.4
QT11	18	Open Urban Land	0.0	9%	9.0	7.9	1.3	0.5	0.3	0.0
QT11	18	Open Urban Land	0.1	9%	9.0	7.9	1.3	0.5	0.5	0.1
QT11	21	Cropland	55.2	0%	15.7	0.0	1.1	0.0	867.1	59.7
QT11	41	Deciduous Forest	0.7	0%	1.5	0.0	0.0	0.0	1.1	0.0
QT11	41	Deciduous Forest	17.8	0%	1.5	0.0	0.0	0.0	26.4	0.4
QT11	43	Mixed Forest	120.5	0%	1.5	0.0	0.0	0.0	178.7	2.7
QT11	60	Wetlands	8.6	0%	1.5	0.0	0.0	0.0	12.7	0.2
QT11	11	Low Density Residential	2.5	14%	9.0	7.9	1.3	0.5	22.6	3.0
QT11	12	Medium Density Residential	7.3	28%	9.0	7.9	1.3	0.5	63.7	7.9
QT11	12	Medium Density Residential	5.8	28%	9.0	7.9	1.3	0.5	50.5	6.3
QT11	16	Institutional	0.4	34%	9.0	7.9	1.3	0.5	3.2	0.4
QT11	16	Institutional	0.2	34%	9.0	7.9	1.3	0.5	1.7	0.2
QT11	18	Open Urban Land	151.6	9%	9.0	7.9	1.3	0.5	1351.5	187.2
QT11	41	Deciduous Forest	6.7	0%	1.5	0.0	0.0	0.0	9.9	0.2
QT11	41	Deciduous Forest	2.6	0%	1.5	0.0	0.0	0.0	3.8	0.1
QT11	41	Deciduous Forest	6.7	0%	1.5	0.0	0.0	0.0	9.9	0.1
QT11	43	Mixed Forest	2.0	0%	1.5	0.0	0.0	0.0	3.0	0.0
QT12	11	Low Density Residential	11.2	14%	9.0	7.9	1.3	0.5	99.1	13.4
QT12	11	Low Density Residential	79.4	14%	9.0	7.9	1.3	0.5	703.5	94.9
QT12	11	Low Density Residential	10.5	14%	9.0	7.9	1.3	0.5	93.0	12.5
QT12	11	Low Density Residential	13.3	14%	9.0	7.9	1.3	0.5	117.7	15.9
QT12	14	Commercial	2.1	72%	9.0	7.9	1.3	0.5	17.4	1.5
QT12	16	Institutional	1.8	34%	9.0	7.9	1.3	0.5	15.7	1.9
QT12	21	Cropland	157.2	0%	15.7	0.0	1.1	0.0	2469.8	170.0
QT12	21	Cropland	20.2	0%	15.7	0.0	1.1	0.0	317.3	21.8
QT12	21	Cropland	145.5	0%	15.7	0.0	1.1	0.0	2286.0	157.3
QT12	41	Deciduous Forest	19.5	0%	1.5	0.0	0.0	0.0	29.0	0.4
QT12	41	Deciduous Forest	31.2	0%	1.5	0.0	0.0	0.0	46.3	0.7
QT12	42	Evergreen Forest	1.5	0%	1.5	0.0	0.0	0.0	2.3	0.0
QT12	60	Wetlands	7.2	0%	1.5	0.0	0.0	0.0	10.7	0.2
QT12	60	Wetlands	6.8	0%	1.5	0.0	0.0	0.0	10.0	0.2
QT13	11	Low Density Residential	0.4	14%	9.0	7.9	1.3	0.5	3.1	0.4
QT13	11	Low Density Residential	61.5	14%	9.0	7.9	1.3	0.5	544.6	73.5
QT13	14	Commercial	1.3	72%	9.0	7.9	1.3	0.5	10.8	1.0
QT13	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.0	0.3
QT13	18	Open Urban Land	79.4	9%	9.0	7.9	1.3	0.5	708.4	98.1
QT13	21	Cropland	258.1	0%	15.7	0.0	1.1	0.0	4055.9	279.1
QT13	21	Cropland	529.6	0%	15.7	0.0	1.1	0.0	8322.0	572.7
QT13	21	Cropland	8.4	0%	15.7	0.0	1.1	0.0	131.7	9.1
QT13	21	Cropland	12.3	0%	15.7	0.0	1.1	0.0	193.6	13.3
QT13	41	Deciduous Forest	37.9	0%	1.5	0.0	0.0	0.0	56.2	0.9
QT13	41	Deciduous Forest	446.9	0%	1.5	0.0	0.0	0.0	663.0	10.0
QT13	41	Deciduous Forest	5.6	0%	1.5	0.0	0.0	0.0	8.4	0.1
QT13	41	Deciduous Forest	0.7	0%	1.5	0.0	0.0	0.0	1.0	0.0
QT13	60	Wetlands	21.1	0%	1.5	0.0	0.0	0.0	31.3	0.5
QT13	60	Wetlands	8.4	0%	1.5	0.0	0.0	0.0	12.4	0.2
QT13	242	Agricultural Buildings	9.7	2%	9.7	0.0	1.4	0.0	92.0	13.5
QT13	242	Agricultural Buildings	4.0	2%	9.7	0.0	1.4	0.0	37.6	5.5
QT14	11	Low Density Residential	13.9	14%	9.0	7.9	1.3	0.5	123.5	16.7
QT14	11	Low Density Residential	18.6	14%	9.0	7.9	1.3	0.5	164.6	22.2
QT14	11	Low Density Residential	1.9	14%	9.0	7.9	1.3	0.5	16.5	2.2
QT14	14	Commercial	1.8	72%	9.0	7.9	1.3	0.5	15.0	1.3
QT14	16	Institutional	1.4	34%	9.0	7.9	1.3	0.5	11.8	1.4
QT14	16	Institutional	0.1	34%	9.0	7.9	1.3	0.5	0.5	0.1
QT14	16	Institutional	1.2	34%	9.0	7.9	1.3	0.5	10.3	1.2
QT14	21	Cropland	0.2	0%	15.7	0.0	1.1	0.0	3.9	0.3
QT14	21	Cropland	41.2	0%	15.7	0.0	1.1	0.0	647.3	44.5
QT14	21	Cropland	104.9	0%	15.7	0.0	1.1	0.0	1648.7	113.5
QT14	21	Cropland	47.5	0%	15.7	0.0	1.1	0.0	745.6	51.3
QT14	21	Cropland	7.6	0%	15.7	0.0	1.1	0.0	119.3	8.2
QT14	21	Cropland	24.2	0%	15.7	0.0	1.1	0.0	380.8	26.2
QT14	41	Deciduous Forest	136.3	0%	1.5	0.0	0.0	0.0	202.2	3.1
QT14	41	Deciduous Forest	4.9	0%	1.5	0.0	0.0	0.0	7.2	0.1

Appendix A2. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under distributed, county-based growth scenario (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT14	41	Deciduous Forest	22.0	0%	1.5	0.0	0.0	0.0	32.6	0.5
QT14	41	Deciduous Forest	21.0	0%	1.5	0.0	0.0	0.0	31.2	0.5
QT14	41	Deciduous Forest	13.3	0%	1.5	0.0	0.0	0.0	19.7	0.3
QT14	42	Evergreen Forest	7.0	0%	1.5	0.0	0.0	0.0	10.4	0.2
QT14	42	Evergreen Forest	47.2	0%	1.5	0.0	0.0	0.0	70.0	1.1
QT14	43	Mixed Forest	27.1	0%	1.5	0.0	0.0	0.0	40.2	0.6
QT14	60	Wetlands	8.2	0%	1.5	0.0	0.0	0.0	12.2	0.2
QT14	60	Wetlands	2.7	0%	1.5	0.0	0.0	0.0	3.9	0.1
QT14	60	Wetlands	1.8	0%	1.5	0.0	0.0	0.0	2.6	0.0
QT15	11	Low Density Residential	2.2	14%	9.0	7.9	1.3	0.5	19.1	2.6
QT15	11	Low Density Residential	93.0	14%	9.0	7.9	1.3	0.5	823.9	111.1
QT15	11	Low Density Residential	308.5	14%	9.0	7.9	1.3	0.5	2732.5	368.5
QT15	11	Low Density Residential	16.9	14%	9.0	7.9	1.3	0.5	149.7	20.2
QT15	14	Commercial	2.6	72%	9.0	7.9	1.3	0.5	21.5	1.9
QT15	21	Cropland	123.6	0%	15.7	0.0	1.1	0.0	1942.7	133.7
QT15	21	Cropland	37.2	0%	15.7	0.0	1.1	0.0	584.4	40.2
QT15	41	Deciduous Forest	39.7	0%	1.5	0.0	0.0	0.0	58.9	0.9
QT15	41	Deciduous Forest	1.7	0%	1.5	0.0	0.0	0.0	2.6	0.0
QT15	41	Deciduous Forest	95.8	0%	1.5	0.0	0.0	0.0	142.1	2.2

