ENVIRONMENTAL PROTECTION

WATERSHED AND LAND MANAGEMENT

STORMWATER MANAGEMENT RULES

FLOOD HAZARD AREA CONTROL ACT RULES

Proposed Amendments:

N.J.A.C. 7:8-1.2, 1.6, 5.4, 5.6 and 5.7; and

N.J.A.C 7:13-1.1, 1.2, 3.3, 3.4, 3.6, 6.7, 10.1, and 12.6.

Proposed Repeal:

N.J.A.C. 7:13 Appendix 1.

Proposed New Rule:

N.J.A.C. 7:13 Appendix 1.

Authorized By: Shawn M. LaTourette, Commissioner, Department of Environmental Protection

Authority:

As to N.J.A.C. 7:8: N.J.S.A. 12:5-3, 13:1D-1 et seq., 13:9A-1 et seq., 13:19-1 et seq., 40:55D-93 through 99, 58:4-1 et seq., 58:10A-1 et seq., 58:11A-1 et seq., and 58:16A-50 et seq.; and

As to N.J.A.C. 7:13: N.J.S.A. 13:1D-1 et seq., 13:1D-29 et seq., 13:20-1 et seq., 58:10A et seq., 58:11A-1 et seq., and 58:16A-50 et seq.

Calendar Reference: See Summary below for explanation of exception to calendar requirement.

DEP Docket Number: 08-22-10

Proposal Number: PRN 2022-

A **public hearing** concerning this notice of proposal will be held on January 11, 2023, at 1:00 P.M. at:

The hearing will be conducted virtually through the Department of Environmental Protection's (Department) video conferencing software, Microsoft Teams. A link to the virtual public hearing will be provided on the Department's NJ PACT website.

Submit comments by close of business on February 3, 2023 (*60 days after publication*), electronically at www.nj.gov/dep/rules/comments. Each comment should be identified by the applicable N.J.A.C. citation, with the commenter's name and affiliation following the comment.

The Department encourages electronic submittal of comments. In the alternative, comments may be submitted on paper to:

Lauren J. Zarrillo, Esq.

Attention: DEP Docket No. 08-22-10

Office of Legal Affairs

New Jersey Department of Environmental Protection

401 East State Street, 7th Floor

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If you are interested in providing oral testimony or submitting written comments at the virtual public hearing, please email the Department at Peter.Demeo@dep.nj.gov, no later than 5:00 P.M. on January 9, 2023, with your contact information (name, organization, telephone number, and email address). You must provide a valid email address so the Department can send you an email confirming receipt of your interest to testify orally at the hearing and provide you with a separate option for a telephone call-in line if you do not have access to a computer that can connect to Microsoft Teams. Please note that the Department will take oral testimony at the hearing in alphabetical order of the testifying person's last name. Further, this hearing will be recorded. It is requested (but not required) that anyone providing oral testimony at the public hearing provide a copy of any prepared remarks to the Department via email.

The proposal may be viewed or downloaded from the Department's website at *http://www.nj.gov/dep/rules*.

The agency proposal follows:

Summary

As the Department has provided a 60-day comment period on this notice of proposal, it is excepted from the rulemaking calendar requirement pursuant to N.J.A.C. 1:30- 3.3(a)5.

This is a proposal of new rules, amendments and repeals to the Stormwater Management (SWM) rules at N.J.A.C. 7:8 and the Flood Hazard Area Control Act (FHACA) Rules at N.J.A.C. 7:13. The proposed amendments are intended to ensure the use of current precipitation data and

reliable climate science to aid New Jersey communities in better preparing themselves to confront one of the most critical threats to public safety presented by climate change – increased intensity of precipitation events and the resulting effects of additional stormwater runoff on stormwater management systems and flood elevations in fluvial areas. The significance of this issue, and the imminent threat it presents, was most recently reinforced by the remnants of Tropical Storm Ida, which struck New Jersey on September 1, 2021, causing widespread devastation to communities, homes, infrastructure, public buildings and private businesses in many of New Jersey's fluvial flood prone areas, where flooding is caused by stormwater runoff resulting from precipitation during flooding events. To assist New Jersey communities in better preparing for such intense rainfall events, which the best available science indicates are likely only to worsen in the future due to climate change, and ensure more resilient recovery efforts, the Department must ensure that its flood hazard area and stormwater management rules are informed by current and future precipitation data. At present, these rules are informed by data that is decades old and is neither representative of existing conditions nor indicative of future conditions, particularly for 24-hour and 48-hour storm events (DeGaetano et al., 2021).

To address this critical deficiency, the proposed amendments incorporate climate-informed precipitation data to better align with current precipitation conditions and the expected effect of climate change on precipitation events. The current methodologies for managing stormwater and determining the extent of flood hazard areas utilize outdated and inherently backward-looking precipitation data and do not account for either current conditions or the expected impacts of climate change on precipitation events. The proposed amendments include adjustment factors that will update published precipitation data provided by the National Oceanic and Atmospheric

Administration's (NOAA) Atlas 14 Point Precipitation Frequency Estimates. The proposed amendments also include change factors that project NOAA's precipitation data into the future to account for the anticipated impacts of climate change. This data informs stormwater management and flood hazard area calculations.

As discussed in further detail below, these proposed amendments will result in increased protection of public safety in fluvial areas through the application of greater factors of safety that will provide protection to areas that are currently experiencing, or are expected to experience, worsening flooding impacts associated with increased precipitation events. These factors of safety are added to flood mapping published by either the Federal Emergency Management Agency (FEMA) or the Department as well as to the approximated flood depths that are currently provided within the rules for use where no flood mapping is available. Alternately, an applicant can choose to calculate the flood hazard area elevation and limits based on anticipated future precipitation amounts as discussed below. Finally, this rulemaking incorporates anticipated greater depths of precipitation for the two, 10, and 100-year storm events for the purposes of stormwater management. These proposed amendments are necessary to ensure that buildings, roads, stormwater management features and other structures are designed and constructed to manage and be protective for today's flood conditions and precipitation as well as anticipated future conditions and precipitation.

In light of the significant adverse economic, social, and environmental impacts of recent storms, including Tropical Storm Henri and the remnants of Tropical Storm Ida, these proposed amendments are necessary to ensure that reconstruction efforts undertaken as a result of damage

caused by recent high precipitation events are conducted in a manner designed to reduce the likelihood of future flooding impacts on the residents of New Jersey.

The Impact of the Remnants of Tropical Storm Ida on New Jersey

Beginning in the evening hours of September 1, 2021, the remnants of Tropical Storm Ida began a widespread path of devastation throughout New Jersey, starting with four confirmed tornadoes in the southern and central regions of the State (Office of the New Jersey State Climatologist (ONJSC), "Ida Remnants Strike New Jersey" (6 October 2021)). Within hours, the storm system made its way north with unrelenting, intense rainfall descending upon the central and northern regions of the State. Residents subjected to both the tornado warnings and flood advisories watched floodwaters enter their basements where they were sheltering from the threat of tornadoes. In the northern regions of the State, where the observed rainfall from the remnants of Tropical Storm Ida was most abundant and intense, residents witnessed floodwaters rise from the banks of nearby waterways, inundating the lower levels of their homes within minutes, forcing them to seek shelter on the upper levels of their residences or become trapped on roadways in their vehicles as floodwaters rose around them. Countless residents across the State were left unprepared for the intensity and danger due, in part, to the inadequacy of the regulations and standards expected to provide protections from these storm events. Tragically, Ida directly resulted in the loss of thirty lives, making this the second deadliest natural disaster event to impact New Jersey in a century (ONJSC, 2021). As the State repairs the damage from these devastating impacts, it is in the interest of the public's health and safety that future development of public and private

structures is as resilient as possible to withstand the increasing frequency and intensity of precipitation events, such as Ida.

