

ENGINEERING REPORT

MUNICIPAL STORMWATER MANAGEMENT PLAN

Borough of Brielle
Monmouth County, New Jersey

H2M Project No. BRLL2103

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Prepared for:

Borough of Brielle
601 Union Lane
Brielle, NJ 08730

Prepared by:

H2M Associates, Inc.
4810 Belmar Boulevard, Ste. 201
Melville, New York 11747



architects + engineers

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1.0 INTRODUCTION

The Borough of Brielle ("Borough") has consulted with H2M Architects and Engineers ("H2M") to update their Municipal Stormwater Management Plan (MSWMP) for the Borough. This MSWMP outlines a strategy for Brielle to alleviate the Borough's stormwater management issues through the incorporation of more stringent stormwater policies within their Land Use Regulations. The update of this MSWMP is required by N.J.A.C 7:8, which was amended on March 2, 2020.

This plan also includes a Stormwater Control Ordinance (Appendix A). Following the adoption of this MSWMP, the Borough has also updated their Stormwater Control Ordinance to apply with the goals of this plan and the State's updated stormwater management design and performance standards to include "Major Development" applications. Including individual development as well as multiple unit developments that individually or collectively result in; the disturbance of one or more acres of land since February 2, 2004; (1) the creation of one-quarter acre or more of "regulated impervious surface" since February 2, 2004; (2) the creation of one-quarter acre or more of "regulated motor vehicle surface" since March 2, 2021; or a combination of 2 and 3 above that totals an area of one-quarter acre or more. The same surface shall not be counted twice when determining if the combination area equals one-quarter acre or more. Also, this plan will incorporate all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules as well as the nine (9) planning goals that should be addressed when devising municipal level stormwater management plans (N.J.A.C. 7:8- 2.2). Further, the plan addresses how flood control, groundwater recharge, and pollutant reeducation shall be achieved through the use of stormwater management measures, including Green Infrastructure Best Management Practices (GI BMPs) and nonstructural strategies. GI BMPs and low impact development (LID) should be utilized to meet the goal of maintaining natural hydrology to reduce stormwater runoff volume, reduce erosion, encourage infiltration and groundwater recharge, and reduce pollution. This plan also addresses the impacts GI BMPs and LID have by incorporating the newly adopted stormwater design and performance standards for new development proposals. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and the loss of groundwater recharge that provides baseflow to receiving water bodies, to reduce the discharge of pollutants to the maximum extent practicable, the plan incorporates the control measures outlined within the New Jersey Pollutant Discharge Elimination System Stormwater Regulation Program Rules (N.J.A.C. 7:14A).

To accomplish these goals, H2M has completed a review of the Borough's existing ordinances, the Brielle Master Plan, and other plans to ensure that nonstructural stormwater management techniques have been integrated into these documents to the maximum extent practicable. A Mitigation Plan (Section 6.4) that allows Brielle, in limited circumstances, to waive the strict compliance of one or more of the performance standards where full compliance cannot be reasonably accommodated on site has also been included. An analysis utilizing New Jersey Parcel Mapping (NJPM) software indicates that the Borough contains under one quarter square miles of vacant land, and no agricultural lands, a Build-Out Analysis, pursuant to N.J.A.C. 7:8 4-2 (C) 9, has not been included in this MSWMP.

2.0 GOALS AND OBJECTIVES

Improved water quality, reduction to the risk of flooding, and in turn improves the quality of life for residents of Brielle, the incorporation of more stringent stormwater management techniques has been identified as a priority by both state and local level government agencies. The new stormwater management requirements and best management practices will advance the goals and objectives of both the New Jersey Department of Environmental Protection (NJDEP), and the Borough. A number of the goals and objectives stated within the Brielle Master Plan would be advanced by more stringent stormwater standards. For example, within the Borough's most recent Master Plan, which was adopted in August of 2000, the second stated objective is to "secure safety from fire, flood, panic and other natural and man-made disasters." In addition, the tenth objective identified by the Borough is to "promote the conservation and enhancement of open space and natural systems and resources, while preventing degradation of the natural and man-made environment through improper use of land." The incorporation

of more stringent stormwater management design standards is analogous to these goals, this MSWMP is consistent with the goals of the Borough.

Further, the NJDEP has established a minimum set of goals and objectives that all municipal stormwater management plans should follow, they include:

- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- Maintain groundwater recharge;
- Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- Maintain the integrity of stream channels for their biological functions, as well as for drainage;
- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
- Protect public safety through the proper design and operation of stormwater basins.

This MSWMP will also incorporate the Goals and Objectives that have been established for municipalities within Watershed Management Area 12, which include:

- Providing healthy and naturally diverse habitats to supply plants and wildlife that will enrich the lives of residents;
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- Maintaining safe and plentiful drinking water supplies;
- Preserving the integrity of the freshwater and tidal benthic communities that support commercial and recreational water-related uses including boating, bathing, fishing, and sightseeing;
- Development and redevelopment in Area 12 will be well-planned and environmentally responsible while maintaining, enhancing, and integrating the historic, cultural, scenic, recreational, and open space resources that define and strengthen the unique identities of each community.

Source: Monmouth County website:
<http://www.co.monmouth.nj.us>, Accessed March 2, 2020.

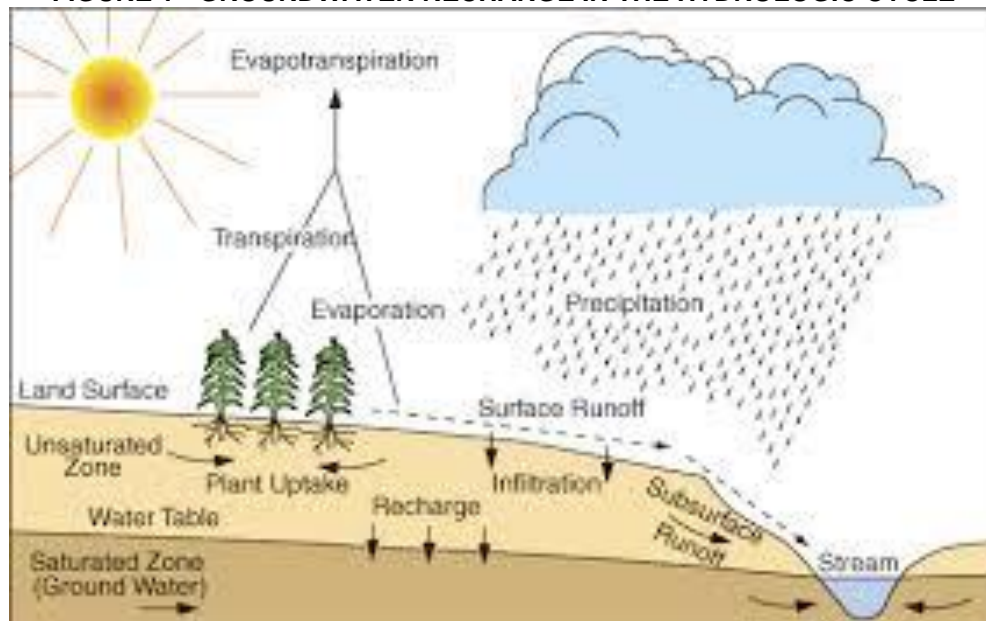
To achieve these goals, this plan examines the most pressing stormwater related issues facing Brielle, and in turn proposes possible amendments to the Borough's design and performance standards to incorporate a more comprehensive code for managing stormwater. By examining the Borough's history, demographics, and current conditions concerning water quality, water quantity, and flooding issues, a clearer picture can be drawn in regard to what the stormwater management issues are at this time, and what type of policy amendments should be taken to improve them. This plan also calls for additional stormwater management regulations to be adopted by the Borough in order to ensure that preventative and corrective maintenance strategies have been formulated to ensure the long-term efficacy of stormwater management facilities.

3.0 EFFECTS OF STORMWATER RUNOFF

The hydrologic cycle is defined as the constant cyclical movement of water from the ground to the atmosphere and back to the ground. As illustrated by the figure below, this process includes evaporation, transpiration, evapotranspiration, condensation, transport, precipitation, infiltration, percolation, surface

runoff, interflow, and groundwater flow. Land development has a dramatic effect on the natural function of this process.

FIGURE 1 - GROUNDWATER RECHARGE IN THE HYDROLOGIC CYCLE



Source: New Jersey Geological Survey Report GSR-32

Prior to development, native vegetation acts to both intercept falling precipitation, and return water that has infiltrated into the ground through evapotranspiration. By clearing vegetation, compacting soil, and replacing it with impervious cover, lawns, or landscaping, the development process serves to reduce the natural rate of water that may infiltrate into the soil, and in turn evapotranspiration.

In developed areas, following a precipitation event, both the volume and the rate of stormwater runoff will increase in proportion to the amount of additional impervious cover generated through a given development. Often gutters, channels and storm sewers, are the tools with which this additional stormwater is carried to local waterways. These man-made stormwater management tools transport water more quickly which causes the stormwater flows in downstream waterways to peak faster and higher than would be produced in a natural state. The increased peak flow during and shortly after a precipitation event produce greater fluctuations between normal and storm flow rates, which can increase channel erosion.

Table 1: The Effect of Impervious Cover on Runoff

Share of Land with Impervious Cover	Share of Rainwater that Becomes Runoff
0% (natural state)	10%
10-20%	20%
35 – 50%	30%
75-100%	75 – 100%

Not only does the development process increase the peak rate of stormwater flows, the addition of impervious cover also results in water pollution. Pollutants carried within stormwater runoff can take the form of nutrients such as nitrogen and phosphorous which encourage the growth of algae in downstream water ways, or trash and oils that accumulate on sidewalks and roadways between precipitation events.

In locations where stormwater sewers discharge runoff directly into a stream, the aggregate accumulation of sediment and pollutants that are carried within it are dumped directly into local waterways. In addition to the chemical and physical contaminants, runoff from impervious systems also provides another form of pollution, heat. When rain falls on pavement that has collected heat through the day, the temperature of runoff can reach as high as 83 degrees Fahrenheit, which is sufficiently warm enough to damage sensitive plant and animal species. Table 2 below, includes a comprehensive list of the possible pollutants contained within untreated stormwater flows.

Table 2: Pollutants Carried in Stormwater
The following pollutants collected and carried in stormwater runoff can seriously degrade water quality in the community
Nutrients - Include nitrogen and phosphorous, which plants need to grow. However, high levels can cause a health hazard in drinking water and stimulate excessive aquatic plant growth, which can ultimately lower dissolved oxygen levels in the water, causing fish and other aquatic life to smother. Algae blooms are examples of how excess nutrients pollute. Sources of excess nutrients include animal waste, fertilizers, septic systems, road salt applications and auto emissions. About half of the fertilizers applied to lawns in the New Jersey coastal zone enter streams and head to the bay and ocean.
Pathogens - Are disease causing bacteria and viruses associated with the presence of fecal matter. They affect human health directly when people contact contaminated water and consume shellfish. Sources include failing septic systems, animal waste, and boat sanitation facilities.
Sediment - Is fine particles of eroded soil or sand. Common origins are concentrated, excessive stormwater runoff from construction sites. Sediment smothers aquatic habitat, carries pollutants bound to soil particles, makes water cloudy and inhibits the breeding and movement of aquatic species.
Toxic Contaminants - Include pesticides as well as heavy metals such as copper, lead and zinc which are commonly found in old paint, tires, lawn chemicals and preservatives. They attach to sediments, resist breakdown, accumulate in organisms and represent threats to the food chain.
Debris - Consists of various items of trash, such as old tires, shopping carts and plastics. It comes from illegal dumping, street litter, and boating waste. It threatens aquatic life and detracts from recreational and aesthetic values.
Oil - Is one of the worst offenders. One gallon of oil dumped down a storm drain can create a slick up to 8 acres and may pollute up to 1 million gallons of water.
Thermal Stress - From elevated water temperatures reduces survival rates and disease resistance of valued native species and allows the spread of non-native (exotic) species. Water temperature rises because of increased pavement near streams, loss of vegetated stream buffers and stream channelization.
Source: Association of New Jersey Environmental Commissions (1998, Spring). ANJEC Report

4.0 CURRENT CONDITIONS

4.1 Setting

In 1919, the Borough of Brielle was created from a portion of Wall Township. The Borough is situated in East-central New Jersey, at the southeastern tip of Monmouth County. It lies some fifty miles south of New York City, and approximately seventy miles east of Philadelphia. The boundaries of the Borough contain an area of 1.65 square miles. The Manasquan River serves as Brielle's southern boundary and to the east, north and west, the Borough borders Manasquan Borough and Wall Township.

Over the years, and particularly since World War II, the town has grown into a residential community with many of its citizens commuting to the New York metropolitan area. Its prime local industry is still connected with the waterfront with more than 200 commercial and charter fishing boats plus private

pleasure craft. The Borough offers residents a number of amenities including; yacht clubs, marinas, and recreational boating. Brielle also has substantial recreational facilities, which include including parks and a golf course.