Appendix A3. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under consolidated growth scenario (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT01	11	Low Density Residential	9.9	14%	9.0	7.9	1.3	0.5	88.1	11.9
QT01	12	Medium Density Residential	84.5	28%	9.0	7.9	1.3	0.5	734.9	91.4
QT01	12	Medium Density Residential	6.1	28%	9.0	7.9	1.3	0.5	52.8	6.6
QT01	12	Medium Density Residential	0.3	28%	9.0	7.9	1.3	0.5	2.6	0.3
QT01	14	Commercial	0.3	72%	9.0	7.9	1.3	0.5	2.8	0.2
QT01	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.7	0.6
QT01	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.0	0.3
QT01	14	Commercial	2.0	72%	9.0	7.9	1.3	0.5	16.7	1.5
QT01	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.1	0.3
QT01	14	Commercial	2.5	72%	9.0	7.9	1.3	0.5	20.1	1.8
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.2	0.3
QT01	16	Institutional	0.7	34%	9.0	7.9	1.3	0.5	5.7	0.7
QT01	16	Institutional	1.0	34%	9.0	7.9	1.3	0.5	9.0	1.1
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.8	0.3
QT01	16	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.5	0.3
QT01	16	Institutional	0.0	34%	9.0	7.9	1.3	0.5	0.2	0.0
QT01	18	Open Urban Land	0.1	9%	9.0	7.9	1.3	0.5	0.8	0.1
QT01	21	Cropland	45.2	0%	15.7	0.0	1.1	0.0	710.0	48.9
QT01	41	Deciduous Forest	1.3	0%	1.5	0.0	0.0	0.0	1.9	0.0
QT01	220	Deciduous Forest	6.3	0%	1.5	0.0	0.0	0.0	9.4	0.1
QT01	41	Deciduous Forest	0.4	0%	1.5	0.0	0.0	0.0	0.7	0.0
QT01	41	Deciduous Forest	20.7	0%	1.5	0.0	0.0	0.0	30.7	0.5
QT01	41	Deciduous Forest	1.9	0%	1.5	0.0	0.0	0.0	2.8	0.0
QT01	43	Mixed Forest	0.4	0%	1.5	0.0	0.0	0.0	0.6	0.0
QT02	12	Medium Density Residential	57.6	28%	9.0	7.9	1.3	0.5	501.2	62.3
QT02	12	Medium Density Residential	15.1	28%	9.0	7.9	1.3	0.5	130.9	16.3
QT02	12	Medium Density Residential	100.9	28%	9.0	7.9	1.3	0.5	877.5	109.1
QT02	14	Commercial	1.6	72%	9.0	7.9	1.3	0.5	12.7	1.1
QT02	16	Institutional	0.2	34%	9.0	7.9	1.3	0.5	1.5	0.2
QT02	16	Institutional	1.2	34%	9.0	7.9	1.3	0.5	10.5	1.3
QT02	16	Institutional	1.6	34%	9.0	7.9	1.3	0.5	13.6	1.6
QT02	17	Extractive	9.2	2%	9.0	7.9	1.3	0.5	83.1	11.9
QT02	21	Cropland	86.5	0%	15.7	0.0	1.1	0.0	1359.2	93.5
QT02	21	Cropland	6.5	0%	15.7	0.0	1.1	0.0	102.9	7.1
QT02	21	Cropland	64.1	0%	15.7	0.0	1.1	0.0	1007.4	69.3
QT02	22	Pasture	1.0	0%	9.7	0.0	1.4	0.0	9.9	1.5
QT02	41	Deciduous Forest	31.0	0%	1.5	0.0	0.0	0.0	46.0	0.7
QT02	41	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT02	41	Deciduous Forest	17.8	0%	1.5	0.0	0.0	0.0	26.4	0.4
QT02	43	Mixed Forest	7.7	0%	1.5	0.0	0.0	0.0	11.5	0.2
QT02	60	Wetlands	5.5	0%	1.5	0.0	0.0	0.0	8.2	0.1
QT03	11	Low Density Residential	9.0	14%	9.0	7.9	1.3	0.5	79.6	10.7
QT03	11	Low Density Residential	0.4	14%	9.0	7.9	1.3	0.5	3.9	0.5
QT03	12	Medium Density Residential	85.5	28%	9.0	7.9	1.3	0.5	744.0	92.5
QT03	12	Medium Density Residential	2.4	28%	9.0	7.9	1.3	0.5	20.5	2.6
QT03	12	Medium Density Residential	5.0	28%	9.0	7.9	1.3	0.5	43.6	5.4
QT03	12	Medium Density Residential	6.9	28%	9.0	7.9	1.3	0.5	60.3	7.5
QT03	12	Medium Density Residential	8.7	28%	9.0	7.9	1.3	0.5	75.9	9.4
QT03	12	Medium Density Residential	40.2	28%	9.0	7.9	1.3	0.5	349.5	43.5
QT03	14	Commercial	3.3	72%	9.0	7.9	1.3	0.5	27.2	2.4
QT03	14	Commercial	5.5	72%	9.0	7.9	1.3	0.5	44.9	4.0
QT03	14	Commercial	10.8	72%	9.0	7.9	1.3	0.5	88.2	7.8
QT03	14	Commercial	15.0	72%	9.0	7.9	1.3	0.5	123.0	10.9
QT03	14	Commercial	0.2	72%	9.0	7.9	1.3	0.5	2.0	0.2
QT03	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.5	0.6
QT03	21	Cropland	11.2	0%	15.7	0.0	1.1	0.0	175.3	12.1
QT03	21	Cropland	3.6	0%	15.7	0.0	1.1	0.0	55.8	3.8
QT03	21	Cropland	16.5	0%	15.7	0.0	1.1	0.0	259.7	17.9
QT03	41	Deciduous Forest	203.4	0%	1.5	0.0	0.0	0.0	301.8	4.6
QT03	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT03	41	Deciduous Forest	1.8	0%	1.5	0.0	0.0	0.0	2.6	0.0
QT04	14	Commercial	0.2	72%	9.0	7.9	1.3	0.5	1.9	0.2
QT04	17	Extractive	0.0	2%	9.0	7.9	1.3	0.5	0.2	0.0
QT04	17	Extractive	26.1	2%	9.0	7.9	1.3	0.5	234.9	33.7
QT04	21	Cropland	395.7	0%	15.7	0.0	1.1	0.0	6218.1	427.9
QT04	21	Cropland	148.0	0%	15.7	0.0	1.1	0.0	2325.3	160.0
QT04	21	Cropland	42.7	0%	15.7	0.0	1.1	0.0	670.7	46.2
QT04	21	Cropland	82.1	0%	15.7	0.0	1.1	0.0	1289.7	88.8
QT04	21	Cropland	0.0	0%	15.7	0.0	1.1	0.0	0.4	0.0
QT04	21	Cropland	153.9	0%	15.7	0.0	1.1	0.0	2417.7	166.4
QT04	22	Pasture	15.8	0%	9.7	0.0	1.4	0.0	153.1	22.5
QT04	41	Deciduous Forest	3.4	0%	1.5	0.0	0.0	0.0	5.1	0.1

Appendix A3. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under consolidated growth scenario (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT04	41	Deciduous Forest	4.5	0%	1.5	0.0	0.0	0.0	6.7	0.1
QT04	41	Deciduous Forest	125.1	0%	1.5	0.0	0.0	0.0	185.6	2.8
QT04	41	Deciduous Forest	2.8	0%	1.5	0.0	0.0	0.0	4.2	0.1
QT04	41	Deciduous Forest	16.9	0%	1.5	0.0	0.0	0.0	25.1	0.4
QT04	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT04	41	Deciduous Forest	210.3	0%	1.5	0.0	0.0	0.0	312.0	4.7
QT04	60	Wetlands	6.8	0%	1.5	0.0	0.0	0.0	10.1	0.2
QT05	14	Commercial	5.2	72%	9.0	7.9	1.3	0.5	42.4	3.8
QT05	17	Extractive	19.4	2%	9.0	7.9	1.3	0.5	174.5	25.0
QT05	17	Extractive	0.1	2%	9.0	7.9	1.3	0.5	1.0	0.1
QT05	21	Cropland	8.1	0%	15.7	0.0	1.1	0.0	127.9	8.8
QT05	21	Cropland	0.1	0%	15.7	0.0	1.1	0.0	1.7	0.1
QT05	21	Cropland	328.2	0%	15.7	0.0	1.1	0.0	5156.4	354.9
QT05	21	Cropland	0.1	0%	15.7	0.0	1.1	0.0	1.7	0.1
QT05	41	Deciduous Forest	102.1	0%	1.5	0.0	0.0	0.0	151.5	2.3
QT05	41	Deciduous Forest	71.1	0%	1.5	0.0	0.0	0.0	105.5	1.6
QT05	41	Deciduous Forest	0.1	0%	1.5	0.0	0.0	0.0	0.2	0.0
QT06	11	Low Density Residential	18.7	14%	9.0	7.9	1.3	0.5	165.8	22.4
QT06	21	Cropland	603.1	0%	15.7	0.0	1.1	0.0	9476.1	652.1
QT06	41	Deciduous Forest	61.0	0%	1.5	0.0	0.0	0.0	90.5	1.4
QT06	41	Deciduous Forest	37.0	0%	1.5	0.0	0.0	0.0	55.0	0.8
QT06	41	Deciduous Forest	44.2	0%	1.5	0.0	0.0	0.0	65.5	1.0
QT07	11	Low Density Residential	23.9	14%	9.0	7.9	1.3	0.5	211.5	28.5
QT07	12	Medium Density Residential	27.0	28%	9.0	7.9	1.3	0.5	234.7	29.2
QT07	12	Medium Density Residential	0.0	28%	9.0	7.9	1.3	0.5	0.0	0.0
QT07	12	Medium Density Residential	0.0	28%	9.0	7.9	1.3	0.5	0.2	0.0
QT07	17	Extractive	0.0	2%	9.0	7.9	1.3	0.5	0.0	0.0
QT07	17	Extractive	37.2	2%	9.0	7.9	1.3	0.5	334.8	48.1
QT07	21	Cropland	29.1	0%	15.7	0.0	1.1	0.0	457.0	31.4
QT07	21	Cropland	32.0	0%	15.7	0.0	1.1	0.0	503.3	34.6
QT07	41	Deciduous Forest	63.3	0%	1.5	0.0	0.0	0.0	93.9	1.4
QT07	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT07	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT08	11	Low Density Residential	4.2	14%	9.0	7.9	1.3	0.5	37.2	5.0
QT08	14	Commercial	8.0	72%	9.0	7.9	1.3	0.5	65.2	5.8
QT08	15	Industrial	33.3	53%	9.0	7.9	1.3	0.5	279.9	29.3
QT08	21	Cropland	0.5	0%	15.7	0.0	1.1	0.0	8.5	0.6
QT08	21	Cropland	15.4	0%	15.7	0.0	1.1	0.0	241.7	16.6
QT08	21	Cropland	159.9	0%	15.7	0.0	1.1	0.0	2512.6	172.9
QT08	41	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT08	41	Deciduous Forest	44.4	0%	1.5	0.0	0.0	0.0	65.9	1.0
QT09	11	Low Density Residential	18.1	14%	9.0	7.9	1.3	0.5	160.5	21.6
QT09	11	Low Density Residential	5.8	14%	9.0	7.9	1.3	0.5	51.6	7.0
QT09	11	Low Density Residential	1.3	14%	9.0	7.9	1.3	0.5	11.9	1.6
QT09	12	Medium Density Residential	68.3	28%	9.0	7.9	1.3	0.5	593.9	73.9
QT09	12	Medium Density Residential	10.2	28%	9.0	7.9	1.3	0.5	88.7	11.0
QT09	12	Medium Density Residential	1.0	28%	9.0	7.9	1.3	0.5	8.8	1.1
QT09	12	Medium Density Residential	3.7	28%	9.0	7.9	1.3	0.5	32.1	4.0
QT09	14	Commercial	2.7	72%	9.0	7.9	1.3	0.5	22.0	2.0
QT09	14	Commercial	57.7	72%	9.0	7.9	1.3	0.5	472.5	41.9
QT09	16	Institutional	2.0	34%	9.0	7.9	1.3	0.5	17.4	2.1
QT09	18	Open Urban Land	0.0	9%	9.0	7.9	1.3	0.5	0.0	0.0
QT09	21	Cropland	1.8	0%	15.7	0.0	1.1	0.0	27.9	1.9
QT09	41	Deciduous Forest	3.8	0%	1.5	0.0	0.0	0.0	5.6	0.1
QT09	41	Deciduous Forest	67.7	0%	1.5	0.0	0.0	0.0	100.4	1.5
QT09	41	Deciduous Forest	8.4	0%	1.5	0.0	0.0	0.0	12.4	0.2
QT09	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT09	41	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT09	41	Deciduous Forest	50.7	0%	1.5	0.0	0.0	0.0	75.2	1.1
QT09	41	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT09	43	Mixed Forest	3.4	0%	1.5	0.0	0.0	0.0	5.0	0.1
QT09	60	Wetlands	17.9	0%	1.5	0.0	0.0	0.0	26.5	0.4
QT09	60	Wetlands	6.0	0%	1.5	0.0	0.0	0.0	8.9	0.1
QT10	11	Low Density Residential	0.0	14%	9.0	7.9	1.3	0.5	0.1	0.0
QT10	11	Low Density Residential	7.3	14%	9.0	7.9	1.3	0.5	64.4	8.7
QT10	11	Low Density Residential	152.9	14%	9.0	7.9	1.3	0.5	1354.5	182.7
QT10	14	Commercial	10.0	72%	9.0	7.9	1.3	0.5	82.0	7.3
QT10	14	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.4	0.6
QT10	21	Cropland	14.1	0%	15.7	0.0	1.1	0.0	221.8	15.3
QT10	21	Cropland	146.8	0%	15.7	0.0	1.1	0.0	2307.4	158.8
QT10	21	Cropland	0.0	0%	15.7	0.0	1.1	0.0	0.4	0.0
QT10	21	Cropland	27.6	0%	15.7	0.0	1.1	0.0	433.0	29.8

