VILLAGE OF MAMARONECK PROPOSED TOD ZONING REGULATIONS

ENVIRONMENTAL ASSESSMENT FORM, PART 3

Prepared on behalf of:
the Village of Mamaroneck Board of Trustees

November 2014

Prepared by:
BFJ Planning

VILLAGE OF MAMARONECK TRANSIT-ORIENTED DEVELOPMENT (TOD) ZONING

VILLAGE OF MAMARONECK, NEW YORK
WESTCHESTER COUNTY

FULL EAF PART 3

LEAD AGENCY:

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SUPPLEMENT TO PART 3, FULL ENVIRONMENTAL ASSESSMENT FORM

Summary of Proposed Zoning Changes

The proposed TOD zoning and Code amendments involve revisions to remove the identified development barriers and increase the number and degree of zoning conformity in the study area to the greatest extent practicable, representing a targeted approach with no changes to allowed uses, height or density, as follows:

- Adjust existing zoning boundaries to eliminate multi-districts and reduce nonconformities with respect to land use. Proposed rezonings (see Figure 1) are:
    - Properties along Mamaroneck Avenue in the area bounded by Jefferson Avenue to the north, Van Ranst Place to the east and Mamaroneck Avenue to the south and west are proposed to be rezoned to C-1, while most lots in the same area that front Van Ranst Place are proposed to be rezoned to RM-3 to match existing development. Both areas are now designated RM-3/C-1/O-1; elimination of dual zones is a Comprehensive Plan recommendation (see p. 38).
    - Properties south of Nostrand Avenue between Mamaroneck Avenue and Lester Avenue are proposed to be rezoned from R2-F to C-1, a recommendation of the Comprehensive Plan (see p. 120 and 123). R2-F-zoned properties between Elliott Avenue and New Street are proposed to be rezoned to C-1 because they are likely to be combined with the adjacent C-1 parcels in future redevelopment to gain greater lot depth and access to the signalized New Street intersection.
    - Properties fronting Mamaroneck Avenue between Grand Street and Old White Plains Road are proposed to be rezoned from RM-3 to C-1. This is intended to facilitate higher-density mixed-use development along Mamaroneck Avenue, which is a recommendation of the Comprehensive Plan (see p. 115 and 122).
    - Several properties along Hoyt Avenue and one property along Mamaroneck Avenue (Bilotta parcel) are proposed to be rezoned from M-1 to C-1. The Bilotta rezoning is a recommendation of the Comprehensive Plan (see p. 120 and 122), while the rezoning along Hoyt Avenue is consistent with the Comprehensive Plan recommendation to consider rezoning a portion of Hoyt Avenue to allow for residential use (see p. 51). It is noted that the proposed rezoning to C-1 along Hoyt Avenue is also consistent with the existing development pattern, and would allow for less density than is currently permitted under M-1.
- Create a TOD overlay to promote development capitalizing on the train station and Central Business District. With the above rezonings, a TOD overlay zone is proposed for C-1 parcels on Mamaroneck Avenue and Hoyt Avenue (see Figure 1), allowing higher-density mixed-use development, as recommended in the Comprehensive Plan, without altering the underlying C-1 provisions Village-wide.

0 75 150 300 450 600 Feet

1 inch = 175 feet

N

TOD Overlay

Zoning Draft

Mamaroneck TOD Zoning, EAF Part 3

Figure 1: Proposed Zoning Map

Village of Mamaroneck

Source: Village of Mamaroneck

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- Revise area and bulk regulations in the RM-3 zone to better reflect current conditions, reduce nonconformities and promote appropriately scaled development. The 2013 TOD zoning study found that many properties in the RM-3 zone in the study area do not meet the current area and bulk standards, especially the minimum lot size, required yards/setbacks and maximum building coverage. The study determined that these nonconformities are a contributor to the poor condition of properties in the area, especially along Madison Street, as property owners may be deterred from making needed repairs and upgrades by the difficulty in obtaining bank financing due to nonconformity. Revising the RM-3 area and bulk provisions was determined helpful in alleviating blighted conditions and promoting needed revitalization. The RM-3 zone is only found in the TOD study area and one other location (the Sheldrake Lofts Estates site on Waverly Avenue[1]), so adjustments would not have a larger impact Village-wide.

Table 1, below, summarizes the proposed changes for the RM-3 zone in comparison to existing zoning. The table only indicates provisions that are proposed to change; there are no changes proposed to minimum lot width and frontage, maximum height or maximum FAR.

As Table 1 indicates, some proposed changes, especially to minimum lot area and front and side yards, are significant. However, these changes are consistent with much of the existing development and are anticipated to have a twofold positive impact: first, to reduce the number or degree of nonconformities in the RM-3 zone, and second, to facilitate development pattern that promotes pedestrian activity and safety (buildings closer to the street with parking at rear).

Table 2 summarizes the proposed TOD Overlay Zone provisions in comparison to the existing C-1 and RM-3 zoning. For properties now zoned RM-3 that will be rezoned C-1 with the ability to develop under the TOD Overlay Zone provisions, the impacts are the same as shown in Table 1. For properties now zoned C-1 that would be eligible to develop under the overlay zone, the major impacts are for front yards and FAR. The front yard reduction is meant to promote a pedestrian-scaled, walkable environment, while the potential increased FAR would promote a higher-density development pattern along Mamaroneck Avenue as envisioned in the 2012 Comprehensive Plan. However, the maximum potential FAR under the TOD Overlay is consistent with the maximum allowed under the current RM-3 zoning – except where the proposed grocery store bonus is used – and in no case exceeds the allowable FAR in the C-2 zone.[2] In addition, the proposed maximum FAR for the TOD Overlay is only possible if all development incentives are maximized; it may not be possible in all cases to take full advantage of incentives while still meeting other Code requirements including parking.

The TOD Overlay does not change the underlying C-1 zoning; no changes are proposed to C-1. Any property owner or developer may continue to use the provisions of the C-1 district.

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[1] The proposed zoning revisions in the RM-3 zone are not anticipated to preclude the previously approved Sheldrake Estates project on the former Blood Brothers site, proceeding under a court order.

[2] The grocery incentive is designed to ensure a continued presence of a supermarket in the Washingtonville neighborhood and prevent a "food desert." The current A&P building is within 10 feet of the Mamaroneck River. Redevelopment of this site as contemplated under the proposed zoning would move the building at least 50 feet away from the river, providing a much more substantial buffer.

Table 1: Proposed RM-3 Zoning Changes vs. Existing Zoning

CURRENT ZONING							
Minimum Lot Area (sf)	**Minimum Lot Depth (ft)**	**Minimum Required Yards**				**Maximum Building Coverage**	**Open Space Per Unit (sf)**
		Front (ft)	**Lesser Side (ft)**	**2 Sides Combined (ft)**	**Rear (ft)**		
20,000 sf, 1,000 sf per dwelling unit	150	25	25	50	30	35%	200
PROPOSED ZONING							
Minimum Lot Area (sf)	**Minimum Lot Depth (ft)**	**Minimum Required Yards**				**Maximum Building Coverage**	**Open Space Per Unit (sf)**
		Front (ft)	**Lesser Side (ft)**	**2 Sides Combined (ft)**	**Rear (ft)**		
7,500 sf, 800 sf per dwelling unit	100	5	8	20	25	50%	150
CHANGE							
-12,500 sf for total area, -200 sf per dwelling unit	-50 ft	-20 ft	-17 ft	-30 ft	-5 ft	+15%	-50 ft

Table 2: Proposed TOD Overlay District vs. Existing Zoning

CURRENT ZONING (RM-3)									
Minimum Lot Area (sf)	**Minimum Lot Depth (ft)**	**Minimum Required Yards**				**Maximum Building Coverage**	**Open Space Per Unit (sf)**	**FAR**	**Parking**
		Front (ft)	**Lesser Side (ft)**	**2 Sides Combined (ft)**	**Rear (ft)**				
20,000 sf, 1,000 sf per dwelling unit	150	25	25	50	30	35%	200	1.2	1 space per unit, plus ½ space per bedroom
CURRENT ZONING (C-1)									
Minimum Lot Area (sf)	**Minimum Lot Depth (ft)**	**Minimum Required Yards**				**Maximum Building Coverage**	**Open Space Per Unit (sf)**	**FAR**	**Parking**
		Front (ft)	**Lesser Side (ft)**	**2 Sides Combined (ft)**	**Rear (ft)**				
None if affordable housing is provided	100	20	10	20	25	35%	200	0.8	1 space per unit, plus ½ space per bedroom
PROPOSED TOD OVERLAY ZONING									
Minimum Lot Area (sf)	**Minimum Lot Depth (ft)**	**Minimum Required Yards**				**Maximum Building Coverage**	**Open Space Per Unit (sf) Front (ft)**	**FAR**	**Parking**
		Front (ft)	**Lesser Side (ft)**	**2 Sides Combined (ft)**	**Rear (ft)**				
None	100	5	8	20	25	50%	150	1.2	1 space per unit, plus ¼ space per bedroom
CHANGE VS. RM-3									
-20,000 sf for total area, -1,000 sf per dwelling unit	-50 ft	-20 ft	-17 ft	-30 ft	-5 ft	+15%	-50 ft	None	-¼ space per bedroom
CHANGE VS. C-1									
None	None	-15 ft	-2 ft	None	None	+15%	-50 ft	+0.4	-1/4 space per bedroom

Note: FAR and Parking under existing and proposed assume all-residential uses and maximization of available FAR incentives. No grocery bonus is assumed for the TOD Overlay Zone.

Analysis of Potential Impacts

To supplement those questions in the EAF Part 2 which elicited a "yes" response, this Part 3 Supplement provides additional information below. As applicable, the relevant question from the Part 2 is indicated. In each case, the potential impact from the proposed action is considered small to moderate, and the justification supporting this conclusion is provided below.

The proposed action, a zoning change, is generic in nature, and will not directly result in any development. Future development that may arise from the zoning changes will be subject to site-specific environmental reviews. This analysis considers those impacts which may result from the changes in the zoning, as development is already permitted under current zoning.

QUESTION #1. IMPACT ON LAND: Proposed action may involve construction on, or physical alteration of, the land surface of the proposed site.

As described in the Full Environmental Assessment Form – Part 1, the TOD Zoning study area covered approximately 80 parcels on about 35 acres in the north-central portion of the Village of Mamaroneck. The area is largely built-out and is characterized by a broad mix of uses, including commercial uses along Mamaroneck Avenue and Old White Plains Road; medium- to high-density residential uses primarily along Madison Street and Van Ranst Place; light industrial and commercial uses along Hoyt Avenue; several institutional uses; and two Village parks: Columbus Park and Pape Memorial Park at the corner of Madison Street and Old White Plains Road. A number of vacant or underutilized sites are present in the study area.

The proposed zoning revisions are intended to allow for targeted changes within the study area, mainly on Mamaroneck Avenue, and not all portions of the study area will be affected. For example, no changes are proposed to the current C-1 provisions. While properties on Mamaroneck Avenue are proposed to be rezoned to C-1 and will be eligible to develop under the TOD Overlay, the underlying C-1 zoning will be unchanged. In addition, no zoning changes are proposed for the residential areas surrounding the study area, such as R4-F-zoned areas on Washington and Grand Street and R2-F-zoned areas north of Avalon Willow and Columbus Park.

Referencing the questions in Part 2 of the EAF, the water table in the study area is not less than 3 feet (1.a), and the study area does not contain steep slopes (1.b) or bedrock outcroppings (1.c). In addition, the study area is not located within a Coastal Erosion Hazard Area (1.g).

As noted, the proposed zoning revisions will not directly result in construction; however, they may indirectly lead to development that could involve new construction or reconstruction of existing buildings and structures. Such development would be subject to a separate environmental review under SEQRA. It is not anticipated that such construction would involve excavation or removal of more than 1,000 tons of natural material (1.d) or result in increased erosion (1.f), given that the majority of the study area is already characterized by impervious surfaces, and any new construction will be required to comply with current Village stormwater regulations. New construction arising from the zoning revisions may continue for more than one year or in multiple phases, depending on the specific nature of such construction (1.e).