From September 1 to September 3, 2021, the remnants of Tropical Storm Ida subjected New Jersey residents, particularly those in the northern and central regions of the State, to record rainfall and flooding. According to preliminary data from the National Weather Service and a report from the State Climatologist, Newark, New Jersey experienced an all-time record for highest one-hour rainfall total (3.65 inches) on September 1, 2021 (ONJSC, 2021). This preliminary rainfall data also documented over 10 inches of rainfall in certain parts of Hunterdon, Essex, Middlesex and Union counties over the course of the storm event (National Weather Service "Advanced Hydrologic Prediction Service", 2021). The bulk of the total rainfall that was associated with the remnants of Tropical Storm Ida fell within a six-hour time interval (ONJSC, 2021), which highlights the intensity of the precipitation associated with this storm event. Accompanying this record rainfall, the remnants of Tropical Storm Ida resulted in record amounts of flooding; this record flooding was recorded by gauges throughout the State, including those along the Passaic, Wanaque, Rockaway, Pompton, Saddle, and Ramapo Rivers (Zimmer, 2021). More than 12 rivers exceeded their 100-year flood levels (Zimmer, 2021). According to the Borough of Manville's Office of Emergency Management, the Raritan River crested at 27.6 feet, which is approximately 0.5 feet higher than it did in Hurricane Floyd in 1999 (Gainer, 2021).

The impacts to public safety that resulted from this record rainfall and flooding were significant. The Borough of Manville's Office of Emergency Management estimates that at least 100 homes in Manville are uninhabitable because of the impacts of the remnants of Tropical Storm Ida (Gainer, 2021); which includes several homes that burned after an explosion associated with

storm damage (Gainer, 2021). Floodwaters made some of these structures inaccessible to firefighters (Gainer, 2021). The 30 flood-related fatalities in New Jersey documented by the National Weather Service for 2021 are all a direct result of the flooding associated with the remnants of Tropical Storm Ida; this single-event fatality total is three times greater than the cumulative number of direct flood-related fatalities that occurred in New Jersey within the last 10 years (National Weather Service "NWS Preliminary US Flood Fatality Statistics", 2021) and two-thirds of the cumulative flood fatalities that occurred in New Jersey between 1960 and 2008 (Brody et al., 2018). As discussed above, Ida was the second deadliest natural disaster event to impact New Jersey in a century, joining the ranks of extreme weather events to deliver record-breaking devastation to the State over this timeframe (ONJSC, 2021).

Many New Jerseyans will likely remember – almost exactly a decade prior to Ida – the significant flood damage that Hurricane Irene, a precipitation-intense storm event like Ida, unleashed across the State. On August 27 and 28, 2011, Hurricane Irene resulted in record breaking floods on many New Jersey streams, with 33 USGS stream gauges recording peak flows equal to or greater than the 100-year recurrence interval (USGS, 2011). The flooding that resulted from Hurricane Irene was in part due to the antecedent weather from August 1 to August 16, with rainfall in New Jersey ranging from 8 to 16 inches over this period (USGS, 2011). The devastating impacts of Hurricane Irene led then U.S. President Barack Obama to sign a Major Disaster Declaration on August 31, 2011, for all 21 counties in New Jersey (USGS, 2011).

The Remnants of Tropical Storm Ida versus Published Flood Studies

The FHACA Rules incorporate two sources of published flood data. The first source is State-promulgated flood maps that depict the flood hazard area design flood elevation along with an approximated extent of the flood hazard area, which are referred to as "Department delineations," N.J.A.C. 7:13-3.3. Promulgated in the 1970s and 1980s, Department delineations contain a factor of safety that accounted for worsening flooding due to continued development. Specifically, the flood hazard area design flood elevation is based on a flood that is 25 percent greater than the 100-year peak flow rate in the stream or river being analyzed and mapped.

The second source of published flood data is FEMA flood insurance rate maps. Like Department delineations, they were initially published in the 1970s and 1980s and are generally still based on precipitation data and hydrologic calculations determined at that time. Unlike Department delineations, the FEMA flood maps contain no factor of safety. In the October 2, 2006 proposal summary of the amended FHACA Rules at 38 N.J.R. 3950(a), the Department noted the flood hazard area design flood elevation shown on the Department delineations was often approximately one foot above the FEMA 100-year flood elevations in fluvial areas. Therefore, the flood hazard area design flood elevation could be estimated by adding a factor of safety of one foot to FEMA's 100-year fluvial flood elevation, in cases where individuals choose to use published mapping products. However, case studies from Ida demonstrate that continued use of published mapping without additional factors of safety to account for increases in precipitation since the promulgation of these maps will not adequately protect residents in flood prone areas. Specifically, the remnants of Tropical Storm Ida resulted in flooding significantly more severe than FEMA's published 100-year flood at various locations in New Jersey:

Raritan River at Bound Brook:

- Flooding during Tropical Storm Ida equaled 1999's Hurricane Floyd, which was the highest elevation ever recorded at Bound Brook.
- Including Floyd, flooding at this location in the past 23 years has equaled or exceeded FEMA's 500-year flood elevation three times.
- The Raritan River during Tropical Storm Ida peaked at 42.13 ft NGVD (41.21 ft NAVD) which is 3.01 feet above FEMA's 100-year elevation (38.2 ft NAVD) and 0.21 ft above FEMA's 500-year flood elevation (41.0 ft NAVD).

Raritan River at Bridgewater

- Flooding during Tropical Storm Ida peaked at roughly FEMA's 500-year flood elevation (41.0 ft NAVD) which is 2.8 ft above FEMA's 100-year flood elevation (38.2 ft NAVD).

Millstone River at Manville:

- Flooding during Tropical Storm Ida peaked at roughly one foot above FEMA's 500-year flood elevation (43.5 ft NAVD) which is 2.5 ft above FEMA's 100-year flood elevation (41.0 ft NAVD). Thus, flooding at this location peaked at approximately 3.5 feet above FEMA's 100-year flood elevation.

Neshanic River at Reaville:

- Flooding during Tropical Storm Ida was 4.14 feet above 1999's Hurricane Floyd, which had been the highest elevation ever recorded at this location.

For the first three case studies above, flooding during Tropical Storm Ida was 3.01 ft, 2.8 ft, and 3.5 ft above FEMA's 100-year flood elevation, respectively. This averages 3.1 ft above the

100-year flood elevation, which is 2.1 ft higher than the current design flood elevation determined using Method 3. This comports with flooding in Montgomery Township, Somerset County, where reconnaissance by USGS indicates that flooding along Bedens Brook peaked approximately 3.5 feet higher than FEMA's 100-year flood elevation. In addition, preliminary FEMA claim data shows that approximately one-third of claims in New Jersey caused by the remnants of Tropical Storm Ida originated outside of the extent of FEMA's published 100-year flood plain.

These examples illustrate not only that Ida was a significant flood event that exceeded the anticipated flooding depicted on available flood mapping products, upon which many roads and buildings were financed, constructed, and insured in the impacted communities, but also that there is an upward trend in the number and severity of flood events in the State. As noted above, flooding in Bound Brook has exceeded FEMA's 100-year flood elevation four times and FEMA's 500-year flood elevation three times since 1999, which leads to the conclusion that we are already experiencing increased flooding as compared with past recurrence interval calculations.

To account for worsening flooding due to climate change, the Department is compelled to implement greater factors of safety than those upon which the FHACA Rules have previously relied. Therefore, the flood hazard area design flood elevation is proposed for amendment to include additional factors of safety. This compensates for the fact that flood severity is getting worse with time, whereas published fluvial mapping has not necessarily followed suit. As noted above, in the hardest hit areas, the remnants of Tropical Storm Ida caused flooding as much as three feet or more above FEMA's 100-year flood elevation. Because of this, the Department finds that the factor of safety found in FEMA mapping needs to increase to a total of three feet to adequately protect the public from extreme flood events. Such a factor of safety represents an

increase of two feet over the factor of safety previously used for FEMA mapping. In addition, to maintain the generalized equality between FEMA mapping and Department delineations, the Department finds it necessary to propose an additional factor of safety of two feet for Department delineations.

