SI Comprehensive Plan Advisory Committee

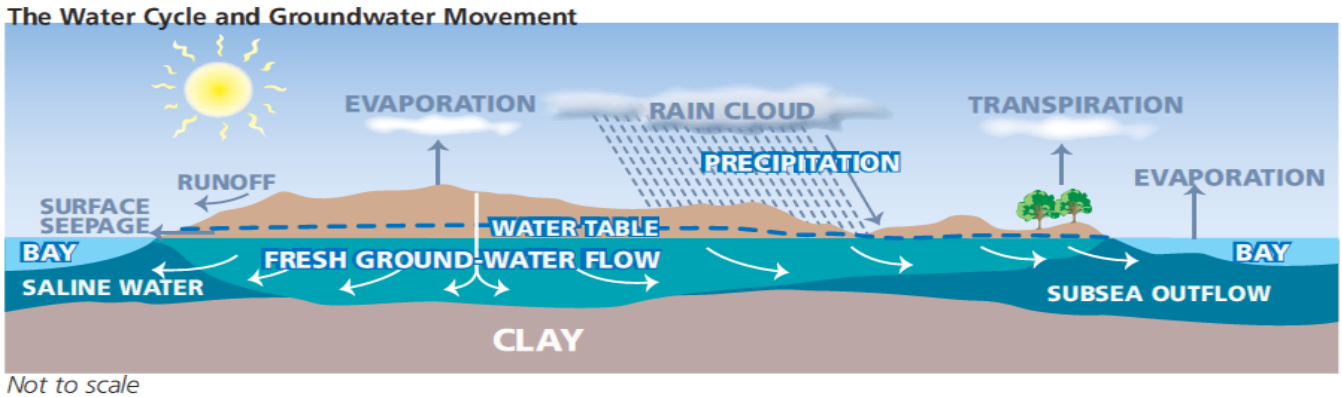
Shelter Island Overview **January 5, 2010**

Introduction: These maps have been developed to promote better understanding important elements of the Comprehensive Plan Report. These maps focus on Shelter Island's aquifer, natural resources, including wetlands, open fields, mature woodlands, creek and harbors, threats to those resources, open space, zoning, and future development potential. Special viewsheds are also indicated.

All the maps have a key to explain the information displayed on the map. There is also a 'zoom' facility (Tools – Zoom – Dynamic Zoom) on all maps to enable you to view detail 'close up', including your own property and neighborhood. Note that many of the maps involve estimates and are not a substitute for properly prepared land surveys.

Aquifer Map: Prepared by the CPRC, this map shows the estimated thickness of the Island's aquifer including those areas where the aquifer is its thickest, a central reservoir of potable water, and those areas, mostly along the outlying peninsular area, where the aquifer is thinnest and most vulnerable. Also shown are estimated water table divides and flows.

The Water Cycle is important to understanding our aquifer and the Aquifer Map.



Not to scale

All our drinking water, from private wells or local water boards, comes from the ground water in our sole source aquifer. Virtually all the ground water originates from rainfall, which percolates down through the ground to the water table.

On average, Shelter Island receives an annual rainfall of about 47 inches, or some 9 billion gallons per year falling over the 11 sq miles of Shelter Island. Just over 50% of the annual rainfall actually filters through the ground to the water table.

An estimated 1% directly enters the surrounding surface waters by means of run off along the road and ground surfaces. Most of the remaining percentage is returned in time to the atmosphere by the process of evapo-transpiration. Evaporation, for example, can easily be seen on a hot summer's day as thunderstorm water evaporates off a warm road. Less visible is evaporation from closely cut lawns, gardens and fields and from surface waters.

Trees and plants also take up much water during the growing season, but discharge most over time into the atmosphere via transpiration, a process in plants whereby plants discharge water and oxygen through stomata in leaves, in exchange for carbon dioxide. Transpiration only occurs when plants are in foliage and is minimal in the winter.