While the proposed zoning regulations will not directly result in any development, the TOD Zoning Study identified six "soft sites," or properties where near-term redevelopment can reasonably be expected to occur because of vacancies or the potential for parcel consolidation. Since the study was completed, another property can be considered as a soft site, the A&P Supermarket site on Mamaroneck Avenue, based on market characteristics and discussion with the property's owners. The soft sites are not intended to capture all development potential within the project area; they may take decades to develop because of the intricacies of ownership and real estate markets. A few may come to the approvals process in the next year or two, while sites not identified as "soft" may in fact be redeveloped first, or identified soft sites may be redeveloped differently than anticipated. The following sites are meant as a representation of the most likely candidates for near-term development potential (see Figure 2):

1. ***Consolidation of three midblock parcels at 39 Madison Street*** (one-family residence, Vittorio Emmanuele Civic Club and parking lot)

2. ***690 Mamaroneck Avenue – former Three Jalapenos restaurant***

3. ***46 Madison Street***

4. ***Consolidation of three vacant properties at 705 Mamaroneck Avenue*** (vacant parcel), ***650 Van Ranst Place*** (G.I. Civic Association) and ***656 Van Ranst Place*** (office building)

5. ***572 Van Ranst Place*** (vacant/underdeveloped property)

6. ***810 Mamaroneck Avenue*** (partially vacant property)

7. ***805 Mamaroneck Avenue*** (A&P site)

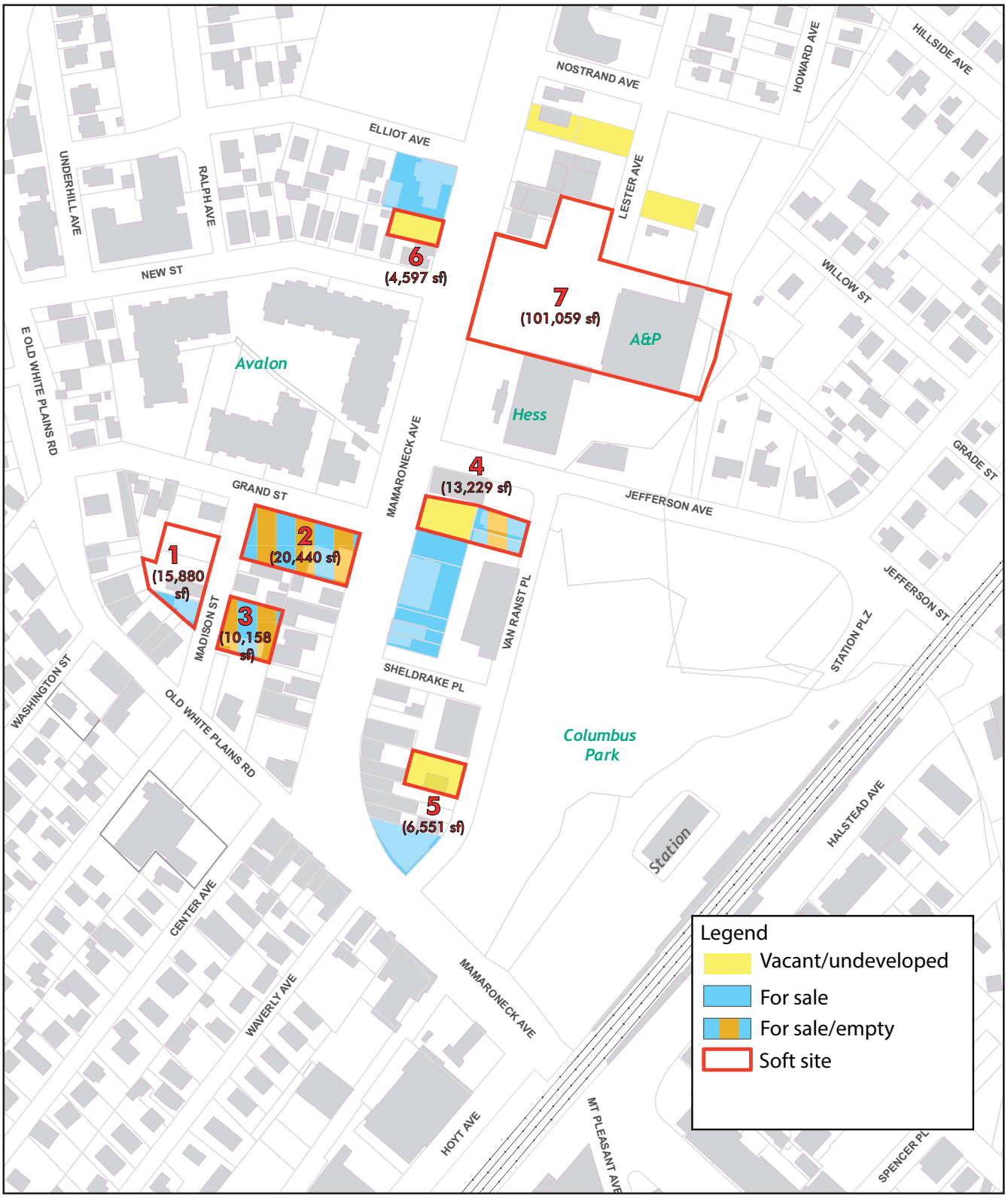
Table 3, below, shows the total number of potential residential units in the soft sites, as possible under existing zoning and the proposed regulations. Several assumptions underlie this analysis:

- It is assumed that sites achieve the maximum FAR possible utilizing all available incentives (both under existing zoning and as proposed). There may be factors, including parking, that limit the ability to maximize the incentives. This provides a conservative, worst-case analysis.

- Except for the A&P site, where it is assumed that a full-service grocery store will remain, all soft sites are assumed to be fully residential. In actuality, portions of these sites may contain commercial/retail uses, which would lessen the number of residential units.

- Sites located in either the RM-3 or C-1 zone will use the current permitted FAR for those districts in the existing zoning analysis. For the two sites with multiple zoning designations, the FAR used in the existing zoning analysis will be C-1, as recent residential development has utilized the C-1 infill housing provisions.

- Units are assumed to be an average of 800 square feet. Larger units would reduce the number of residential units.



Mamaroneck TOD Zoning, EAF Part 3

Figure 2: Soft Sites

Village of Mamaroneck

Source: BFJ Planning

0 300 ft

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Table 3: Potential Maximum Residential Development of Soft Sites in TOD Area, Existing Zoning vs. Proposed TOD Zoning Regulations[3]

Soft Site Area	Parcels	Land Area (sf)	Existing Zoning				Proposed Zoning			
			FAR	Total Buildable Residential Floor Area	Avg. Unit Size (sf)	Total Unit Yield*	FAR	Total Buildable Floor Area	Avg. Unit Size	Total Unit Yield*
1	3	15,880	1.2	19,056	800	24	1.2	19,056	800	24
2	1	20,440	1.2	24,528	800	31	1.2	24,528	800	31
3	1	10,158	1.2	12,190	800	15	1.2	12,190	800	15
4	3	13,229	0.8	10,583	800	13	1.2	15,875	800	20
5	1	6,551	0.8	5,241	800	7	1.2	7,861	800	10
6	1	4,597	0.8	3,678	800	5	1.2	5,516	800	7
7	1	101,059	0.8	80,847	800	101	1.5	126,589**	800	158
TOTAL	**11**	**171,914**		**156,123**		**196**		**211,615**		**265**

*Number of units rounded to the nearest whole number.

**Excludes 25,000 sf for a full-service grocery store.

As shown in Table 3, under the existing zoning, the seven soft sites could generate a total of **196** residential units, assuming that the four sites developed under the C-1 regulations take advantage of the 0.2 bonus for affordable housing, which would provide for a total FAR of 0.8 on those sites. Under the proposed zoning, a total of **265** residential units could be developed, again, assuming that all incentives are utilized (affordable housing, provision of a grocery store on the A&P site and payment into a Neighborhood Stabilization Fund/provision of green building or green infrastructure elements).

Comparing the existing zoning with the proposed TOD zoning regulations, the difference in potential residential units for maximum build-out of the seven soft sites is **69** units. Given that it can take 15 to 20 years or longer to bring all potential units to market, it is estimated that only 25% of these 69 units would be built in the next five years, generating a short-term build-out increase of approximately 17 units. Clearly, economic conditions and financial markets will affect the exact pace of development.

[3] This analysis is based on land area and floor area ratio (FAR) and does not take into account other factors which may further limit development, such as required land area and open space per unit, setbacks, coverage and required parking. The unit count generated can be considered conservative; actual unit counts are likely to be lower.

QUESTION #3. IMPACTS ON SURFACE WATER: Proposed action may affect one or more wetlands or other surface water bodies (e.g. streams, rivers, ponds or lakes).

The study area includes the confluence of the Mamaroneck and Sheldrake Rivers at Columbus Park, and properties along Hoyt Avenue are adjacent to the Sheldrake River, while two properties along Mamaroneck Avenue are adjacent to the Mamaroneck River. With the exception of the park, all parcels adjoining the rivers in the study area are currently developed with either commercial or industrial uses. There are no wetlands within the study area.

The proposed zoning revisions will not create a new water body (3.a); will not result in an increase or decrease in the surface area of any water body (3.b); will not involve dredging or more than 100 cubic yards of material from a wetland or water body (3.c); will not involve construction within or adjoining a freshwater or tidal wetland, or in the bed or banks of <u>any</u> water body (3.d); will not create turbidity in a water body (3.e); will not involve construction of one or more intake(s) for withdrawal of water from surface water (3.f); will not involve construction of one or more outfall(s) for discharge of wastewater to surface waters (3.g); will not involve a change in the application of pesticides or herbicides in or around any water body (3.j); and will not require the construction or new or expansion of existing wastewater treatment facilities (3.k).

The study area's location at the confluence of two major rivers, downstream from the source of both rivers, means that portions of the Sheldrake and Mamaroneck Rivers in the study area may be subject to soil erosion or siltation (3.h). This is an existing condition that reflects development patterns throughout the region, and exists with or without the proposed action.

Construction arising from the proposed zoning regulations may have an impact on stormwater flows within the study area, which could have potential impacts on the water quality of water bodies within or downstream from the study area (3.i). However, any such impact is anticipated to be minor, or positive, given that the majority of the study area is built-out and covered in impervious surfaces (77% of the area within the proposed TOD Overlay Zone is impervious), and that <u>all</u> existing buildings and structures in the study area pre-date current Village stormwater regulations. Much of the existing construction in the area has no stormwater controls, and new construction will have to comply with the provisions of Chapter 294 of the Village Code and current floodplain regulations, as well as best management practices to ensure the control of stormwater runoff and combined sewer overflows draining into coastal waters. In addition, the proposed zoning revisions include incentives for green building and green infrastructure techniques, which are anticipated to facilitate greater flexibility and efficiency in on-site treatment of both water quantity and quality. These factors, together with an anticipated decrease in impervious surfaces, should reduce the impacts on surface waters, including a reduction in the quantity of water leaving the sites, and ensuring that the water quality of all of Mamaroneck's water bodies remains consistent or improved from their current water quality classifications and best usage.

QUESTION #4. IMPACT ON GROUNDWATER: Proposed action may result in new or additional use of ground water, or may have the potential to introduce contaminants to ground water or an aquifer.

The proposed zoning revisions will not require new water supply wells or create additional demand on supplies from existing water supply wells (4.a); will not result in residential uses in areas without water and sewer services (4.c); will not require wastewater discharged to groundwater (4.d); will not result in the construction of water supply wells in locations where groundwater is, or is suspected to be, contaminated (4.e); and will not involve the commercial application of pesticides within 100 feet of potable drinking water or irrigation sources (4.g).

Various Westchester County and New York State Department of Environmental Conservation (NYSDEC) maps indicate an existing unconfined aquifer under a portion of the study area (4.b, 4.f). The original source of this mapping appears to be a USGS map titled, "Potential Yields of Wells in Consolidated Aquifers in Upstate New York-Lower Hudson Sheet," dated 1988. This map indicates an "unconfined" aquifer running in a northeasterly direction in the study area, generally parallel to the Metro-North tracks. Later mapping conducted by the County and NYSDEC used the USGS paper map to digitize the aquifer location, and create Geographic Information Systems (GIS) data for the aquifer. However, the digitization generated differing results as to the precise location of the aquifer. The County's GIS aquifer data is based on 2001 New York State Department of Health data, which the NYSDEC updated in 2011. Village of Mamaroneck planning staff geo-referenced the USGS paper map and identified the aquifer in the same location as the NYSDEC GIS data; therefore it is believed that the NYSDEC data is a more accurate representation of the aquifer's location (see Figure 3: General Location of Aquifer in the Study Area).

Regarding the location of the aquifer, it is important to note that none of the available mapping is intended for detailed site evaluations; they are intended to indicate only the general extent of unconsolidated aquifers in New York State. In addition, none of the available GIS datasets accurately show the aquifer location. The NYSDEC notes in its supporting documentation, "The digitization involved folded paper maps, leading to an undetermined amount of distortion in the aquifer boundary."

However, all the maps and data confirm that the aquifer is not a primary aquifer, and is not used for drinking water.

Aquifer Basics

An aquifer is an underground layer of water-bearing permeable and porous rock or unconsolidated materials (gravel, sand or silt) in which groundwater can easily move or flow. As the water gathers in the spaces between the soil and rock, it eventually builds up to a layer of groundwater below the surface and fills to its water table, or the upper limited of the collected water. The area below the water table is the zone of saturation. Unconsolidated sandy aquifers function as natural filters that trap sediment and other particles (like bacteria) and provide natural purification of the groundwater flowing through them.