New Jersey Flooding in Context

Historical climate records and recent studies indicate that extreme precipitation events, such as Hurricane Irene and the remnants of Tropical Storm Ida, have been significantly increasing since the mid- to late 20th century (DeGaetano, A., 2021). On November 18, 2021, the Department released two reports prepared by Cornell University - "Changes in Hourly and Daily Extreme Rainfall Amounts in NJ since the Publication of NOAA Atlas 14 Volume," downloadable at www.nj.gov/dep/dsr/publications/nj-atlas-14.pdf and "Projected Changes in Extreme Rainfall in New Jersey based on an Ensemble of Downscaled Climate Model Projections," downloadable at www.nj.gov/dep/dsr/publications/projected-changes-rainfall-model.pdf. Both reports were used to inform the current and future precipitation amounts. These New Jersey-specific reports are the most recent and best available studies, which are part of a growing body of research that highlights the increasing commonness of these economically, environmentally, and socially damaging storm events. According to the 2019 State Hazard Mitigation Plan, NOAA's National Climatic Data Center (NCDC) database reported that New Jersey experienced 1,582 flood events in a 63-year period beginning 1950 and ending 2012 (NJ Office of Emergency Management, 2019). The next five-year period, beginning January 1, 2013, and ending December 31, 2017, saw an additional 643 flood events that occurred in New Jersey (NJ Office of Emergency Management, 2019). Total property damage from flooding was estimated at over $24.6 million in this 5-year period (NJ Office

of Emergency Management, 2019). As discussed in further detail in the economic impact statement below, a 2021 report by First Street Foundation found that an additional 10,870 New Jersey properties are expected to experience financial loss from flood damage over the next 30 years and the average expected annual loss per property is expected to increase by 53 percent over that same time period (First Street Foundation, 2021). Each of these studies demonstrates the increasing need and criticality of addressing New Jersey's flooding issues.

A significant number of New Jersey properties outside of FEMA's Special Flood Hazard Area ("SFHA") (also known as the FEMA 100-year floodplain) experienced financial loss and flood damage due to the remnants of Tropical Storm Ida. Preliminary claim data from FEMA demonstrates that homes outside of the SFHA were subject to significant flood damage due to storm events in 2021 such as Tropical Storm Henri in addition to the remnants of Tropical Storm Ida. This preliminary claim data from FEMA shows that 38.5 percent of NJ claims from Tropical Storm Henri and 31 percent of NJ claims from the remnants of Tropical Storm Ida occurred outside of the designated SFHA (FEMA Direct Correspondence, 2021). In Essex, Mercer, Morris, Passaic, Union and Warren counties, preliminary data shows that average claim payouts associated with the remnants of Tropical Storm Ida were higher for homes outside of the FEMA SFHA than within the SFHA (FEMA Direct Correspondence, 2021). This preliminary data indicates that storm events such as Henri and Ida are causing significant flood damage to properties outside of mapped SFHAs, leaving residents unaware of and unprepared for the flood risks they are unwittingly accepting until damage occurs. These observations of significant financial loss and flood damage to properties outside of the SFHA are not unique to New Jersey; it is estimated that almost three quarters of the home damage associated with Hurricane Harvey, a precipitation-

intense storm event which resulted in extensive flood damage to homeowners across Texas, Mississippi, Tennessee and Kentucky in late-August 2017, occurred outside of the 100-year FEMA floodplain in the City of Houston, Texas (City of Houston, 2018). That significant damages incurred outside of the FEMA mapped boundaries only heightens the need to act immediately to ensure the safe construction and reconstruction of structures in these areas in the aftermath of – and in preparation for – future intense storm events.

Given the significant adverse impact to public health, safety and welfare, and the environment presented by flooding, which continues to worsen in New Jersey due to increased frequency and intensity of climate-influenced precipitation, reliance on existing flood mapping that underestimates the extent of fluvial flood hazard areas is likely to result in greater degrees of injury, loss of life, and property damage than would otherwise occur. As noted above, flood mapping developed by FEMA and the State is generally based on backward-looking precipitation and hydrologic data from decades in the past, which fails to account for increased precipitation due to climate change. Due to already observed increases in frequency and intensity of precipitation, which are projected to escalate over the remainder of the century, as discussed in more detail below, use of existing flood mapping is insufficient. Without appropriate additional factors of safety, flood risks will continue to be underestimated.

Critically, in the absence of these proposed amendments, new investments in public infrastructure and private development, as well as the reconstruction of storm-damaged buildings, roads, stormwater management features, and other structures, would be based on design and construction standards that are already outdated and will only become more so as the State's flood risks continue to worsen. Since these structures are intended to remain serviceable for many

decades to come, it is essential that those affected by the remnants of Tropical Storm Ida rebuild in a manner informed by the best available flood data so that flood damages can be avoided or ameliorated over the lifetime of the structure. With over 8.9 million residents in New Jersey's 8,722 square mile area (NJ Office of Emergency Management, 2019), and approximately 62,629 properties within FEMA's special flood hazard areas (First Street Foundation, 2021), without swift and immediate action, the State is presented with a risk of severe impacts to human life and property during future flood events.

Climate Change Facts and Trends: New Jersey's Increasing Temperatures & Precipitation

These proposed amendments consider the impacts of climate change on flooding, particularly current and projected precipitation. On June 30, 2020, the Department issued the New Jersey Scientific Report on Climate Change (the "NJ Climate Science Report") in accordance with Governor Murphy's Executive Order No. 89 (issued on October 29, 2019), which required the planning and implementation of resilience measures in response to the impacts of climate change. The NJ Climate Science Report assembled the latest and most reliable scientific information on the current and predicted future impacts of climate change that are specific to New Jersey's natural and built environments, including the primary driver of climate change, the effects of climate change on temperatures, precipitation, sea level, and ocean acidification, and the impacts of climate change on resources and ecosystems.

It is well-settled in the scientific community that climate change is driven by increased atmospheric levels of greenhouse gas concentrations. The concentration of greenhouse gases in

the atmosphere, such as carbon dioxide, has a direct impact on the amount of radiation (heat) from the sun that is retained on Earth. The difference between incoming and outgoing radiation on Earth is known as radiative forcing (NOAA Climate.org, 2021). A higher concentration of greenhouse gases in the atmosphere will result in higher radiative forcing – greater retention of heat on Earth – which drives warming of the planet's average global temperature, a phenomenon commonly known as global warming (NOAA Climate.org, 2021). Global warming has, and is expected to continue to, result in changes in climate, the type and extent of which vary depending upon locality. One such change, which is particularly relevant to this rule proposal, is the increase in average global temperature; this change will cause Earth's atmosphere to hold more water vapor, which leads to a higher potential for increased and more intense precipitation in certain regions (NJDEP, 2020). For example, New Jersey has already experienced impacts from the observed increase in greenhouse gas concentrations since the end of the 1890s, including a 3.5° F (1.9° C) increase in the State's average temperature, a 7.9 percent increase in the State's average precipitation, more intense and heavier precipitation, and 0.16 inches per year of sea-level rise over the past century (NJDEP, 2020).

As temperatures increase, the atmosphere can hold more water vapor, which leads to a greater potential for precipitation in terms of increased occurrence, intensity, and overall rainfall totals during storm events (NJDEP, 2020). In New Jersey, a wet year is defined as a specific year that has an annual precipitation ten inches or more above the current long-term average from 1895 to the current year. (Broccoli et al., 2020). Wet years are historically infrequent, having occurred in 20 percent of years between 1895 and 1999, but they have become more frequent over the last twenty years, occurring 30 percent of the time (Office of the New Jersey State Climatologist,

2020). Annual precipitation totals for the last 10 years show a 7.9 percent increase over the long-term average (NJDEP, 2020). The annual precipitation in New Jersey is projected to increase by 2.3 inches to 3.5 inches above the 1980-2010 average of 46.7 inches by the 2080s, assuming greenhouse gas emissions decline slowly over time. (NJDEP, 2020). Such increases reflect a 4.9 percent increase in annual precipitation by the end of the century.

In addition to increases in annual precipitation, the State will continue to be subject to more severe or intense storm events because of climate change. Specifically, heavy precipitation events where more than 2 to 4 inches fall in a single day are projected to increase on a national scale (US EPA, 2017). Moreover, increasing extreme precipitation events are already being observed in the United States, including New Jersey. A significant increase of over 130 percent has occurred in the frequency of extreme rainfall events that exceed the 10-year 24-hour storm between 1950 and 2017 in the Northeast (Wright et al., 2019). In New Jersey, extreme storms typically include coastal nor'easters and snowstorms between September and April and spring and summer thunderstorms, tropical storms and, on rare occasions, hurricanes in the warmer months between April and October. Over the last 50 years, storms that resulted in extreme rain increased by 71 percent in New Jersey, which is a faster rate of increase than anywhere else in the United States (Huang et al., 2017).