Brielle has no ocean frontage but has almost 4 miles of frontage on the Manasquan River, Debbie's Creek, and the Glimmer Glass. Very little vacant land remains. There are approximately 4,709 residents within the Borough's 1.65 square miles, which includes the eight-acre Osborn Island. Brielle is situated in the region known as the Atlantic Coastal Plain, which features broad areas of lowlands. The hills found in the western portion of the Borough are a result of sedimentary soil deposits containing erosion resistant soils than are normally found in other deposits. The highest point in the Borough is 96 feet above sea level and is located on the western portion of the Manasquan River Golf Course.

4.2 Demographics

The Borough of Brielle is small, having a land area of only 1.65 square miles, and contained 4,709 residents as of the 2020 Census. Over the past twenty years the borough has experienced a steady decline in population. Due to the limited amount of developable land remaining in Brielle, the majority of construction and growth would be through redevelopment and infill. The Monmouth County Planning Board projects that Brielle will slowly decrease over the next fifteen years, reaching a projected population of 4,614 by the year 2030.

Table 3: Brielle Population Characteristics		
Year	Population	% Change
1980	4,068	N/A
1990	4,406	7.7%
2000	4,893	11.0%
2010	4,774	-2.5%
2020	4,709	-1.4%
2030 (Projected)	4,614	-2.0%
Source: https://www.co.monmouth.nj.us/documents/24/2020_AAG_Final_(Revised)_2_July_21_2020.pdf		

4.3 Waterways

The most significant waterbody that flows through the Borough of Brielle is the Manasquan River. As the entire Borough lies within the Manasquan's watershed, all channeled and discharged stormwater finds its way back to the river. The Manasquan River Sub watershed is contained within the larger framework of Watershed Management Area 12, known as the Monmouth Coastal Watersheds Partnership. The Manasquan River Sub watershed is the longest stream system within Watershed Management Area 12, and all lands within this region eventually drain to the Atlantic Ocean via the Manasquan River. Not only is the Manasquan one of the most heavily utilized recreational waterways on the East Coast, but the river is also a significant source of potable water for Monmouth and Ocean County residents. To protect the watershed's natural resources, recreational opportunities, and cultural heritage, in March of 2000, the Manasquan Watershed Management Group completed the Manasquan River Watershed Management Plan.

Other notable, less volumous water bodies within the Borough include Roberts Swamp Brook, Debbie's Creek, and Judas Creek, which is more commonly known as Glimmer Glass. Combined these waterways offer the residents of Brielle over four miles of waterfront property. The incorporation of more stringent stormwater regulations will be a vital tool for the Borough of Brielle to protect these fragile coastal lands.

4.4 Water Quality

To further these public goals, the New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. Currently, there are over 900 AMNET sites within the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. The data is used to generate a New Jersey Impairment Score (NJIS). According to these scores, the waterway is then classified as "non-impaired", "moderately impaired", or "severely impaired". These designations are determined by the following criteria:

Table 4: New Jersey Department of Environmental Protection AMNET Program Waterway Classification Criteria	
Non-Impaired	Benthic community comparable to other undisturbed streams within the region. A community characterized by a maximum taxa richness, balanced taxa groups and good representation of intolerant individuals.
Moderately Impaired	Macroinvertebrate richness is reduced, in particular EPT taxa. Taxa composition changes result in reduced community balance and intolerant taxa become absent.
Severely Impaired	A dramatic change in the benthic community has occurred. Macroinvertebrates are dominated by a few taxa that are very abundant. Tolerant taxa are the only individuals present.
Source: New Jersey Geographic Information Network (NJGIN) Open Data portal https://njgis-newjersey.opendata.arcgis.com/datasets/d8937d8a49064467876d80e0c58a0d6a_13 Accessed: March 1, 2021.	

The Manasquan River ranges from "non-impaired" to "severely impaired" according to AMNET parameters. The testing location at Squankum, which is in closest proximity to Brielle, has been allocated to Sublist 5, due to excessive phosphorous levels. In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d) Integrated List) is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. The integrated list is divided into five different sublists. The following table illustrates how those sublists were determined:

Table 5: New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d) Integrated List) Sublist Criteria	
Sublist 1	Attaining a water quality standard and no use is threatened.
Sublist 2	Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened.
Sublist 3	Insufficient or no data and information to determine if any designated use is attained.
Sublist 4	Impaired or threatened for one or more designated uses but does not require the development of a TMDL. (Three Categories). 1. TMDL has been completed. Sublist 4 2. Other enforceable pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future. 3. Impairment is not caused by a pollutant.
Sublist 5	The water quality standard is not attained. The waterbody is impaired or Sublist 5 threatened for one or more designated uses by a pollutant(s) and requires a TMDL.
Source: New Jersey Department of Environmental Protection: https://www.state.nj.us/dep/wms/bears/2014_integrated_report.htm . Accessed March 2, 2021	

Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more Total Daily Maximum Load (TMDL) are needed. A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and nonpoint sources, which interfere with stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems and other BMP's.

Both the estuarine and freshwater portions of the Manasquan River are listed on The New Jersey 2014 Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(b)), which was adopted on October 16, 2017. The results of water quality testing analysis indicate that the Manasquan River does not attain water quality standards for benthic macroinvertebrates and phosphorous. Also, the estuarine portion of the Manasquan does not meet water quality standards for the following pollutants: total coliform and dissolved oxygen. More in-depth information relating to New Jersey's 2014 Integrated List is available in Appendix C of this report.

Currently, no sampling stations exist in Brielle and to date, with the exception of the Manasquan River, no streams have been deemed "impaired" through the AMNET program, or any other regulating governmental agency. Although the AMNET program has not conducted water quality testing in the Borough of Brielle, a group both public and private organizations have teamed up to conduct water quality testing along the Roberts Swamp Brook. The partnership, which involves Monmouth County Water Watch, Brookdale Community College, Monmouth University, Manasquan River Management Group, The Manasquan Environmental Commission and NJ Watershed Management Area 12 among others, have united to restore the Roberts Swamp Brook.

The objectives for the project include:

To improve water quality for sportfish in the Manasquan River Estuary by restoring the Roberts Swamp Brook;

To provide environmental education to hundreds of Manasquan school children and involve them in direct service projects on the Roberts Swamp Brook;

To strengthen Manasquan communities surrounding the Roberts Swamp Brook by uniting a diversity of groups and people around the common goals of revitalizing Manasquan waterways.

These objectives were set in motion through the organization of two stream assessment events to determine both the health of the brook and area land use patterns. Participants in stream monitoring effort included: NJ Community Water Watch AmeriCorps members, and students from Brookdale Community College, Monmouth University, and Ocean County College, as well as community members and environmental leaders.

The first stream-walk, held on November 17, 2001, consisted of a 6-site visual assessment of Roberts Swamp Brook according to the Natural Resource Conservation Service's Stream Visual Assessment Protocol. Volunteers monitored for the following assessment elements – channel condition, riparian zone, bank stability, water appearance, nutrient enrichment, barriers to fish movement, and in-stream fish cover. The assessment determined that Robert Swamp Brook became more impaired the further downstream you went. The sites furthest downstream received a "poor" rating on the assessment. However, upstream, water quality assessments of Robert Swamp Brook were consistently rating as "fair", and the Brook even received one "good" rating. Potential reasons for the changes in overall rating include new housing

developments, some of which have been constructed within the last 5-10 years and some which are still being built right alongside the brook. In addition, stream width is much wider downstream of the new developments and stream bank erosion is one of the most significant impairment factors in these areas. Recently, a second stream monitoring event was held to gain a better understanding of the overall brook health, particularly biological indicators. Jim Burkitt, Watershed Area 12 representative of NJ Department of Environmental Protection Watershed Ambassador program, conducted the RATS and BATS assessment with a team of volunteers. The RATS (River Assessment Teams) analysis was fairly consistent with the previous NRCS Visual Assessment done in November.

However, the BATS (Biological Assessment Teams) analysis showed significant impairment as Robert Swamp Brook scored "poor" on the analysis. The only macro-invertebrates found at this site were midge fly larvae, aquatic worms, lung snails, and some scuds. With the exception of scuds, those organisms are very pollution tolerant, and the scuds were not found in great numbers. No pollution sensitive organisms were found. This is problematic as it is further evidence that fish populations are suffering due to poor water quality conditions. As illustrated through the Roberts Swamp Creek Restoration project, community involvement has been and will continue to be a key element in restoring and protecting the Brook. Educating the public about their local waterways and how they can help address the problems in their community can help local citizens prevent future waterway degradation.

In addition, as noted earlier, all streams within Brielle originate outside of Borough borders. Consequently, some degree of impairment is caused by regional factors and is not exclusive to the Borough of Brielle. As such, the incorporation of regionally based watershed management planning efforts will be essential to move towards restoring waterways both within and around Brielle.

4.5 Water Quantity

Brielle Borough has exhibited water quantity problems including flooding, stream bank erosion, and many of the culvert is associated with road crossings in the Borough are undersized. As such, the design of culverts has been cited as a contributor to both the frequency and the severity of stormwater flow flooding, which is experienced in several locations throughout the Borough. Brielle's most pressing stormwater quantity management issues are discussed in greater detail below in Section 4.6 *Flooding & Proposed Solutions*.

In regard to potable water supplies, potable water is supplied to the residents of Brielle through the Department of Public Works. Brielle's water supply sources consist of three underground wells and through interconnections with the New Jersey Water Supply Authority (NJWSA). In addition, the Borough has emergency connections with Wall Township and the Borough of Manasquan. Potable water supplies for the Borough of Brielle and the Manasquan River Watershed in general have been a perplexing problem for many years. Population increases in the region in the 1960s, and 1970's strained drinking water supplies and lowered aquifers to dangerous levels. Published in 2000, the Manasquan River Watershed Management Plan indicates that in less than 20 years aquifer levels dropped 140 feet, allowing saltwater to infiltrate into these underground formations and contaminate the region's drinking water. The growing concern about drinking water supplies then led to the construction and operation of the 770-acre Manasquan Reservoir System in July 1990. The reservoir is replenished by pumping water from the Manasquan River during periods of high river flow at an intake facility in Wall Township and was supplemented by rain events in the 3.2 square mile drainage area surrounding the facility. The reservoir has the capacity to store 4.7 billion gallons of water and can supply a safe yield of 30 million gallons per day even during drought conditions. The Manasquan Water Treatment Plant now provides 60% of the potable water consumed by the communities of Brielle, Sea Girt, Spring Lake, Spring Lake Heights, and Wall Township.

The Bureau of Safe Drinking Water's Water Supply Administration within the New Jersey Department of Environmental Protection administers the Source Water Assessment Program (SWAP). According to the 2004 Source Water Assessment Report for Brielle, the Borough receives potable water from one single water supply entity, the Brielle Water Department. This system serves residents of the Borough through

three wells, two purchased groundwater sources, and two purchased surface water sources. The systems source water comes from the following aquifers: the Atlantic City "800 foot) sand aquifer, and the Englishtown aquifer system. The system also purchases water from the Manasquan Water Department, the Wall Township Water Department, and the New Jersey Water Supply Authority. Wellhead Protection Areas in the Borough of Brielle are illustrated through Figure 6-Wellhead Protection Areas Map. A Wellhead Protection Area is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates Tier designations according to the horizontal extent captured by groundwater at a specific rate: Tier 1 (2 years), Tier 2 (5 years), and Tier 3 (12 years).

In addition, independent water-quality laboratories regularly test water samples from around the Borough. The results of these water tests show no contaminants present that contain maximum contaminants levels (MCL's), as established by Federal and NJ State government agencies. Under Federal law, all water users now receive an annual report on the quality of their drinking water, listing only the contaminants that are detected in the water.

4.6 Flooding and Proposed

To inform both public and private land use decision makers of areas that are subject to flooding, the Federal Emergency Management Agency has completed Flood Insurance Rate Maps (FIRM) for the Borough of Brielle. Due to its low relief and proximity to the estuary portion of the Manasquan River, areas along the river, and other water bodies are vulnerable to flooding, as several areas have been designated as an "A Flood Zone" by the FIRM maps. Other, additional lands within the Borough that have been determined as an "A Flood Zone" include areas immediately along the banks of Debbie's Creek, Glimmer Glass, and Roberts Swamp Brook. Areas contained within an "A Flood Zone" designation represents that they have been found to lie within the 100-year floodplain, but specific base flood elevations have only been determined at a few selected points in the Borough. The specific points, along with the base flood elevation are listed below in Table 5. In addition, Figure 4, titled FEMA Flood Zone Map illustrated the areas of Brielle that have been delineated as resting within a flood zone.