Appendix A3. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under consolidated growth scenario (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT10	41	Deciduous Forest	12.5	0%	1.5	0.0	0.0	0.0	18.5	0.3
QT10	41	Deciduous Forest	68.3	0%	1.5	0.0	0.0	0.0	101.4	1.5
QT10	60	Wetlands	0.1	0%	1.5	0.0	0.0	0.0	0.1	0.0
QT10	60	Wetlands	0.2	0%	1.5	0.0	0.0	0.0	0.2	0.0
QT10	242	Agricultural Buildings	61.8	2%	9.7	0.0	1.4	0.0	587.1	86.2
QT11	18	Open Urban Land	74.6	9%	9.0	7.9	1.3	0.5	664.9	92.1
QT11	60	Wetlands	3.9	0%	1.5	0.0	0.0	0.0	5.8	0.1
QT11	60	Wetlands	6.4	0%	1.5	0.0	0.0	0.0	9.5	0.1
QT11	18	Open Urban Land	125.5	9%	9.0	7.9	1.3	0.5	1119.3	155.1
QT11	43	Mixed Forest	2.1	0%	1.5	0.0	0.0	0.0	3.1	0.0
QT11	60	Wetlands	8.5	0%	1.5	0.0	0.0	0.0	12.7	0.2
QT11	18	Open Urban Land	125.8	9%	9.0	7.9	1.3	0.5	1121.6	155.4
QT11	18	Open Urban Land	0.0	9%	9.0	7.9	1.3	0.5	0.3	0.0
QT11	18	Open Urban Land	0.1	9%	9.0	7.9	1.3	0.5	0.5	0.1
QT11	21	Cropland	55.2	0%	15.7	0.0	1.1	0.0	867.1	59.7
QT11	41	Deciduous Forest	0.7	0%	1.5	0.0	0.0	0.0	1.1	0.0
QT11	41	Deciduous Forest	17.8	0%	1.5	0.0	0.0	0.0	26.4	0.4
QT11	43	Mixed Forest	120.5	0%	1.5	0.0	0.0	0.0	178.7	2.7
QT11	60	Wetlands	8.6	0%	1.5	0.0	0.0	0.0	12.7	0.2
QT11	11	Low Density Residential	2.5	14%	9.0	7.9	1.3	0.5	22.6	3.0
QT11	12	Medium Density Residential	7.3	28%	9.0	7.9	1.3	0.5	63.7	7.9
QT11	12	Medium Density Residential	5.8	28%	9.0	7.9	1.3	0.5	50.5	6.3
QT11	16	Institutional	0.4	34%	9.0	7.9	1.3	0.5	3.2	0.4
QT11	16	Institutional	0.2	34%	9.0	7.9	1.3	0.5	1.7	0.2
QT11	18	Open Urban Land	151.6	9%	9.0	7.9	1.3	0.5	1351.5	187.2
QT11	41	Deciduous Forest	6.7	0%	1.5	0.0	0.0	0.0	9.9	0.2
QT11	41	Deciduous Forest	2.6	0%	1.5	0.0	0.0	0.0	3.8	0.1
QT11	41	Deciduous Forest	6.7	0%	1.5	0.0	0.0	0.0	9.9	0.1
QT11	43	Mixed Forest	2.0	0%	1.5	0.0	0.0	0.0	3.0	0.0
QT12	11	Low Density Residential	11.2	14%	9.0	7.9	1.3	0.5	99.1	13.4
QT12	11	Low Density Residential	13.3	14%	9.0	7.9	1.3	0.5	117.7	15.9
QT12	11	Low Density Residential	10.5	14%	9.0	7.9	1.3	0.5	93.0	12.5
QT12	11	Low Density Residential	79.4	14%	9.0	7.9	1.3	0.5	703.5	94.9
QT12	14	Commercial	2.1	72%	9.0	7.9	1.3	0.5	17.4	1.5
QT12	16	Institutional	1.8	34%	9.0	7.9	1.3	0.5	15.7	1.9
QT12	21	Cropland	157.2	0%	15.7	0.0	1.1	0.0	2469.8	170.0
QT12	21	Cropland	20.2	0%	15.7	0.0	1.1	0.0	317.3	21.8
QT12	21	Cropland	145.5	0%	15.7	0.0	1.1	0.0	2286.0	157.3
QT12	41	Deciduous Forest	19.5	0%	1.5	0.0	0.0	0.0	29.0	0.4
QT12	41	Deciduous Forest	31.2	0%	1.5	0.0	0.0	0.0	46.3	0.7
QT12	42	Evergreen Forest	1.5	0%	1.5	0.0	0.0	0.0	2.3	0.0
QT12	60	Wetlands	7.2	0%	1.5	0.0	0.0	0.0	10.7	0.2
QT12	60	Wetlands	6.8	0%	1.5	0.0	0.0	0.0	10.0	0.2
QT13	11	Low Density Residential	0.4	14%	9.0	7.9	1.3	0.5	3.1	0.4
QT13	14	Commercial	1.3	72%	9.0	7.9	1.3	0.5	10.8	1.0
QT13	14	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.0	0.3
QT13	18	Open Urban Land	79.4	9%	9.0	7.9	1.3	0.5	708.4	98.1
QT13	21	Cropland	258.1	0%	15.7	0.0	1.1	0.0	4055.9	279.1
QT13	21	Cropland	529.6	0%	15.7	0.0	1.1	0.0	8322.0	572.7
QT13	21	Cropland	8.4	0%	15.7	0.0	1.1	0.0	131.7	9.1
QT13	21	Cropland	61.5	0%	15.7	0.0	1.1	0.0	966.0	66.5
QT13	21	Cropland	12.3	0%	15.7	0.0	1.1	0.0	193.6	13.3
QT13	41	Deciduous Forest	37.9	0%	1.5	0.0	0.0	0.0	56.2	0.9
QT13	41	Deciduous Forest	446.9	0%	1.5	0.0	0.0	0.0	663.0	10.0
QT13	41	Deciduous Forest	5.6	0%	1.5	0.0	0.0	0.0	8.4	0.1
QT13	41	Deciduous Forest	0.7	0%	1.5	0.0	0.0	0.0	1.0	0.0
QT13	60	Wetlands	21.1	0%	1.5	0.0	0.0	0.0	31.3	0.5
QT13	60	Wetlands	8.4	0%	1.5	0.0	0.0	0.0	12.4	0.2
QT13	242	Agricultural Buildings	9.7	2%	9.7	0.0	1.4	0.0	92.0	13.5
QT13	242	Agricultural Buildings	4.0	2%	9.7	0.0	1.4	0.0	37.6	5.5
QT14	11	Low Density Residential	18.6	14%	9.0	7.9	1.3	0.5	164.6	22.2
QT14	11	Low Density Residential	13.9	14%	9.0	7.9	1.3	0.5	123.5	16.7