Higher temperatures, as discussed above, increase the energy in a storm, which increases the potential for more intense tropic storms (Huang et al., 2017), especially those of Category 4 and 5 (Melillo et al., 2014). By the end of the 21st century, heavy storm events are projected to occur 200 to 500 percent more often (Walsh et al., 2014) and with more intensity than in the 20th century (Huang et al., 2017). An increase in the intensity and the frequency of storms is likely to

lead to increased flooding events that will significantly impact land use practices, land resources, public safety, and infrastructure. The NJ Climate Science Report similarly describes cases of increased flooding due to extreme weather events. In the New England and Mid-Atlantic regions of the Northeastern United States, climate-induced increases in the magnitude and frequency of floods have been observed (NJDEP, 2020). In New Jersey, major flood events were observed in 2000, 2004, 2005, 2006, 2007, 2010, 2011, 2012, 2016, and 2021 (NJDEP, 2020).

The increased precipitation depth, intensity and duration of storms caused by climate change will additionally impact the runoff generated from development, the extent of floodplains, and the conveyance capacity of storm sewer systems (Berggren et al., 2012; Blair et al., 2014; Semadeni-Davies, 2008). As precipitation depth, intensity, and duration increase due to climate change, fluvial flood elevations will increase as well. Properties in known flood hazard areas will be subject to more frequent and severe flooding while properties currently located in proximity to mapped flood hazard areas will find themselves subject to flooding. In addition, stormwater best management practices (BMPs), such as basins, that were designed based on historical rainfall patterns, will become increasingly unable to manage the storm events they were initially designed to manage, thereby increasing the risk of flooding to the surrounding community.

Climate Change Projected Precipitation Totals for Design Storms

Design engineers currently obtain depths of the two-, 10-, and 100-year storms from NOAA Atlas 14. The data is published on a website hosted by NOAA's National Weather Service. It is based on a document titled, "NOAA Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 2, Version 3, last revised in 2006" ("NOAA Atlas 14"). While 2006 is the most

recent revision of NOAA Atlas 14, the daily and hourly rainfall records were last revised in December 2000.

The NJ Climate Science Report found that annual precipitation for the last 10 years increased 7.9 percent over the long-term average in part due to global warming and changing climate. As described above, increasing temperatures due to increasing concentrations of atmospheric carbon dioxide and other greenhouse gases will continue to contribute to an increase in precipitation and the intensity of extreme weather. This renders NOAA Atlas 14 outdated. Therefore, stormwater BMPs and flood hazard calculations based on this obsolete data will inadequately protect against the adverse impacts of flooding due to increasing precipitation resulting from climate change.

As noted above, Cornell University conducted a study of projected precipitation totals for New Jersey ("Cornell's Projection Study"). This report projects 24-hour rainfall depths of two-, 10-, and 100-year storms in New Jersey into the future for two time periods, 2020 to 2069 and 2050 to 2099. The projections were performed under a moderate greenhouse gas emissions scenario (RCP4.5) and a high greenhouse gas emissions scenario (RCP8.5). The moderate greenhouse gas emissions scenario assumes that there will be a gradual decrease in greenhouse gas emissions in the future, whereas the high greenhouse gas emissions scenario assumes continually increasing amounts of greenhouse gas emissions. Cornell's Projection Study utilizes historical rainfall data between 1950 and 2019 collected by 55 weather stations located within the area extending from latitude 41.7°N to 37.5°N and longitude 76.0°W to 72.5°W, which approximately includes the entirety of New Jersey and Delaware, a part of Maryland along Chesapeake Bay, a part of Pennsylvania adjacent to the western boundary of New Jersey, a portion of southern New

York, and the southwest portion of Connecticut. The results of this study have been assigned likelihood ranges for ease of understanding. The likely range, which represents a minimum 66 percent chance of occurrence (Mastrandrea, M.D., et al., 2010), can also be represented via the use of percentiles. A 66 percent chance of occurrence is equivalent to a range of values falling between the 17th and 83rd percentiles (Kopp, 2019). Statistically, this means that there is a 17 percent chance that a given value will be lower than the 17th percentile and a 17 percent chance that a given value is greater than the 83rd percentile.

For this rulemaking, the Department proposes utilizing the projected precipitation totals at the 83rd percentile under the "moderate" RCP 4.5 scenario for the two-, 10-, and 100-year storms using the timeframe of 2050-2099 from Cornell's Projection Study. Roads, bridges and buildings built today will be used and occupied for decades to come and must therefore be designed and constructed to anticipate future conditions. For example, according to the Federal Highway Administration, the "designer should consider the performance of the project over its design life given the design criteria. The design life is a reference period over which a project feature is expected to meet a particular service objective (75 years for bridges according to the AASHTO LRFD Bridge Design Specifications)." (US DOT, Hydraulic Engineering Circular 17, 2016). Further, considering the age of New Jersey's current infrastructure, the service life of such structures can be much longer than the design life. Similarly, it is not uncommon for homes and other buildings to be occupied for over 75 years. Because roads, bridges, and buildings are generally built with an expected useful life of 75 years or more, use of this timeframe is necessary to ensure that roads, bridges, buildings, and other structures designed and constructed today will be sufficiently resilient to withstand the exacerbated flooding that increasing precipitation will

bring about over the lifetime of that structure. Similarly, usage of the 83rd percentile ensures that runoff calculations encompass the full breadth of the likely range. Consistent with Cornell's Projection Study, the changes in future precipitation amounts are best communicated using "change factors," which are the projections of rainfall depths from 2050 to 2099 divided by the historical rainfall data from 1950 to 1999. The change factors for the two-, 10-, and 100-year storms computed by Cornell are presented for each county in New Jersey in the table below.

Future Precipitation Change Factors			
County	**2-year Design Storm**	**10-year Design Storm**	**100-year Design Storm**
Atlantic	1.22	1.24	1.39
Bergen	1.20	1.23	1.37
Burlington	1.17	1.18	1.32
Camden	1.18	1.22	1.39
Cape May	1.21	1.24	1.32
Cumberland	1.20	1.21	1.39
Essex	1.19	1.22	1.33
Gloucester	1.19	1.23	1.41
Hudson	1.19	1.19	1.23
Hunterdon	1.19	1.23	1.42
Mercer	1.16	1.17	1.36

Middlesex	1.19	1.21	1.33
Monmouth	1.19	1.19	1.26
Morris	1.23	1.28	1.46
Ocean	1.18	1.19	1.24
Passaic	1.21	1.27	1.50
Salem	1.20	1.23	1.32
Somerset	1.19	1.24	1.48
Sussex	1.24	1.29	1.50
Union	1.20	1.23	1.35
Warren	1.20	1.25	1.37

The projected precipitation depths at a given site are equivalent to the precipitation depths of the two, 10, and 100-year storms from NOAA Atlas 14, as measured for the county in which the development is located (or for the specific site location), multiplied by the future precipitation change factor for the county wherein the site is located. For example, Mercer County has a 100-year, 24-hour rainfall of 8.33 inches per NOAA Atlas 14. The change factor for Mercer County in the above table is 1.36. Therefore, the projected 100-year, 24-hour precipitation amount is 8.33 inches multiplied by 1.36. This yields a value of 11.33 inches. Alternatively, instead of using countywide data to obtain the published precipitation value, site specific data can be used. In the previous example, if the project is located in Trenton, NJ, then NOAA Atlas 14 informs that the 100-year, 24-hour rainfall is 8.16 inches,

via https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=nj. Therefore, using the change factor for Mercer County in the above table, the projected 100-year, 24-hour precipitation amount is 8.16 inches multiplied by 1.36. This yields a value of 11.10 inches. For the site in this example, either calculated projected precipitation value is acceptable for regulatory usage.

Use of these change factors will result in the calculation of higher peak flow rates than would have been calculated under the methodologies authorized under either the FHACA Rules or SWM rules prior to these proposed amendments. As a result, calculated flood hazard areas in fluvial areas will be more expansive and deeper, placing more land area in the State under the protection of the FHACA Rules. The expanded regulatory area serves to ensure that proposed development accounts for climate change, which results in increased flood resiliency. Similarly, stormwater BMPs required under the SWM rules will need to account for greater volumes of runoff.