Table 6: Elevated Reference Marks Within Brielle Borough	
Elevation	Location
6.16 ft. PID: AI8477	To reach the station from the center of the bridge carrying State Route 35 over the Manasquan river, go northwest on state route 35 for 0.2 mi (0.3 km) to the exit ramp leading to evergreen avenue on the right. continue around the exit ramp and go southeast on Evergreen Avenue to the tee intersection with Ashley Avenue. Turn right and go southwest on Ashley Avenue for 0.1 mi (0.2 km) to the intersection with Higgins Avenue. Turn left and follow a driveway for 0.05 mi (0.08 km) to a parking area under the bridge for Bogan's Boat Basin and the station on the right, set flush vertically in the east face of the eastern most square concrete pier column at the edge of the water. The station is about 0.8 m (2.6 ft) above the ground.

Table 6: Elevated Reference Marks Within Brielle Borough

Elevation	Location
10.08 ft. PID: AI8479	The station is located at the tee intersection of Evergreen Avenue and Ashley avenue. To reach the station from the center of the bridge carrying state route 35 over the Manasquan River, go northwest on state route 35 for 0.2 mi (0.3 km) to the exit ramp leading to Evergreen Avenue on the right. Continue around the exit ramp and go southeast on Evergreen Avenue to the tee intersection with Ashley Avenue and the station on the left, set about 0.2 ft (6.1 cm) below the ground in an elongated grass traffic island. The station is 11.4 m (37.4 ft) southwest from a fire hydrant, 13.6 m (44.6 ft) south from wood utility pole number jc56 bre, 4.7 m (15.4 ft) northwest from the southeast nose of the grass traffic island, 14.0 m (45.9 ft) southeast from the northwest nose of the grass traffic island and 21.6 m (70.9 ft) northwest from wood utility pole number jc48 bre.
74.39 ft. PID: DP7893	The station is set in a drill hole on top and at the northwest end of the north retaining wall on the southwest side of NJ Highway 35 for the Schoolhouse Road Bridge (structure number 1310-152, milepost 15.48) spanning Route 35.
13.969 ft	On the westerly side of State 71 approximately 1050 feet north of the bridge carrying State Route 35 over the highway, 17.60 feet from the centerline of the highway opposite slab 348, 5.48 feet north of a drill hole in the curb, and 3.26 feet east of a drill hole in the concrete sidewalk.
20.485 ft	Set in the corner of a State Highway Department manhole on the westerly side of State Route 71 under the bridge carrying State Route 35 over the highway, 32.56 feet west of the centerline of State Route 71, 15.36 feet. south of the easterly corner of the bridge abutment, and 30.52 feet northwest of an inlet near the centerline of State Route 71.
22.511 ft	On the easterly side of State Route 71 approximately 300 feet south of the bridge carrying State Route 35 over the highway, 43.61 feet north of a tack in pole 11 BRE, 33.83 feet northeast of drill hole in concrete curb; 53.96 feet northeast, 45.61 feet south and 38.11 feet northwest of tacks in three 6 inches by 6-inch signposts. The monument is within a triangular shaped island at the entrance to the ramp leading to State Route 35.

Table 6: Elevated Reference Marks Within Brielle Borough	
Elevation	Location
21.507 ft	Set in concrete at the intersection of State Route 71 and State Route 35 and approximately .1 mile south of the bridge carrying State Route 35 over State Route 71, 26.26 feet northwest of a tack in pole JC7, 3.05 feet east of an x-cut on an inlet curb and 8.73 feet northwest of a drill hole in the concrete curb.
19.355 ft	On the northeast side of State Route 35 north of New Manasquan River Bridge and between Riverview Drive and Ashley Avenue, 63.47. feet south of a tack in pole 96, 28.78 feet southwest of an x-cut in inlet curb, and 25.15 feet southwest of a drill hole in the concrete curb nosing at point of approach road.
Source: National Geodetic Survey Data Explorer https://www.ngs.noaa.gov/NGSDDataExplorer/ . Accessed March 1, 2020	

Finally, Brielle actively addresses drainage and flooding issues as they arise and are reported by residents. Each year Brielle includes drainage improvements as part of their Capital Improvement Program. As such, most of the reported flooding and drainage problems have been corrected. However, Brielle will continue to utilize this program, along with its Mitigation Plan, which is included within this report as Section 6.4, as tools to remediate the most pressing flooding and stormwater management issues that face the Borough.

5.0 STORMWATER MANAGEMENT

5.1 Infrastructure

Brielle Borough receives nearly 44 inches of rain in an average year. To manage the public risk that flooding imposes on residents, a substantial stormwater management system has been developed. As illustrated earlier in Table 2, both the amount and condition of the stormwater that finds its way into local waterways is determined in large part by the amount of impervious cover the land contains. With less absorption of rainwater into the ground, the increased runoff moves faster and collects more pollutants from the surface, which promotes erosion, damages stream banks, and in turn deposits sediment into streambeds.

N.J.A.C. 7:8 spells out guidelines for how to manage stormwater more effectively and also how to incorporate best management practices into the planning stages of project design. These standards now require stormwater detention capacity to hold and slowly release the runoff from storms that have a likelihood of occurring once every two, ten and one hundred years. Some sites may be able to achieve these standards through vegetative swales, buffers, and landscaping to control non-point source pollution. Other sites may require the building of a structural stormwater management facility. In situations where the development of structural stormwater facilities is necessary, the NJDEP's Best Management Practice Manual should be consulted as it outlines alternatives and strategies to incorporate Best Management Practices into a projects site design. Possible alternatives include structures such as Infiltration Basins, Vegetative Filters, Pervious Paving Systems, and Sand Filters. These BMPs are strongly encouraged to be incorporated into the Borough's existing stormwater management infrastructure to enhance groundwater recharge and reduce the velocity and amount of runoff that originates on site; thus, improving the quality and reducing the quantity of stormwater that originates within Brielle.

5.2 Storm Drains

Brielle Borough has an annual Capital Improvement Program through which infrastructure improvements are designed and constructed. The construction or reconstruction of drainage best management practices, and stormwater management improvements, are included in this program.

Further, to inform the public of the presence of storm drains, Brielle has initiated a storm drain labeling program. The Borough's Public Works Department will complete the mapping, although volunteer groups like the Boy Scouts may also participate in the labeling process, pending their availability. The initiative will label all storm drain inlets that are along municipal streets with sidewalks, and all storm drain inlets within plazas, parking areas, or maintenance yards that are operated by the Borough. Brielle currently uses various label types and application methods. During the label application process, more than one label type may be utilized to ensure maximum durability in all locations. The Borough of Brielle along with a Boy Scout project has labeled a minimum of 50% of the storm drain inlets in 2018 and will label all of the remaining storm drain inlets during 2021. During the annual catch basin cleaning program, the Borough will be checking to ensure that the labels are still visible. If not, they will be replaced as soon as possible.

Brielle has also initiated programs to maintain and manage its existing stormwater infrastructure more effectively. In accordance with the Stormwater Pollution Prevention Plans (SPPP), maps showing the location of the end of all MS4 outfall pipes that are operated by the Borough, and that discharge within the Borough's jurisdiction to a surface water body have been prepared by H2M Architects and Engineers, Inc., a consultant of the Borough. The maps show both the location and name of each outfall pipe and have also been given an alphanumeric identifier that is noted on the map. In accordance with SPPP, these maps have also been made electronic and submitted to the DEP. Through the future, as new development and/or redevelopment changes the current storm sewer system through the creation of new outfalls, these maps will be updated yearly per the SPPP.

Further, the Borough of Brielle will implement a stormwater facility maintenance program to ensure that all stormwater facilities operated by the Borough are functioning properly. The Borough of Brielle will implement an annual catch basin cleaning program to maintain catch basin function and efficiency. All catch basins will be inspected once a year. If, at the time of inspection, no sediment, trash, or debris is observed in the catch basin, then that catch basin will not be cleaned. All catch basins within Brielle will be inspected annually, even if they had been found to be "clean" the previous year. At the time of cleaning, the catch basins will also be inspected for proper function, and maintenance will be performed on those facilities that are not operating to capacity. The catch basin cleaning and maintenance will be recorded through the "Stormwater Facility Inspection and Maintenance Log", which are available upon request by the NJDEP. These items are reported on within the Borough's NJPDES annual report.

Brielle Borough will also investigate the storm drains for illicit connections and will check outfall pipes for signs of scouring. The Borough performed the initial inspection of outfall pipes within 18 months of the EDP A (completed October 2005) and completed the initial physical inspection of all outfall pipes within 60 months of the EDP A (completed April 2009). The Borough used the NJ Department of Environmental Protection (NJDEP) Illicit Connection Inspection Report Form to conduct these inspections, and each of these forms will be kept within the SPPP records. Outfall pipes that were found to have dry weather flow or evidence of an intermittent non-stormwater flow will be investigated to locate the illicit connection. If the Borough is able to locate the illicit connection (and the connection is located within Brielle), the responsible party will be cited, and the connection will be eliminated immediately. If an illicit connection is found to originate from another public entity, the Borough of Brielle will report the illicit connection to the NJDEP.

As part of its illicit connection elimination program, the Borough is also checking outfall points for signs of scouring. All sites where scouring is observed is will be placed on a prioritized list and repairs will be made in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey. Those repairs that do not need NJDEP permits for implementation were done first. Each repair will be followed

up to ensure that scouring has not resumed. This program was implemented in conjunction with the illicit connection elimination program and started October 1, 2005 (within 18 months of the EDPA) and checked yearly per the SPPP.

5.3 Stormwater Basins

Most of the stormwater management system within Brielle Borough relies on storm drains. However, there are two types of stormwater basins and both are present in Brielle. First, "detention basins", which are designed to stay dry between storm events, detain stormwater for a period of time, while releasing water at a slow and controlled rate. A second type of basin that is designed to manage stormwater flows is a "retention basin". These basins are designed to stay wet by retaining a permanent pool so as to mimic a natural pond or lake.

As the number of subdivisions in the Borough has increased, so too have the number of stormwater basins. A number of the existing stormwater basins in Brielle are suited to be retrofitted to accommodate more volume, or to improve the quality of stormwater that is dispensed into the basin. As flooding and/or drainage issues arise in the Borough, due to their ability to improve water quality, maintain water quantity, and provide groundwater recharge, the retrofitting of stormwater basins may be initiated by the Borough itself, or included within an adopted Mitigation Plan which would allow applicants who are not able to meet the stormwater design standards on site, to provide mitigation by means of retrofitting a proximate stormwater basin. Through mapping, maintenance, and retrofitting, these coordinated stormwater basin operation and maintenance programs will enable the Borough to improve the way stormwater is managed in Brielle.

5.4 Watershed

The Borough of Brielle is entirely contained within the Manasquan Valley Subwatershed Management Region. The Manasquan River Subwatershed is the longest stream system within Watershed Management Area 12. It is not only one of the most heavily utilized recreational waterways on the East Coast, but it is also a significant source of potable water for Monmouth and Ocean County residents. All land in this region drains to the Atlantic Ocean via the Manasquan River. Significant streams within the watershed include Roberts Swamp Brook, Yellow Brook, Marsh Bog Brook, Timber Swamp Brook, Mingamahone Brook, Bear Swamp Brook, Squankum Brook, Mill Run, Sawmill Creek, Macs Pond Brook and Judas Creek. The Manasquan Reservoir, the Glimmer Glass, Stockton Lake, Blisbane Lake, the lake at Turkey Swamp, and the Bay Head-Manasquan Canal are also other significant water bodies in this region.

The United States Geological Service have developed a method for identifying and inventorying subwatersheds within this larger watershed network called the hydrologic unit code system. Through this system all U.S. watersheds have a name and a corresponding number, this number is called the hydrologic unit code (HUC) or watershed address.

The term "HUC-14" is from the hydrologic unit code system for delineating and identifying drainage areas. The system starts with the largest possible drainage area (basin) and progressively breaks it down into smaller subdivisions (subbasins, watersheds and subwatersheds respectively). These subdivisions are delineated and numbered in a nested fashion. A drainage area with a 14 numbered address, or HUC-14, is a subwatershed of a larger watershed with 11 numbers, or a HUC-11. There are 921 HUC-14 subwatersheds in New Jersey that average 8.5 square miles. There are 150 HUC-11 watersheds in New Jersey with an average size of 51.9 square miles. A statewide graphic depiction of the breakdown of these watershed areas is available at:

https://njogis-newjersey.opendata.arcgis.com/datasets/8de4c55bcf6540bcbe173df2b0552eb2_22

(Source: NJGIN - Open Data).

The Borough of Brielle is located almost entirely within the Manasquan HUC-14 subwatershed 02030104100100 (Manasquan River-below Route 70 bridge). However, a small portion of the south west

comer of the Borough is contained within HUC-14 subwatershed 02030104100200 (Manasquan River (Route 70 bridge to 74 degrees 7 minutes and 30 seconds), these areas are illustrated on Figure 2-Wetlands Map.