Evaporation is greatest during the hot summer months. Hence, there is almost no net infiltration of rainwater to the aquifer in summer. In contrast, by far the greatest net intake occurs from late autumn to the early months of spring. During this period, it is estimated that about 90% of the rainfall recharges into the aquifer, thus increasing the depth and 'mound' of the aquifer and the pressure of fresh water against the salt water interface along the shoreline.

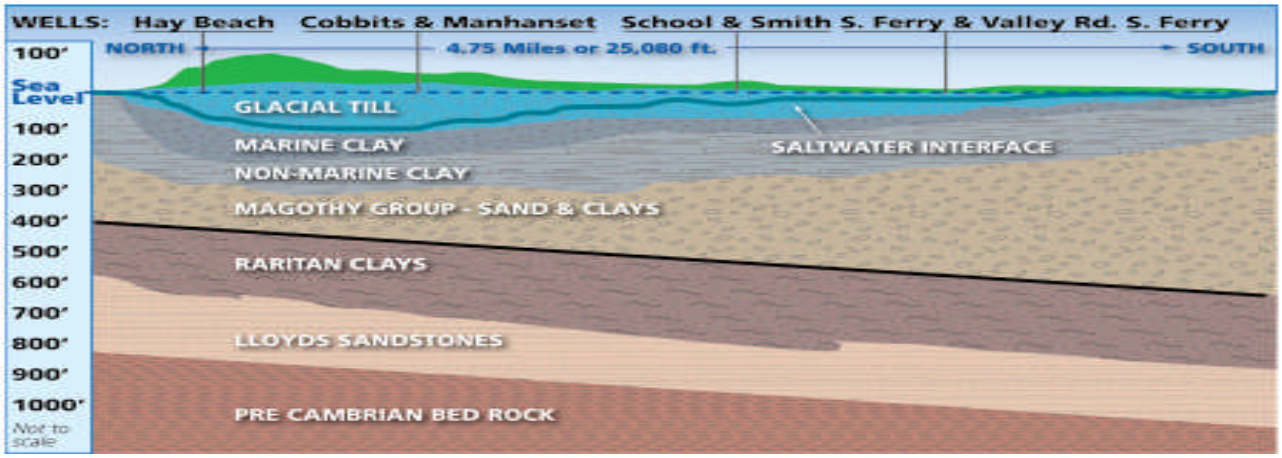
Once absorbed into the ground, water moves down hill towards our creeks, bays and harbors. Fresh water flows into tidal waters along the surface as run off, but primarily underground, at the salt water interface. The rate of flow will depend on the underground mixture of sand, gravel and clay, the height of the mound and the steepness of the slope, on average only one foot per day. Thus, rain water landing on Goat Hill may take 15 years before it reaches West Neck Bay.

Once in our tidal waters, through the actions of winds and tides, the fresh water mixes with bay waters reducing the salinity of our creeks, bays and harbors, and encouraging an environment of tidal wetlands, sea grasses and algae, vital for the development of young fin and shell fish and other aquatic species.

Closing the circle and completing the water cycle, water vapor from evaporation from our bays and harbors combines with water vapor formed by transpiration and evaporation from land to produce clouds, and under the right circumstances another round of rainfall.

Shelter Island's Aquifer – why is it so sensitive: Fill a thin saucer with sand, gravel and silt and add fresh water. Then float this saucer 'boat' on the underlying salt water saturating the glacial conglomerate and clay. Essentially that's what our aquifer is!

Cross Section of Shelter Island



Normally geologists would expect the fresh water aquifer to be 40 ft deep for every foot that the water table is above sea level, which in our case is a maximum of five feet in the center – creating in theory a deep soup bowl of some 200 feet. However, overlaying the ancient Pre-Cambrian bed rock some 900 ft under Shelter Island are two nearly impervious layers of clay located some 100 to 300 ft below sea level, under which are