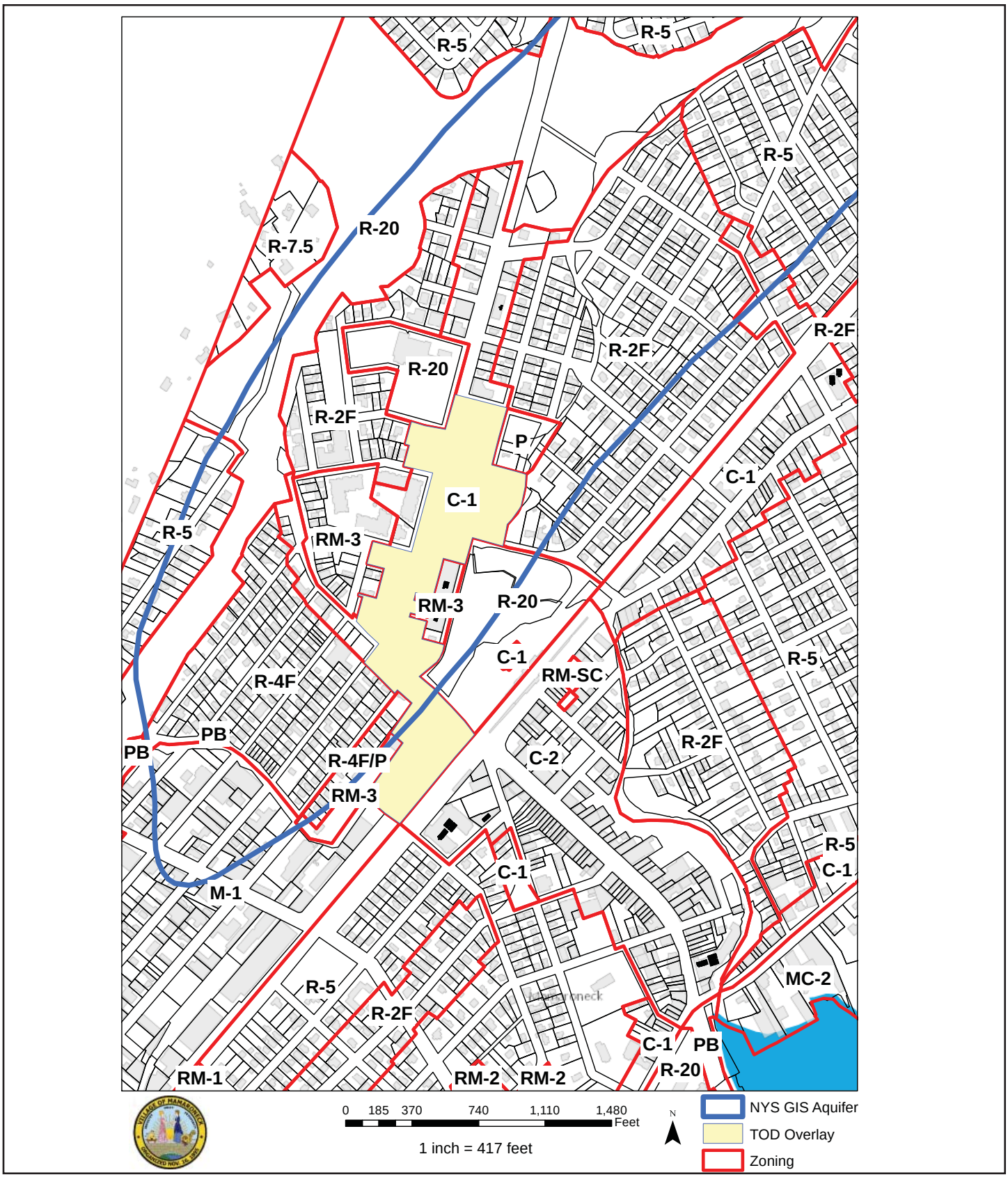

Figure 3: General Location of Aquifer in the Study Area

Source: Village of Mamaroneck, NYSDEC

There are two basic types of aquifers: confined and unconfined. Unconfined aquifers are those into which water seeps from the ground surface directly above the aquifer. Unconfined aquifers are sometimes also called water table or phreatic aquifers, because their upper boundary is the water table or phreatic surface. In unconfined aquifers, water always flows from high points to low points because of gravity. Unconfined aquifers are often in direct hydraulic connection with surface water bodies. Unconfined aquifers are not "protected" by an impermeable layer. This means that if anything leaks or spills into the soil above the unconfined aquifer, it will seep into the water.

Confined aquifers are those in which a less permeable soil/rock layer, termed a confining unit, prevents water from seeping into the aquifer from the ground surface located directly above. Instead, water seeps into confined aquifers from farther away, where the impermeable layer does not exist.

Precipitation eventually adds water (recharge) into the porous material of the aquifer. The hydrologic cycle begins with precipitation. As precipitation falls, some of it may evaporate directly into the atmosphere from bodies of water, and a portion may be intercepted by vegetation. The remainder reaches the ground, where it can enter the soil by a process called infiltration. Where the precipitation rate exceeds the infiltration rate, excess water builds on the soil surface and moves by overland flow called surface runoff. Downward movement of water through the soil is referred to as percolation. Recharge is the process by which water percolating through the soil replenishes groundwater.

Village of Mamaroneck Aquifer

The Village of Mamaroneck aquifer is considered to be an unconfined aquifer. The most productive aquifers consist of unconsolidated deposits of sand and gravel that occupy major river and stream valleys or lake plains and terraces. Municipalities throughout New York have been built over many of these aquifers, because they typically form flat areas that are suitable for development and generally provide an ample groundwater supply. As shown in Figure 4, aquifers are found throughout Westchester County, including in urbanized areas such as downtown White Plains and downtown Rye.

The Village of Mamaroneck aquifer lies within the New England Uplands physiographic province. It is an existing unconfined aquifer system that is about 280 acres in size and generally extends in an approximately northeasterly direction from about Fenimore Road in the Village to West Street in the Town/Village of Harrison. Base flow to the Sheldrake River and the Mamaroneck River is provided by this aquifer, and most likely upwards through the stream bottom from the local bedrock aquifer. The aquifer boundary was derived by the USGS[4] from hydrogeologic and surficial geology maps, numerous well records and interpretation of topographic maps. The Village of Mamaroneck aquifer is located immediately beneath Mamaroneck Avenue within the area of the proposed TOD zoning changes, and receives recharge through precipitation.

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[4] "Potential yields of Wells in Unconsolidated Aquifers in Upstate NY-Lower Hudson Sheet" map published in 1988 on a cooperative basis between the USGS and NYSDEC.

MAMARONECK TOD ZONING, EAF PART 3

FIGURE 4: AQUIFERS IN WESTCHESTER COUNTY

VILLAGE OF MAMARONECK

Source: Westchester County Department of Planning, NYSDEC

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The Mamaroneck aquifer is comprised of unconsolidated Quaternary sand and gravel sediments, has a high transmissivity rate and has an estimated thickness of greater than 10 feet. Potential yields that could be obtained from properly constructed wells screened and developed in this aquifer are estimated to be at a rate of more than 100 gallons per minute. Based upon an interpretation of a USGS groundwater well that is located within the TOD area just off of Jefferson Avenue, available 2-foot topographic contour mapping from Westchester County and stream bed elevations of the Mamaroneck River and the Sheldrake River from the effective FEMA Flood Insurance Study (FIS) profiles, the water table or top of the aquifer level within the TOD area has been estimated to be within a range of elevations from approximately 10 feet to 13 feet NAVD88.

Below the Mamaroneck aquifer is a bedrock aquifer composed of the Hartland formation, a Cambro-Ordovician Amphibolite and Pelitic Schist. This aquifer is estimated to be up to 4,000 feet thick, and groundwater flow is under semi-confined conditions to a depth of about 60 feet beneath the top of the aquifer. Below this, confined conditions prevail. Dominant groundwater flow is primarily within fractures and joint sets intersecting the fractures.

The National Oceanic and Atmospheric Association (NOAA) has identified a 30-year average total rainfall/precipitation of 49.9 inches per year for the Central Park region of New York City. It is estimated that approximately 20 inches per year of precipitation would reach the unconfined Mamaroneck aquifer through infiltration under existing conditions, accounting for evapotranspiration and surface water runoff in this developed area.

Potential Impacts from Zoning Changes

A detailed impervious surface coverage analysis comparing the existing zoning conditions and the potential TOD build-out conditions for both the developable properties and the properties within the TOD Overlay Zone has been completed by the Village of Mamaroneck Planning Department (see below).

Based on the results of this analysis, it has been determined that the future potential build-out of the area will result in an overall reduction of 48,978 square feet of impervious surface coverage. Therefore, an increase in groundwater percolation within this 48,978-square-foot area will result.

Given the reduced impervious surface coverage and the known annual precipitation for the area, preliminary estimations reveal an annual decrease in the amount of surface water runoff with an increase in healthy water table recharge of about 1.5 million gallons. This increase in the annual healthy water table recharge is equivalent to the volume of water required to fill about 2.5 Olympic-sized swimming pools.

Generally, factors that adversely affect an aquifer include:

- Increased water supply demand from wells
- Periods of drought
- Direct underground injection of contaminated material
- Lack of groundwater recharge

Given that the Village of Mamaroneck has a public water supply, the potential impact from wells is not applicable to this aquifer. Impacts from periods of drought would be a regional issue, and would be mitigated through Village action (see Chapter 334, Water Conservation, of the Village Code). Therefore, these factors are not applicable to the proposed action.

Direct underground injection of contaminated material is not proposed or anticipated under the proposed zoning revisions. There is one known historic source of groundwater contamination, located on a site that is part of the NYSDEC's Superfund environmental remediation program. A 0.92-acre property located at 139 Hoyt Avenue, the former ITT Sealectro site, was used to manufacture electronic parts and jewelry from 1960 to 1990. The company used machine oils and cleaning solvents in its manufacturing operations, and spent solvents and electroplating wastes as well as fuel oil from underground storage tanks leaked into underlying soils and groundwater. The NYSDEC has had contaminated soil and underground storage tanks removed from the site, and an extraction and treatment system and subslab depressurization system were installed in the on-site building in December 2013. Any contaminated soils remaining at the site are below concrete or clean backfill, and therefore people will not come in contact with the contamination unless they dig below the surface materials, which will be restricted by the NYSDEC. Groundwater at the site is not used for drinking or other purposes, and the site is served by a public water supply that obtains water from a different source not affected by the site's contamination (see the Environmental Remediation Databases Details in the Appendix).

Based on discussion with the NYSDEC, the property at 139 Hoyt Avenue remains an active clean-up site, with the NYSDEC retaining jurisdiction over any future development. Contamination remains, but is fully contained on-site. Analysis conducted by the NYSDEC found no environmental impacts to the Sheldrake River or other water resources and, therefore, no impacts to Mamaroneck Harbor or Long Island Sound.[5]

The Hoyt Street property remains in active use by Half Time Beer Distributors, and is, therefore, not a priority site for redevelopment. If the property were to be redeveloped for future use (including residential use), such redevelopment would need to conform to all applicable environmental remediation standards, and would also be subject to NYSDEC jurisdiction. These additional actions would be required whether or not the proposed TOD zoning provisions were in place for the site. Because this site is the only known historic source of groundwater

[5] Discussion between Village Manager Richard Slingerland and Scott Deyette, NYSDEC Division of Environmental Remediation, November 2014.

contamination in the project area, and no new sources of contamination are contemplated, the potential for direct injection of contaminated material into the aquifer is not anticipated.

Therefore, the only issue remaining that could potentially impact the aquifer in the project area is a lack of groundwater recharge. The Village Engineer reports that standard stormwater management practices such as infiltration address this potential issue. If groundwater is too shallow for filtration (e.g., sand filter, bio-retention, etc.), or infiltration (e.g., drywells), there are a number of green infrastructure techniques that can be applied for treatment of the NYSDEC's and the Village's requirements regarding water quality and quantity. These techniques include, but are not limited to, green rooftops, rain gardens (1,000-square-foot maximum drainage area), rain barrels, cisterns and recycled irrigation/rain harvesting. Thus, even on the most challenging of sites, developers have a diverse toolbox to address on-site both water quality and water quantity (flood control). Because the proposed TOD zoning regulations actually incentivize the use of green infrastructure to achieve stormwater management objectives, it is anticipated that not only will they successfully mitigate any negative impact on the aquifer, but will potentially result in a net benefit in relation to stormwater runoff.

In conclusion, because the Mamaroneck aquifer is an unconfined aquifer, it is dependent on recharge of its groundwater via precipitation and infiltration through the pervious ground surface areas. Therefore, based on the findings of the technical hydrogeological evaluation, the proposed TOD zoning revisions would not have a negative impact on the existing Mamaroneck aquifer when compared with existing conditions. In fact, because the future amount of pervious surfaces could increase, the proposed TOD zoning changes will result in a longer-term positive impact on the condition of the existing Mamaroneck aquifer, with greater infiltration of freshwater precipitation and less surface water runoff and overland flow.[6]

In addition to the above issues, mention was made at the public hearing on the proposed zoning that taller buildings might require deeper foundations. The proposed zoning does not allow taller buildings. The height of the buildings remains the same as the existing zoning.

The maximum height in RM-3 is 50 feet and 4 stories. The maximum height in the C-1 zone on Mamaroneck Avenue is also 50 feet and 4 stories. The type of construction that is expected under the proposed zoning is stick-built construction, possibly over a level of parking. Such construction does not need deep basements or unusual structural support. If one builds more than 5 stories, the New York State Building Code requires different and more costly construction types. Because no change in height is proposed, no 5-, 6- or 7-story buildings will be permitted.

[6] See the appendix for the full hydrogeology report conducted for the Village by Geo-Hydro, Inc.

QUESTION #5. IMPACT ON FLOODING: Proposed action may result in development on land subject to flooding.