6.0 DESIGN AND PERFORMANCE STANDARDS

To minimize the adverse impact of stormwater runoff on water quality, water quantity and the loss of groundwater recharge in receiving water bodies, the Borough has adopted design and performance standards that comply with the stormwater management measures as presented in N.J.AC. 7:8. The design and performance standards include amended language for the inclusion of maintenance requirements, and safety standards consistent with NJ.AC. 7:8-6. The Stormwater Control ordinances were updated and submitted to the County for review and approval per the N.A.J.A. 7:8, as amended on March 2, 2020.

Further, it is the intention of the Borough of Brielle to incorporate green infrastructure Best Management Practices (GI BMPs), non-structural stormwater management strategies and low impact development as presented in N.J.A.C. 7:8-5 to the maximum extent practicable. Major developments must meet one of two standards for groundwater recharge (N.J.AC. 7:8-5.4(a)2i.): (1) maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site or (2) infiltrate the increase in the stormwater runoff volume from pre-construction to post-construction for the two-year storm. For water quality (NJ.AC. 7:8-5.5), stormwater management measures shall be designed to reduce the postconstruction" load of total suspended solids (TSS) in the stormwater runoff generated by the water quality design storm by 80 percent of the anticipated load from the major development., expressed as an annual average

To control stormwater runoff quantity impacts (NJ.AC. 7:8-5.4 3.), a major development must also meet one of three design standards: (1) demonstrate at no point in time that the postconstruction runoff hydro graph exceed the pre-construction runoff hydro graph, (2) demonstrate there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2, 10, 100-year storm event and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site, and (3) demonstrate the postconstruction peak runoff rates for the 2, 10 and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction runoff rates. However, for stormwater water runoff quantity requirement (3), stream encroachment standards (N.J.A.C.7:13-2.8) will require for the 100-year storm event 75 percent of the pre-construction peak runoff rates. Prior to adoption, these ordinances were submitted to the Monmouth County Planning Board for review and approval per the N.J.A.C. 7-8, amended on March 2, 2020.

Further, by amending their current Land Use Regulations, it is the intention of the Borough of Brielle to incorporate GI BMPs, low impact development and nonstructural stormwater management strategies as presented in N.J.AC. 7:8-5 to the maximum extent practicable. So as to minimize the adverse impact on water quality, which is imposed by stormwater runoff, the proposed amendments to the Borough's current development regulations include the incorporation of stricter stormwater management guidelines relating to water quantity, water quality, and groundwater recharge as identified in the design and performance standards as presented in NJ.AC. 7:8-5. Prior to adoption, these ordinances will all be submitted to the Ocean County Planning Board for review and approval per the N.J.A.C. 7-8, amended on March 2, 2020.

The second set of applicable stormwater management regulations are the Phase II New Jersey Pollutant Discharge Elimination System Stormwater Regulation Program Rules (N.J.A.C. 7:14A). These Rules are intended to address and reduce pollutants associated with existing stormwater runoff. The Rules establish a regulatory program for existing stormwater discharges as required under the Federal Clean Water Act. These rules govern the issuance of permits to entities that own or operate "small" (those that serve a population of under 100,000) municipal separate storm sewer systems, known as MS4s. Under this program permits must be secured by municipalities, certain public complexes such as universities and hospitals, and State, interstate and Federal agencies that operate or maintain highways. The permit

program establishes the Statewide Basic Requirements that must be implemented to reduce nonpoint source pollutant loads from these sources. The Statewide Basic Requirements include measures such as: the adoption of ordinances (litter control, pet waste, wildlife feeding, proper waste disposal, etc.); the development of a municipal stormwater management plan and implementing ordinance(s); requiring certain maintenance activities (such as street sweeping and catch basin cleaning); locating discharge points and stenciling catch basins; and a public education component. Owners or operators of small MS4s would be required to develop and implement a storm water management program designed to reduce the discharge of pollutants to the maximum extent practicable and protect water quality. Control measures are expected to include, at a minimum, the following components:

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site storm water runoff control
- Post-construction storm water management in new development and redevelopment
- Pollution prevention/good housekeeping for municipal operations.

6.1 Implementing Non-Structural Stormwater Management Strategies

The implementation of non-structural Best Management Practices are strongly encouraged to be added to the Borough's existing development regulations and applied to all new site design proposals. Whenever possible, the following nine strategies should be incorporated into site design:

- Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
- Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
- Maximize the protection of natural drainage features and vegetation;
- Minimize the decrease in the "time of concentration" from pre-construction to post construction. "Time of Concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed;
- Minimize land disturbance including clearing and grading;
- Minimize soil compaction;
- Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides;
- Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and
- Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
 - i. Site design features that help to prevent accumulation of trash and debris in drainage systems;
 - ii. Site design features that help to prevent discharge of trash and debris from drainage systems;
 - iii. Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
 - iv. When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act N.J.S.A. 4:24-39 et seq., and implementing rules.

Also, Chapter 20 "Land Use Procedures", Chapter 21 "Zoning", Chapter 23 "Site Plan Regulations, and Chapter 24 "Land Subdivisions" within the Borough's Land Use Procedure Code were reviewed to evaluate the extent to which non-structural stormwater management techniques have been implemented

into the site design of a proposed development. This review included, but was not limited to, existing provisions for Curbs and Gutters, Driveways and Accessways, Off-Street Parking and Loading, Streets, and Sidewalks. A summary of the of the pertinent provisions is presented below:

Chapter 21, Section 9.25 (Unsuitable Lands) This section stipulates that no structure shall be erected on land which is unsuitable for improvement because it is subject to flooding or other hazards to life, health, or property, unless the owner agrees to take approved adequate measures to eliminate such hazards. The approval must be obtained from the Planning Board, unless otherwise required from the Board of Adjustment pursuant to the flood plain ordinance of the Borough. The Board shall make or instigate adequate investigation by a recognized, trained, or licensed authority before granting approval and only after a public hearing thereon. Expenses incurred for such investigation must be paid for by the applicant and no certificate or permit shall be issued until payment in full is received. The exception to the above would apply to structures necessary for access and safety such as bridges, culverts, or protective walls and fences or for accessory agricultural structures, such as irrigation facilities, dependent upon access to water.

Chapter 21, Section 19.5 (Other Provisions and Requirements) All applications for development in the C2 and C2A Zone on properties abutting or contiguous with the Manasquan River and which require submission of a major site plan or preliminary subdivision will be accompanied by an Environmental Impact Statement (EIS). The EIS will include a project description that specifies both what is to be done and how it is to be done during construction and operation on site, and will also include, a recital of alternative plans deemed practicable to achieve the objective. The EIS supplies to stormwater management by including air quality, water quality, water supply, hydrology, geology, soils, and properties thereof, including capabilities and limitations, sewage systems, topography, slope, and vegetation in its inventory of existing environmental considered on site. The EIS also lists those adverse environmental impacts that cannot be avoided, a statement of steps that have been taken to minimize adverse environmental impacts imposed by the project, and a statement of alternatives to the proposed project which might avoid some or all of the adverse environmental effects, including a non-action alternative. EIS must reference water quality standards as established by the DEP, may consider revising to implement NJAC 7:8.

Chapter 21, Section 31.11 (Location of Curb Cuts) At the intersection of streets, a curb cut, where required or installed, shall be set if not less than twenty-five (25') feet from the intersection of two (2) curb lines in all zones. Between the curb cuts for any two (2) driveways serving the same property there shall be at least fifty (50) feet. Curb cuts shall be located at least five (5) feet from abutting property lines in all zones. As stated in Chapter 21, Section 17.2, all curb cuts for commercial zones shall be at least fifteen (15') feet but not more than thirty (30') feet in width, except on County roads where County Site Plan Requirements are established. This section may be revised to allow for curb cuts or flush curbs with curb stops to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas. These amendments would encourage developers to allow for the discharge of impervious areas into landscaped areas for stormwater management.

Chapter 21, Section 31.4 (Required Area for Each Parking Space) Each automobile parking space shall not be less than nine (9') feet nor less than eighteen (18) feet deep exclusive of passageways. In addition, there shall be provided adequate interior driveways to connect each parking space with a public right-of-way. In the case. of parallel parking, each space shall be not less than nine (9') feet wide and twenty-two (22') feet long. This section may be reviewed to determine that if a developer were able to determine whether it is feasible for pervious paving materials to be incorporated into a projects site design, and whether overflow parking, vertical parking structures, smaller parking stalls, and shared parking may be utilized to minimize site disturbance.

Chapter 21, Section 31.5 (Drainage and Maintenance) All off-street parking, off-street loading, and service facilities shall be graded and drained so as to dispose of all surface water accommodation in a safe maimer while preventing damage to abutting properties and or public streets. Except for single-family

uses, they shall be surfaced with asphalt, bituminous cement, or other properly bound pavement, which will assure a surface resistant to erosion. Such drainage and materials shall be installed as required by the Planning Board and as recommended by the Municipal Engineer. All such areas shall be at all times maintained at the expense of the owners thereof, in a clean, orderly, and dust-free condition. This ordinance may be amended to reference the DEP's BMP manual for the incorporation of Low Impact Development principles into the projects site design.

Chapter 21, Section 63.1 (Land Disturbance Permit) To control the disturbance of land and related changes in grades and elevation, the Borough has adopted an ordinance that requires a land disturbance permit. The permit stipulates that no land or land area shall be disturbed by any person, partnership, corporation, municipal corporation, or other public agency in the borough unless they comply with the General Design Standards and the conditions of the Limit Disturbance Permit. The general design standards indicate that all soil disturbance is undertaken in a manner that will minimize erosion, retain, and protect natural vegetation wherever feasible, that drainage provisions shall accommodate increased runoff resulting from modified soil and surface conditions during and after development or disturbance, and that water runoff should be minimized and retained on site whenever possible to facilitate groundwater recharge. The Borough's Construction Official who shall either personally inspect or require the inspection of all work shall enforce these standards.

Chapter 21, Section 31.10 (Size of Driveways) A driveway exclusive of curb return radii shall be not less than ten (10') feet in width in all residential zones, and not less than fifteen (15) feet in all other zones. A curb return radius for a driveway at its entrance to a public street shall be a minimum of five (5') feet for single-family residential lots and a minimum of fifteen (15') feet for all other uses. The maximum width of a driveway exclusive of curb return radii shall not exceed thirty (30') feet. This ordinance may be amended to incorporate the use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

Chapter 21, Section 31.15 (Reductions of Off-Street Parking) Required off street parking area shall not be reduced. No off-street parking area shall be reduced in size or encroached upon by building, vehicle storage, loading or unloading, or any other use where such reduction or encroachment will reduce the off-street parking and loading spaces that are required by these regulations. Subsection 17 (Joint Parking Facilities) of the off-street parking requirements, which discusses joint parking facilities stipulates that the off street parking requirements for two (2) or more neighboring uses may be satisfied by the allocation of the required number of spaces for each use in a common parking facility, provided that the number of off-street parking spaces is not less than the sum of individual requirements; and provided further, that there be compliance with all other provisions of these regulations.

In addition, subsection 15 (*Sharing of Parking Facilities*) Off-street parking facilities for one use shall not be considered as providing the required facilities for any other use; except that one-half (1/2) of the off-street parking space required by any use whose peak attendance will be at night or on Sundays, such as churches, theaters, and assembly halls, may be assigned to a use which will be closed at night or on Sundays ... subject to approval by the municipal agency.

Chapter 21, Section 32 (Landscaping) This section of the Borough ordinance outlines vegetative screening and buffers requirements that have been established by the Borough. However, these features are utilized for aesthetic purposes, rather than as potential stormwater filtration/management facilities.

Chapter 23, Section 1.5 (General Requirements and Conditions) When submitting a site plan an applicant must demonstrate that: There shall be no intrusion or elimination of any existing buffer area or area designated for that purpose on a previously approved site plan. Also, the applicant must demonstrate that there will be no significant alteration of the existing drainage.

Chapter 24, Section 8.6 (Maintenance Guarantee) The maintenance of on and offsite improvements by an applicant are subjected to provisions for a maintenance guarantee. These maintenance guarantees

are be posted with the Governing Body for a period not to exceed two (2) years after final acceptance of the improvement, in an amount not to exceed fifteen (15%) percent of the cost of the improvement. In the event that other governmental agencies or public utilities automatically will own the utilities to be installed or the improvements are covered by a maintenance guarantee to another governmental agency, no maintenance guarantee shall be required by the municipality for such utilities or improvements.

Chapter 24, Section 8.7 (Required Improvements) Storm drains and culverts where storm drains or culverts are required on-site or off-site, all streets shall be provided with sufficient catch basins, storm sewers, culverts water detention basins and other drainage appurtenances for the proper drainage of the area in the light of existing and future conditions. All such facilities shall be constructed in accordance with the standards and requirements of good engineering practice, or such other specifications as may be required by the Municipal Engineer where special circumstances so require.