more porous formations, including the Magothy and Lloyd sandstones, which are here saturated by salt water. In contrast to much of Long Island which taps the Magothy and Lloyd formations for fresh water, we have no deep fresh water aquifer, but must instead rely on the water in the top layer only – that thin saucer at most ranging from 5 ft to 90 feet deep. As shown on Aquifer Map and cross section, the aquifer thickens under the center and other higher parts of the Island to the 90 foot maximum and is much thinner and more vulnerable in outlying peninsulas such as Silver Beach, South Menantic/Montclair, Shorewood, and the Rams. As the recharged rainwater accumulates in late winter, the water table rises, as seen in the many fresh water ponds, and results in increased outward pressure on the salt water interface boundary along the Island's shoreline, thus ensuring the health of the aquifer and preventing saltwater intrusion into shoreline wells. This increased pressure also thickens and pushes the thin aquifer on the isolated outlying peninsulas outward. While the aquifer underlying these peninsular areas are believed to be connected to the main aquifer, the flows from the central mound outwards to these outlying peninsular areas are variable so that the peninsula water tables become quasi-independent mounds which are much more sensitive to drought than areas with strong links to the center.

During the dry summer season, when water usage is estimated to be six times greater than winter usage, the opposite occurs – the freshwater mound is reduced, outward water flow is diminished and the saltwater interface moves inward and upward. During times of prolonged drought and with heavy water usage, upconing (salt water intrusion of low lying shoreline wells) and reduced well head pressure can occur. Periods of extended drought also increase the negative impacts of pollution, by slowing the process of flushing contaminants, (pesticides, fertilizers and chemical contaminants) from the aquifer to outside tidal waters.

Topographical Maps: The NYS geodetic survey map shows surface contour in 10 foot increments, and tidal and freshwater bodies. Slope steepness is a major factor in determining run-off risk and underground water flows. A second topographical map taken in 1954-1956 shows contours as well as roads, building structures, woodlands and underwater depths but from over 60 years ago – with many areas not yet developed and thus many fewer houses and roads, with many more open fields, with denser development along the inner southward facing shore line. Development in the 'Center' is also evident.

Natural Resources Map: This CPRC developed map shows many of the more important natural resources of the Island. Undeveloped parcels of mature woodland – usually oak and beech are shown in dark solid green parcels, and include The Nature Conservancy's Mashomack Preserve. Developed areas, where mature trees, mainly oak, remain dominant are shown in olive green. Among these hardwoods, there are areas of large northern white pine, usually occurring in groves. While the Island had active agricultural fields over 50 years ago, there is no significant commercial agriculture today. Nonetheless, a number of open fields remain, providing scenic open vistas and a different type of habitat from woodland and developed areas. Other open areas include larger parcels of cut grass – Klenawiscus airport and parts of Westmoreland and two golf courses. Nurseries and cemeteries are shown with the same key. Most of the nursery properties are protected by conservation easements/CPF 2% owned land.

These woodlands and open fields are very important to the recharge and filtration of rainwater on the Island, as they greatly reduce runoff, reduce evaporation, create healthy soil, and provide habitat for wildlife.

The map shows our undeveloped creeks and areas of our harbors in dark blue, - Chase, Crab, Dickerson, Gardiners, Mabel's (Clarks) creeks, parts of West Neck Bay and Mare's Neck and Barnyard Creeks in West Neck Creek and parts of Coecles Harbor along the Causeway and Mashomack and much of Congdon's Creek. These areas are generally shallower areas which have few docks or bulkheads. In every location, substantial tidal wetlands are present and many once sustained productive eel grass beds. Now, the Town's only substantial eel grass beds lie along the outside eastern shore ranging from Hay Beach to the Rams and along the Mashomack coastline. These special creeks and harbor areas provide substantial benefit to Shelter Island functioning as nurseries for shell and fin fish, crabs, snails and many other maritime creatures critical to the marine food chain. These areas also provide tranquil scenic views and are a vital part of what makes Shelter Island special. A somewhat lighter blue shows creeks and bays which are more developed and the lightest blue shows our active harbors. Currently, there is no long term Shelter Island waters/waterfront plan in place to guide the future development of local waters.

Finally, while the Island is ringed with sandy and some stony beaches, there are some wide 'special' sandy beaches – Wades, Crescent, Shell and Menhaden Lane. There are also relatively isolated areas for walking and beachcombing – the Ram Causeways, Reel Pont, Crab Creek, and the shore line of Mashomack.