Appendix A4. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under consolidated growth scenario with BMPs emplaced for development and agriculture across the Planning Area (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT01	11.0	Low Density Residential	9.9	14%	9.0	7.9	1.3	0.5	88.1	11.9
QT01	12.0	Medium Density Residential	84.5	28%	6.1	5.8	0.8	0.4	510.6	60.0
QT01	12.0	Medium Density Residential	0.3	28%	6.1	5.8	0.8	0.4	1.8	0.2
QT01	12.0	Medium Density Residential	6.1	28%	6.1	5.8	0.8	0.4	36.7	4.3
QT01	14.0	Commercial	2.5	72%	9.0	7.9	1.3	0.5	20.1	1.8
QT01	14.0	Commercial	2.0	72%	9.0	7.9	1.3	0.5	16.7	1.5
QT01	14.0	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.0	0.3
QT01	14.0	Commercial	0.3	72%	9.0	7.9	1.3	0.5	2.8	0.2
QT01	14.0	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.7	0.6
QT01	14.0	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.1	0.3
QT01	16.0	Institutional	0.7	34%	9.0	7.9	1.3	0.5	5.7	0.7
QT01	16.0	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.5	0.3
QT01	16.0	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.2	0.3
QT01	16.0	Institutional	0.3	34%	9.0	7.9	1.3	0.5	2.8	0.3
QT01	16.0	Institutional	1.0	34%	9.0	7.9	1.3	0.5	9.0	1.1
QT01	16.0	Institutional	0.0	34%	9.0	7.9	1.3	0.5	0.2	0.0
QT01	18.0	Open Urban Land	0.1	9%	9.0	7.9	1.3	0.5	0.8	0.1
QT01	25.0	Pasture	45.2	0%	8.7	0.0	0.8	0.0	393.3	35.2
QT01	41.0	Deciduous Forest	20.7	0%	1.5	0.0	0.0	0.0	30.7	0.5
QT01	220.0	Deciduous Forest	1.9	0%	1.5	0.0	0.0	0.0	2.8	0.0
QT01	41.0	Deciduous Forest	1.3	0%	1.5	0.0	0.0	0.0	1.9	0.0
QT01	41.0	Deciduous Forest	6.3	0%	1.5	0.0	0.0	0.0	9.4	0.1
QT01	41.0	Deciduous Forest	0.4	0%	1.5	0.0	0.0	0.0	0.7	0.0
QT01	43.0	Mixed Forest	0.4	0%	1.5	0.0	0.0	0.0	0.6	0.0
QT02	12.0	Medium Density Residential	100.9	28%	6.1	5.8	0.8	0.4	609.7	71.6
QT02	12.0	Medium Density Residential	15.1	28%	6.1	5.8	0.8	0.4	91.0	10.7
QT02	12.0	Medium Density Residential	57.6	28%	6.1	5.8	0.8	0.4	348.2	40.9
QT02	14.0	Commercial	1.6	72%	9.0	7.9	1.3	0.5	12.7	1.1
QT02	16.0	Institutional	1.6	34%	9.0	7.9	1.3	0.5	13.6	1.6
QT02	16.0	Institutional	1.2	34%	9.0	7.9	1.3	0.5	10.5	1.3
QT02	16.0	Institutional	0.2	34%	9.0	7.9	1.3	0.5	1.5	0.2
QT02	17.0	Extractive	9.2	2%	9.0	7.9	1.3	0.5	83.1	11.9
QT02	21.0	Cropland	6.5	0%	15.7	0.0	1.1	0.0	102.9	7.1
QT02	21.0	Cropland	86.5	0%	15.7	0.0	1.1	0.0	1359.2	93.5
QT02	25.0	Pasture	1.0	0%	8.7	0.0	0.8	0.0	8.9	0.8
QT02	25.0	Pasture	64.1	0%	8.7	0.0	0.8	0.0	558.0	50.0
QT02	41.0	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT02	41.0	Deciduous Forest	31.0	0%	1.5	0.0	0.0	0.0	46.0	0.7
QT02	41.0	Deciduous Forest	17.8	0%	1.5	0.0	0.0	0.0	26.4	0.4
QT02	43.0	Mixed Forest	7.7	0%	1.5	0.0	0.0	0.0	11.5	0.2
QT02	60.0	Wetlands	5.5	0%	1.5	0.0	0.0	0.0	8.2	0.1
QT03	11.0	Low Density Residential	9.0	14%	9.0	7.9	1.3	0.5	79.6	10.7
QT03	11.0	Low Density Residential	0.4	14%	9.0	7.9	1.3	0.5	3.9	0.5
QT03	12.0	Medium Density Residential	6.9	28%	6.1	5.8	0.8	0.4	41.9	4.9
QT03	12.0	Medium Density Residential	40.2	28%	6.1	5.8	0.8	0.4	242.8	28.5
QT03	12.0	Medium Density Residential	5.0	28%	6.1	5.8	0.8	0.4	30.3	3.6
QT03	12.0	Medium Density Residential	8.7	28%	6.1	5.8	0.8	0.4	52.8	6.2
QT03	12.0	Medium Density Residential	85.5	28%	6.1	5.8	0.8	0.4	517.0	60.7
QT03	12.0	Medium Density Residential	2.4	28%	6.1	5.8	0.8	0.4	14.3	1.7
QT03	14.0	Commercial	15.0	72%	9.0	7.9	1.3	0.5	123.0	10.9
QT03	14.0	Commercial	10.8	72%	9.0	7.9	1.3	0.5	88.2	7.8
QT03	14.0	Commercial	0.2	72%	9.0	7.9	1.3	0.5	2.0	0.2
QT03	14.0	Commercial	3.3	72%	9.0	7.9	1.3	0.5	27.2	2.4
QT03	14.0	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.5	0.6
QT03	14.0	Commercial	5.5	72%	9.0	7.9	1.3	0.5	44.9	4.0
QT03	21.0	Cropland	3.6	0%	15.7	0.0	1.1	0.0	55.8	3.8
QT03	25.0	Pasture	11.2	0%	8.7	0.0	0.8	0.0	97.1	8.7
QT03	25.0	Pasture	16.5	0%	8.7	0.0	0.8	0.0	143.8	12.9
QT03	41.0	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT03	41.0	Deciduous Forest	1.8	0%	1.5	0.0	0.0	0.0	2.6	0.0
QT03	41.0	Deciduous Forest	203.4	0%	1.5	0.0	0.0	0.0	301.8	4.6
QT04	14.0	Commercial	0.2	72%	9.0	7.9	1.3	0.5	1.9	0.2
QT04	17.0	Extractive	0.0	2%	9.0	7.9	1.3	0.5	0.2	0.0
QT04	17.0	Extractive	26.1	2%	9.0	7.9	1.3	0.5	234.9	33.7
QT04	21.0	Cropland	0.0	0%	15.7	0.0	1.1	0.0	0.4	0.0
QT04	21.0	Cropland	153.9	0%	15.7	0.0	1.1	0.0	2417.7	166.4
QT04	21.0	Cropland	82.1	0%	15.7	0.0	1.1	0.0	1289.7	88.8
QT04	21.0	Cropland	395.7	0%	15.7	0.0	1.1	0.0	6218.1	427.9
QT04	21.0	Cropland	42.7	0%	15.7	0.0	1.1	0.0	670.7	46.2
QT04	21.0	Cropland	148.0	0%	15.7	0.0	1.1	0.0	2325.3	160.0
QT04	25.0	Pasture	15.8	0%	8.7	0.0	0.8	0.0	137.4	12.3
QT04	41.0	Deciduous Forest	2.8	0%	1.5	0.0	0.0	0.0	4.2	0.1
QT04	41.0	Deciduous Forest	210.3	0%	1.5	0.0	0.0	0.0	312.0	4.7

Appendix A4. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under consolidated growth scenario with BMPs emplaced for development and agriculture across the Planning Area (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT04	41.0	Deciduous Forest	125.1	0%	1.5	0.0	0.0	0.0	185.6	2.8
QT04	41.0	Deciduous Forest	4.5	0%	1.5	0.0	0.0	0.0	6.7	0.1
QT04	41.0	Deciduous Forest	3.4	0%	1.5	0.0	0.0	0.0	5.1	0.1
QT04	41.0	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT04	41.0	Deciduous Forest	16.9	0%	1.5	0.0	0.0	0.0	25.1	0.4
QT04	60.0	Wetlands	6.8	0%	1.5	0.0	0.0	0.0	10.1	0.2
QT05	14.0	Commercial	5.2	72%	9.0	7.9	1.3	0.5	42.4	3.8
QT05	17.0	Extractive	0.1	2%	9.0	7.9	1.3	0.5	1.0	0.1
QT05	17.0	Extractive	19.4	2%	9.0	7.9	1.3	0.5	174.5	25.0
QT05	21.0	Cropland	328.2	0%	15.7	0.0	1.1	0.0	5156.4	354.9
QT05	21.0	Cropland	0.1	0%	15.7	0.0	1.1	0.0	1.7	0.1
QT05	21.0	Cropland	8.1	0%	15.7	0.0	1.1	0.0	127.9	8.8
QT05	25.0	Pasture	0.1	0%	8.7	0.0	0.8	0.0	0.9	0.1
QT05	41.0	Deciduous Forest	71.1	0%	1.5	0.0	0.0	0.0	105.5	1.6
QT05	41.0	Deciduous Forest	102.1	0%	1.5	0.0	0.0	0.0	151.5	2.3
QT05	41.0	Deciduous Forest	0.1	0%	1.5	0.0	0.0	0.0	0.2	0.0
QT06	11.0	Low Density Residential	18.7	14%	9.0	7.9	1.3	0.5	165.8	22.4
QT06	21.0	Cropland	603.1	0%	15.7	0.0	1.1	0.0	9476.1	652.1
QT06	41.0	Deciduous Forest	37.0	0%	1.5	0.0	0.0	0.0	55.0	0.8
QT06	41.0	Deciduous Forest	61.0	0%	1.5	0.0	0.0	0.0	90.5	1.4
QT06	41.0	Deciduous Forest	44.2	0%	1.5	0.0	0.0	0.0	65.5	1.0
QT07	11.0	Low Density Residential	23.9	14%	9.0	7.9	1.3	0.5	211.5	28.5
QT07	12.0	Medium Density Residential	27.0	28%	6.1	5.8	0.8	0.4	163.1	19.1
QT07	12.0	Medium Density Residential	0.0	28%	6.1	5.8	0.8	0.4	0.2	0.0
QT07	12.0	Medium Density Residential	0.0	28%	6.1	5.8	0.8	0.4	0.0	0.0
QT07	17.0	Extractive	0.0	2%	9.0	7.9	1.3	0.5	0.0	0.0
QT07	17.0	Extractive	37.2	2%	9.0	7.9	1.3	0.5	334.8	48.1
QT07	21.0	Cropland	32.0	0%	15.7	0.0	1.1	0.0	503.3	34.6
QT07	25.0	Pasture	29.1	0%	8.7	0.0	0.8	0.0	253.1	22.7
QT07	41.0	Deciduous Forest	63.3	0%	1.5	0.0	0.0	0.0	93.9	1.4
QT07	41.0	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT07	41.0	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT08	11.0	Low Density Residential	4.2	14%	9.0	7.9	1.3	0.5	37.2	5.0
QT08	14.0	Commercial	8.0	72%	9.0	7.9	1.3	0.5	65.2	5.8
QT08	15.0	Industrial	33.3	53%	9.0	7.9	1.3	0.5	279.9	29.3
QT08	21.0	Cropland	0.5	0%	15.7	0.0	1.1	0.0	8.5	0.6
QT08	21.0	Cropland	159.9	0%	15.7	0.0	1.1	0.0	2512.6	172.9
QT08	25.0	Pasture	15.4	0%	8.7	0.0	0.8	0.0	133.9	12.0
QT08	41.0	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT08	41.0	Deciduous Forest	44.4	0%	1.5	0.0	0.0	0.0	65.9	1.0
QT09	11.0	Low Density Residential	18.1	14%	9.0	7.9	1.3	0.5	160.5	21.6
QT09	11.0	Low Density Residential	1.3	14%	9.0	7.9	1.3	0.5	11.9	1.6
QT09	11.0	Low Density Residential	5.8	14%	9.0	7.9	1.3	0.5	51.6	7.0
QT09	12.0	Medium Density Residential	3.7	28%	6.1	5.8	0.8	0.4	22.3	2.6
QT09	12.0	Medium Density Residential	68.3	28%	6.1	5.8	0.8	0.4	412.7	48.5
QT09	12.0	Medium Density Residential	1.0	28%	6.1	5.8	0.8	0.4	6.1	0.7
QT09	12.0	Medium Density Residential	10.2	28%	6.1	5.8	0.8	0.4	61.6	7.2
QT09	14.0	Commercial	57.7	72%	9.0	7.9	1.3	0.5	472.5	41.9
QT09	14.0	Commercial	2.7	72%	9.0	7.9	1.3	0.5	22.0	2.0
QT09	16.0	Institutional	2.0	34%	9.0	7.9	1.3	0.5	17.4	2.1
QT09	18.0	Open Urban Land	0.0	9%	9.0	7.9	1.3	0.5	0.0	0.0
QT09	21.0	Cropland	1.8	0%	15.7	0.0	1.1	0.0	27.9	1.9
QT09	41.0	Deciduous Forest	8.4	0%	1.5	0.0	0.0	0.0	12.4	0.2
QT09	41.0	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT09	41.0	Deciduous Forest	50.7	0%	1.5	0.0	0.0	0.0	75.2	1.1
QT09	41.0	Deciduous Forest	3.8	0%	1.5	0.0	0.0	0.0	5.6	0.1
QT09	41.0	Deciduous Forest	67.7	0%	1.5	0.0	0.0	0.0	100.4	1.5
QT09	41.0	Deciduous Forest	1.4	0%	1.5	0.0	0.0	0.0	2.1	0.0
QT09	41.0	Deciduous Forest	0.0	0%	1.5	0.0	0.0	0.0	0.0	0.0
QT09	43.0	Mixed Forest	3.4	0%	1.5	0.0	0.0	0.0	5.0	0.1
QT09	60.0	Wetlands	17.9	0%	1.5	0.0	0.0	0.0	26.5	0.4
QT09	60.0	Wetlands	6.0	0%	1.5	0.0	0.0	0.0	8.9	0.1
QT10	11.0	Low Density Residential	7.3	14%	9.0	7.9	1.3	0.5	64.4	8.7
QT10	11.0	Low Density Residential	152.9	14%	9.0	7.9	1.3	0.5	1354.5	182.7
QT10	11.0	Low Density Residential	0.0	14%	9.0	7.9	1.3	0.5	0.1	0.0
QT10	14.0	Commercial	0.8	72%	9.0	7.9	1.3	0.5	6.4	0.6
QT10	14.0	Commercial	10.0	72%	9.0	7.9	1.3	0.5	82.0	7.3
QT10	21.0	Cropland	0.0	0%	15.7	0.0	1.1	0.0	0.4	0.0
QT10	21.0	Cropland	14.1	0%	15.7	0.0	1.1	0.0	221.8	15.3
QT10	21.0	Cropland	146.8	0%	15.7	0.0	1.1	0.0	2307.4	158.8
QT10	25.0	Pasture	27.6	0%	8.7	0.0	0.8	0.0	239.8	21.5
QT10	41.0	Deciduous Forest	68.3	0%	1.5	0.0	0.0	0.0	101.4	1.5
QT10	41.0	Deciduous Forest	12.5	0%	1.5	0.0	0.0	0.0	18.5	0.3