Chapter 24, Section 8. 7 (Required Improvements) Topsoil which shall be removed in the course of regrading a subdivision shall not be used as soil. No topsoil be removed from the subdivision site until such topsoil shall be redistributed as to provide at least six (6") inches of cover on areas to be used as building sites from which topsoil was removed and shall be stabilized by seeding or planting. Any excess topsoil may be removed from the site only with the written approval of the Municipal Engineer.

Also, subsection F, the Borough's Shade Tree Ordinance states that the removal of existing trees shall not be permitted in any subdivision except in the location of structures or unless it can be shown that grading or construction requires removal. The developer shall plant, and maintain for one (1) year, and replace (where necessary) all shade trees. Trees shall be selected from the following list and spaced as specified (A list of 25 acceptable species is also provided in the ordinance). This ordinance recognizes that the preservation of mature trees and forested areas is a key strategy in the management of environmental resources, particularly watershed management, air quality, and ambient heating and cooling. By protecting shade trees, the Borough is also protecting the objectives of the new stormwater management rules, which are to improve water quantity stormwater quantity, and improve groundwater recharge.

Chapter 24, Section 9.5 (Design Standards-Public Use and Service Areas) This section outlines provisions that have been established by the Borough for Public Use and Service Areas. Subsection B Drainage Easements indicates that when there is a subdivision that is traversed by a watercourse, drainage way, channel, or street there shall be provided a storm water easement or drainage right-of-way conforming substantially with the lines of such watercourse and such further width or the construction of both, as will be adequate for the purpose. Subsection C Natural Features states that natural features such as trees, brooks, hilltops, and views shall be preserved whenever possible in designing any subdivision containing such features.

Also, a public drainage way shall mean the land reserved or dedicated for the installation of stormwater sewers or drainage ditches, or required along a natural stream or watercourse for preserving the biological as well as drainage function of the channel and providing for the flow of water to safeguard the public against flood damage, sedimentation, and erosion and to assure the adequacy of existing and proposed culverts and bridges, to induce water recharge into the ground where practical, and to lessen nonpoint pollution.

Chapter 21, Section 31. 7 (Provide Walks Adjacent to Business Buildings) A walkway, if provided it is adjacent to a business building, shall not be less than four (4') feet in width and shall be constructed in addition to other requirements. In all locations where parked automobiles may overhang such adjacent sidewalk, a minimum wall a width of six (6') feet shall be provided. This section and other sections within the Borough's ordinance may be reviewed with respect to whether setting a minimum sidewalk width may be undertaken so as to reduce the amount of impervious cover that is produced by new development. Also, language may be incorporated in order ordinance which would require developers to design sidewalks to discharge stormwater to neighboring lawns where feasible to disconnect these impervious

surfaces or use permeable paving materials where appropriate. Additional language requiring developers to design sidewalks to discharge stormwater to neighboring lawns where feasible to disconnect these impervious surfaces or use permeable paving materials where appropriate may be considered for additional into this section.

As illustrated above, Brielle has adopted a number of provisions to incorporate nonstructural stormwater management into their Land Development Regulations. However, several sections of the existing ordinance may be examined to determine if it is practicable to incorporate additional nonstructural stormwater management regulations into the Borough's existing design standards. For example, the Borough may consider revising its landscaping provisions to require the planting of native vegetation (which requires less fertilization and watering than non-native species) on site. Further, the Borough may examine the feasibility of amending their current design standards to incorporate language encouraging vegetated open swale conveyance as opposed to standard curb and gutter conveyance. Also, whenever feasible the design standards may be amended to encourage pervious paving materials to be used in the construction of sidewalks and driveways. Also, applicants should be required to disconnect impervious surfaces, where practical, to promote pollutant removal and groundwater recharge. Although, additional amendments may be made, the Borough's existing provisions have been found to be compatible with N.J.A.C. 7:8-5.3 (Nonstructural Stormwater Management Strategies).

In addition, Appendix A provides a model ordinance that has been provided by the NJDEP to assist municipalities in drafting stormwater control ordinances that comply with the State's newly adopted stormwater management design and performance standards. Following the adoption of this plan a new Stormwater Management Control Ordinance per the NJDEP's new Stormwater Management Rules will be prepared and adopted by the Borough. A number of additional provisions relating to stormwater basin fees and maintenance, design standards, pertaining to both structural and nonstructural methods that must be incorporated into a projects design, safety standards for stormwater basins, and maintenance and repair fees and responsibility will all be included within the amended ordinance. Upon completion, the ordinances will then be sent to the Monmouth County Stormwater Technical Advisory Committee for review and approval within 24 months of the EDPA.

6.2 Implementing Green Infrastructure Best Management Practices (GI BMP's)

As mentioned earlier, the NJDEP has implemented more rigid regulations regarding the volume, rate, and quality of stormwater originating on a new development site. Some sites may be able to achieve these standards through vegetative swales, buffers, and landscaping to control nonpoint source pollution. Other sites may require the building of a stormwater basin. In these cases, where the development of green infrastructure stormwater facilities is necessary, the New Jersey Department of Environmental Protection's BMP guide should be consulted. The GI BMPs utilized in low impact development concentrate on the following practices to be utilized in site development in conjunction with the non-structural methods described above:

- Bio-retention Systems- A bioretention system consists of a soil bed planted with native vegetation located above and underdrained sand layer. It can be configured either as a basin or a swale.
- Constructed Stormwater Wetlands - Constructed wetlands are wetlands systems designed to maximize the removal of pollutants from stormwater runoff through settling and both uptake and filtering by the vegetation.
- Dry Wells - A dry well is a subsurface storage facility that receives and temporarily stores stormwater runoff from roofs and structures. Discharge of the accumulated stormwater from a dry well occurs through infiltration into the surrounding soils.
- Extended Detention Basins - An extended detention basin is a facility constructed through excavation or embankments that provides temporary storage of stormwater runoff It has an outlet structure that detains runoff inflow and allows for controlled outflow to aid in mitigating stormwater

flows from development. Usually, this type of structure is utilized to provide both water quantity and water quality mitigation.

- Infiltrative Basins - Infiltration Basins are similar to detention basins in that they both temporarily store stormwater runoff generated from development project. The principal outlet to this type of basin is not a constructed outlet structure, but rather the highly permeable soils allowing for infiltration into the surrounding subsoils.
- Manufactured Treatment Devices - A manufactured treatment device is a pre-fabricated stormwater treatment structure utilizing settling, filtration, absorptive materials, vortex separation, vegetative components, and/or other appropriate technology to remove pollutants from stormwater runoff.
- Pervious Paving Systems - Pervious pavement utilizes paving material which allows for stormwater to infiltrate through the pavement rather than accumulate as is the case with standard paving material. Pervious pavement utilizes void areas within the paving material to provide for this permeable feature.
- Blue Roofs – Blue roofs are systems that is designed to provide stormwater detention. Rainfall onto the roof is managed using orifices, weirs, or other outlet devices that control the discharge rate of rooftop runoff. By reducing flow rates from rooftops, blue roofs are effective in reduction the size of downstream detention basin.
- Sand Filters - A sand filter consists of a forebay and an underdrained sand bed. Runoff entering the sand filter is conveyed first through the forebay, which removes trash, debris, and coarse sediments, and then infiltrates through the sand bed to an outlet pipe at the bottom of said filter.
- Vegetative Filter Strips - A vegetative filter strip is a stable, evenly graded area that removes pollutants from stormwater runoff through filtration and biological intake. In order to provide pollutant treatment, runoff must enter and move through the filter strip as sheet flow; therefore, vegetative filter strips must have shallow slopes to maintain sheet flow. When designed in accordance with N.J.A. 7:8, the total suspended solid (TSS) removal rate is 60-80%, depending on the type of vegetation.
- Wet Ponds - A wet pond is a facility constructed through excavation or embankments that provides both permanent and temporary storage of stormwater runoff. It has an outlet structure that creates a permanent pool and detains and attenuates runoff inflows promoting the settlement of pollutants.
- Grass Swales - A grass swale is a stable, parabolic, or trapezoidal channel that is lined with turf; it is used to improve water quality and convey stormwater runoff. Grass swales do not rely on the permeability of the underlying soil for pollutant removal; instead, pollutants are removed by settling and filtration through the grass. The maximum suspended solids (TSS) removal rate is 50%.
- Subsurface Gravel Wetlands - A subsurface gravel wetland is a stormwater management system designed to maximize the removal of pollutants from stormwater; the system is a combination of a surface marsh and a subsurface gravel bed. Pollutants are treated through settling, both uptake and filtration by vegetation, and chemical transformation in the subsurface bed, specifically denitrification. Both the total suspended solids (TSS) removal rate and nitrogen removal rate are 90%.
- Green Roofs - A green roof, also known as a vegetated roof, is a roof that has been covered with a growing medium and vegetation. Green roofs are effective for reducing the amount of

stormwater runoff leaving a site. A green roof consists of vegetation planted growing media on top of a drainage layer that intercepts stormwater and reduces the total volume of runoff through evapotranspiration.

- Cisterns – Cisterns are stormwater facilities that temporarily store stormwater runoff from rooftops, which is subsequently reused for non-potable uses, such as toilet flushing and vehicle washing. Cisterns can either be indoors or outdoors and above, at, or below grade. The reuse of the stormwater reduces the volume of stormwater runoff that makes it to downstream facilities. Take note that cisterns are not a viable stormwater management choice for sites with little or no demand for reuse.

Further, all GI BMPs shall be designed according to the following conditions:

- They should consider the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal highwater table; soil type, permeability, and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).
- They should be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate and shall be parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the diameter of the orifice or one-third (1/3) the width of the weir, with a minimum spacing between bars of one-inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of N.J.A.C. 7:8-6.2.
- They should be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvements Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement.
- At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.
- Stormwater management basins shall be designed to meet the minimum safety standards for storm water management basins at Section N.J.A.C. 7:8-6.
- Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by this subchapter.
- Manufactured treatment devices may be used to meet the requirements of this sub chapter, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.
- In order to ensure adequate longterm operation as well as preventative and corrective maintenance of stormwater management measures and GI BMP's, the designers of such facilities should submit to the municipality a *Maintenance Plan* indicating specific maintenance tasks and schedules as indicated in NJ.AC. 7:8-5.8 "Maintenance Requirements". This maintenance plan will require the ultimate user of said GI BMPs to provide an annual certification that the stormwater management measures approved are functioning as designed and that the proper

maintenance and inspection of said measures have been performed. Random spot inspections by the municipality will be conducted to ensure compliance along with appropriate enforcement actions such as fines to be levied should non-compliance result.

By adhering to the State's newly adopted design standards, the BMP's engineered for each proposed development project will serve to improve stormwater quality, enhance groundwater recharge, and reduce stormwater runoff. Combined, these methods will serve to improve the environment and protect the public interest by minimizing the risk of flooding and maintain the Borough's water supply through the future.

6.3 Plan Consistency

Currently, no land within Brielle is contained within the bounds of an adopted a Regional Stormwater Management Plan (RSWMP) and no Total Daily Maximum Loads (TDML's) have been developed for waters within the Borough. Therefore, at this time, it is not necessary for the amendments proposed in this plan to adhere to standards developed through the adoption of a Regional Stormwater Management Plan.

Also, this Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) N.J.A.C. 5:21, and the Borough will utilize the most current update of the RSIS in the stormwater management review of residential areas. The Borough's Stormwater Management Ordinance requires all new development and redevelopment plans to comply when necessary, applications will be submitted to the Freehold Soil Conservation District to ensure that that proposed project is consistent with New Jersey's Soil Erosion and Sediment Control Standards. Further, upon adoption, the Borough's amended Stormwater Control Ordinance will ensure compliance with the Safety Standards for Stormwater Management Basins within N.J.A.C. 7:8-6.

6.4 Mitigation Plan

6.4.1 Overview

A municipal mitigation plan is an element of the Municipal Stormwater Management Plan that allows municipalities to grant a waiver from the design and performance standards for stormwater runoff quality, stormwater runoff quantity, and groundwater recharge established in N.J.A.C. 7:8-5, and adopted into the municipal stormwater control ordinance. The existence of a mitigation plan does not preclude the requirement that an applicant meet the design and performance standards for any one of the three key stormwater requirements, namely maintaining pre-development recharge, stormwater runoff quantity reduction and stormwater runoff quality. Instead, this mitigation plan, once it has been approved by the Monmouth County Planning Board's Stormwater Technical Advisory Committee (STAC), will serve to enable the Borough of Brielle, in limited circumstances to waive the strict compliance with one or more of the performance standards where full compliance cannot be reasonably accommodated on site. In addition, approval of a waiver or exemption from one of the three criteria outlined above provides no guarantee that, if requested, an exemption or waiver will be granted for either or both of the remaining criteria. However, under no circumstances shall Brielle waive the Special Resources Protection Area (SRP A) established under the Stormwater Management Rules at N.J.A.C. 7:8-5.5 (h).