The proposed zoning regulations are not anticipated to result in development within a designated floodway (5.a) or to change flood water flows that contribute to flooding (5.e), and there is no dam located in the project area vicinity that will be affected by the proposed regulations (5.f). However, the project area is located within either a 100-year floodplain (5.b) or a 500-year floodplain (5.c), and development arising from the proposed zoning regulations may result in modification of existing drainage patterns (5.d).

The flooding issue in the project area is well documented, and was noted in the 2013 TOD Zoning Study. The Village of Mamaroneck is at the bottom of three drainage basins – the Sheldrake River, Mamaroneck River and Beaver Swamp Brook – which collectively drain approximately 28 square miles of land. Sheldrake and Mamaroneck Rivers meet at Columbus Park and drain into Mamaroneck Harbor, while the Beaver Swamp Brook drains into Guion Creek and discharges to Mamaroneck Harbor. While the TOD project area's location at the confluence of the Mamaroneck and Sheldrake Rivers makes it especially prone to flooding, development within the area itself is not the cause of the Village's flooding problems. The generator of flooding is development upstream of the study area, much of it outside of the Village itself. These factors mean that flooding will remain an issue with or without adoption of the proposed zoning regulations.

In general, development within a floodplain is to be discouraged. However, the study area – as well as other portions of the Village that are in floodplains – is already developed. Significantly, <u>all</u> of the development in the project area was constructed prior to current stormwater management or floodplain laws. Many, if not most, of the properties were constructed without any stormwater management. Even without the proposed TOD zoning regulations, redevelopment within the project area is likely to improve drainage conditions because of these current laws and regulations.

As discussed in the TOD Zoning Study, the lack of investment and significant number of nonconforming properties (nonconforming as to zoning and floodplain laws), along with current market conditions, make it unlikely that redevelopment with more flood-resistant construction will occur on its own. The proposed zoning changes are needed to remove development barriers and facilitate the development and redevelopment of properties with greater safety for both people and property. Without the zoning changes, the area is likely to continue to experience flooding and suffer from blighted conditions.

The proposed zoning also provides incentives for green infrastructure techniques, which are anticipated to promote greater pervious coverage and on-site management of water quality and quantity. In addition, the Neighborhood Stabilization Fund may be used by the Village to address stormwater management and flooding issues throughout the study area. Both green infrastructure techniques and improvements made possible from the fund may also allow for the use of non-structural flooding and erosion protection measures, or the replacement of

flooding and erosion protection structures with non-structural alternatives.

To address concerns raised during the public hearing regarding flooding impacts, the Village conducted an additional analysis of the potential change in impervious surfaces within the proposed TOD Overlay District resulting from future development that arises from the proposed regulations. There are a number of assumptions underlying this analysis:

- Parcel assembly is necessary. A total of 35 parcels were assembled into nine larger parcels for the purposes of illustrating the calculations (see Figure 4).
- Potential developments will have 30% permeable surfaces, including pervious driveways, pervious uncovered parking, walkways, patios, etc. Green roofs are utilized for 10% of the usable open space requirement as defined in § 342-3.
- Hypothetical developments have used all available incentives and are using maximum FAR and lot coverages when possible, to be conservative in this analysis and consider the worst case.
- A distance of 50 feet from the Mamaroneck River is required and maintained as open space.
- Apartment sizes range from 1,000 sf to 1,200 sf, leaving room for building corridors and utilities.
- For the purposes of the analysis, a 50/50 split was assumed between one- and two-bedroom apartments.
- Hypothetical developments have 3,000 sf of the ground floor as retail, with one-half of the building footprint devoted to covered parking. In the case of the current A&P site, 25,000 sf of the ground floor is reserved for a full-service supermarket.
- Parking is set at 350 sf per required space, including space for parking aisle widths.
- Smaller parcels (<± 11,000 sf) in the project area may have a lower opportunity for redevelopment and have been excluded from the calculations analyzing the developable areas.
- The impervious surfaces within street right-of-ways have been excluded from the analysis, as there will be no change.
- Supermarket parking is set at 4 spaces per 1,000 sf, based on industry standards. This is a variation from the Village Code which does not differentiate supermarkets from retail.

The proposed TOD Overlay District contains a total area of 542,592 square feet, with an existing impervious area of 415,486 square feet, or 77% of the total area. The total area of the nine assembled properties (see Figure 5) is 316,538 square feet, with an impervious area of 254,608 square feet, or 80% of the total area. The table below presents the existing impervious coverage for each of the assembled properties and indicates the change in impervious coverage resulting from full build-out under the proposed TOD zoning regulations.

Table 4: Existing vs. Potential Impervious Coverage for Assembled Properties in the TOD Overlay District

Map ID	Parcel Area (sf)	FAR	# Units	Existing Impervious Coverage (sf)	Potential Impervious Coverage (sf)	Change (sf)	Change (%)
1	25,551	1.2	30	21,382	16,452	-4,930	-23%
2	12,707	1.1	15	10,328	8,862	-1,466	-14%
3	31,683	1.2	36	26,594	19,388	-7,207	-27%
4	23,823	1.2	28	16,059	15,521	-538	-3%
5	22,224	1.2	26	19,449	14,376	-5,073	-26%
6	25,771	1.2	30	21,843	16,524	-5,319	-24%
7	49,757	1.2	54	42,636	27,979	-14,657	-34%
8	97,708	1.5	98	80,784	69,289	-11,495	-14%
9	27,314	1.2	32	15,533	17,240	+1,707	+11%
Total	**316,538**		**349**	**254,608**	**205,630**	**-48,978**	**-19%**

Source: Village of Mamaroneck Building Department, 2014

As shown in Table 4, under full build-out conditions for the nine assembled properties, there would be a reduction in total impervious surfaces of 48,978 square feet, or 19%, from current conditions. In fact, for all but one of the assembled properties, there would be a reduction in impervious surfaces resulting from build-out under the proposed zoning, as compared with existing conditions. It is noted that this site (map ID #9), includes a portion of land along Mamaroneck Avenue that is undeveloped. This land is presently for sale and will likely be developed with some impervious surfaces whether or not the TOD zoning regulations are adopted. For the full impervious surfaces analysis, please see the Appendix.

It is noted that the unit yield in Table 4 is significantly higher than the yield in Table 3 (349 units vs. 265). Table 3 identifies the maximum development potential for the seven identified "soft sites" only, whereas Table 4 is based on nine assembled properties, and, therefore, includes a larger area with a resulting greater potential for development.

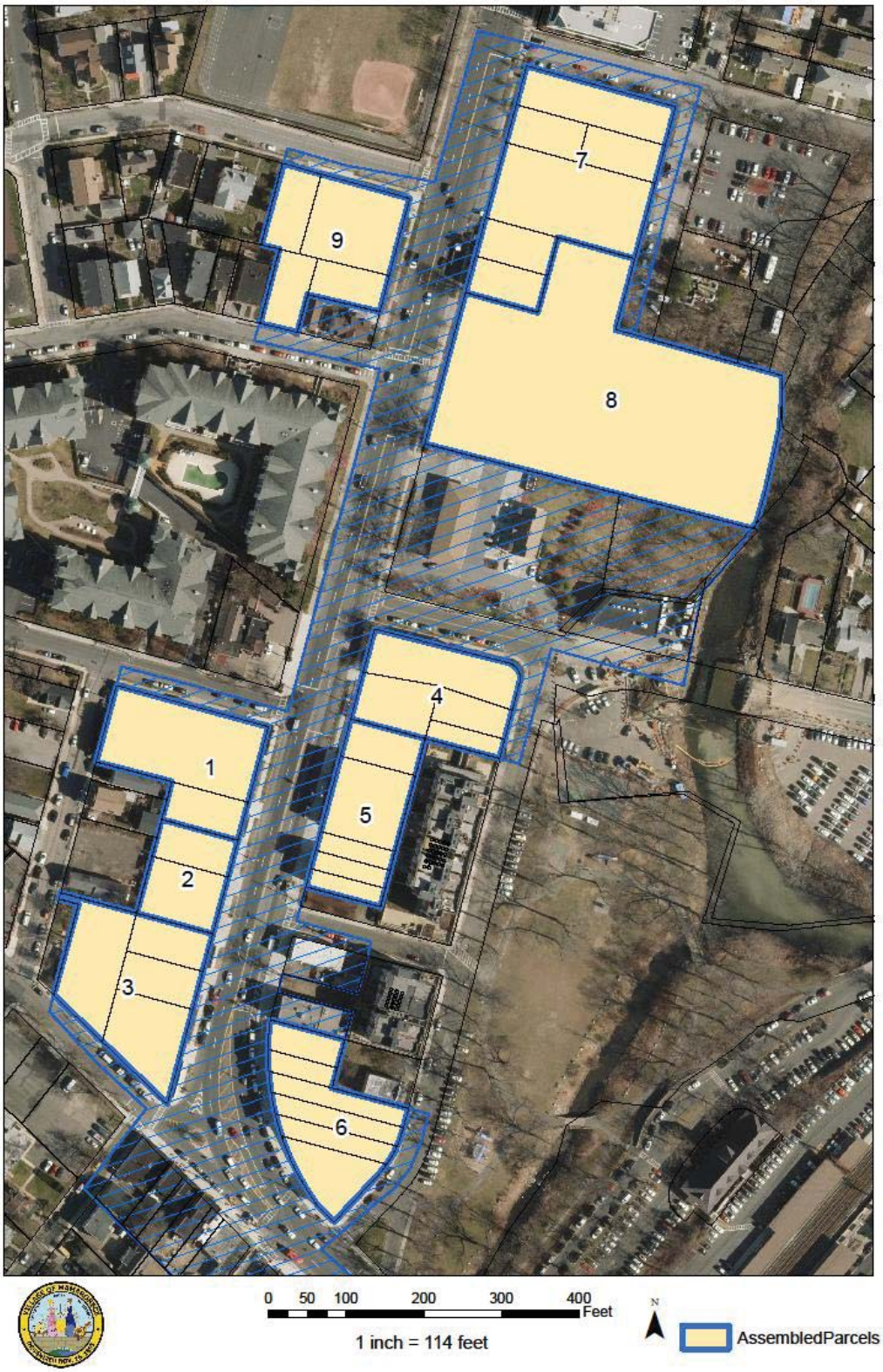

Figure 5: Conceptual Parcel Assemblages for Impervious Surface Analysis

Source: Village of Mamaroneck

QUESTION #13. IMPACT ON TRANSPORTATION: Proposed action may result in a change to existing transportation systems.

The proposed zoning regulations are not anticipated to result in the construction of paved parking area for 500 or more vehicles (13.b) or to degrade existing transit access (13.c) or existing pedestrian or bicycle accommodations (13.d). In fact, the proposed regulations are intended to promote transit and other non-vehicular transportation, by capitalizing on proximity to the Mamaroneck train station and the Central Business District and by promoting a pedestrian-oriented environment that encourages people to walk.

The proposed regulations have the potential to alter the present pattern of movement of people and goods (13.e), but such change is anticipated to be largely positive, given the focus on transit and non-vehicular transportation as discussed above. Development arising from the zoning changes may result in increased traffic, but any such increase is not expected to exceed the capacity of the existing road network (13.a).

To test these assumptions and respond to traffic and parking concerns raised at the public hearing, BFJ Planning conducted additional analysis of the potential for increased traffic and parking demand resulting from the proposed zoning regulations.

Traffic Impacts

As discussed above, the build-out analysis of the proposed TOD zoning changes in comparison to the existing zoning has shown that the proposed changes could result in a maximum increase of 69 apartment units. This assumes that all seven soft sites identified for potential development would be redeveloped and that they would be redeveloped to their maximum FAR potential. To estimate the potential traffic impacts of the zoning change, BFJ Planning applied the traffic generation rates surveyed at the apartment buildings located on the Hudson River waterfront near the Yonkers train station, which represents a comparable TOD project with recent (2012) parking data, to the 69 potential additional apartments. It is believed that the sites in the Mamaroneck study area will be very attractive to residents who commute by transit and want to live with a minimum number of cars, especially since the sites are not only close to a very active train station, but also within easy walking distance to a large number of retail stores and restaurants. To include a margin of safety and present a worst-case analysis, however, BFJ Planning has increased the Yonkers rates by 25% for the Mamaroneck sites. They are as follows (vehicle trips per apartment)

- AM Peak Hour: Inbound: 0.03 Outbound: 0.15
- PM Peak Hour: Inbound: 0.14 Outbound: 0.05

Applying the rates to the 69 apartments will yield the following additional vehicle trips generated in the TOD area:

- AM Peak Hour Inbound: 2 vehicle trips Outbound: 10 vehicle trips
- PM Peak Hour Inbound: 10 vehicle trips Outbound: 3 vehicle trips

These additional vehicle trips will be distributed primarily over three major street directions (as well as some of the more local streets):

- Mamaroneck Avenue north of the TOD area
- Mamaroneck Avenue south of the TOD area
- Old White Plains north of the TOD area

Even if all of the above vehicle trips (a maximum of 10 vehicles per direction) were to use only one of the three arterials/collectors above, the impacts would not be noticeable. The additional vehicles that could be generated by the TOD zoning will not have any impact on the local traffic conditions.