Appendix A4. Estimated non-point source loads for the Upper Wye and Queenstown Harbor watersheds under consolidated growth scenario with BMPs emplaced for development and agriculture across the Planning Area (LULC class modified from MDP 2002).

HUC_ID	MDP LULC Code	LULC Description	Area (acres)	Percent Impervious Surface	Nitrogen Loading Rate for Pervious Surfaces (lbs/acre/yr)	Nitrogen Loading Rate for Impervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Pervious Surfaces (lbs/acre/yr)	Phosphorus Loading Rate for Impervious Surfaces (lbs/acre/yr)	Total Nitrogen Non-Point Source Load (lbs/year)	Total Phosphorus Non-Point Source Load (lbs/year)
QT10	60.0	Wetlands	0.2	0%	1.5	0.0	0.0	0.0	0.2	0.0
QT10	60.0	Wetlands	0.1	0%	1.5	0.0	0.0	0.0	0.1	0.0
QT10	242.0	Agricultural Buildings	61.8	2%	9.7	0.0	1.4	0.0	587.1	86.2
QT11	11.0	Low Density Residential	2.5	14%	9.0	7.9	1.3	0.5	22.6	3.0
QT11	12.0	Medium Density Residential	7.3	28%	6.1	5.8	0.8	0.4	44.2	5.2
QT11	12.0	Medium Density Residential	5.8	28%	6.1	5.8	0.8	0.4	35.1	4.1
QT11	16.0	Institutional	0.4	34%	9.0	7.9	1.3	0.5	3.2	0.4
QT11	16.0	Institutional	0.2	34%	9.0	7.9	1.3	0.5	1.7	0.2
QT11	18.0	Open Urban Land	0.1	9%	9.0	7.9	1.3	0.5	0.5	0.1
QT11	18.0	Open Urban Land	0.0	9%	9.0	7.9	1.3	0.5	0.3	0.0
QT11	18.0	Open Urban Land	151.6	9%	9.0	7.9	1.3	0.5	1351.5	187.2
QT11	18.0	Open Urban Land	125.8	9%	9.0	7.9	1.3	0.5	1121.6	155.4
QT11	18.0	Open Urban Land	125.5	9%	9.0	7.9	1.3	0.5	1119.3	155.1
QT11	18.0	Open Urban Land	74.6	9%	9.0	7.9	1.3	0.5	664.9	92.1
QT11	21.0	Cropland	55.2	0%	15.7	0.0	1.1	0.0	867.1	59.7
QT11	41.0	Deciduous Forest	2.6	0%	1.5	0.0	0.0	0.0	3.8	0.1
QT11	41.0	Deciduous Forest	6.7	0%	1.5	0.0	0.0	0.0	9.9	0.1
QT11	41.0	Deciduous Forest	17.8	0%	1.5	0.0	0.0	0.0	26.4	0.4
QT11	41.0	Deciduous Forest	0.7	0%	1.5	0.0	0.0	0.0	1.1	0.0
QT11	41.0	Deciduous Forest	6.7	0%	1.5	0.0	0.0	0.0	9.9	0.2
QT11	43.0	Mixed Forest	120.5	0%	1.5	0.0	0.0	0.0	178.7	2.7
QT11	43.0	Mixed Forest	2.0	0%	1.5	0.0	0.0	0.0	3.0	0.0
QT11	43.0	Mixed Forest	2.1	0%	1.5	0.0	0.0	0.0	3.1	0.0
QT11	60.0	Wetlands	8.5	0%	1.5	0.0	0.0	0.0	12.7	0.2
QT11	60.0	Wetlands	8.6	0%	1.5	0.0	0.0	0.0	12.7	0.2
QT11	60.0	Wetlands	3.9	0%	1.5	0.0	0.0	0.0	5.8	0.1
QT11	60.0	Wetlands	6.4	0%	1.5	0.0	0.0	0.0	9.5	0.1
QT12	11.0	Low Density Residential	11.2	14%	9.0	7.9	1.3	0.5	99.1	13.4
QT12	11.0	Low Density Residential	13.3	14%	9.0	7.9	1.3	0.5	117.7	15.9
QT12	11.0	Low Density Residential	10.5	14%	9.0	7.9	1.3	0.5	93.0	12.5
QT12	11.0	Low Density Residential	79.4	14%	9.0	7.9	1.3	0.5	703.5	94.9
QT12	14.0	Commercial	2.1	72%	9.0	7.9	1.3	0.5	17.4	1.5
QT12	16.0	Institutional	1.8	34%	9.0	7.9	1.3	0.5	15.7	1.9
QT12	21.0	Cropland	20.2	0%	15.7	0.0	1.1	0.0	317.3	21.8
QT12	21.0	Cropland	157.2	0%	15.7	0.0	1.1	0.0	2469.8	170.0
QT12	21.0	Cropland	145.5	0%	15.7	0.0	1.1	0.0	2286.0	157.3
QT12	41.0	Deciduous Forest	19.5	0%	1.5	0.0	0.0	0.0	29.0	0.4
QT12	41.0	Deciduous Forest	31.2	0%	1.5	0.0	0.0	0.0	46.3	0.7
QT12	42.0	Evergreen Forest	1.5	0%	1.5	0.0	0.0	0.0	2.3	0.0
QT12	60.0	Wetlands	6.8	0%	1.5	0.0	0.0	0.0	10.0	0.2
QT12	60.0	Wetlands	7.2	0%	1.5	0.0	0.0	0.0	10.7	0.2
QT13	11.0	Low Density Residential	0.4	14%	9.0	7.9	1.3	0.5	3.1	0.4
QT13	14.0	Commercial	1.3	72%	9.0	7.9	1.3	0.5	10.8	1.0
QT13	14.0	Commercial	0.4	72%	9.0	7.9	1.3	0.5	3.0	0.3
QT13	18.0	Open Urban Land	79.4	9%	9.0	7.9	1.3	0.5	708.4	98.1
QT13	21.0	Cropland	8.4	0%	15.7	0.0	1.1	0.0	131.7	9.1
QT13	21.0	Cropland	529.6	0%	15.7	0.0	1.1	0.0	8322.0	572.7
QT13	21.0	Cropland	258.1	0%	15.7	0.0	1.1	0.0	4055.9	279.1
QT13	21.0	Cropland	12.3	0%	15.7	0.0	1.1	0.0	193.6	13.3
QT13	25.0	Pasture	61.5	0%	8.7	0.0	0.8	0.0	535.0	48.0
QT13	41.0	Deciduous Forest	5.6	0%	1.5	0.0	0.0	0.0	8.4	0.1
QT13	41.0	Deciduous Forest	37.9	0%	1.5	0.0	0.0	0.0	56.2	0.9
QT13	41.0	Deciduous Forest	0.7	0%	1.5	0.0	0.0	0.0	1.0	0.0
QT13	41.0	Deciduous Forest	446.9	0%	1.5	0.0	0.0	0.0	663.0	10.0
QT13	60.0	Wetlands	21.1	0%	1.5	0.0	0.0	0.0	31.3	0.5
QT13	60.0	Wetlands	8.4	0%	1.5	0.0	0.0	0.0	12.4	0.2
QT13	242.0	Agricultural Buildings	4.0	2%	9.7	0.0	1.4	0.0	37.6	5.5
QT13	242.0	Agricultural Buildings	9.7	2%	9.7	0.0	1.4	0.0	92.0	13.5
QT14	11.0	Low Density Residential	18.6	14%	9.0	7.9	1.3	0.5	164.6	22.2
QT14	11.0	Low Density Residential	1.9	14%	9.0	7.9	1.3	0.5	16.5	2.2