Supporting evidence for an exemption or waiver shall be prepared in the form of a "stormwater management report" which will be signed and sealed by a New Jersey licensed professional engineer. The report shall include at a minimum:

- Detailed hydrologic and hydraulic calculations identifying the sizing criteria for each BMP and the stormwater collection system based upon the anticipated peak flow and/or volume.
- A map of the planned project showing existing conditions with drainage boundaries and land features, including delineated wetlands, proposed improvements, including all BMPs, grading, utilities, impervious features, and landscaping.

- Construction details for each BMP with appropriate contact information.

When applying for a waiver, the applicants professional engineer must first demonstrate that onsite compliance is either a) not possible, or b) possible but would result in tangible negative environmental or structural impacts. Such impacts may include:

- If the strict application of the regulations would result in a reduction of open space and/or undisturbed buffer areas. It is important to note that in this situation, the applicant must demonstrate that such reductions are caused by compliance with State and local regulations and not an attempt to maximize buildable area.
- The degradation of groundwater quality due to the infiltration of poor-quality runoff. For example, if runoff from a shopping plaza with heavy traffic volume will be directed to a protected water supply aquifer to achieve compliance, alternative recharge locations may be more practical and environmentally sound.
- The modification to the elevation of the groundwater table due to rapid infiltration of stormwater will have demonstrable negative impacts on local structures and/or local groundwater quality. For example, rapid infiltration in a highly pervious soil near a basement may cause flooding and settlement; and also
- Flooding due to changes in the time of peak for a storm attenuated in- compliance with *NJA.C. 7:8* and the *New Jersey Stormwater Best Management Practices Manual*. Despite the requirement for peak reductions to be applied to the 2-year, 10-year and 100- year events, peak runoff from a sub-basin of a HUC-14 may actually experience increases due to changes to peak timing.

An applicant may also propose a mitigation project on a site that has not been identified in this mitigation plan. However, in each circumstance the selection of a mitigation project must incorporate the following requirements:

- The project must be within the same area that would contribute to the receptor impacted by that project. If there is no specific sensitive receptor impacted, then the location of the mitigation project may be located anywhere within the municipality, preferably at a location that would provide the greatest benefit.
- Legal authorization must be obtained to construct the project at the location selected. This includes the maintenance and any access needs for the project throughout its operation.
- The mitigation project should be located close to the original development project. If possible, the mitigation project should be located at a similar distance from the identified sensitive receptor. This distance should not be based on actual location, but on a similar hydraulic distance to the sensitive receptor. For example, if a project for which a waiver is obtained discharges to a tributary, but the closest location discharges to the main branch of a waterway, it may be more beneficial to identify a location discharging to the same tributary.
- It is preferable to have one location that addresses any and all of the performance standards waived, rather than one location for each performance standard.
- The project location must demonstrate no adverse impacts to other properties.
- For projects addressing the groundwater recharge performance standard, a mitigation project site upstream of the location of the actual project site is preferable to a downstream location.

- Mitigation projects that address stormwater runoff quantity can choose to provide storage for proposed increases in runoff volume, as opposed to a direct peak flow reduction.
- Mitigation projects that address stormwater runoff quality can choose to address another pollutant other than TSS, which has been demonstrated to be of particular concern, such as streams that have been listed as an impaired waterbody for other pollutants. However, care must be taken to ensure that waivers that are granted for the TSS requirements do not result in the impairment of an existing unimpaired area.

All mitigation plans and reviews should consider the location of the mitigation project in relation to the property where the projected damage will occur. For example, if a project were unable to achieve the stormwater quantity performance standards upstream of an inadequate culvert, a mitigation project downstream of that culvert would not offer similar protection. Or, if the groundwater recharge is the major contributor to a wetlands area, the new project should Continue to provide recharge to the wetlands area.

Also, in environmentally critical areas, the quality of stormwater that is being directed to infiltration facilities should be assessed. If the quality of stormwater that would be infiltrated following development poses a threat to groundwater supplies, off-site mitigation should be considered. Off-site mitigation should also be undertaken when on-site recharge is precluded by site conditions, or when stormwater quality assessments indicate that on-site stormwater infiltration will degrade ambient groundwater quality in environmentally sensitive areas.

Environmentally critical areas include locations where groundwater is classified by the State as holding either special ecological significance, wellhead protection areas, areas of known groundwater contamination, or areas of on-going groundwater remediation. Groundwater recharge is of particular concern in areas discharging to Category 1 (CI) groundwater or in wellhead protection areas. Options for off-site groundwater recharge include:

- Retrofitting an existing stormwater basin
- Reducing the amount of impervious cover on site by adding vegetation or incorporating pervious paving materials
- Splitting flows to isolate high quality runoff and constructing infiltration basins to receive only the high-quality runoff
- Acquiring upland recharge areas

6.4.2 Sensitive Receptors

Within Figure 7, entitled Sensitive Receptor Map, Brielle has indicated the sensitive receptor areas within the Borough that are especially susceptible to stormwater changes. As many of the mitigation measures that will be employed to these sensitive receptor areas are in the planning stage, when appropriate, Brielle will allow developers to fund studies to plan and engineer the most suitable mitigation measure for each project site, and each performance standard. An applicant may also provide compensatory mitigation through the contribution of funds when, due to the small amount of the waiver given for the performance standard, it is not practical to provide a full mitigation project. In these circumstances, the receipt of financial contributions shall be considered the completion of mandatory mitigation for that project. However, in these instances, the Borough of Brielle itself would be responsible to ensure that mitigation occurs based on the collection of these funds. If such a situation were to arise, a detailed description of the circumstances, funding amount and performance standard that was mitigated will be provided in Brielle's annual NJPDES report.

6.4.3 Mitigation Criteria

The mitigation requirements listed below offer a hierarchy of options that are intended to offset the effect on groundwater recharge, stormwater quantity control, and/or stormwater quality control to an equal or

greater extent than was created by the granting of a waiver or exemption from the stormwater management requirements.

The mitigation criteria are listed below in order of preference:

- 1) Identify, design, and implement a compensating measure to mitigate impacts** - The preferred option is to identify and develop a compensating mitigation project in the same drainage area as the proposed development. In these cases, the applicant will address the same issue within the design and performance standards for which the variance or exemption is being sought, and demonstrate that the proposed mitigating measures provide equal or greater compensation to offset the non-complying aspect of the stormwater management system on site. The developer must also ensure the long-term maintenance of the project as outlined in Chapters 8 and 9 of the NJDEP Stormwater BMP Manual. If the Borough agrees to control a new stormwater management facility, arrangement in the form of an escrow account will be made to stipulate the payment amount, schedule, and long-term responsibilities of the facility to ensure that it functions to capacity.
- 2) Complete a project identified by the municipality as equivalent to the environmental impact created by the exemption or variance** - If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in option 1, the mitigation project may provide measures that are not directly equivalent to the impacts for which the variance or exemption is being sought, but that addresses the same issue to an equal or greater extent. For example, if a variance is given because the 80% TSS requirement has not been met, the selected project may address water quality impacts that increase the siltation of a waterbody within the applicable HUC 14 subwatershed.

It shall be the responsibility of the applicant that is requesting hardship to identify, quantify, and complete a compensatory mitigation alternative that will compensate for the relief that is being sought from the stormwater design and performance standards to an equal or greater extent. First and foremost, the applicant is encouraged to identify and propose a compensatory mitigation project within the confines of the drainage area within which the proposed project is located. However, an appropriate mitigation measure may take place within the larger confines of a proposed project's HUC-14 subwatershed area, or another portion of the Borough, rather than the contributing area if the Brielle Planning Board or Zoning Board of Adjustment finds that the mitigation will equally protect public health, safety and welfare, the environment, and public and private property.

- 3) Provide funding for municipal projects that would address existing stormwater impacts** - The third and least preferable stormwater mitigation option is for the applicant to provide funding or partial funding for an environmental enhancement project that has been identified in the Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The contributed funds must be equal or greater than the cost to implement the required on-site stormwater measure for which relief is requested including the cost of land, easements, engineering design, and long-term maintenance. However, with this option, the Borough, and not the applicant is ultimately responsible for the design, property acquisition, construction, construction management, maintenance (short-term and long-term) and follow-up study, unless that project and its prospective costs have been outlined within this Mitigation Plan.

6.4.4 Requirements for Mitigation Projects

Whether the applicant is proposing the mitigation project, or Brielle has identified the project within this Mitigation Plan, the following requirements for mitigation must be included in the project submission.

- **Impact from noncompliance** - The applicant must provide a table to show the required values, and the values provided in the project, and include an alternatives analysis that demonstrates that on-site compliance was maximized to the greatest extent practicable.
- **Sensitive Receptor** - Identify the sensitive receptor related to the performance standard for which a waiver is sought. Demonstrate that the mitigation site contributes to the same sensitive receptor.
- **Narrative and Supporting Information Regarding the Need for the Waiver** - The waiver cannot be granted for a condition that was created by the applicant. If the applicant can provide compliance with the stormwater rules through a reduction in the scope of the project, the applicant has created the condition and a waiver cannot be issued. The applicant must provide a discussion and supporting information of the site conditions that would not allow the construction of a stormwater management facility to provide compliance with these requirements, and/or if the denial of the application would impose an extraordinary hardship on the applicant brought about by circumstances peculiar to the subject property. The site conditions to be considered are soil type, the presence of limestone, acidic soils, a high groundwater table, any other unique conditions that would create an unsafe design, as well as conditions that may provide a detrimental impact to public health, welfare, and safety.
- **Design of the Mitigation Project** - Provide the design details of the mitigation project. This includes, but is not limited to, drawings, calculations, and other information needed to evaluate the mitigation project.
- **Responsible Party** - The mitigation project submission must list the party or parties responsible for the construction or maintenance of the mitigation project. Documentation must be provided to demonstrate that the responsible party is aware of, has authority to perform, and accepts the responsibility for the construction and the maintenance of the mitigation project. Under no circumstances shall the responsible party be an individual single-family homeowner.
- **Maintenance** - The applicant must include a maintenance plan that addresses the maintenance criteria at N.J.A.C. 7:8-5.8 as part of a mitigation plan. In addition, if the maintenance responsibility is being transferred to the Borough, or another entity, the entity responsible for the cost of the maintenance must be identified. Brielle provides applicants with the option of conveying the mitigation project to the Borough, provided that the applicant funds the cost of long-term maintenance of the facility in perpetuity.
- **Permits** - The applicant is solely responsible to obtain any and all necessary local, State, or other applicable permits for the identified mitigation project or measure. The applicable permits must be obtained prior to the municipal approval of the project for which the mitigation is being sought.
- **Construction** - The applicant must demonstrate that the construction of the mitigation project coincides with the construction of the proposed project. A certificate of occupancy or final approval by the municipality for the application permit cannot be issued until the mitigation project or measure receives final approval. Any mitigation projects proposed by the municipality to offset the stormwater impacts of the Borough's own projects must be completed within six months of the completion of the municipal project, in order to remain in compliance with Brielle's NJPDES General Permit.



APPENDICES

ORDINANCE FOR ADOPTION OF THE FLOODPLAIN MANAGEMENT REGULATIONS OF THE BOROUGH OF BRIELLE

DRAFT

ORDINANCE NO. XX-XX

AN ORDINANCE BY THE Mayor and Council AMENDING THE Borough of Brielle CODE OF ORDINANCES TO REPEAL _____ TO ADOPT A NEW _____; TO ADOPT FLOOD HAZARD MAPS; TO DESIGNATE A FLOODPLAIN ADMINISTRATOR; AND PROVIDING FOR SEVERABILITY AND AN EFFECTIVE DATE

WHEREAS, The Legislature of the State of New Jersey has in N.J.S.A. 40:48-1, et seq., delegated the responsibility to local governmental units to adopt regulations designed to promote public health, safety, and general welfare of its citizenry. Therefore, the **Mayor and Council** of the **Borough of Brielle** of Monmouth County, New Jersey does ordain as follows:

FINDINGS OF FACT

- a) The flood hazard areas of the **Borough of Brielle** are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.
- b) These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazard which increase flood heights and velocities, and when inadequately anchored, causes damage in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss.

STATEMENT OF PURPOSE

It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- a) Protect human life and health;
- b) Minimize expenditure of public money for costly flood control projects;
- c) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- d) Minimize prolonged business interruptions;
- e) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, bridges located in areas of special flood hazard;
- f) Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;
- g) Ensure that potential buyers are notified that property is in an area of special flood hazard; and
- h) Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

METHODS OF REDUCING FLOOD LOSSES

In order to accomplish its purposes, this ordinance includes methods and provisions for:

- a) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
- b) Requiring that uses vulnerable to floods including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- c) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
- d) Controlling filling, grading, dredging, and other development which may increase flood damage; and,
- e) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters, or which may increase flood hazards in other areas.

DEFINITIONS

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

AH Zone- Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone

AO Zone- Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet.

Appeal — A request for a review of the Zoning Officer's interpretation of any provision of this ordinance or a request for a variance.