Current Precipitation Data Update

In addition to the projection study mentioned above, Cornell University performed another study to update NOAA Atlas 14. This study is described in a report entitled "Changes in Hourly and Daily Extreme Rainfall Amounts in NJ since the Publication of NOAA Atlas 14 Volume" ("Cornell's Present Update Study"). As with the Cornell's Projection Study, this study utilizes historical rainfall data between 1950 and 2019 collected by 55 weather stations located within the area extending from latitude 41.7 degrees north to 37.5 degrees north and longitude 76.0 degrees west to 72.5 degrees west. Cornell updated the precipitation data to present day using the same methods undertaken to derive the precipitation depths currently provided by NOAA's Atlas 14 and included rainfall records from 1999 through 2019, which represents the most recent available

data. The study shows that, over the approximately 20-year period ending in 2019, increases in extreme precipitation were seen at over 75 percent of the weather stations in New Jersey.

Similar to the projection data discussed in the preceding section of this summary, Cornell developed "adjustment factors" meant to be applied to the published NOAA Atlas 14 data. These results are presented as "current precipitation adjustment factors" in the table below. However, unlike Cornell's Projection Study, the adjustment factors were presented in this study only for each weather station analyzed as opposed to creating countywide averages. To make the data more user-friendly, the Department developed countywide averages for the adjustment factors using Thiessen polygons. Thiessen polygon methodology is a commonly used hydrological methodology that determines the extent of an area surrounding a given weather station that shares the same rainfall depth as measured at that rainfall station. (American Meteorological Society, 2012). For the purpose of this rule proposal, the Thiessen polygon methodology was used to find the extent of an area surrounding a weather station that shares the same adjustment factor. The Thiessen polygons and the associated adjustment factors obtained from the above step are imposed within county boundaries. Each county has one or more Thiessen polygons, which are wholly contained within the boundaries of each county. The resulting adjustment factors are shown in the table below:

Current Precipitation Adjustment Factors			
County	**2-year**	**10-year**	**100-year**
Atlantic	1.01	1.02	1.03
Bergen	1.01	1.03	1.06

Burlington	0.99	1.01	1.04
Camden	1.03	1.04	1.05
Cape May	1.03	1.03	1.04
Cumberland	1.03	1.03	1.01
Essex	1.01	1.03	1.06
Gloucester	1.05	1.06	1.06
Hudson	1.03	1.05	1.09
Hunterdon	1.02	1.05	1.13
Mercer	1.01	1.02	1.04
Middlesex	1.00	1.01	1.03
Monmouth	1.00	1.01	1.02
Morris	1.01	1.03	1.06
Ocean	1.00	1.01	1.03
Passaic	1.00	1.02	1.05
Salem	1.02	1.03	1.03
Somerset	1.00	1.03	1.09
Sussex	1.03	1.04	1.07
Union	1.01	1.03	1.06
Warren	1.02	1.07	1.15

The table shows that within the last 20 years, precipitation depth has either remained roughly the same for the two-year storm or has increased slightly. The precipitation depths for the 10 and 100-year storms have largely either increased slightly or by as much as 15 percent. Data in this table is meant to be used similar to the way the change data is used in the table accompanying Cornell's Projection Study.

Stormwater Management

Subchapter 1. General Provisions

N.J.A.C. 7:8-1.2 Definitions

The Department proposes a new defined term for "public transportation agency" at N.J.A.C. 7:8-1.2 and N.J.A.C. 7:13-1.2. This defined term would distinguish public transportation entities from other public entities that are not municipalities, counties, or other highway agencies. As noted in the summaries of proposed N.J.A.C. 7:8-5.2 and N.J.A.C. 7:13-12.6 below, the Department recognizes the unique challenges associated with new, expanded, reconstructed and improved public transportation infrastructure, which can lead to impracticability of strict compliance with the proposed new standards in this rulemaking. The new defined term identifies the agencies that would be able to rely on the proposed new flexibility for public transportation infrastructure described below.

In addition, the Department proposes the addition of a definition of the term "public roadway or railroad." The proposed definition ensures that the increased flexibility proposed is limited to specific types of projects. Public roadways and railroads are those used by motor vehicles or trains which are intended for public use and developed on behalf of the above

referenced "public transportation entity." For the purposes of these rules, a roadway constructed as part of a private development project, regardless of whether the roadway is ultimately to be dedicated to and/or maintained by a government entity, is not within the proposed definition of public roadway or railroad. While public roadways constructed by the listed public entities are subject to unique constraints that can impact the ability of such a project to comply with stormwater requirements, such unique circumstances are not present in roadways constructed as part of a private development project. An internal roadway that is part of a private development project will often have a greater amount of adjacent area owned by the private entity within which to incorporate stormwater BMPs. In contrast, a public roadway is often adjacent to properties not owned or controlled the public transportation entity. Because of this, the designer of a private development has the opportunity to arrange buildings, roadways, and other utility structures to avoid conditions that would prevent the installation of stormwater BMPs. However, a public transportation entity does not have the same degree of flexibility in designing a public roadway, which is usually constructed adjacent to private lands which often contain existing structures. Additionally, there is greater flexibility available to designers of private projects to plan the location of all aspects of the development, which provides opportunities to design stormwater BMPs in a manner that reduces risks to those maintaining the stormwater BMPs. This flexibility is often not available to designers of public roadway or railroad projects, especially those projects involving highways with traffic moving at a greater rate of speed. Accordingly, the proposed definition of "public roadway or railroad" makes clear that the proposed amendments, discussed below, providing flexibility in meeting the Stormwater Management rules for public roadway and railroad projects do not apply to private roadways within private developments.

N.J.A.C. 7:8-1.6 Applicability to Major Development

Legacy Application Provisions

The Department has routinely included provisions for legacy applications, which are applications determined to be complete in advance of the effective date of revised rules. Such provisions are therefore included as part of this proposal, as reflected in amended N.J.A.C. 7:8-1.6(b) and (c). The amended standards will not apply to any major development that does not require permits from the Department under the statutes listed at N.J.A.C. 7:8-1.6(c), provided that the applicant has submitted an application for one of the approvals listed at N.J.A.C. 7:8-1.6(b)1(i) through (v) prior to the effective date of the proposed amendments and new rules. Similarly, the amendments and new rules proposed at this time will not apply to any major development that does require Department approval under the aforementioned statutes, provided that the Department has received an administratively and technically complete application that includes a stormwater management review component prior to the effective date of these rules. This is consistent with the FHACA rules at N.J.A.C. 7:13-21.1(e), which affirms that, in reviewing an application, "the Department shall apply the requirements of this chapter in effect at the time the application is declared complete for review." Because the Stormwater Management rules were previously amended as recently as March 2, 2020, with an effective date of March 2, 2021, amendments are made at proposed N.J.A.C. 7:8-1.6(b)2, (b)3, (b)4i, and (b)4ii to continue the legacy provisions of the March 2, 2020 amendments.

7:8-1.6(f) Applicability to Certain Public Transportation Projects

The Department is proposing amendments to the Stormwater Management rules, N.J.A.C. 7:8 to afford public transportation entities greater flexibility in demonstrating regulatory compliance with respect to major developments associated with public roadways and railroads in consideration of implementation challenges unique to public transportation entities who often engage in significant advanced planning and design processes for which minimal feasible alternatives may be available at later design stages. Projects eligible for flexibility would include large-scale linear projects that have been the subject of significant advanced planning and design to an extent that includes, but may not be limited to, public engagement, development of land acquisition plans within limited right-of-way, and commitment of public funding to implement selected designs from multiple possible alternatives, providing minimal feasible opportunity for project redesign in the latter stages of planning. The Department also recognizes that, as a reflection of their commitment to protecting public health, safety, and the environment, public transportation entities commonly adhere to internal environmental, sustainability, and climate resilience practices through which they routinely seek to meet or exceed applicable environmental standards, including, but not limited to, stormwater management standards. Accordingly, the Department proposes to amend N.J.A.C. 7:8-1.6 to add a new subsection (f) which provides that major developments associated with public roadways and railroads conducted by public transportation entities that have determined a preferred alternative or reached an equivalent planning and design milestone before the effective date of these rules shall not be required to utilize the precipitation change factors proposed herein for purposes of demonstrating compliance with

the Stormwater Management rules, N.J.AC. 7:8. Where, however, a public transportation entity selects a new preferred alternative (or equivalent) for a project after the effective date of these rules, the public transportation entity shall comply with the stormwater standards effective at the time the project's applicable permit is found complete for review.