Appendix B1

Watershed Segment (HUC ID)	Watershed	Acres	Percent Impervious Surface	Impervious Surface Area (Acres)	NPS TN from Development	NPS TN from Septic Systems	NPS TN from Agriculture	NPS TN from Forest	NPS TN Load	TN Yield (lbs/acre/yr)
QT01	Queenstown Creek	186.2	11.0	20.4	965	37	715	46	1,763	9.5
QT02	Queenstown Creek	409.3	1.1	4.4	255	2,437	4,972	94	7,758	19.0
QT04	Queenstown Creek	1234.9	0.1	0.7	237	7,913	13,080	549	21,779	17.6
QT11	Queenstown Creek	735.7	7.8	57.6	5,514	1,339	868	92	7,812	10.6
QT14	Chester River	556.1	1.7	9.5	584	1,523	3,547	392	6,046	10.9
QT03	Upper Wye	430.4	7.3	31.5	512	4,594	2,538	304	7,948	18.5
QT05	Upper Wye	534.6	0.8	4.2	268	3,446	5,290	249	9,253	17.3
QT06	Upper Wye	764.3	0.3	2.6	166	1,471	9,480	211	11,328	14.8
QT07	Upper Wye	212.6	0.4	0.8	377	436	2,029	62	2,904	13.7
QT08	Upper Wye	267.2	9.0	24.0	382	1,700	2,764	68	4,914	18.4
QT09	Upper Wye	332.1	15.6	51.9	887	992	1,265	217	3,361	10.1
QT10	Upper Wye	502.6	6.3	31.4	1,508	2,331	3,551	120	7,511	14.9
QT12	Upper Wye	507.6	3.6	18.2	1,047	1,311	5,075	98	7,531	14.8
QT13	Upper Wye	1486.3	0.6	8.7	726	9,288	13,805	773	24,591	16.5
QT15	Upper Wye	721.5	0.3	2.0	21	3,043	9,101	204	12,370	17.1

Table 2. Current total phosphorus (TP) loads for watershed segments connected to the Queenstown Plannning Area. All non-point source (NPS) nutrient loads predicted from MDP Nutrient Assessment Spreadsheet are in pounds per year.

Watershed Segment (HUC ID)	Watershed	Acres	Percent Impervious Surface	Impervious Surface Area (Acres)	NPS TP from Development	NPS TP from Agriculture	NPS TP from Forest	NPS TP Load	TP Yield (lbs/acre/yr)
QT01	Queenstown Creek	186.2	11.0	20.4	127	49	1	177	0.9
QT02	Queenstown Creek	409.3	1.1	4.4	34	343	1	379	0.9
QT04	Queenstown Creek	1234.9	0.1	0.7	34	912	8	954	0.8
QT11	Queenstown Creek	735.7	7.8	57.6	763	60	1	824	1.1
QT14	Chester River	556.1	1.7	9.5	79	244	6	329	0.6
QT03	Upper Wye	430.4	7.3	31.5	54	181	5	239	0.6
QT05	Upper Wye	534.6	0.8	4.2	36	364	4	404	0.8
QT06	Upper Wye	764.3	0.3	2.6	22	652	3	678	0.9
QT07	Upper Wye	212.6	0.4	0.8	54	140	1	195	0.9
QT08	Upper Wye	267.2	9.0	24.0	40	190	1	231	0.9
QT09	Upper Wye	332.1	15.6	51.9	95	87	3	186	0.6
QT10	Upper Wye	502.6	6.3	31.4	199	290	2	491	1.0
QT12	Upper Wye	507.6	3.6	18.2	140	349	1	491	1.0
QT13	Upper Wye	1486.3	0.6	8.7	100	960	12	1,072	0.7
QT15	Upper Wye	721.5	0.3	2.0	2	631	3	636	0.9

Appendix B2

Watershed Segment (HUC ID)	Watershed	Acres	Percent Impervious Surface	Impervious Surface Area (Acres)	NPS TN from Development	NPS TN from Septic Systems	NPS TN from Agriculture	NPS TN from Forest	NPS TN Load	TN Yield (lbs/acre/yr)
QT01	Queenstown Creek	186.1	20.7	38.6	1354	37	0	46	1,437	7.7
QT02	Queenstown Creek	409.1	9.2	37.7	2225	2611	1472	94	6,402	15.7
QT04	Queenstown Creek	1234.4	0.1	0.7	237	7913	13075	549	21,773	17.6
QT11	Queenstown Creek	735.4	6.4	47.2	4400	1339	867	277	6,882	9.4
QT14	Chester River	555.9	1.3	7.0	342	1523	3546	432	5,843	10.5
QT03	Upper Wye	430.2	12.0	51.5	1789	5688	56	329	7,862	18.3
QT05	Upper Wye	534.6	0.8	4.1	219	3446	5286	257	9,208	17.2
QT06	Upper Wye	764.0	0.3	2.6	166	1471	9476	211	11,323	14.8
QT07	Upper Wye	212.6	5.6	11.9	1043	840	503	94	2,481	11.7
QT08	Upper Wye	267.1	9.8	26.1	519	1930	2521	68	5,038	18.9
QT09	Upper Wye	331.9	18.5	61.3	1471	1111	28	236	2,846	8.6
QT10	Upper Wye	502.4	6.3	31.4	1507	2331	3117	161	7,117	14.2
QT12	Upper Wye	507.4	3.6	18.2	1046	1311	5073	98	7,529	14.8
QT13	Upper Wye	1485.7	1.2	17.3	1270	9932	12833	772	24,807	16.7
QT15	Upper Wye	721.2	8.4	60.8	3747	6621	2527	204	13,098	18.2

Table 2. Predicted total phosphorus (TP) loads with full build-out under current county zoning for watershed segments connected to the Queenstown Plannning Area. All non-point source (NPS) nutrient loads predicted from MDP Nutrient Assessment Spreadsheet are in pounds per year.

Watershed Segment (HUC ID)	Watershed	Acres	Percent Impervious Surface	Impervious Surface Area (Acres)	NPS TP from Development	NPS TP from Agriculture	NPS TP from Forest	NPS TP Load	TP Yield (lbs/acre/yr)
QT01	Queenstown Creek	186.1	20.7	38.6	172	-	1	172	1.0
QT02	Queenstown Creek	409.1	9.2	37.7	298	102	1	402	1.1
QT04	Queenstown Creek	1234.4	0.1	0.7	34	912	8	954	0.9
QT11	Chester River	735.4	6.4	47.2	608	60	4	672	1.0
QT14	Chester River	555.9	1.3	7.0	45	244	7	296	0.6
QT03	Upper Wye	430.2	12.0	51.5	226	4	5	235	0.6
QT05	Upper Wye	534.6	0.8	4.1	29	364	4	397	0.8
QT06	Upper Wye	764.0	0.3	2.6	22	652	3	678	1.0
QT07	Upper Wye	212.6	5.6	11.9	144	35	1	180	0.9
QT08	Upper Wye	267.1	9.8	26.1	58	173	1	233	1.0
QT09	Upper Wye	331.9	18.5	61.3	174	2	4	179	0.6
QT10	Upper Wye	502.4	6.3	31.4	199	260	2	462	1.0
QT12	Upper Wye	507.4	3.6	18.2	140	349	1	491	1.1
QT13	Upper Wye	1485.7	1.2	17.3	173	893	12	1,078	0.8
QT15	Upper Wye	721.2	8.4	60.8	504	174	3	681	1.1

Appendix B3

Watershed Segment (HUC ID)	Watershed	Acres	Percent Impervious Surface	Impervious Surface Area (Acres)	NPS TN from Development	NPS TN from Septic Systems	NPS TN from Agriculture	NPS TN from Forest	NPS TN Load	TN Yield (lbs/acre/yr)
QT01	Queenstown Creek	186.1	17.4	32.3	954	37	710	46	1,747	9.4
QT02	Queenstown Creek	409.1	12.4	50.9	1,631	2,437	2,479	94	6,641	16.2
QT04	Queenstown Creek	1234.4	0.1	0.7	237	7,913	13,075	549	21,773	17.6
QT11	Queenstown Creek	735.4	6.4	47.2	4,400	1,339	867	277	6,882	9.4
QT14	Chester River	555.9	1.3	7.0	342	1,523	3,546	432	5,843	10.5
QT03	Upper Wye	430.2	16.0	68.6	1,669	4,594	491	304	7,058	16.4
QT05	Upper Wye	534.6	0.8	4.1	218	3,446	5,288	257	9,209	17.2
QT06	Upper Wye	764.0	0.3	2.6	166	1,471	9,476	211	11,323	14.8
QT07	Upper Wye	212.6	5.5	11.7	781	436	960	94	2,271	10.7
QT08	Upper Wye	267.1	9.0	24.0	382	1,700	2,763	68	4,913	18.4
QT09	Upper Wye	331.9	21.4	71.0	1,459	992	28	236	2,715	8.2
QT10	Upper Wye	502.4	6.3	31.4	1,507	2,331	3,550	120	7,509	14.9
QT12	Upper Wye	507.4	3.6	18.2	1,046	1,311	5,073	98	7,529	14.8
QT13	Upper Wye	1485.7	0.6	8.7	725	9,288	13,799	772	24,585	16.5
QT15	Upper Wye	721.2	1.0	6.9	188	3,043	8,835	204	12,270	17.0

Table 2. Predicted total phosphorus (TP) loads with full build-out under consolidated growth scenario for watershed segments connected to the Queenstown Plannning Area. All non-point source (NPS) nutrient loads predicted from MDP Nutrient Assessment Spreadsheet are in pounds per year.