Area of Shallow Flooding — A designated AO or AH zone on a community's Flood Insurance Rate Map (FIRM) with a one percent annual or greater chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of Special Flood Hazard — Land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year. It is shown on the FIRM as Zone V, VE, V1-30, A, AO, A1-A30, AE, A99, or AH.

Base Flood — A flood having a one percent chance of being equaled or exceeded in any given year.

Base Flood Elevation (BFE) – The flood elevation shown on a published Flood Insurance Study (FIS) including the Flood Insurance Rate Map (FIRM). For zones AE, AH, AO, and A1-30 the elevation represents the water surface elevation resulting from a flood that has a 1-percent or greater chance of being equaled or exceeded in any given year.

Basement — Any area of the building having its floor subgrade (below ground level) on all sides.

Best Available Flood Hazard Data — The most recent available preliminary flood risk guidance FEMA has provided. The Best Available Flood Hazard Data may be depicted on but not limited to Advisory Flood Hazard Area Maps, Work Maps or Preliminary FIS and FIRM.

Best Available Flood Hazard Data Elevation — The most recent available preliminary flood elevation guidance FEMA has provided. The Best Available Flood Hazard Data Elevation may be depicted on an Advisory Flood Hazard Area Map, Work Map or Preliminary FIS and FIRM.

Breakaway Wall — A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation system.

Coastal A Zone — The portion of the Special Flood Hazard Area (SFHA) starting from a Velocity (V) Zone and extending up to the landward Limit of the Moderate Wave Action delineation. Where no V Zone is mapped the Coastal A Zone is the portion between the open coast and the landward Limit of the Moderate Wave Action delineation. Coastal A Zones may be subject to wave effects, velocity flows, erosion, scour, or a combination of these forces. Construction and development in Coastal A Zones is to be regulated the same as V Zones/Coastal High Hazard Areas.

Coastal High Hazard Area — An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

Cumulative Substantial Improvement — Any reconstruction, rehabilitation, addition, or other improvement of a structure that equals or exceeds 50 percent [lower threshold – e.g.: replace 50 percent with 40 percent] of the market value of the structure at the time of the improvement or repair when counted cumulatively for 10 years.

Development — Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials located within the area of special flood hazard.

Elevated Building — A non-basement building (i) built, in the case of a building in an Area of Special Flood Hazard, to have the top of the elevated floor or in the case of a building in a Coastal High-Hazard Area or Coastal A Zone, to have the bottom of the lowest horizontal structural member of the elevated floor, elevated above the base flood elevation plus freeboard by means of piling, columns (posts and piers), or shear walls parallel to the flow of the water, and (ii) adequately anchored so as not to impair the structural integrity of the building during a flood up to the magnitude of the base flood. In an Area of Special Flood Hazard "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of flood waters. In Areas of Coastal High Hazard and Coastal A Zones "elevated building" also includes a building otherwise meeting the definition of "elevated building" even though the lower area is enclosed by means of breakaway walls.

Elevation Certificate — An administrative tool of the National Flood Insurance Program (NFIP) that can be used to provide elevation information, to determine the proper insurance premium

rate, and to support a required for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F).

Erosion — The process of gradual wearing away of land masses.

Existing Manufactured Home Park or Subdivision — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

FEMA Publication – Any publication authored or referenced by FEMA related to building science, building safety, or floodplain management related to the National Flood Insurance Program. Publications shall include but are not limited to technical bulletins, desk references, and American Society of Civil Engineers Standards documents.

Flood Design Class – An American Society of Civil Engineers (ASCE) classification of buildings and other structures for determination of flood loads and conditions and determination of minimum elevation requirements on the basis of risk associated with unacceptable performance.

Flood or Flooding — A general and temporary condition of partial or complete inundation of normally dry land areas from:

- a) The overflow of inland or tidal waters and/or
- b) The unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance Rate Map (FIRM) — The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Flood Insurance Study (FIS) — The official report in which the Federal Insurance Administration has provided flood profiles, as well as the Flood Insurance Rate Map(s) and the water surface elevation of the base flood.

Floodplain Management Regulations — Zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such State or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Floodproofing — Any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures, and their contents.

Floodproofing Certificate – Certification by an engineer or architect to certify a floodproofing design for a non-residential building.

Floodway — The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than 0.2 foot.

Freeboard — A factor of safety usually expressed in feet above a flood level for purposes of flood plain management. “Freeboard” tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Highest Adjacent Grade — The highest natural elevation of the ground surface prior to construction next to the proposed or existing walls of a structure.

Historic Structure — Any structure that is:

- a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
- b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
- c) Individually listed on a State inventory of historic places in States with historic preservation programs which have been approved by the Secretary of the Interior; or
- d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
 - (1) By an approved State program as determined by the Secretary of the Interior; or
 - (2) Directly by the Secretary of the Interior in States without approved programs.

Limit of Moderate Wave Action (LiMWA) – Inland limit of the area affected by waves greater than 1.5 feet during the Base Flood. Base Flood conditions between the V Zone and the LiMWA will be similar to, but less severe than those in the V Zone.

Lowest Floor — The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for the parking of vehicles, building access or storage in an area other than a basement is not considered a building's lowest floor provided that such enclosure is not built so to render the structure in violation of other applicable non-elevation design requirements of 44 CFR Section 60.3.

Manufactured Home — A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

Manufactured Home Park or Manufactured Home Subdivision — A parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

New Construction — Structures for which the start of construction commenced on or after the effective date of a floodplain regulation adopted by a community and includes any subsequent improvements to such structures.

New Manufactured Home Park or Subdivision — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets,

and either final site grading or the pouring of concrete pads) is completed on or after the effective date of the floodplain management regulations adopted by the municipality.

Preliminary Flood Insurance Rate Map— The draft version of the FIRM released for public comment before finalization and adoption.

Recreational Vehicle — A vehicle which is [i] built on a single chassis; [ii] 400 square feet or less when measured at the longest horizontal projections; [iii] designed to be self-propelled or permanently towable by a light duty truck; and [iv] designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Start of Construction — (For other than new construction or substantial improvements under the Coastal Barrier Resources Act (P.L. No. 97-348)) includes substantial improvements and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site such as the pouring of a slab or footings, the installation of pilings, the construction of columns, or any work beyond the stage of excavation, or the placement of a manufactured home on a foundation.

Permanent construction does not include land preparation, such as clearing, grading, and filling nor does it include the installation of streets and/or walkways, nor does it include excavation for a basement, footings or piers, or foundations or the erection of temporary forms, nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure — A walled and roofed building, a manufactured home, or a gas or liquid storage tank that is principally above ground.

Substantial Damage — Damage of any origin sustained by a structure whereby the cost of restoring the structure to its condition before damage would equal or exceed fifty (50) percent of the market value of the structure before the damage occurred.

Substantial Improvement — Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty (50) percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:

- a) Any project for improvement of a structure to correct existing violations of State or local health, sanitary or safety code specifications which have been identified by the local code enforcement officer and which are the minimum necessary to assure safe living conditions; or
- b) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

Variance — A grant of relief from the requirements of this ordinance that permits construction in a manner that would otherwise be prohibited by this ordinance.

Violation — The failure of a structure or other development to be fully compliant with this ordinance. A new or substantially improved structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in 44 CFR §60.3(b)(5), (c)(4), (c)(10), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

Water Surface Elevation — the height, in relation to the North American Vertical Datum (NAVD) of 1988, (or other datum, where specified) of floods of various magnitudes and frequencies in the flood plains of coastal or riverine areas.

GENERAL PROVISIONS

LANDS TO WHICH THIS ORDINANCE APPLIES

This ordinance shall apply to all areas of special flood hazards within the jurisdiction of the **Borough of Brielle**, Monmouth County, New Jersey.

BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD

The areas of special flood hazard for the **Borough of Brielle**, Community No. 340290, are identified and defined on the following documents prepared by the Federal Emergency Management Agency:

- a) A scientific and engineering report “Flood Insurance Study, Monmouth County, New Jersey (All Jurisdictions)” dated 1/2014.
- b) “Flood Insurance Rate Map for Monmout County, New Jersey (All Jurisdictions)” as shown on Index and panel 0456, whose effective date is September 25, 2009.
- c) Best Available Flood Hazard Data. These documents shall take precedence over effective panels and FIS in construction and development regulations only. Where the effective mapping or Base Flood Elevation conflict or overlap with the Best Available Flood Hazard Data, whichever imposes the more stringent requirement shall prevail.

The above documents are hereby adopted and declared to be a part of this ordinance.

PENALTIES FOR NONCOMPLIANCE

No structure or land shall hereafter be constructed, re-located to, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violation of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions) shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall upon conviction thereof be fined not more than \$1,000.00 or imprisoned for not more than 30 days, or both, for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the **Borough of Brielle**, from taking such other lawful action as is necessary to prevent or remedy any violation.

3.4 ABROGATION AND GREATER RESTRICTIONS

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and other ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

INTERPRETATION

In the interpretation and application of this ordinance, all provisions shall be:

- a) Considered as minimum requirements;
- b) Liberally construed in favor of the governing body; and,
- c) Deemed neither to limit nor repeal any other powers granted under State statutes.

WARNING AND DISCLAIMER OF LIABILITY

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the area of special flood hazards or uses permitted within such areas will be free from flooding or flood damages.

This ordinance shall not create liability on the part of the **Borough of Brielle**, any officer or employee thereof or the Federal Insurance Administration, for any flood damages that result from reliance on this ordinance, or any administrative decision lawfully made thereunder.

ADMINISTRATION

ESTABLISHMENT OF DEVELOPMENT PERMIT

The **Borough of Brielle** shall establish and maintain a local development permitting system to determine whether such proposed construction or other development is reasonably safe from flooding. A local Development Permit shall be obtained before construction or development begins, including placement of manufactured homes, within any area of special flood hazard established in section 3.2. Application for a Development Permit shall be made on forms furnished by the Zoning Officer and may include, but not be limited to; plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; a description of the flood design class, and the location of the foregoing. Specifically, the following information is required:

- a) Elevation in relation to 0-foot elevation NAVD 88 datum of the lowest floor (including basement) of all structures;
- b) Elevation in relation to 0-foot elevation NAVD 88 datum to which any structure has been floodproofed.
- c) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in section 5.2-2; and,
- d) Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

- e) Any forms, plans, or information required pursuant to any applicable FEMA publication.

DESIGNATION OF THE LOCAL ADMINISTRATOR

The Zoning Officer is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

DUTIES AND RESPONSIBILITIES OF THE ADMINISTRATOR

Duties of the Zoning Officer shall include, but not be limited to:

PERMIT REVIEW

- a) Review all development permits to determine that the permit requirements of this ordinance have been satisfied.
- b) Review all development permits to determine that all necessary permits have been obtained from those Federal, State, or local governmental agencies from which prior approval is required.
- c) Review all development permits to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of 5.3 a) are met.
- d) Review all permit applications to determine whether proposed building sites are reasonably safe from flooding;
- e) Review all permit applications to determine whether development complies with all applicable FEMA Publications;
- f) Review all permit applications to determine whether development complies with all applicable New Jersey Land Use requirements;
- g) Review all development permits in the Coastal A Zone area to determine if the proposed development alters natural coastal protections so as to increase potential flood damage.
- h) Review plans for walls to be used to enclose space below the base flood level in accordance with section 5.4-2 d).

USE OF OTHER BASE FLOOD AND FLOODWAY DATA

When base flood elevation and floodway data has not been provided in accordance with section BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the Zoning Officer shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source, in order to administer sections SPECIFIC STANDARDS, RESIDENTIAL CONSTRUCTION, and SPECIFIC STANDARDS, NONRESIDENTIAL CONSTRUCTION.

INFORMATION TO BE OBTAINED AND MAINTAINED

- a) Obtain and record on a current Elevation Certificate the actual elevation (in relation to 0-foot elevation NAVD 88 datum) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.
- b) For all new or substantially improved floodproofed structures:
 - i. verify and record on a Floodproofing Certificate the actual elevation (in relation to 0-foot elevation NAVD 88 datum);
 - ii. maintain the floodproofing certifications required in section 4.1 c).
- c) In Coastal A Zone area, certification shall be obtained from a registered professional engineer or architect that the provisions of 5.4-2 a) and 5.4-2 b) i. and ii. are met.

- d) Record the study date of the Best Available Flood Hazard Data (and other documents) used to determine the actual elevation of the lowest floor (including basement) of all new or substantially improved structures; and
- e) Maintain for public inspection all records pertaining to the provisions of this ordinance.

ALTERATION OF WATERCOURSES

- a) Notify adjacent communities and the New Jersey Department of Environmental Protection, Bureau of Flood Engineering and the Land Use Regulation Program prior to any alteration or relocation of a watercourse and submit evidence of such notification to the Federal Insurance Administration.
- b) Require that maintenance be provided within the altered or relocated portion of said watercourse so the flood carrying capacity is not diminished.