Subchapter 5. Design and Performance Standards for Stormwater Management Measures

N.J.A.C. 7:8-5.4 Groundwater Recharge Standards

The groundwater recharge requirement at N.J.A.C. 7:8-5.4(b)1 establishes two paths for compliance. The design engineer can comply with the groundwater recharge requirement by demonstrating the site will maintain the annual average groundwater recharge on-site or by infiltrating the difference in volume between the two-year storm runoff in both pre- and post-construction conditions. The paragraph establishing the option of infiltrating the difference in volume between the pre- and post-development two-year storms, N.J.A.C. 7:8-5.4(b)ii, is proposed for amendment to require that the two-year storm utilized in calculations be the projected two-year storm defined at N.J.A.C. 7:8-5.7(d). The projected values are computed in accordance with the table of change factors described above. This will ensure that any stormwater management system designed via this method of compliance will continue to provide the required level of groundwater recharge over its entire life span.

N.J.A.C. 7:8-5.6 Stormwater Runoff Quantity Standards

The existing runoff quantity control standards require that major developments be designed to manage the quantity of stormwater runoff leaving a site for the two-, 10-, and 100-year storms. However, as noted above, precipitation data for those storms is obtained from NOAA Atlas 14,

which is based on obsolete data, and the Cornell Projection Study indicates that precipitation totals and intensities will continue to increase through the end of this century. To help ensure that BMPs are designed and constructed to properly detain, retain, infiltrate and otherwise manage today's precipitation, and to further ensure that these BMPs will continue to provide these important functions throughout the intended lifespan of the structures being served by the BMP, the requirement to manage runoff quantity is proposed for amendment at N.J.A.C. 7:8-5.6(b)1, 2, and 3 to require that both current and projected precipitation totals be utilized for each of the two-, 10-, and 100-year for both the pre- and post-construction conditions. The current and projected precipitation totals are calculated in accordance with proposed N.J.A.C. 7:8-5.7(c) and (d), respectively, and the methodologies utilized therein equate to the methodologies described above with respect to the tables describing both the adjustment factors and change factors.

N.J.A.C. 7:8-5.7 Calculation of stormwater runoff and groundwater recharge

The existing SWM rules require the applicant's design engineer to calculate runoff using one of two methodologies. In addition to the USDA Natural Resources Conservation Service methodology specified at N.J.A.C. 7:8-5.7(a)1i, N.J.A.C. 7:8-5.7(a)1ii allows the design engineer to alternatively calculate runoff utilizing the Rational Method for the computation of peak flow and the Modified Rational Method for the computation of hydrographs. Under these proposed amendments, N.J.A.C. 7:8-5.7(a)1ii would be deleted, thereby no longer allowing the use of either the Rational or Modified Rational Method. N.J.A.C. 7:8-5.7(a)2 is similarly proposed for amendment to reflect the discontinuation of the use of both the Rational and Modified Rational

Methods. In addition, the term "runoff coefficient" is proposed to be deleted and replaced by the term "curve number" to be consistent with terminology used in the NRCS methodology.

Both the Rational and Modified Rational Methods are based on an oversimplification of complex hydrological processes in which the volume of runoff is estimated from three basic variables: a dimensionless runoff coefficient, rainfall intensity, and the size of the contributory drainage area being analyzed. Issues exist with each of these variables that severely limit the utility of these methods for the purposes of computing the rate of runoff generated on a site.

First, there is no single authoritative source or set of values or standards in place to calculate the runoff coefficient. (Chow, 1964; Fantin, 2012). Therefore, one design engineer may assume the runoff coefficient of a forest to be 0.79 because that value is allowed by the New Jersey Residential Site Improvement Standards (NJRSIS), while another engineer may use the 0.70 value specified in the New Jersey Department of Transportation's Roadway Design Manual for the same soil type and land cover. This leads to inconsistent calculation of runoff rates, thereby complicating determinations of regulatory compliance.

Second, the Rational Method assumes that rainfall intensity is uniform from the beginning of a storm to the end of a storm. This assumption is largely inaccurate because over the course of a storm, intensity increases gradually to a maximum and then recedes gradually until the storm concludes.

Third, in addition to the lack of uniformity of the runoff coefficients utilized in the Rational Method, there is also variability as to when the Rational Method may be appropriately utilized. NJRSIS allows the Rational Method to be applied on a drainage area up to 320 acres in size. However, both the New Jersey Department of Transportation's Roadway Design Manual

and the New Jersey Stormwater BMP Manual allow the Rational Method to be used only on drainage areas less than 20 acres.

With such inconsistency and discrepancy in use of the Rational Method and its input parameters, it is not possible to achieve a consistent, uniform estimate of the runoff flow rate and volume in the application of the SWM rules. Furthermore, professionals reviewing the calculations will often disagree with design engineers regarding the choice of the runoff coefficients and the applicability of the Rational Method when reviewing a stormwater management design. For these reasons, the SWM rules are amended to disallow usage of the Rational and Modified Rational Methods.

The proposed amendments to the SWM rules include new paragraphs in N.J.A.C. 7:8-5.7(c) and (d). As alluded to above, these paragraphs contain standards concerning how to use the information from Cornell's Present Update Study and Cornell's Projection Study, respectively. Proposed N.J.A.C. 7:8-5.7(c)1 requires usage of NOAA Atlas 14 data, and it provides an internet link to locate said data. Proposed N.J.A.C. 7:8-5.7(c)2 requires the modification of NOAA Atlas 14 data for each of the two-, 10-, and 100-year storms in order to bring them up to date. The process to do that is the same as previously described in this summary. Similarly, proposed N.J.A.C. 7:8-5.7(d) would do the same, only it would project NOAA Atlas 14 data through 2050-2099.

Flood Hazard Area Control Act Rules

Subchapter 1. General Provisions

N.J.A.C. 7:13-1.1 Purpose and scope

The FHACA Rules aid in preventing and ameliorating destructive impacts due to flooding by establishing standards for disturbance to the land and vegetation and for the construction of structures within flood hazard areas. As previously discussed, flooding is the most frequent, deleterious, and costly natural hazard in New Jersey. Given the State's dense population and extensive existing development, the FHACA Rules aim to protect against disaster-related damage.

To reflect the intent of this rule proposal to protect public health and safety and the environment in the State based upon the best available scientific information both from present and future flooding impacts, N.J.A.C. 7:13-1.1(c) is proposed for amendment to more specifically reference the impacts that result from flooding. This includes the loss, damage and interruption of essential public and private services and infrastructure. It is also proposed to add a goal to address the environmental and socioeconomic impacts resulting from more frequent and increasing flooding caused by climate change.

N.J.A.C. 7:13-1.2 Definitions

For the reasons previously discussed, the definition of "flood hazard area design flood" is proposed for amendment to explicitly include climate change as a factor contributing to worsening flooding. For the reasons discussed more fully above under the discussion of N.J.A.C. 7:8-1.2, the additional definitions of "public transportation entity" would be added to distinguish public transportation entities from other public entities that are not municipalities, counties, or other highway agencies. The Department recognizes the unique challenges associated with new,

expanded, reconstructed and improved public transportation infrastructure, which can lead to impracticability of strict compliance with the proposed new standards in this rulemaking. The new defined term identifies the agencies that would be able to rely on the proposed new flexibility for public transportation infrastructure described below.

Subchapter 2. Applicability and Activities for which a Permit or Authorization Is Required

7:13-2.1 When a permit or authorization is required

Proposed N.J.A.C. 7:13-2.1(a) would establish the requirement to obtain the appropriate flood hazard area approval before undertaking an activity regulated by this chapter and proposed N.J.A.C. 7:13-2.1(b) lists the approvals available under N.J.A.C. 7:13. Limited exemptions from the requirement to obtain an approval would be set forth at N.J.A.C. 7:13-2.1(c), which would be amended to address the expansion of the flood hazard area subject to the design and construction standards of the FHACA rules as a result of this rulemaking. Specifically, proposed N.J.A.C. 7:13-2.1(c) sets forth four situations under which a flood hazard area approval pursuant to N.J.A.C. 7:13-2.1(b) is not required in order to undertake a regulated activity in a regulated area, two of which are proposed for amendment as described below at N.J.A.C. 7:13-2.1(c)1 and 4.