Watershed Segment (HUC ID)	Watershed	Acres	Percent Impervious Surface	Impervious Surface Area (Acres)	NPS TP from Development	NPS TP from Agriculture	NPS TP from Forest	NPS TP Load	TP Yield (lbs/acre/yr)
QT01	Queenstown Creek	186.1	17.4	32.3	118	49	1	167	0.9
QT02	Queenstown Creek	409.1	12.4	50.9	204	171	1	377	0.9
QT04	Queenstown Creek	1234.4	0.1	0.7	34	912	8	954	0.8
QT11	Queenstown Creek	735.4	6.4	47.2	608	60	4	672	0.9
QT14	Chester River	555.9	1.3	7.0	45	244	7	296	0.5
QT03	Upper Wye	430.2	16.0	68.6	198	34	5	236	0.5
QT05	Upper Wye	534.6	0.8	4.1	29	364	4	397	0.7
QT06	Upper Wye	764.0	0.3	2.6	22	652	3	678	0.9
QT07	Upper Wye	212.6	5.5	11.7	106	66	1	173	0.8
QT08	Upper Wye	267.1	9.0	24.0	40	190	1	231	0.9
QT09	Upper Wye	331.9	21.4	71.0	166	2	4	172	0.5
QT10	Upper Wye	502.4	6.3	31.4	199	290	2	491	1.0
QT12	Upper Wye	507.4	3.6	18.2	140	349	1	491	1.0
QT13	Upper Wye	1485.7	0.6	8.7	100	960	12	1,071	0.7
QT15	Upper Wye	721.2	1.0	6.9	23	608	3	634	0.9

Appendix B4

Watershed Segment (HUC ID)	Watershed	Acres	Percent Impervious Surface	Impervious Surface Area (Acres)	NPS TN from Development	NPS TN from Septic Systems	NPS TN from Agriculture	NPS TN from Forest	NPS TN Load	TN Yield (lbs/acre/yr)
QT01	Queenstown Creek	186.1	17.4	32.3	713	37	393	46	1,189	6.4
QT02	Queenstown Creek	409.1	12.4	50.9	1,170	2,437	2,029	94	5,730	14.0
QT04	Queenstown Creek	1234.4	0.1	0.7	237	7,913	13,059	549	21,758	17.6
QT11	Queenstown Creek	735.4	6.4	47.2	4,365	1,339	867	277	6,847	9.3
QT14	Chester River	555.9	1.3	7.0	342	1,523	3,546	432	5,843	10.5
QT03	Upper Wye	430.2	16.0	68.6	1,274	4,594	297	304	6,469	15.0
QT05	Upper Wye	534.6	0.8	4.1	218	3,446	5,287	257	9,208	17.2
QT06	Upper Wye	764.0	0.3	2.6	166	1,471	9,476	211	11,323	14.8
QT07	Upper Wye	212.6	5.5	11.7	710	436	756	94	1,996	9.4
QT08	Upper Wye	267.1	9.0	24.0	382	1,700	2,655	68	4,805	18.0
QT09	Upper Wye	331.9	21.4	71.0	1,239	992	28	236	2,495	7.5
QT10	Upper Wye	502.4	6.3	31.4	1,507	2,331	3,356	120	7,315	14.6
QT12	Upper Wye	507.4	3.6	18.2	1,046	1,311	5,073	98	7,529	14.8
QT13	Upper Wye	1485.7	0.6	8.7	725	9,288	13,368	772	24,154	16.3
QT15	Upper Wye	721.2	1.0	6.9	143	3,043	6,021	204	9,411	13.0

Table 2. Predicted total phosphorus (TP) loads with full build-out under consolidated growth scenario and BMPs for development and agriculture emplaced across the Queenstown Planning Area for watershed segments connected to the Queenstown Plannning Area. All non-point source (NPS) nutrient loads predicted from MDP Nutrient Assessment Spreadsheet are in pounds per year.

Watershed Segment (HUC ID)	Watershed	Acres	Percent Impervious Surface	Impervious Surface Area (Acres)	NPS TP from Development	NPS TP from Agriculture	NPS TP from Forest	NPS TP Load	TP Yield (lbs/acre/yr)
QT01	Queenstown Creek	186.1	17.4	32.3	84	35	1	120	0.6
QT02	Queenstown Creek	409.1	12.4	50.9	139	151	1	292	0.7
QT04	Queenstown Creek	1234.4	0.1	0.7	34	902	8	944	0.8
QT11	Queenstown Creek	735.4	6.4	47.2	603	60	4	667	0.9
QT14	Chester River	555.9	1.3	7.0	45	244	7	296	0.5
QT03	Upper Wye	430.2	16.0	68.6	143	25	5	173	0.4
QT05	Upper Wye	534.6	0.8	4.1	29	364	4	397	0.7
QT06	Upper Wye	764.0	0.3	2.6	22	652	3	678	0.9
QT07	Upper Wye	212.6	5.5	11.7	96	57	1	155	0.7
QT08	Upper Wye	267.1	9.0	24.0	40	185	1	227	0.8
QT09	Upper Wye	331.9	21.4	71.0	135	2	4	141	0.4
QT10	Upper Wye	502.4	6.3	31.4	199	282	2	483	1.0
QT12	Upper Wye	507.4	3.6	18.2	140	349	1	491	1.0
QT13	Upper Wye	1485.7	0.6	8.7	100	941	12	1,053	0.7
QT15	Upper Wye	721.2	1.0	6.9	16	487	3	507	0.7

APPENDIX A:

APPENDIX B:

APPENDIX C: Design Standards for Queenstown and its Planning Area

Create Human Scale

Human scale is the proportional relationship of buildings and spaces to people. When components in the built environment are ordered in such a way that people feel comfortable then human scale has most likely been used. By contrast, a place that is out of human scale, either too small or too large, will tend to make people feel uncomfortable. The reaction is to avoid such a place or to move through it quickly. Significant buildings and sites use monumental scale to create a sense of importance. In these cases, the human scale elements are often incorporated into the project as well. Human scale can be further reinforced by the choice of materials, textures, patterns, colors, and details.

Characteristics of Human Scale Development

a. The dimensions of building height and width, street width, streetscape elements, building setback, and other elements are combined so that they establish a comfortable realm for people to move around in and interact in. The dimensions of human interaction govern the design rather than the dimensions of vehicular circulation and convenience.
b. Buildings are arranged to enclose and define space. This may include locating buildings close to a sidewalk, creating spatial definition.
c. Buildings have limited height at pedestrian paths and sidewalks. Taller buildings have upper stories that are set back. There is a gradual transition of heights and mass, with the greatest concentration in the center of activity centers.
d. Building articulation and design details reduce the perceived mass of large buildings. Elements such as openings at street level, decorative elements that mark floor heights such as cornices, porches, and awnings are used to break the building down to human dimensions.
e. Residential forms and proportions are used on commercial and office buildings next to residential areas.
f. Street trees with protective canopies enclose and define the streetscape.
g. Street widths are limited when possible, bump-outs are used at crosswalks, and medians are used to break the street into dimensions comfortable for pedestrians.
h. Streetscape elements such as sidewalks wide enough for comfortable pedestrian movement,

distinctive sidewalk paving, pedestrian- scale streetlights and other fixtures are used to relate to the human dimension.

Create a Sense of Place

A "sense of place" creates an image that remains in your mind when you leave that area. This sense can be built on a particular distinctive element, such as a landmark building or a grove of mature trees or a special view. It also can be a mosaic of details that creates a fine-grained streetscape. Individuality of design can give a sense of place, and so can a theme of common design elements, particularly in the public realm.

Characteristics of Sense of Place

a. Civic open spaces may be located in central parts of a development.
b. Amenities such as fountains, clocks, or seating areas are provided.
c. Gateways into an area are marked with signature architecture, public art, and/or landscaping.d. A landscaping and/or streetscape theme is used to define the area or the inherent features of a place.
e. The architecture relates to human scale, is pedestrian friendly and is harmonious with neighboring buildings and the setting.
f. Outdoor spaces are defined by building arrangement, landscaping, and/or site elements such as fences or walls.
g. A materials palette or architectural theme may be established for specific areas.
h. Special features and buildings may be used to terminate vistas.
i. While an architectural style or landscape theme may create a unified design, some variety and individual expression within that theme provides vitality to an area.

Connect Uses

A community is made up of both social and physical connections. Connecting uses means making clear pedestrian and vehicular pathways between developments. It also means intermingling compatible uses. A strong sense of community, the highly valued "small-town atmosphere," depends on having such convenient and easy access to a variety of activities and uses. This connection of uses is very important to the function of a livable, pedestrian-oriented community such as Queenstown desires. Because many policies of recent decades have resulted in or even required the separation of projects and uses, this all-important design principle perhaps will require the greatest adjustment in how development occurs.

Characteristics of Connectivity

a. Individual developments are joined together with roads and continuous sidewalks and paths versus a collection of separate development pods. Within a development, easy-to-use internal circulation is provided not only for cars but for pedestrians and bicyclists between all buildings and spaces.
b. Street stubs to adjacent developable sites are provided in existing developments for future connections between new projects and uses.
c. Common streetscape elements, materials and designs are used to visually link different areas.
d. Buildings are oriented to roads and sidewalks with orientation to parking areas being secondary. Buildings and whole developments are not isolated from one another with extensive buffers.
e. Pedestrian and vehicular links are provided to parks, schools, and other public destinations.

Provide Transitions

As Queenstown moves into a pattern of integrated uses and development projects, transitions become more important than ever to ensure compatible neighbors. Traditionally, uses have been separated and projects were designed to stand alone, buffered by landscaping and spatial separation. Queenstown's vision calls for bringing activity centers closer together and requiring connections. With good transitions, potential conflicts can be forestalled.

Characteristics of Transitions Among Uses

a. Complementary architectural design including building height, style, color, materials, mass, footprint and decoration is used to make a transition between diverse land uses.
b. Manipulation of massing is used to buffer abrupt changes of scale. For instance, the mass of a multistory development can be stepped back from the street when adjacent to smaller scale development.
c. Transitions between residential and larger commercial areas are created with midsized developments that may include higher density residential, small office and/or retail uses.
d. Primary building elevations that are visible from the street or neighboring developments generally are not devoted to service functions such as delivery, loading docks, maintenance areas, utility equipment, etc.
e. Planted buffers or fences and walls are used when architectural transitions would not be sufficient to reduce negative impacts such as rear service entries.
f. Parks and open spaces can be transition zones between residential and commercial uses.