To conclude, it is important to realize that the TOD zoning change could generate an increase of up to 69 apartments only. In addition, because of its TOD characteristics (adjacency to commuter train station and proximity to retail and restaurants) these additional apartments have very low traffic generation rates, compared with typical apartments or with single-family homes. In addition, we should note that it is highly unlikely that all seven soft sites will redevelop to their maximum potential within the foreseeable future.

Parking Impacts

Recent parking surveys in TOD projects have confirmed that car ownership and parking demand statistics are lower than in traditional residential developments. Demographic trends show that there are more "millennials" who want to live without a car, as well as growing preferences of households with two wage-earners to move to TOD developments because they can live there with only one car. As discussed above, the Mamaroneck Village TOD area is adjacent to a very active commuter rail station and also within easy walking distance to a fairly large selection of retail and restaurant opportunities. Thus, we expect the same low vehicle ownership statistics as in other TOD developments.

Detailed parking occupancy surveys at the Hudson Park apartment buildings on the Yonkers waterfront and adjacent to the Yonkers train station showed that the average car ownership ratio for the three buildings was in the range of 1.08 to 1.12 per apartment. The three buildings included 62.5% of 1-bedroom apartments and 37.5 % of 2-bedroom apartments, with no studios. With visitor parking, these ratios increased to 1.13 to 1.18 vehicles per apartment, adding about 5% to the ownership rates. These surveys also showed that during the peak periods surveyed (three different surveys at 3 a.m.) only 88% of the assigned spaces were occupied on average (the percentages ranged from 84% to 95%). This means that there were 12% of the cars not parking in the garage. These would typically represent residents that were on business trips or vacation.

This information indicates that the typical parking zoning ratios used for residential developments can be reduced by about 10% if the parking spaces are not assigned or reserved.

Other municipalities in Westchester County (White Plains, New Rochelle, Yonkers) have adopted

parking ratios of 1 space per apartment (average apartment) for their downtown areas.

The proposed Mamaroneck TOD zoning includes the following parking requirements:

If the parking spaces are assigned:

- Studios: 1.00 space per unit
- 1-Bedroom Apartment: 1.25 spaces per unit
- 2-Bedroom Apartment: 1.50 spaces per unit
- 3-Bedroom Apartment: 1.75 spaces per unit

If the spaces are not assigned and are shared with other uses (for mixed-use development):

- Studios: 1.00 space per unit
- 1-Bedroom Apartment: 1.00 spaces per unit
- 2-Bedroom Apartment: 1.25 spaces per unit
- 3-Bedroom Apartment: 1.50 spaces per unit

The parking ratios under a shared parking regime are subject to Planning Board approval.

It should be noted that the above ratios are more conservative (higher) than the ratios surveyed in the Yonkers TOD area, and higher than the ratios adopted by other municipalities for their downtown areas. BFJ Planning recommends that future parking demands for TOD projects in Mamaroneck be monitored and that the above ratios be reduced as needed.

Shared Parking Analysis

In mixed-use projects that share the same parking facility, there is the additional opportunity to share the same spaces for the different uses, since not all uses peak at the same time. However, the shared parking credit must be based on a detailed shared parking analysis that takes into consideration the magnitude of each use in the project, the peak parking ratios for each use and the presence of the parked cars by time period. As mentioned above, residential TOD developments have lower car ownership ratios compared with typical residential developments; however, the percentage of vehicles leaving the development during working hours is also lower. This is due to the fact that many of the TOD residents commute by transit, but they still may own a car for evening or weekend activities (although on average they will own fewer cars than in a traditional development). Based on the surveys undertaken at the Hudson Park developments, we recommend that the shared parking analysis should assume that for the residential cars, 55% will still be parked at 10 a.m. and 50% between 3 p.m. and 4 p.m. Peak parking ratios for apartments occur during night hours from midnight to 5 a.m.

The table below shows the recommended shared-parking analysis for a hypothetical mixed-use development of 100 apartments and 15,000 square feet of retail development:

Table 5: Hypothetical Shared Parking Calculation

Use	Size	Peak Parking (individual peaks)		Weekday AM (10-11 AM)		Weekday Lunch (12-2 PM)		Weekday PM (3-4 PM)		Weekday Evening (7-8 PM)		Weekday Night (12-5 AM)		Saturday Midday (12-2 PM)	
		Ratio	Spaces	% Present	Cars	% Present	Cars	% Present	Cars	% Present	Cars	% Present	Cars	% Present	Cars
Retail	15,000 sf	3/1,000 sf	45	70%	32	85%	38	75%	34	50%	23	0%	0	100%	45
Residential	100 DUs	1.15/DU	115	55%	63	50%	58	50%	58	75%	86	100%	115	60%	69
Total			**160**		**95**		**96**		**91**		**109**		**115**		**114**
Savings from shared parking: 28%															

NOTES

1. The peak parking column represents the amount of parking that would have to be supplied if each use was built independently on its own lot. These ratios may be the ratios required by zoning or the ratios given for each use by the Institute of Transportation Engineers publication *Parking Generation, 4th Edition, 2010*, and adjusted for the modal split.
2. Percentages for the presence of each peak peaking demand by time period are based *on Shared Parking, 2nd Edition, 2005* by the Urban Land Institute; *Parking Generation, 4th Edition, 2010* by ITE; and on BFJ experience.
3. None of the spaces are assigned or reserved

Source: BFJ Planning, November 2014

Similar analyses would need to be submitted to the Planning Board for other sizes or uses of mixed-use projects. If needed, specific surveys can be undertaken to determine some of the critical factors needed for this analysis.

It is recommended that the Village encourage the establishment of shared cars (Zip Cars) near the train station or that it require the inclusion of shared-car spaces in developments with 50 or more apartments. Hudson Park in Yonkers includes four Zip Car spaces; they are used more than 65% of the time. Other residential developments are including shared cars in their developments because of the beneficial effect on car ownership and parking demand.

It is also noted that the 2013 TOD Zoning Study recommended several strategies, apart from the proposed zoning, to address existing traffic and parking issues in the study area, which were identified as part of the study's public outreach process. Each of these would require further study, outreach and potentially third-party approvals, and include:

- Implementing a pedestrian crosswalk at the Mamaroneck Avenue/Grand Street intersection;
- Undertaking a comprehensive transportation study of the Mamaroneck Avenue/Old White Plains Road intersection to address pedestrian safety;
- Negotiating a shared parking agreement with Strait Gate Church (and potentially other property owners) for off-street Village parking to serve shoppers;
- Placing pay parking stations/meters on Mamaroneck Avenue to promote turnover; and
- Looking at the potential to create a neighborhood residential permit parking zone.

QUESTION #17. CONSISTENCY WITH COMMUNITY PLANS: Proposed action is not consistent with adopted land use plans.

The proposed zoning regulations may result in increased development and redevelopment within the project area – which in fact is a goal of the regulations – but the land use components of such development is not anticipated to be different from, or in sharp contrast to, the current surrounding land use patterns (17.a). There are no changes proposed to allowable land uses within the project area. In addition, the proposed regulations are not expected to cause Mamaroneck's population to grow by more than 5% (17.b), nor is the study area located in an area characterized by low-density development that will require new or expanded public infrastructure (17.f).

The proposed zoning is not inconsistent with any County plans or other regional land use plans (17.d). The Westchester County Planning Board expressed "strong support" for the proposed regulations and found them consistent with the long-range planning policies in *Westchester 2025 – Context for County and Municipal Planning and Policies to Guide County Planning*, and the recommended strategies in *Patterns for Westchester: The Land and the People*.[7]

The proposed regulations are not inconsistent with local land use plans; they are inconsistent with the existing zoning provisions that are being proposed to change (17.c). During the public hearing, a concern was raised that the proposed zoning is not consistent with the 2012 Comprehensive Plan's suggestion that the Village consider "extending the C-2 zone along Mamaroneck Avenue, in the vicinity of the train station" as a means to achieve additional residential density to support the Central Business District (see Comprehensive Plan, p. 115).

The 2013 TOD Zoning Study itself is an outgrowth of the Comprehensive Plan recommendation regarding increasing the residential population in the vicinity of the train station. During the 2013 study process, it became clear in the public outreach sessions that the level of density allowed in the Central Business District (C-2) was not supported in the study area by residents of the neighborhood centered on Madison Street. This community input directly influenced the provisions of the proposed TOD Overlay Zone, which would provide for density bonuses, but – with the exception of the targeted grocery store bonus which can potentially increase FAR to 1.5 – will not increase density to the level currently allowed in the RM-3 or C-2 zones. No height increases are proposed.

Thus, while the proposed zoning regulations do not extend the C-2 zone as was suggested for consideration in the Comprehensive Plan, they will promote development and redevelopment along Mamaroneck Avenue, including residential development, which is in entirely keeping with the intent of the Plan's recommendation while respecting the neighborhood's preferences. It is also noted that the recommendation is not a firm one, but instead a suggestion for the Village to explore as part of further study (see the Comprehensive Plan Action Plan, p. 181). The TOD Zoning Study, which was accepted by the Board of Trustees in February 2013, represents that further study.

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[7] See October 20, 2014 letter from the Westchester County Planning Board.

The proposed zoning regulations are not anticipated to cause a change in the density of development that is not supported by existing infrastructure or is distant from existing infrastructure (17.e). As noted above, the regulations will not increase density beyond the maximum which is presently allowed in the C-2 Central Commercial district (FAR of 2.0). However, concerns were raised during the public hearing about the available sewer capacity in the project area to handle additional development.

The Village has accurate mapping of the sewer infrastructure within the TOD study area. The mains in the area range in size from 8 inches to 18 inches, and excess capacity exists in this existing sanitary sewer infrastructure.

The Village of Mamaroneck has completed a substantial amount of sewer upgrades to strengthen its infrastructure and enhance water quality. These include utilized cured-in-place pipe (CIPP) sanitary sewer lining. CIPP is a trenchless technology developed in 1971 by Insituform. The end product is a jointless, seamless, pipe-within-a-pipe that protects against spills, breaks and pipeline leakage. During the CIPP renewal process, a flexible fabric liner, coated with a thermosetting resin, is inserted into the existing pipeline and cured to form a new liner. The liner is typically inserted into the existing pipe through an existing manhole. The fabric tube holds the resin in place until the tube is inserted in the pipe and ready to be cured. Commonly manufactured resins include unsaturated polyester, vinyl ester and epoxy, with each having distinct chemical resistance to domestic wastewater.

The CIPP method can be applied to rehabilitate pipelines with defects such as cracks, offset joints and structurally deficient segments. The thermosetting resin material bonds with the existing pipe materials to form a tighter seal than most other trenchless techniques. The two primary methods of installing CIPP are winch-in-place and inversion-in-place. These methods are used during installation to feed the tube through the pipe. The winch-in-place method uses a winch to pull the tube through the existing pipeline. After being pulled through the pipeline, the tube is inflated to push the liner against the existing pipe walls. The more typically applied inversion-in-place method uses gravity and either water or air pressure to force the tube through the pipe and invert it, or turn the tube inside out. This process of inversion pressure the resin-coated tube against the walls of the existing pipe. During both the winch-in-place and inversion-in-place methods, heat is then circulated through the tube to cure the resin to form a strong bond between the tube and the existing pipe. A typical CIPP process by the water-inversion method is shown in Figure 6.

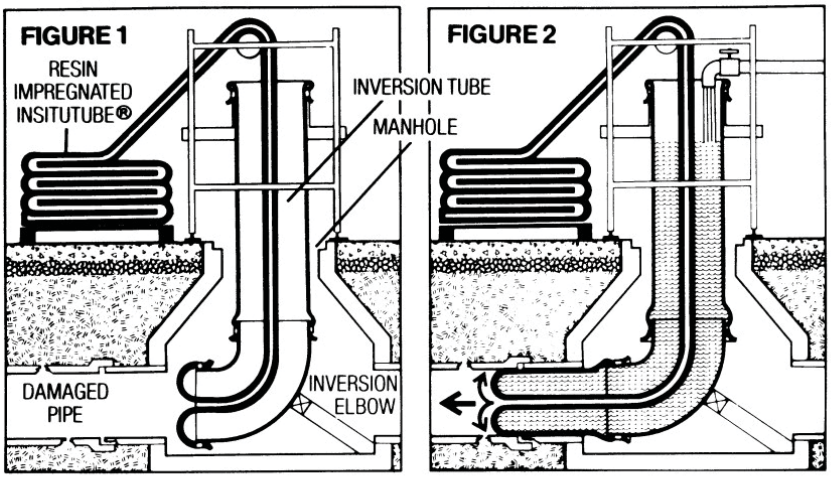
Under both CIPP methods, as the liner expands to fit the new pipe, dimples occur in the line where the laterals exist. Dimples in the line can be found by TV inspection or robotic equipment. In some applications, a Tee is placed at the junction before rehabilitation begins. Tees enable junctions to be easily identified and modified after the pipeline has been re-lined. Laterals are typically reinstated with robotic cutting devices, or, for large-diameter pipes, by manually cutting the liner.