Proposed amendments to N.J.A.C. 7:13-2.1(c)1 and 4 address certain cases where a proposed activity was located outside the regulated area of this chapter prior to this rulemaking but is now located within the newly adopted flood hazard area limits. As discussed in the summary for subchapter 3 below, the Department is proposing to amend the extent of the flood hazard area subject to the requirements of this chapter to protect projects that lie outside the flood hazard area

as it exists today, but which are anticipated to be subject to periodic flooding within the foreseeable future and lifespan of projects being designed and constructed today. Since these proposed amendments will result in an increase in the land area of New Jersey that is subject to the requirements of this chapter, limited exemptions for projects lying outside the existing regulated area are appropriate.

N.J.A.C. 7:13-2.1(c)1 currently exempts from regulation activities that were part of a project that was received by the Department as complete for review prior to November 5, 2007, provided the application was subsequently approved. Since all such approvals (then referred to as stream encroachment permits) received prior to that date have long since expired, this exemption is no longer necessary and is replaced with a reference to flood hazard area approvals that are complete for review prior to the effective date of this rulemaking. The purpose of this provision is to exempt from regulation certain activities that were proposed outside the flood hazard area prior to this proposal but which are now located within the expanded flood hazard area as a result of the expanded flood hazard area proposed herein. To be exempt, the regulated activity must be part of a project for which a complete flood hazard area application was submitted prior to the effective date of these rules, provided the application was subsequently approved.

N.J.A.C. 7:13-2.1(c)4 exempts certain activities that are part of a project that was subject to neither N.J.A.C. 7:13 nor N.J.A.C. 7:7 prior to November 5, 2007. To be exempt, the activity must have received certain qualifying local approvals prior to that date, unless the activity did not require any such approval. Prior N.J.A.C. 7:13-2.1(c)(4) required certain construction activities to have commenced in order to qualify for exemption from the requirements of the FHACA rules. Under proposed N.J.A.C. 7:13-2.1(c)4, the activity must not have been subject to the regulated

area of the chapter prior to the effective date of these rules; that is, the activity must lie wholly and completely outside the flood hazard area and riparian zone prior to this date. The activity must additionally have received all necessary Federal, State, and local approvals such that construction could have lawfully commenced prior to the effective date of this rulemaking. Finally, the regulated activity must have commenced prior to the effective date of these rules. Proposed new N.J.A.C. 7:13-2.1(c)4ii(1) would define what constitutes commencement of regulated activities for the purposes of this exemption. The proposed language mirrors 44 C.F.R. 60.3, which is used by FEMA to ensure that a regulated activity within the flood hazard area has reached a certain milestone of construction to address situations where flood mapping has changed after the regulated activity is authorized, and further incorporates examples of construction activities listed at prior N.J.A.C. 7:13-2.1(c)4ii. Depending on the level of development that has already occurred when a flood map is amended, it may not be practicable to alter the design to reflect the new flood elevation. For example, a person may have a building permit to construct a house immediately outside the prior flood hazard area limits but within the newly expanded flood hazard area. If construction of the house has not commenced by the time the regulatory area changes, it often can be possible to amend the design to meet the new flood elevation, which would be in the best interest of the long-term integrity of the structure and the safety of future occupants. Conversely, where the foundation of the building has already been constructed by the time the regulation changes, amending the lowest floor elevation would likely be impracticable and place an undue burden on the developer. Therefore, regulated activities that have commenced in accordance with N.J.A.C. 7:13-2.1(c)4ii(1) have reached a point where they cannot practicably be modified to account for a higher flood elevation. For these reasons and to help align the FHACA rules with FEMA's

National Flood Insurance Program, it is appropriate to exempt from the FHACA rules activities that meet N.J.A.C. 7:13-2.1(c)4. Where an activity that is situated outside the prior flood hazard area limits but within the newly expanded flood hazard area is not covered by N.J.A.C. 7:13-2.1(c), a flood hazard area approval pursuant to N.J.A.C. 7:13-2.1(b) is required prior to commencement. Should it be demonstrably impracticable for such an activity to be amended to comply with the FHACA rules, the applicant can request a hardship exception pursuant to N.J.A.C. 7:13-15.

Subchapter 3. Determining the Flood Hazard Area and Floodway

N.J.A.C. 7:13-3.3 Flood hazard area and floodway based on a Department delineation (Method 1)

N.J.A.C. 7:13-3.3 establishes the method for determining the flood hazard area and floodway using Department delineated flood mapping. Flood mapping is a useful tool that provides an estimate of the extent of flooding in a community given certain parameters. However, flooding is not uniformly confined by the limits depicted on these maps. As discussed above, flood risk commonly extends beyond the boundaries depicted on flood mapping. While New Jersey has long regulated a larger geographic area than FEMA-mapped SFHAs to protect its residents, the historical data previously relied upon to set the boundaries of the State's regulatory flood hazard area did not account for the realities of climate-influenced precipitation that the State faces today and will continue to face in the future.

Reflecting the best scientific information and considering the impact of the remnants of Tropical Storm Ida discussed above, N.J.A.C. 7:13-3.3(b)1 is proposed for amendment to increase the flood hazard area design flood elevation shown on the Department's adopted flood profile by

two feet. A two-foot increase enables the Department delineations to account for extreme floods such as those caused by the remnants of Tropical Storm Ida, and for other, future flood events that will grow in severity as a result of climate change.

The Department delineations have long utilized a factor of safety in the form of a 25 percent increase in the 100-year peak flow rate. The two-foot increase in the flood hazard design flood elevation is in addition to, and not a replacement of, the 25 percent increase in the 100-year peak flow rate. The additional factor of safety proposed is necessary to address impacts to flood elevations over time due to climate change. Given the generalized relationship between the Department delineations and FEMA mapping, the pre-existing factor of safety is not sufficient to address climate change on its own. Furthermore, despite the 25 percent increase in peak flow rate, it is important to point out that the Department delineations are still based on outdated, decades-old hydrologic data. Without an additional factor of safety as established via this rulemaking, the State risks undermining its continued economic growth if communities do not become better prepared to withstand extreme weather and flooding.

Without precise data on the depth and extent of flooding related to Ida, it is currently not possible to precisely determine how many properties damaged by the remnants of Ida will be under the future protection of these proposed rules; however, based upon the Department's review of preliminary stream gauge data, existing flood mapping, and preliminary FEMA claims, as well as extensive experience in developing and administering the methodologies by which floodplains throughout the State are determined and verified, increasing the design flood elevation by two feet is the most appropriate course of action to account for the observed and expected impacts of flooding throughout the State.

The Department recognizes that while the data used to promulgate a Department delineation has been relatively static for decades, this does not mean that Department delineations must remain trapped in time. Therefore, the proposed amendment to N.J.A.C. 7:13-3.3(b)1 will not impose an additional two-foot freeboard amount on a Department delineation if said delineation is revised in accordance with N.J.A.C. 7:13-3.8 to account for increased precipitation. In this case, the flood hazard area design flood elevation will be that which is shown on the revised flood profile in that Department delineation.

N.J.A.C. 7:13-3.4 Flood hazard area and floodway based on FEMA flood mapping (Methods 2 through 4)

Similar to N.J.A.C. 7:13-3.3, N.J.A.C. 7:13-3.4 establishes methods for determining the limits of the flood hazard area based on available FEMA mapping products. Under Method 3, the flood hazard area design flood elevation could, prior to this proposal, be determined by adding one foot to FEMA's 100-year flood elevation. Since, as previously noted, FEMA mapping insufficiently depicts the extent of flooding caused by the remnants of Tropical Storm Ida, and similar to the amendments at N.J.A.C. 7:13-3.3 described above, proposed N.J.A.C. 7:13-3.4(e)1 would be amended to add an additional two-foot factor of safety to flood hazard area design flood elevations determined using Method 3. This would result in a new design flood elevation that is determined by adding three feet to FEMA's 100-year flood elevation. As noted above FEMA mapping is largely based on hydrology calculations that have been unrevised since the 1970s and 1980s. Because ample evidence shows that flooding is expected to worsen by the end of this

century due to climate change, a higher factor of safety than what was previously used for FEMA mapping is appropriate.