Reduce Parking Impacts

A key principle of Queenstown's design vision is to reduce the visual impact of parking. This goal includes reducing the image of the "sea of parking" one finds along corridors at retail centers and the "garage-scape " in neighborhoods. Parking is necessary at work, at home, and at destinations throughout the Town. However, there is no reason why it needs to dominate the view. Following the Town's design principles should result in a decreased need for parking spaces, as more sites are accessible on foot and in combined trips. At the same time, the careful placement and design of parking areas will do much to determine how successfully Queenstown can achieve its other goals of full pedestrian access and good connections.

Characteristics of Reduced Parking Impacts

a. A portion of parking is placed to the rear or sides of commercial buildings that face a street. This parking is essentially overflow parking for peak usage during the year.
b. Buildings are more prominent than parking lots.
c. On-street parking is provided when feasible to reduce the area of parking lots.
d. Parking is shared between complementary uses such as churches and office buildings.
e. Plantings and pedestrian paths are used to divide large lots into smaller lots.
f. Parking lots are screened with low walls and/or year-round plantings.
g. Parking lots are well-shaded with trees in order to create a more desirable parking area.
h. Garages do not dominate the residential street view. In some cases, access and parking are provided at the rear of some residential units.
i. Structured parking is used in high-density commercial/office areas to reduce the area of necessary surface parking.

Plan for Pedestrians, Bicyclists, and Transit Users

Emphasis on the pedestrian experience looms large throughout the vision for Queenstown. It is intended that it be possible to bike or walk between most destinations. Overcoming obstacles to walking from place to place requires evaluation of all components of development, from road dimensions to building arrangement and to parking lot design. It also requires amenities such as sidewalks, plantings, and street furniture. Continuous routes are the key.
Characteristics of Planning for Pedestrians, Bicyclists, and Transit Users

a. Overall, sidewalks, paths and greenways are connectors between communities, between and within

neighborhoods, block-to-block and at mid-block to schools and other high volume pedestrian destinations.

b. Sidewalks are continuous along public streets.

c. Sidewalks connect buildings to the public sidewalk and to each other.

d. A system of bicycle and pedestrian paths is provided Town-wide.

e. Sidewalks are designed to match the future volume of pedestrian traffic.

f. Safe and frequent crossings are provided for pedestrians.

g. Amenities such as street furniture, shade, and shelter are provided for pedestrians where there is a high volume of usage.

h. Sites for transit stops are reserved at locations appropriate for commuters and activity center users.

i. Bicycle storage is provided at appropriate locations, including parks, focus areas, and office parks.

Provide Open Space

Even as the amount of land consumed generally has outstripped raw population growth, modern patterns of development generally offer little space for recreation, social gathering, and preservation of natural areas. This design principle calls for outdoor space to be just as integral to the overall development plan as the construction of buildings, roads, and other structures. A wide range of open spaces is possible: public gathering areas in activity centers and office parks; common play areas and mini-parks shared by nearby residences; and natural preserves. Setting aside well-designed open areas makes the immediate environs pleasant and fulfilling, giving citizens a convenient outlet for recreation and socialization and doing much to make continued development sustainable in the long run.

Characteristics of Usable Community Open Space

a. Open space is provided in central, pedestrian-oriented areas in activity centers, neighborhoods, and in large office/industrial parks.

b. Scenic views, mature woods or specimen trees, and riparian areas are preserved in new development.

c. Residential areas have recreation areas within a five-minute walk of each home.

APPENDIX D: Assessment of Riparian buffers in the Queenstown Planning Area

There are several factors that are considered in this analysis; the size of a riparian buffer, its connectivity to other areas, and if it is a habitat for a protected species. Edge effects were not rated, as they are prevalent in all riparian environments due to their linear shape. Connectivity was measured based on the number of potential connections that an area has to other stream buffers.

Table B-1: Riparian Buffer Quality

	Buffer Width (in feet)	Connections	Possible Connections	% Connected	Protected Species Habitat	Notes
Little Queenstown Creek		2	3	67%	yes	
in Town	100					
At Golf Course	100					
Queenstown Creek	300+	2	2	100	yes	
Salthouse Cove	100	1	2	50%	yes	Some areas at 300’
Wosley Creek	300	2	3	67%	yes	Some areas at 200’
Wye River		12	22	55%	yes	
Section A	0					
Section B	100					
Section C	300					
Section D	100					Some areas at 0’
Section E	100					One area at 0’
East Branch		7	14	50%	yes	
Section F	300					Some areas at 100’
Section G	0					
Section H	0					North bank 300’+ in places
Section I	200					Some areas 300’+
Wye East River		2	15	13%	yes	
Section J	300					Some areas at 100’
Section K	200					
Section L	0					

Several features are of note regarding the quality of riparian environments in Queenstown.

• Queenstown Creek, Wosley Creek, Section C of the Wye River, Section F of the East Branch, and Section J of the Wye East River are the only areas that have full adequate buffers.

• There are very few sections of Riparian environment that provide the full benefits of a 300 foot buffer.

Many lower-order streams lack sufficient buffer (Sections D, E, H, and G). These streams often begin amid agricultural uses.

• Buffers are missing from three of the streams that feed into the Eastern Branch of the Wye River (Sections H and G).

• Little Queenstown Creek only has buffers of 100 feet. This does not provide an adequate buffer to filter the residential pollutants.
• The buffer is often only 100 feet or less along the floodplain and storm surge areas of the Wye River and Queenstown Creek. This does not provide the full benefits of storm surge mitigation.

Implications/Opportunities

• The size and quality of riparian buffers have implications for Queenstown's future. Opportunities exist for improved quality of the water in streams and rivers as well as the Chesapeake Bay.
• Nutrient and pollutant removal from water before it enters major water bodies is possible through expanded buffers.
• Lower order streams without existing buffers such as sections G, H, D, and E could be buffered, allowing an opportunity to remove nutrients and pollutants before they enter the stream network.
• The lack of buffer along the Wye River is detrimental to its overall health and the health of the Bay.
• The small buffer around Little Queenstown Creek can cause this area to be subject to more pollutants and runoff from the golf course and residential uses nearby.

APPENDIX E: Assessment of Forest Areas in the Queenstown Planning Area

Vegetation in forested areas absorbs and stores carbon dioxide, removing this greenhouse gas from the atmosphere. Carbon dioxide is a contributor to global warming, which in the Chesapeake Bay region is a component of sea level rise among other things. Afforestation—converting lands to forest—increases the rate at which carbon is removed. Converting cultivated lands to forest provides that two to ten tons of carbon per year are removed for every 2.5 acres; making afforestation an important ecological tool to mitigate local carbon emissions [From Richards, K.R. and C. Stokes. 2004. "A Review of Forest Carbon Sequestration Cost Studies: A Dozen Years of Research." Climatic Change 63(1-2): 1-48.]

Several factors were considered in the evaluation of forested aeas in Queenstown: the size of an area, its connectivity to other areas, its edge effects, if it is a habitat for a protected species, and whether or not it provides tree cover for wetlands.

Table C-1 Forested Area Quality

	Size	Connections	Possible connections	% Connected	Edge Effects	Protected Species	Wetland Tree Cover
Lower Chester Watershed							
Area 17	170.7	2	2	100%	high		yes
Area 20	157.3	4	5	80%	low	yes	yes
Area 2	94.1	0	3	0%	low		yes
Area 1	62.6	2	3	67%	high		yes
Area 24	49.3	0	0	n/a	high	yes	yes
Area 18	31.5	0	2	0%	high		yes
Area 23	25.0	1	2	50%	high	yes	yes
Area 3	22.1	1	2	50%	high		yes
Area 19	18.0	0	0	n/a	high	yes	yes
Area 22	3.4	0	0	n/a	high		yes
Wye River Watershed							
Sub A Area 14	97.8	2	2	100%	high	yes	yes
Area 12	77.1	1	2	50%	low		yes
Area 9	75.6	2	3	67%	high		yes
Area 15	69.4	2	3	67%	high	yes	yes
Area 13	60.8	3	4	75%	low		yes
Area 16	41.4	1	2	50%	high		yes
Area 10	28.3	2	3	67%	high		yes
Area 6	27.2	2	3	67%	high		yes
Area 5	16.1	1	1	100%	high		no
Area 4	12.3	2	2	100%	high		no
Area 7	10.5	1	2	50%	high		yes
Area 21	9.6	2	2	100%	high	yes	yes

	Size	Connections	Possible connections	% Connected	Edge Effects	Protected Species	Wetland Tree Cover
Sub B Area 11	98.8	1	4	25%	low		yes
Area 8	85.8	1	2	50%	low		yes

Forested areas analyzed for their benefits were all above three acres in size. There are smaller areas that were not considered but these still provide benefits. Several conclusions can be drawn from the information presented in the table above.

• In general, all areas that have a low connectivity score could realize benefits from increased connections; this is particularly true in endangered species habitat.
• Water quality improvement effects are reduced by the edge created by Rt. 301, Rt. 50, and other roads in the Queenstown Area.
• The largest stands of forest around Queenstown are areas 17 and 20.
• Forest areas that ranked high in their current state include 13, 14, 17, and 20.
• Areas that are fragmented by existing highways include 3, 16, 18-22, and 24
• Routes 301 and 50 inhibit connectivity between forested areas.
• Water quality improvements are realized from the forested areas near the Wye and Wye East Rivers.
• Edge effects for areas 9-12 and 14 could be reduced through broad connections between these forest stands. Connecting these areas would also have the greatest effect on overall connectivity between the three major river tributaries.
• Connections between areas 6, 7, and 9-11 and expansion of area 13 could improve water quality.

Implications/Opportunities

The quality of forested areas has implications for Queenstown's future. Opportunities exist for expansion and connectivity in ways that will improve the overall environment and quality of life in Queenstown.

• Nutrient and pollutant removal from water before it enters major water bodies is possible through enhanced connectivity and expansion of existing forested areas. This would have the most impact in areas along the watershed lines (1, 6-8, 9-12, 17-23)
• A high-quality Forest Interior Dwelling Bird Species (FIDS) habitat could be created through connections among areas 9-12 and 14. The existing forest network contains a high proportion of edge

environment in relation to high-quality FIDS environment. To realize the full benefits from forested areas some high-quality FIDS environment is necessary. Since preserving existing forested areas is paramount, the recommended way to create these high quality forest stands is to forest around the existing areas, creating forest edges of newer growth, thereby protecting existing old growth forests.

• Future road upgrades and expansions do not have to reduce existing forested areas.

• Given watershed configurations, forested areas are not all distributed in such a way as to create filters between run-off and local waterbodies.

• The Delmarva Fox squirrel is a protected endangered species and is largely found in one area near the Town of Queenstown. Bald Eagle nesting sites and a heron rookery are also present.