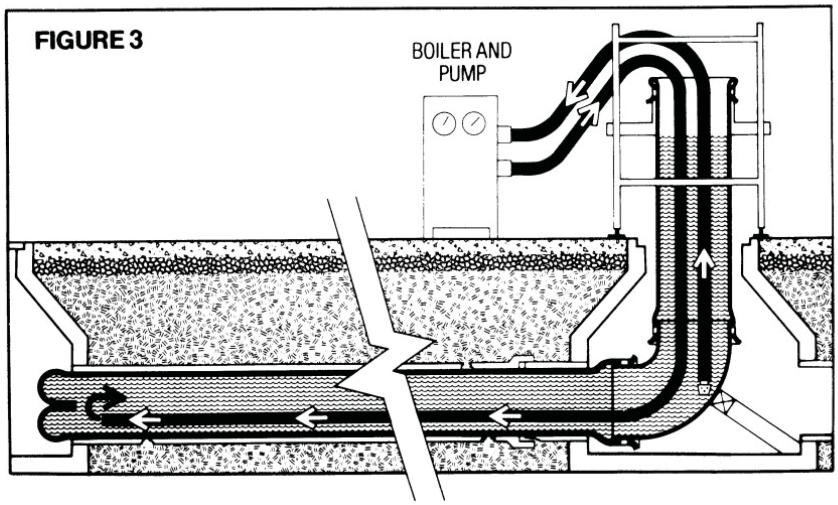
How Insituform® is installed

Figure 1. A special needled felt reconstruction tube, Insitutube®, coated on the outside, is custom engineered and manufactured to fit the damaged pipe exactly. It is impregnated with a liquid thermosetting resin and lowered into a manhole through an inversion tube. One end of the Insitutube is firmly attached to the lower end of the inversion tube elbow.

Figure 2. The inversion tube is then filled with water. The weight of the water pushes the Insitutube into the damaged pipe and turns it inside out, while pressing the resin impregnated side firmly against the inside walls of the old pipe. The smooth coated side of the Insitutube becomes the new interior surface of the pipe.

Figure 3. After the Insitutube is inverted through the old pipe to the desired length, the water is circulated through a boiler. The hot water causes the thermosetting resin to cure within a few hours, changing the pliable Insitutube into a hard, structurally sound, pipe-within-a-pipe, Insitupipe™. It has no joints or seams and is usually stronger than the pipe it replaced. The ends are cut off and the inversion tube and scaffolding are removed. Normally, there are no messy excavation repairs to be made since most work is done without digging or disruption.





Mamaroneck TOD Zoning, EAF Part 3 Figure 6: Typical Cured-in-Place Pipe (CIPP) Process

Source: Insituform

Trenchless sewer rehabilitation methods are now routinely applied to wastewater collection system improvement projects in the United States and many other countries. Trenchless sewer rehabilitation has been successfully applied by both large municipalities such as New York City, Los Angeles, Boston, Miami and Houston, and smaller municipalities such as Baton Rouge, Louisiana; Madison, Wisconsin; and Amarillo, Texas.

While trenchless techniques may be applied to rehabilitate existing pipelines in a variety of conditions, they are particularly valuable in urban environments where construction impacts are especially disruptive to businesses, homeowners and automotive and pedestrian traffic. Other underground utilities and existing infrastructure are an obstacle in the traditional dig-and-replace method, and trenchless techniques are widely applied when these are present. Most trenchless techniques are applicable to both gravity and pressure pipelines. Many trenchless methods are capable of performing spot repairs as well as manhole-to-manhole lining.

For most applications, trenchless sewer rehabilitation techniques require less installation time, and, therefore, less pump-around time, than traditional dig-and-replace methods. Installation time can be critical in decided between trenchless sewer rehabilitation methods and dig-and-replace methods.

By reducing I/I levels in the collection system, trenchless rehabilitation projects can assist communities in complying with the EPA's Clean Water Act, SDPES Permits, County Sewer Acts and other applicable regulations, and thereby protect the aquatic integrity of receiving water bodies from potentially high pollutant concentrations by reducing SSOs. In addition to potential improvements in receiving water bodies, trenchless sewer rehabilitation requires substantially less construction work than traditional dig-and-replace methods. In wetland areas and areas with established vegetation, construction influences can be especially harmful to the plant and aquatic habitat. Underground utility construction can disrupt people living and working in areas near the construction zone. Trenchless sewer rehabilitation, with the potential to reduce surface disturbance over traditional dig-and-replace methods, can reduce the number of traffic and pedestrian detours, spare tree removal, decrease construction noise and reduce air pollution from construction equipment.

As Table 6, below, indicates, a total of 2,897 linear feet of sewers in the overlay zone were CIPP lined in 2006 and 2014. This equates to 52% of the sanitary sewer mains within the overlay.

Table 6: Cured-in-Place Pipe (CIPP) Sewer Lining Within TOD Overlay District

Pipe Width	Street	CIPP Lined	Length
8”	Mamaroneck Ave- Between Waverly & Center	2014	295 LF
8”	Center Ave	2014	313 LF
12”	Waverly Ave	2014	340 LF
10”	Mamaroneck Ave (short)	2014	16 LF
10”	Mamaroneck Ave- Between Waverly & Van Ranst	2014	75 LF
8”	Mamaroneck Ave- Between Old White Plains Rd & Sheldrake Pl	2006	231 LF
10”	Sheldrake Pl	2006	268 LF
10”	Mamaroneck Ave (short)	2006	40 LF
8”	Mamaroneck Ave- Between Mt Pleasant & Hoyt	2006	103 LF
10”	Mamaroneck Ave- Between Hoyt & Sheldrake River	2006	139 LF
10”	Mamaroneck Ave- Between Sheldrake & Van Ranst	2006	197 LF
8”	Grand St- Between Madison St & Mamaroneck Ave	2014	222 LF
8”	Crosses Mamaroneck Ave near Grand St	2014	64 LF
8”	Elliot Ave- Between Mamaroneck Ave & Ralph Ave	2014	244 LF
10”	Mamaroneck Ave- Between Sheldrake Pl & Grand St	2014	86 LF
10”	Mamaroneck Ave- Between Grand St & Jefferson Ave	2014	265 LF
Total			**±2,900 LF**

Source: Village of Mamaroneck, November 2014

A total of 2,668 linear feet of sewers in the TOD Overlay District have not yet been CIPP lined in recent years. This equates to 48% of the sanitary sewer mains within the overlay (see Table 7, below). Funding for sanitary sewer main rehabilitation is appropriated in the Village’s capital budget. The Mayor and Board of Trustees have allocated funding for annual CIPP lining. Based on current contractor bid prices, the approximate construction cost to complete the remaining CIPP sanitary sewer lining within the TOD area is $90,000.

Table 7: Sewers To Be CIPP Lined Within TOD Overlay District

Pipe Width	Street	Length
18”	Crosses Mamaroneck Ave Near Jefferson Ave	63 LF
8”	From 890 Mamaroneck Ave to Nostrand Ave	157 LF
8”	Nostrand Ave- Between Mamaroneck Ave & Mamaroneck River	499 LF
12”	Behind A&P	313 LF
12”	Behind Hess	277 LF
18”	Jefferson Ave- Near 180 Jefferson Ave	53 LF
18”	Jefferson Ave- Before Bridge	74 LF
18”	Van Ranst- Between Jefferson Ave & Columbus Park Parking Lot	162 LF
18”	Jefferson Ave- Between Van Ranst & Mamaroneck Ave	224 LF
18”	Jefferson Ave & Mamaroneck Ave	35 LF
8”	Mamaroneck Ave- Between Elliot Ave & Nostrand Ave	255 LF
8”	Mamaroneck Ave- Between Elliot Ave & New St	243 LF
8”	Mamaroneck Ave- Between New St & Jefferson Ave	56 LF
8”	Mamaroneck Ave- Between New St & Jefferson Ave	256 LF
Total		**±2,670 LF**

Source: Village of Mamaroneck, November 2014

A significant portion of the sanitary sewer mains surrounding the TOD area received CIPP linings in 2014 (see Table 8). Most of the sanitary sewers in the TOD area and adjacent areas are connected to a Westchester County Department of Environmental Facilities sanitary sewer trunk line. Completing CIPP lining on the remaining sanitary sewer mains in the TOD area will result in rehabilitation of nearly the entire Washingtonville sewershed.

Table 8: 2014 CIPP Sewer Lining Within Adjacent Neighborhoods to the TOD Overlay District

Street	Pipe Width	Length
Grand St	8”	1,308 LF
Grand St (Between Mamaroneck Ave & Old White Plains Rd)	8”	477 LF
Washington St	8”	933 LF
Madison St	8”	942 LF
Madison St (Between Grand St & Old White Plains Rd)	8”	303 LF
Center Ave	8”	920 LF
Waverly Ave (to Sheldrake River)	12”	992 LF
Plaza Ave	Three 8” lines Six 10” Lines	1,097 LF
Old White Plains Rd	8”	909 LF
Avalon	10”	474 LF
New St	8”	523 LF
Elliot Ave	8”	387 LF
Underhill Ave (Msg Goodwin)	8”	533 LF
Ralph Ave- Between Gertrude Ave & New St	Three 10” lines One 8” Line	756 LF
Total		**±10,550 LF**

*Sewer lines in RM-3 have been highlighted.

Source: Village of Mamaroneck, November 2014

It is noted that the sanitary sewer CIPP lining is necessary and will proceed regardless of whether the proposed zoning regulations are adopted. Any application for new construction or significant redevelopment will have to show that sewer capacity is available, or upgrade the line as needed as part of the application approval. Thus, sewer capacity is not an issue, particularly given the limited potential residential development that has been identified as resulting from the proposed zoning (69 residential units).

Finally, it is not anticipated that the proposed regulations would induce secondary development impacts not included in the proposed action (17.g). The proposed action is generic, and therefore, the environmental analysis under SEQRA has evaluated potential area-wide impacts, including economic and fiscal impacts, effects on the number of school children and traffic. Therefore, any secondary development impacts are believed to have been addressed.

In general, where a rezoning is not related to a specific project, and future development is, therefore, speculative, the Lead Agency need not speculate about specific projects in undertaking its SEQRA review. However, to assist the Board of Trustees in its environmental review and to respond to concerns raised during the 2013 TOD Zoning Study and the public hearing during the zoning process, this Part 3 has analyzed potential development on a number of soft sites. This analysis, which, therefore, goes beyond what is required by SEQRA, is meant to be illustrative of the type of development and redevelopment that could occur as a result of the proposed regulations.

Any future development resulting from the zoning changes will be subject to its own environmental review under SEQRA. During the public hearing, concerns were raised about whether this future review would constitute inappropriate segmentation. According to the SEQR Handbook, segmentation is defined as the division of the environmental review of an action so that various activities or stages are addressed as though there were independent, unrelated activities needing individual determinations of significance. Except in special circumstances, considering only a part, or segment, of an overall action is contrary to the intent of SEQR. Reviewing the "whole action" is an important principal of SEQR. Interrelated or phased decisions should not be made without considerations of their consequences for the whole action. Each lead agency should consider the environmental impacts of the entire action before approving, funding or undertaking any specific element of the action.[8]

However, there are cases where a segmented review is justified. As noted in the SEQR Handbook, the following circumstances, **when considered together**, may warrant segmentation when a project has several phases:

- Information on future project phase(s) is too speculative;
- Future phase(s) may not occur;
- Future phase(s) are functionally independent of current phase(s)

The proposed zoning regulations would meet all of the above criteria because any future development that may or may not occur as a result of the regulations is completely speculative and dependent on a variety of factors including the individual decisions of property owners, the real estate market and overall economic conditions. Any such development – if it occurs at all – is functionally independent of the proposed regulations that are the subject of this EAF.

[8] http://www.dec.ny.gov/permits/45577.html

Transit Oriented Development (TOD): Impervious Surfaces Analysis

Proposed Zoning Code Regulations that Limit Impervious Coverage

- Open Space Requirement: 150 square feet per unit.
- Setbacks: 25 feet in rear, combined 20 feet for sides, 5 feet for frontage.
- Building footprint. Proposed maximum footprint coverage is 50% of the property.
- Parking Regulations. Retail requirements remain the same and are available in more detail in §342-56 of the zoning code.

Retail	**Supermarket**	**1 Bedroom**	**2 Bedroom**
3 Spaces/1,000 Square Feet *Based on 3000 Square Feet of Retail*	8.8 Spaces/1,000 Square Feet *Based on 36,000 Square Foot Supermarket*	1 Space/Unit in mixed use development	1.25 Spaces/Unit in mixed use development

Assumptions

- Parcel assembly is necessary. A total of 35 parcels have been assembled into 9 larger parcels for the purposes of illustrating the calculations.
- Potential developments will have 30% permeable surfaces including but not limited to driveways, uncovered parking, walkways, patios, etc. Green roofs are utilized for 10% of the usable open space requirement as defined in § 342-3.
- Hypothetical developments have used all available incentives and are using maximum FAR and lot coverages when possible.
- A distance of fifty feet from the Mamaroneck River is required and maintained as open space.
- 3,000 square feet of the ground floor is retail. One-half of the building footprint is covered parking. In the case of current A & P site 25,000 square feet of the ground floor is reserved for a full-service supermarket.
- Apartment sizes range from 1,000-1,200 square feet. This leaves room for building corridors and utilities.
- For the purposes of this report we assumed a 50/50 split between 1 and 2 bedroom apartments.
- Parking is set at 350 square feet per required spot. This includes space for parking aisle widths.
- Smaller (<±11,000 square feet) parcels that are in the study area may have a lower opportunity for redevelopment and therefore, have been excluded from the calculations analyzing the developable areas.
- The impervious surfaces within street Right-of-Ways have been excluded from this study.
- Supermarket parking set at 4/1,000 square feet based on industry standards. **Varies from current code.