SUBSTANTIAL DAMAGE REVIEW

- a) After an event resulting in building damages, assess the damage to structures due to flood and non-flood causes.
- b) Record and maintain the flood and non-flood damage of substantial damage structures and provide a letter of Substantial Damage Determination to the owner and the New Jersey Department of Environmental Protection, Bureau of Flood Engineering.
- c) Ensure substantial improvements meet the requirements of sections SPECIFIC STANDARDS, RESIDENTIAL CONSTRUCTION, SPECIFIC STANDARDS, NONRESIDENTIAL CONSTRUCTION and SPECIFIC STANDARDS, MANUFACTURED HOMES.

INTERPRETATION OF FIRM BOUNDARIES

Make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 4.4.

REPORT CHANGES IN FLOODING CONDITIONS

Obtain and record changes in flooding conditions and report the technical or scientific data to the Federal Insurance Administrator on a six (6) month basis or sooner in accordance with Volume 44 Code of Federal Regulations Section 65.3.

VARIANCE PROCEDURE

APPEAL BOARD

- a) The **Zoning Board** as established by **Mayor and Council** shall hear and decide appeals and requests for variances from the requirements of this ordinance.
- b) The **Zoning Board** shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the **Zoning Officer** in the enforcement or administration of this ordinance.
- c) Those aggrieved by the decision of the **Zoning Board**, or any taxpayer, may appeal such decision to the appropriate court, as provided in NJ Statutes.

- d) In passing upon such applications, the **Zoning Board**, shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:
 - i. the danger that materials may be swept onto other lands to the injury of others;
 - ii. the danger to life and property due to flooding or erosion damage;
 - iii. the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
 - iv. the importance of the services provided by the proposed facility to the community;
 - v. the necessity to the facility of a waterfront location, where applicable;
 - vi. the availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;
 - vii. the compatibility of the proposed use with existing and anticipated development;
 - viii. the relationship of the proposed use to the comprehensive plan and floodplain management program of that area;
 - ix. the safety of access to the property in times of flood for ordinary and emergency vehicles;
 - x. the expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,
 - xi. the costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.
- e) Upon consideration of the factors of section 4.4-1 d) and the purposes of this ordinance, the **Zoning Board** may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.
- f) The **Zoning Officer** shall maintain the records of all appeal actions, including technical information, the justification for their issuance, and report any variances to the Federal Insurance Administration upon request.

CONDITIONS FOR VARIANCES

- a) Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items i.-xi. in section 4.4-1 d) have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.
- b) Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
- c) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
- d) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
- e) Variances shall only be issued upon:
 - i. A showing of good and sufficient cause;
 - ii. A determination that failure to grant the variance would result in exceptional hardship to the applicant; and,
 - iii. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create

- nuisances, cause fraud on or victimization of the public as identified in section 4.4- 1 d), or conflict with existing local laws or ordinances.
- f) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

PROVISIONS FOR FLOOD HAZARD REDUCTION

GENERAL STANDARDS

In all areas of special flood hazards, compliance with the applicable requirements of the Uniform Construction Code (N.J.A.C. 5:23) and the following standards, whichever is more restrictive, is required:

ANCHORING

- a) All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
- b) All manufactured homes to be placed or substantially improved shall be anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

CONSTRUCTION MATERIALS AND METHODS

- a) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
- b) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

UTILITIES

- a) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
- b) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters;
- c) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding; and
- d) For all new construction and substantial improvements, the electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

SUBDIVISION PROPOSALS

- a) All subdivision proposals and other proposed new development shall be consistent with the need to minimize flood damage;

- b) All subdivision proposals and other proposed new development shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
- c) All subdivision proposals and other proposed new development shall have adequate drainage provided to reduce exposure to flood damage; and,
- d) Base flood elevation data shall be provided for subdivision proposals and other proposed new development which contain at least fifty (50) lots or five (5) acres (whichever is less).

ENCLOSURE OPENINGS

All new construction and substantial improvements having fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria: A minimum of two (2) openings in at least two (2) exterior walls of each enclosed area, having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one (1) foot above grade. Openings may be equipped with screens, louvers, or other covering or devices provided that they permit the automatic entry and exit of floodwaters.

SPECIFIC STANDARDS

In all areas of special flood hazards where base flood elevation data have been provided as set forth in section BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD or in section USE OF OTHER BASE FLOOD DATA, the following standards are required:

RESIDENTIAL CONSTRUCTION

New construction and substantial improvement of any residential structure located in an A, AE, AO, or AH zone shall have the lowest floor, including basement together with the attendant utilities (including all electrical, heating, ventilating, air- conditioning and other service equipment) and sanitary facilities, elevated at or above the more restrictive of the following:

- a) For A or AE zones:
 - i. base flood elevation (published FIS/FIRM) plus one (1) foot
 - ii. the best available flood hazard data elevation plus one (1) foot
 - iii. as required by ASCE/SEI 24-14, Table 2-1, or
 - iv. as required by N.J.A.C. 7:13-3.
- b) For AO or AH zones on the municipality's FIRM to elevate above the depth number specified in feet plus one (1) foot, above the highest adjacent (at least three (3) feet if no depth number is specified). And require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.
- c) Record the method and elevation used above and, the Best Available Flood Hazard Design Data elevation, date, and revision in the local Development Permit.

NONRESIDENTIAL CONSTRUCTION

In an Area of Special Flood Hazard, all new construction and substantial improvement of any commercial, industrial, or other nonresidential structure located in an A, AE, AO, or AH zone shall have the lowest floor, including basement together with the attendant utilities and sanitary facilities as well as all electrical, heating, ventilating, air-conditioning and other service equipment:

Either:

- a) Elevated at or above the more restrictive of the following:
 - i. For A or AE zones:
 - a. base flood elevation (published FIS/FIRM) plus one (1) foot
 - b. the best available flood hazard data elevation plus one (1) foot
 - c. as required by ASCE/SEI 24-14, Table 2-1, or
 - d. as required by N.J.A.C 7:13-3.
 - ii. For AO or AH zones on the municipality's FIRM to elevate above the depth number specified in feet plus one (1) foot, above the highest adjacent grade (at least three (3) feet if no depth number is specified). And require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures;
 - iii. Record the method and elevation used above and, the Best Available Flood Hazard Design Data elevation, date, and revision in the local Development Permit.

or

- b) Be floodproofed so that below the more restrictive of the following:
 - i. For A or AE zones:
 - a. base flood elevation (published FIS/FIRM) plus one (1) foot
 - b. the best available flood hazard data elevation plus one (1) foot
 - c. as required by ASCE/SEI 24-14, Table 6-1, or
 - d. as required by N.J.A.C 7:13-3.
 - e. AO or AH zone elevation based upon the highest adjacent grade, plus the depth number specified in feet, plus one (1) foot/ (at least three (3) feet if no depth number is specified) . And require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures,
 - ii. The structure is watertight with walls substantially impermeable to the passage of water;
 - iii. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and,
 - iv. Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of this subsection. Such certification shall be provided to the official as set forth in section 4.3-3 b) ii.
 - v. Record the method and elevation used above and, the Best Available Flood Hazard Design Data elevation, date, and revision in the local Development

MANUFACTURED HOMES

- a) Manufactured homes shall be anchored in accordance with section 5.1-1 b).
- b) All manufactured homes to be placed or substantially improved within an area of special flood hazard shall:

- i. Be consistent with the need to minimize flood damage,
- ii. Be constructed to minimize flood damage,
- iii. Have adequate drainage provided to reduce exposure to flood damage,
- iv. Be elevated on a permanent foundation such that the top of the lowest floor is at or above the more restrictive of the following:
 - a. base flood elevation (published FIS/FIRM) plus one (1) foot,
 - b. the best available flood hazard data elevation plus one (1) foot, or
 - c. as required by ASCE/SEI 24-14, Table 2-1,
 - d. as required by N.J.A.C 7:13-3.
 - e. AO or AH zone elevation based upon the highest adjacent grade, plus the depth number specified in feet, plus one (1) foot (at least three (3) feet if no depth number is specified) . _And require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures,
- v. Record the method and elevation used above and, the Best Available Flood Hazard Design Data elevation, date, and revision in the local Development Permit.
- c) All recreational vehicles located within an area of special flood hazard shall either:
 - i. Be on site for fewer than 180 consecutive days,
 - ii. Be fully licensed and ready for highway use, or
 - iii. Meet the requirements of sections 4.1 and 5.2-3 a) and b) above.

FLOODWAYS

Located within areas of special flood hazard established in section 3.2 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

- a) Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless a technical evaluation demonstrates that encroachment shall not result in any increase in flood levels during the occurrence of the base flood discharge.
- b) If section 5.3 a) is satisfied, all new construction and substantial improvements must comply with section 5.0 PROVISIONS FOR FLOOD HAZARD REDUCTION.
- c) In all areas of special flood hazard in which base flood elevation data has been provided and no floodway has been designated, no new construction, substantial improvements, fill, or other development shall be permitted, unless it is demonstrated that the accumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than two-tenths (0.2) of a foot at any point.

COASTAL A ZONE

Coastal A Zones are located within the areas of special flood hazard established in section 3.2. These areas may be subject to wave effects, velocity flows, erosion, scour, or a combination of these forces; therefore, the following provisions shall apply:

LOCATION OF STRUCTURES

- a) All buildings or structures shall be located landward of the reach of the mean high tide.
- b) The placement of manufactured homes shall be prohibited, except in an existing manufactured home park or subdivision.

CONSTRUCTION METHODS

a) ELEVATION

All new construction and substantial improvements shall be elevated on piling or columns so that:

- i. The bottom of the lowest horizontal structural member of the lowest floor (excluding the piling or columns) (together with the attendant utilities and sanitary facilities as well as all electrical, heating, ventilating, air-conditioning and other service equipment) is elevated to or above the more restrictive
 - (a) base flood elevation (published FIS/FIRM) plus one (1) foot [**optional – higher standard – freeboard – replace “one foot” with two feet or three feet**],
 - (b) the best available flood hazard data elevation plus one (1) foot [**optional – higher standard – freeboard – replace “one foot” with two feet or three feet**],
 - (c) as required by ASCE/SEI 24-14, Table 2-1, or
 - (d) as required by N.J.A.C 7:13-3
- ii. Record the method and elevation used above and, the Best Available Flood Hazard Design Data elevation, date, and revision in the local Development Permit and
- iii. With all space below the lowest floor's supporting member open so as not to impede the flow of water, except for breakaway walls as provided or in section 5.4-2 d).

b) STRUCTURAL SUPPORT

- i. All new construction and substantial improvements shall be securely anchored on piling or columns.
- ii. The pile or column foundation and structure attached thereto shall be anchored to resist flotation, collapse, or lateral movement due to the effects of wind and water loading values each of which shall have a one percent chance of being equaled or exceeded in any given year (100-year mean recurrence interval).
- iii. Prohibit the use of fill for structural support of buildings within Coastal A Zones on the community's FIRM.

c) CERTIFICATION

A registered professional engineer or architect shall develop or review the structural design specifications and plans for the construction and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for compliance with the provisions of section 5.4-2 a) and 5.4-2 b) i. and ii.

d) SPACE BELOW THE LOWEST FLOOR

- i. Any alteration, repair, reconstruction, or improvement to a structure started after the enactment of this ordinance shall not enclose the space below the lowest floor unless breakaway walls, open wood lattice-work or insect screening are used as provided for in this section.
- ii. Breakaway walls, open wood lattice-work or insect screening shall be allowed below the base flood elevation provided that they are intended to collapse under wind and water loads without causing collapse, displacement, or other structural

damage to the elevated portion of the building or supporting foundation system. Breakaway walls shall be designed for a safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions.

- (i) breakaway wall collapse shall result from a water load less than that which would occur during the base flood and,
- (ii) the elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water load acting simultaneously on all building components (structural and non-structural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards.
- iii. If breakaway walls are utilized, such enclosed space shall be used solely for parking of vehicles, building access, or storage and not for human habitation.
- iv. Prior to construction, plans for any breakaway wall must be submitted to the Construction Code Official or Building Sub-Code Official for approval.

SEVERABILITY

If any section, subsection, paragraph, sentence, clause, or phrase of this Ordinance shall be declared invalid for any reason whatsoever, such a decision shall not affect the remaining portions of the Ordinance, which shall remain in full force and effect, and for this purpose the provisions of this Ordinance are hereby declared to be severable.

ENACTMENT

ADOPTION

This Ordinance shall be effective on _____ and shall remain in force until modified, amended or rescinded by **Borough of Brielle**, **Monmouth**, New Jersey.

ENACTED AND ADOPTED by the **Mayor and Council** this ____ day of _____, 202_.

ATTEST: Mayor and Council of the **Borough of Brielle**,

Borough of Brielle, Clerk

By: _____
Borough of Brielle, Mayor

APPROVED, this ____ day of _____, 202_ by the Mayor of Borough of Brielle

ATTEST:

Borough of Brielle, Clerk

Mayor _____