It is important the public appreciate the importance of these resources and special areas, all vital to the character of Shelter Island. It is also important that public policy address the protection on these highly important natural resources areas.

The map shows our tidal and freshwater wetlands in the blue cross-hatched key. The inland freshwater ponds and small wetlands are areas where the water table is higher than the land and thus form an integral part of our aquifer. The water level in these ponds rises and falls with the season and is clearly linked to our drinking water. Thus, these areas are a critical resource and need protection from development and pollution.

Docks and Tidal Wetlands Map This map shows tidal wetlands, dock and bulkheads and includes two blow ups, showing dock development potential for Menantic Creek and the western shore of Coecles Harbor. It is estimated that docks in our inner waters could double increasing from 282 docks to an estimated 571. The potential increase along our outer shoreline, where shoreline conditions can be adverse, is even greater increasing from an estimated 49 today to a total of 217 docks. The impact of new docks in the Town's relatively undeveloped creeks; Chase, Clarks, Crab, Dickerson and Gardiner's would have major impact on those creeks and marine life. The blow-ups show as an example the potential for additional dock development in Menantic Creek and the western side of Coecles Harbor, which would likely bring added boat traffic and consequentially impact local waters and bordering wetlands and marine life. While the Town has created a grid system for moorings, there is no formal long term plan for creek and water ways development, which could possibly put at risk most of the pristine areas of our inland creeks and bays, and dramatically alter views of these quiet and peaceful areas.

Zoning Maps: The Town Zoning map shows the current boundaries of the various zoning and overlay districts. It is believed the zone areas have been unchanged since first adopted in 1959. The Overlay District map shows the Near Shore and Peninsula District, covering the thinnest and generally more sensitive areas of the aquifer, outside the red boundary. Note that the red area on the Aquifer Map closely follows the NSOD

boundary. The Coastal Barrier Zone and the Department of the Interior (Fish & Wild Life Department) is best viewed on the Fish & Wild life web site www.Fish&Wildlife.gov)

Open Space Map: Developed by the CPAC, this map shows 'Open Space' parcels on Shelter Island. Details include ownership of the parcel, if it is 'protected' or not, the nature of the protection and the governmental/land trust or private interests involved. It is important to understand that Shelter Island has used blend of preservation and legal tools to acquire and protect open space. While the results of protecting open space have been impressive, there are still a number of important areas which might be protected.

Full Build-out Map: This CPAC map shows those existing lots, which could be further developed, either by one new house, or through subdivision. Potentially developable lots under 1/4 of an acre are not shown on this map. The number of new houses is a 'best estimate high' for each property taking into account zoning, wetlands, lot configuration and slopes. The estimate of new lots indicates there could be from 750-1100 new homes on Shelter Island, from the current number of about 2,500. Such development will clearly impact the aquifer, the environment, and the services provided by government, school, fire department and ambulance service.

Small Lot Build Out Map: This CPAC map shows some 370 existing 'small lots', of less than one acre, which in theory might be developed, separated into Beach access lots, buildable lots (76), parkland lots (31), roads (15) and unbuildable lots (23). The CPAC estimate that 225 of these lots could be developed, many of which will quite possibly involve requests for easements due to their small size.

Business Zone Usage Map: Developed by the CPAC, this map shows the current business zone areas and current lot usage. Of the 263 lots in the Business zones (B & B1), there are some 55 properties currently in residential use and 23 vacant parcels. Moreover, many businesses are seasonal, and vacancies are not unknown. As explained in Action Point 45 (Z-11), it is likely that even with full build-out, that we have excessive land zoned business and in such layout to as to encourage 'strip zoning'

Proposed New Business Zone Maps: This CPAC developed map shows possible changes in business zones to meet future needs consistent with the goals of the Comprehensive Plan by establishing a hamlet zone in the center, a light industrial zone at the recycling center area, a marine business zone to support local marine businesses, with other areas converted from business zone back to residential zones. These changes clearly will need careful review and full discussion.

D M Kornrumpf
Chair CPAC