Existing Conditions – Within TOD Overlay

Total TOD Parcelized Area: 542,592 square feet

Total Impervious Area: 77% or 415,486 square feet

Existing Conditions - Developable Properties (9 Assembled Properties)

Total Area: 316,538 square feet

Total Impervious Area: 80% or 254,608 square feet

Potential TOD Build-Out Conditions – Within TOD Overlay

Total TOD Parcelized Area: 542,592 square feet

Total Impervious Area: 68% or 366,508 square feet

Anticipated Reduction of Impervious Area within TOD Overlay: 13% or 48,978 square feet

Potential TOD Build-Out Conditions - Developable Properties (9 Assembled Properties)

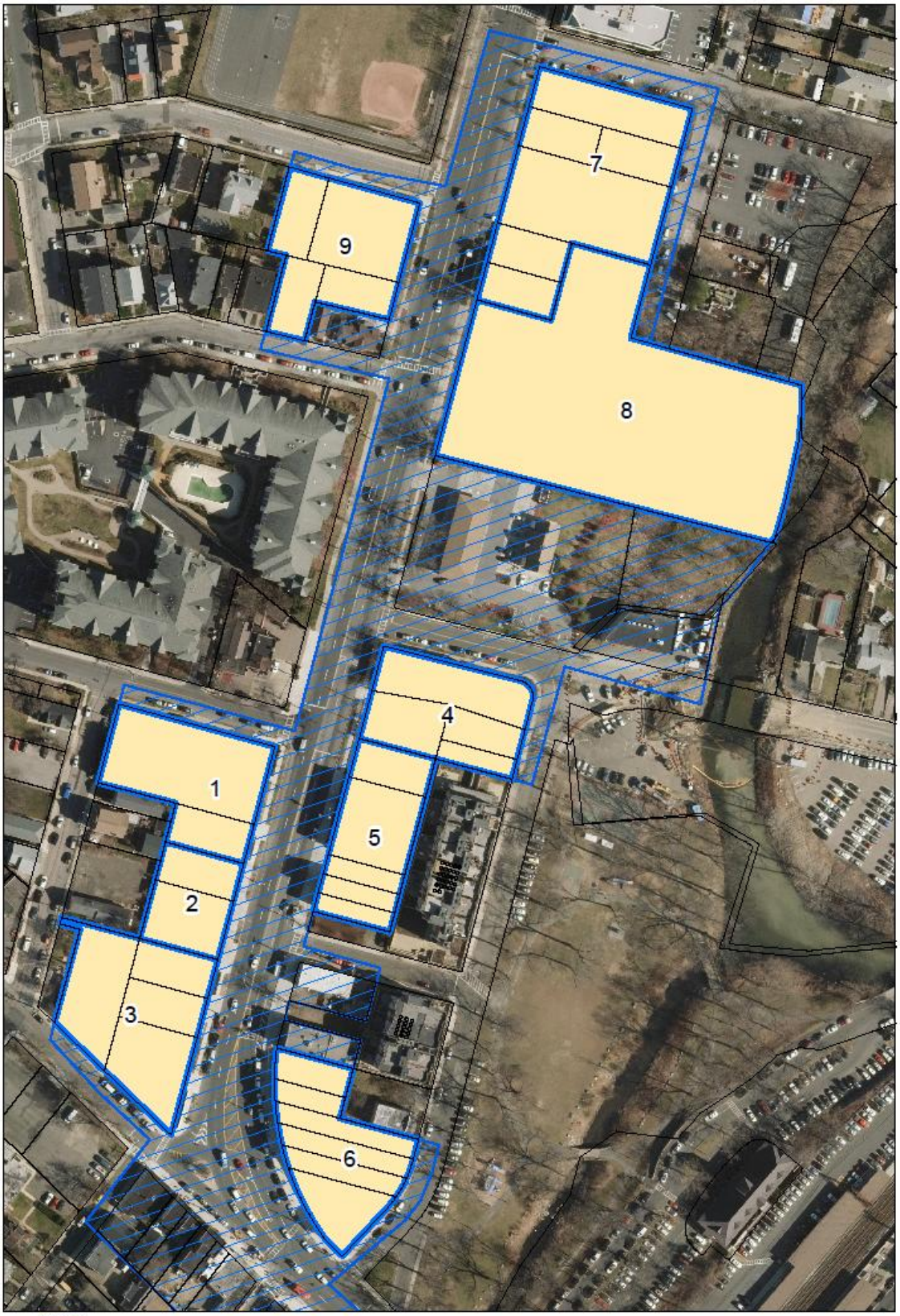
Total Area: 316,538 square feet

Total Impervious: 65% or 205,630 square feet

Anticipated Reduction of Impervious Area on Developable Properties: 19% or 48,978 square feet

Map ID	Parcel Area	Existing Impervious – In Square Ft	Potential Impervious— In Square Ft	Difference— In Square Ft	PCT Reduction	PCT Coverage	FAR	# Units
1	25,551	21,382	16,452	4,930	23%	39%	1.2	30
2	12,707	10,328	8,862	1,466	14%	39%	1.1	15
3	31,683	26,594	19,388	7,207	27%	38%	1.2	36
4	23,823	16,059	15,521	538	3%	39%	1.2	28
5	22,224	19,449	14,376	5,073	26%	38%	1.2	26
6	25,771	21,843	16,524	5,319	24%	39%	1.2	30
7	49,757	42,636	27,979	14,657	34%	36%	1.2	54
8	97,708	80,784	69,289	11,495	14%	37%	1.5	98
9	27,314	15,533	17,240	-1,707	-11%	38%	1.2	32
Total	316,538	254,608	205,630	48,978	19%			349

TOD: Potential Assemblages



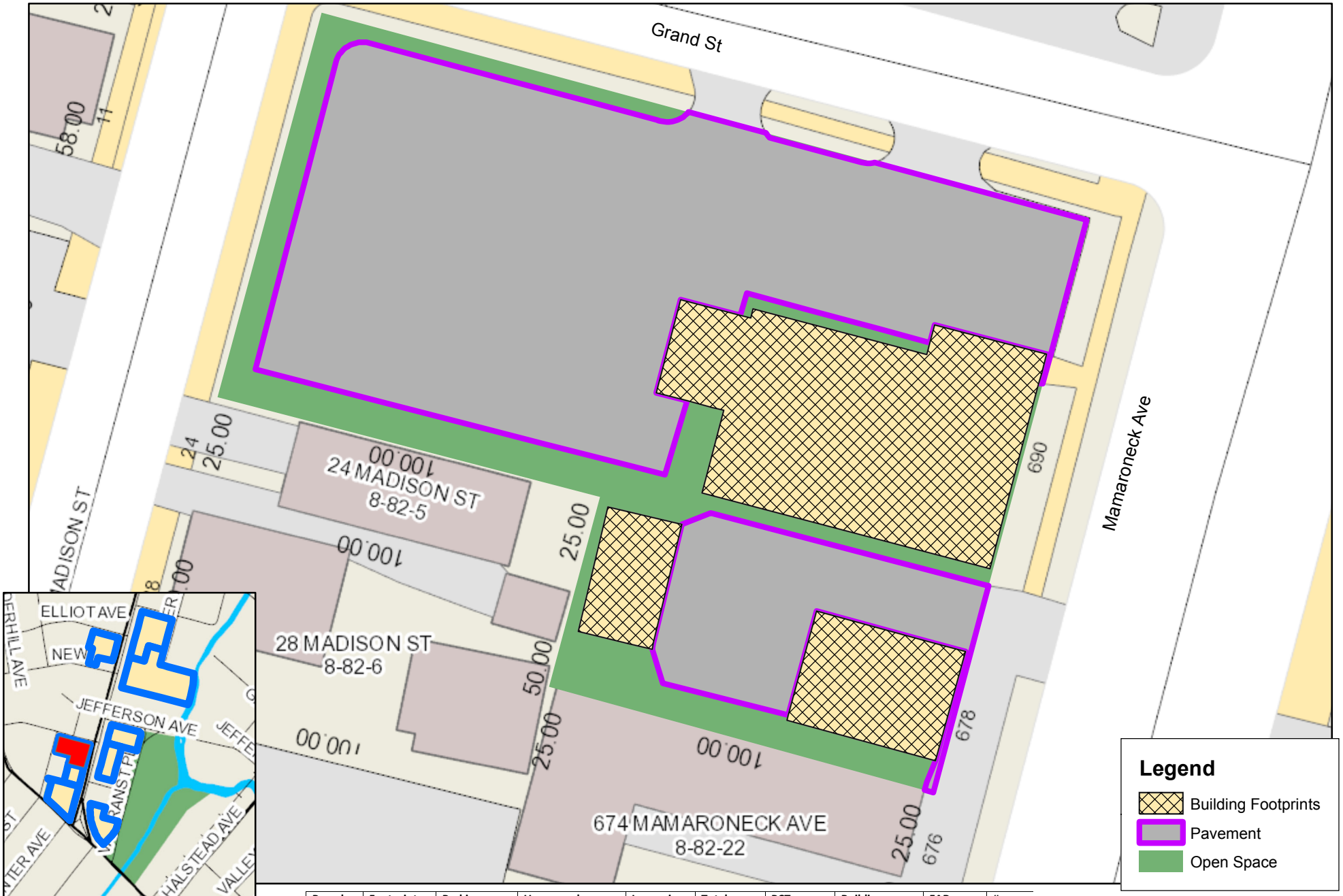
0 50 100 200 300 400 Feet

1 inch = 114 feet

N

AssembledParcels

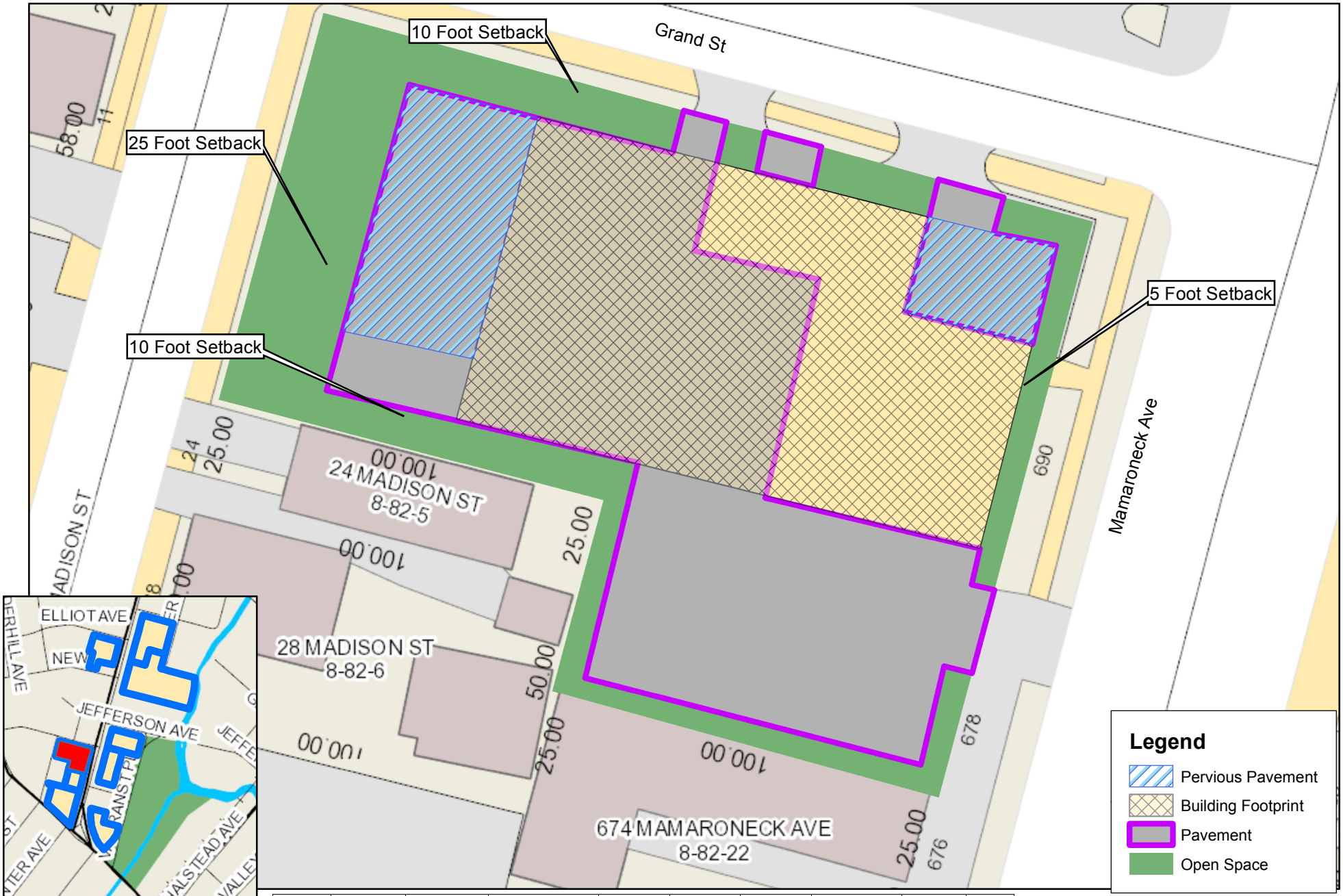
TOD Impervious Analysis Sample: Assemblage One
Existing Conditions



Parcel Area	Footprint	Parking Requirement	Uncovered Parking/Pavement	Impervious Pavement	Total Impervious	PCT Impervious	Building Coverage*	FAR	# Units
25,551	6,149	NA	15232	6,502	21,381	84%	24%	.3	NA

*Building Coverage is the percentage of the lot that is covered by the building.

TOD Impervious Analysis Sample: Assemblage One
Potential Development



Parcel Area	Footprint	Parking Requirement	Uncovered Parking/Pavement	Impervious Pavement	Total Impervious	PCT Impervious	Building Coverage*	FAR	# Units
25,551	9,950	14,903	9,928	6,502	16,452	64%	39%	1.2	30

*Building Coverage is the percentage of the lot that is covered by the building.

Art Gallery
Seattle Coffee
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Art Gallery
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SCHOOL STREET

GEO-HYDRO Inc.

22 Christinalynn Drive
Monroe Township, NJ 08831-1996
Telephone: (908) 420-3854
Joseph_Ruggeri@comcast.net

November 14, 2014

Village of Mamaroneck
Village Hall (Third Floor)
169 Mt. Pleasant Avenue
Mamaroneck, New York 10543

Attention: Mr. Anthony R. Carr, P.E., CFM
Village Engineer

Subject: Hydrogeological Evaluation
Proposed Transit-Oriented Development (TOD) Zoning Change
Village of Mamaroneck, Westchester County, NY

Dear Mr. Carr:

Geo-Hydro Inc. is pleased to submit this Hydrogeological Evaluation of the Transit-Oriented Development (TOD) Zoning changes, which are being proposed within an area of the Village of Mamaroneck, Westchester County, New York.

PROJECT OVERVIEW

Over the last few years the Village of Mamaroneck has been working on a community-based Transit-Oriented Development (TOD) zoning study resulting in a draft zoning ordinance to incentivize affordable housing, provide quality public space and link Mamaroneck's Washingtonville neighborhood and adjacent retail uses to the Central Business District. The overall purpose of the TOD Zoning Study was to support TOD planning efforts in the community, build local support through citizen participation including neighborhood representatives as well as nonprofit groups, religious organizations, property owners and developers, foster more walkable communities and support mixed-use development with both affordable and market-rate units and energy efficient, green building design. The outcome of the study is a set of draft TOD zoning regulations for potential adoption into the Village Code.

The TOD zoning study area covers approximately 80 parcels on about 35 acres in the north-central portion of the Village of Mamaroneck. In general, the area is bounded on the north by I-95 (New England Thruway), the Metro-North railroad tracks on the south, the Sheldrake River and I-95 on the west and Mamaroneck River on the east. The study area was delineated to capture a generalized half-mile radius around the Mamaroneck train station, as consistent with the standard definition of a transit-oriented development, centered along Mamaroneck Avenue and the Washingtonville neighborhood.

An existing unconfined aquifer is located beneath Mamaroneck Avenue and within the general area of the proposed TOD zoning changes. This report will provide basic information on aquifers and how they work, a brief discussion of the characteristics of the Mamaroneck Aquifer which is located below Mamaroneck Avenue, an evaluation of the Village of Mamaroneck proposed TOD Zoning changes and the potential correlation of the development/zoning changes in impervious surface coverage on the existing aquifer system and a conclusion on the assessment of the TOD Zoning and impervious area surface coverage change in relation to the Mamaroneck aquifer.

AQUIFER BASICS

An aquifer is an underground layer of water-bearing permeable and porous rock or unconsolidated materials (gravel, sand, or silt) in which groundwater can easily move or flow. The study of water flow in aquifers and the characterization of aquifers is called hydrogeology. As the water gathers in the spaces between the soil/rock, it eventually builds up to a layer of groundwater below the surface and fills to its water table, or the upper limit of the collected water. The area below the water table is the zone of saturation. Unconsolidated sandy aquifers function as natural filters that trap sediment and other particles (like bacteria) and provide natural purification of the ground water flowing through them.

There are the two basic types of aquifers; confined and unconfined. The diagram to the right indicates the typical flow directions in a cross-sectional view of a simple confined or unconfined aquifer system.

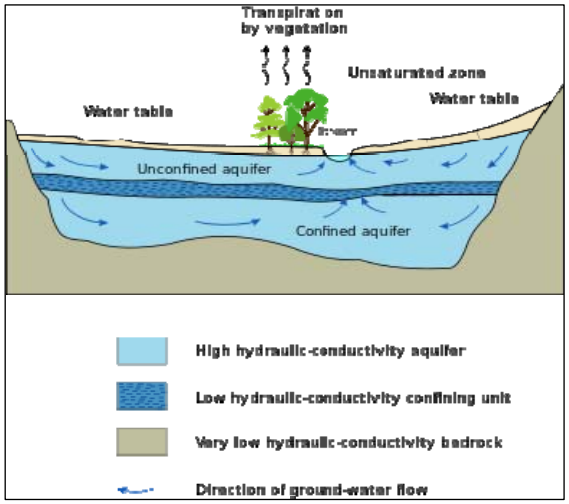

Figure 1: Illustration of Unconfined & Confined Aquifers

Unconfined aquifers are those into which water seeps from the ground surface directly above the aquifer. Unconfined aquifers are sometimes also called water table or phreatic aquifers, because their upper boundary is the water table or phreatic surface. In unconfined aquifers, water always flows from high points to low points because of gravity. Unconfined aquifers are often in direct hydraulic connection with surface water bodies. Unconfined aquifers are not "protected" by an impermeable layer. This means that if anything leaks or spills into the soil above the unconfined aquifer, it will seep into the water.

Confined aquifers are those in which a less permeable soil/rock layer, termed a confining unit, prevents water from seeping into the aquifer from the ground surface located directly above. Instead, water seeps into confined aquifers from farther away where the impermeable layer doesn't exist.

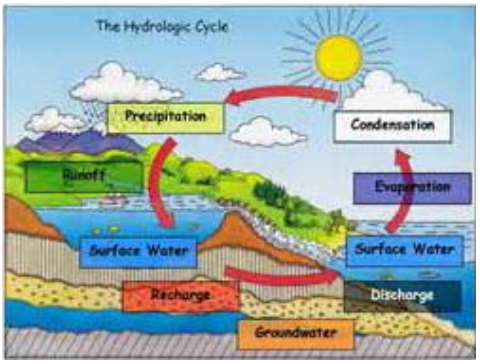

Figure 2: The Hydrologic Cycle

Precipitation eventually adds water (recharge) into the porous material of the aquifer. The hydrologic cycle begins with precipitation in the form of rain, snow, sleet, or hail falling on the surface of the earth. As precipitation falls, some of it may evaporate directly into the atmosphere from bodies of water, and a portion may be intercepted by vegetation. The remainder reaches the ground where it can enter the soil by a

process called infiltration. When the precipitation rate exceeds the infiltration rate, excess water builds on the soil surface and moves by overland flow called surface runoff. Downward movement of water through the soil is referred to as percolation. Recharge is the process in which water percolating through the soil replenishes groundwater.

VILLAGE OF MAMARONECK AQUIFER

The Village of Mamaroneck Aquifer is considered to be an unconfined aquifer. The most productive aquifers consist of unconsolidated deposits of sand and gravel that occupy major river and stream valleys or lake plains and terraces. Municipalities throughout New York have been built over many of these aquifers because they typically form flat areas that are suitable for development and generally provide an ample groundwater supply.

The Village of Mamaroneck Aquifer lies within the New England Uplands physiographic province. The aquifer is not considered to be a primary water supply aquifer but rather a principal aquifer since it is not being used for water supply. It is an existing unconfined aquifer system that is about 280-acres in area size and generally extends in an approximate northeasterly direction from about Fenimore Road in the Village of Mamaroneck to about West Street in the Town of Harrison. Base flow to the Sheldrake River and the Mamaroneck River is provided by this aquifer, and most likely upwards through the stream bottom from the local bedrock aquifer. The aquifer boundary was derived by the USGS[1] from hydrogeologic and surficial geology maps, numerous well records and interpretation of topographic maps. The Village of Mamaroneck Aquifer is located immediately beneath Mamaroneck Avenue within the area of the proposed TOD zoning changes, and receives recharge through precipitation.

Figure 3: NYSDEC GIS Location of Mamaroneck Aquifer

The Mamaroneck aquifer is comprised of unconsolidated Quaternary sand and gravel sediments, has a high transmissivity rate and has an estimated thickness of greater than 10-feet. Potential yields that could be obtained from properly constructed wells screened and developed in this aquifer are estimated to be at a rate of more than 100 gallons per minute. Based upon an interpretation of a USGS groundwater well[2] that is located within the project area just off of Jefferson Avenue, available two (2) feet topographic contour mapping from County of Westchester and stream bed elevations of the Mamaroneck River and the Sheldrake River from the effective FEMA Flood Insurance Study (FIS) profiles, the water table or top of the aquifer level within the area of the TOD zoning change has been estimated to be within a range of elevations from approximately 10-feet to 13-feet NAVD88.

Below the Mamaroneck Aquifer is a bedrock aquifer composed of the Hartland formation, a Cambro-Ordovician Amphibolite and Pelitic Schist. This aquifer is estimated to be up to 4000 feet thick (1200m). Groundwater flow is under semi-confined conditions in the bedrock aquifer to a depth of about 60 feet

[1] "Potential Yields of Wells in Unconsolidated Aquifers in Upstate NY-Lower Hudson Sheet" map published in 1988 on a cooperative basis between the USGS and NYSDEC

[2] USGS 405722073441601 WE 143 http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=405722073441601

beneath top of aquifer. Below this, confined conditions prevail. Dominant groundwater flow is more regional and primarily within fractures and joint sets intersecting the fractures.

The National Oceanic and Atmospheric Association (NOAA) has identified a thirty-year average total rainfall/precipitation of 49.9 inches per year for the Central Park region of New York City. It is estimated that at least 20 inches per year of precipitation would reach the unconfined Mamaroneck aquifer through infiltration under existing conditions, accounting for evapotranspiration and surface water runoff in this developed area.

TOD ZONE/IMPERVIOUS COVERAGE SURFACE CHANGE & MAMARONECK AQUIFER

A detailed impervious surface coverage analysis comparing the existing zoning conditions and the potential TOD build-out conditions for both the developable properties and the properties within the TOD overlay area has been developed by the Village of Mamaroneck planning department. The following Table 1 provides a summarization of the results of the analysis for the impervious surface changes.

Table 1
Summary of Results of TOD Impervious Surface Analysis
Village of Mamaroneck Planning Department

Condition	Property Parcel	Total Parcel Area (ft^2)	Total Impervious Area (ft^2)	Impervious Area Reduction
Existing	Within TOD Overlay	542,592	415,486	0.0 ft^2/0%
	Developable Properties	316,538	254,608	0.0 ft^2/0%
Potential TOD Build-Out	Within TOD Overlay	542,592	366,508	48,978 ft^2/13%
	Developable Properties	316,538	205,630	48,978 ft^2/19%

Based upon the results of the Village of Mamaroneck planning department impervious surface coverage analysis, it has been determined that the future potential build-out of the area will result in an overall reduction of 48,978 square-feet of impervious surface coverage. Therefore, an increase in groundwater percolation within this 48,978 square-feet area will result.

Given the reduced impervious surface coverage and the known annual precipitation for the area, preliminary estimations reveal an annual decrease in the amount of surface water runoff with an increase in healthy water table recharge of up to 1.5 million gallons. This increase in the annual healthy water table recharge is equivalent to the volume of water required to fill up to 2.5 Olympic size swimming pools.

CONCLUSIONS

As noted previously, precipitation recharges the Village of Mamaroneck aquifer system. Development or more specifically the introduction of impervious surface area coverage will generally limit the amount of water that can recharge an aquifer system, and could lead to a lower water table within the Village of Mamaroneck Aquifer.

It has been determined that the future potential build-out as a result of the proposed TOD Zoning changes would result in a reduction of 48,978 square-feet of impervious area coverage. As the Mamaroneck Aquifer is an unconfined aquifer, it is dependent upon recharge of its groundwater via precipitation and infiltration through the pervious ground surface areas. Therefore, based upon the findings of our technical evaluation, the proposed TOD Zoning changes would not have a negative

impact on the existing Mamaroneck aquifer when comparing to the existing conditions. In fact, due to the fact that the future amount of pervious surface coverage could increase, the proposed TOD Zoning changes will result in a longer-term positive impact on the condition of the existing Mamaroneck Aquifer, with greater infiltration of fresh water precipitation and less surface water runoff and overland flow.

We appreciate the opportunity to be of continued assistance to the Village of Mamaroneck. If you have any questions on this hydrogeological evaluation, please do not hesitate to contact me at (908) 420-3854, or by e-mail at Joseph_Ruggeri@comcast.net.

Respectfully submitted,

Geo-Hydro Inc.

Joseph Ruggeri, P.E., CFM
Project Engineer

Joseph Marchesani
Project Hydrogeologist