N.J.A.C. 7:13-3.4(f) describes the FEMA hydraulic method. Proposed amendment at N.J.A.C. 7:13-3.4(f)1i would state that the flood hazard area design flood elevation derived under the FEMA hydraulic method is equal to two feet above the flood elevation determined by this method. Unlike the three-foot factor of safety used under the proposed amendment at N.J.A.C. 7:13-3.4(e)1, the FEMA hydraulic method already requires a 25 percent increase in the published 100-year flow rate to account for the effects of future development on flooding. Therefore, the FEMA hydraulic method more closely relates to a Department delineation than it does the FEMA fluvial method described at N.J.A.C. 7:13-3.4(e). Consistent with the additional factor of safety required for a Department delineation, a two-foot factor of safety under Method 4 is appropriate and proposed.

N.J.A.C. 7:13-3.6 Flood hazard area and floodway determined by calculation (Method 6)

Method 6 provides an applicant with the framework to calculate the flood hazard area design flood elevation and floodway limits using his or her own hydrologic and hydraulic analyses. Where State or federal flood mapping is available, prospective applicants can use the existing mapping with the added factors of safety described above in order to account for anticipated increases in flood elevations due to a changing climate. However, where an applicant disagrees with the available flood mapping or where no such mapping exists, Method 6 provides a means by which the design flood elevation and floodway limits can be calculated by a licensed

professional engineer for use in determining the regulatory limits under this chapter as well as to determine compliance with the FHACA rules' design and construction standards.

Proposed amendments to this section account for climate change via reliance on updated and projected precipitation amounts derived from Cornell's Projection Study and Cornell's Present Update Study.

Currently, N.J.A.C. 7:13-3.6(c)1i requires that a hydrologic analysis be performed for fluvial waters to determine the peak flow for the 100-year flood, which was based on existing land use coverage, and then to increase the flow rate by 25 percent to account for impacts to flooding resulting from development. The resultant flow rate was then used in a hydraulic analysis described at N.J.A.C. 7:13-3.6(c)1i(2), and the flood hazard area design flood elevation and extent were thereby determined. The proposed amendment to N.J.A.C. 7:13-3.6(c)1i(1) would require the applicant determine the 100-year peak flow rate based on projected rainfall data using the change factors listed in Table 3.6B located at proposed N.J.A.C. 7:13-3.6(c)6. This is the same table previously derived from Cornell's Projection Study, except that it only includes change factors for the 100-year precipitation amount. The two- and 10-year factors are not utilized in Table 3.6B because they are not pertinent to the calculation of the flood hazard area. The change factors are used the same way as described previously in this summary.

The proposed amendments to N.J.A.C. 7:13-3.6(c)1ii would continue to allow other calculations to be performed to determine the flood hazard area design flood elevation if, pursuant to N.J.A.C. 7:13-3.6(c)1ii(1), the Department determines the calculations will more accurately model the regulated water. N.J.A.C. 7:13-3.6(c)1ii(2) requires that the flood hazard area design flood elevation be determined using a flood that is no less than 125 percent of the peak flow and

volume of the 100-year flood. To account for climate change, a proposed amendment at N.J.A.C. 7:13-3.6(c)1ii(2) would require the flood hazard area design flood elevation to be determined using a flood that is no less than 125 percent of the peak flow rate and volume of the projected 100-year flood.

In addition to calculating the flood hazard design flood elevation, this rule proposal would establish the framework to be used to calculate the floodway. The floodway is the inner portion of the flood hazard area which is reserved for the conveyance of floodwaters. Currently, N.J.A.C. 7:13-3.6(c)1iii establishes that the floodway limit was to be calculated by a hydraulic analysis using the 100-year flow rate. However, this relies on obsolete precipitation data. Therefore, the proposed amendment at N.J.A.C. 7:13-3.6(c)1iii(1) would require the floodway limit to be determined through a hydraulic analysis using the 100-year flow rate based on current precipitation data pursuant to N.J.A.C. 7:13-3.6(c)5, which requires NOAA Atlas 14's 100-year precipitation data to first be made current. This is done via N.J.A.C. 7:13-3.6(c)5i and ii, which direct the applicant to obtain NOAA Atlas 14 data for the 100-year precipitation amount, and then modify that amount via the use of the adjustment factors listed in Table 3.6A, respectively. This is the same table previously derived from Cornell's Present Update Study, except that it only includes adjustment factors for the 100-year precipitation amount. The two- and 10-year factors are not utilized in Table 3.6A because they are not pertinent to the calculation of the floodway. The change factors are used the same way as described previously in this summary.

Unlike the case for determining the limit of the flood hazard design flood, the proposed rules do not require that NOAA Atlas 14 data for the 100-year storm be projected into the future for the purpose of calculating floodway limits. Whereas a consistent factor of safety is appropriate

for determining flood elevations using State or FEMA flood mapping products as described above, there is no consistent way to estimate how floodways may expand or alter due to increased precipitation. One of the Department's goals is to provide a consistent level of protection of people, property, and the environment in its rules. This is apparent in the Department's treatment of the flood hazard area design flood elevation. Each method described in Subchapter 3 that would be updated under this rule proposal, provides a consistent level of protection over the former requirements they would replace. In order to follow suit with respect to the floodway, Methods 1, 3, and 4 would need to be updated in a consistent manner. However, the only readily available mechanism of updating floodway limits to reflect climate change is to require complete recalculation of the hydrology and hydraulics of the water in question generally using sophisticated computer modelling and detailed topographic information. Requiring floodways to be recalculated in all cases would be an enormous and often cost-prohibitive undertaking for many regulated activities proposed in accordance with this chapter. Given that the location of the floodway is only one means by which the Department determines whether a proposed activity is subject to flood risk, and in light of the additional protections being incorporated as discussed above, the Department has decided not to propose required projection NOAA Atlas 14 data for the 100-year storm for the purpose of calculating floodway limits.

Current N.J.A.C. 7:13-3.6(c)1iii(1) and (2) are would be recodified as N.J.A.C. 7:13-3.6(c)1iii(2)(A) and (B), respectively. Proposed amendment to N.J.A.C. 7:13-3.6(c)6 would set forth the means for determining the projected 100-year rainfall depth to be used in the hydrologic analyses outlined above. Proposed amendment to N.J.A.C. 7:13-3.6(c)6i would explains that a weighted average may be used to determine the projected precipitation when the drainage area of

a site is located in more than one county. Alternatively, separate hydrographs may be derived for each county using the change factors in Table 3.6B.

7:13-6.7 Conditions applicable to a permit-by-rule or to an authorization pursuant to a general permit-by-certification or a general permit

The Department is proposing to amend N.J.A.C. 7:13-6.7 to include a new condition related to compliance with the applicable State and Federal design and construction standards. Existing N.J.A.C. 7:13-6.7(b)1 requires that any new, reconstructed, enlarged, or elevated structure within a flood hazard area shall be secured to resist flotation, collapse, and displacement due to hydrostatic and hydrodynamic forces from floodwaters. An additional provision is proposed that would require structures authorized under a permit-by-registration, general permit-by-certification, or general permit to additionally comply with the applicable design and construction standards of the Uniform Construction Code, N.J.A.C. 5:23 and the Federal flood reduction standards, 44 C.F.R. Part 60. These added references mirror the requirement in the Department's Coastal Zone Management rules at N.J.A.C. 7:7-9.25(f) for activities under a coastal permit in a flood hazard area and will help to ensure that authorized activities do not violate local construction codes or municipal floodplain ordinances.

The Uniform Construction Code, administered by the Department of Community Affairs, incorporates by reference applicable portions of the International Residential Code, International Building Code, and other relevant publications of the International Code Council. Construction activities authorized under N.J.A.C. 7:13 are already subject to N.J.A.C. 5:23; specifically, local

construction officials must determine whether a project complies with the applicable codes prior to issuing a building permit. Further, buildings in flood hazard areas authorized under an individual permit are currently required to meet applicable portions of N.J.A.C. 5:23, pursuant to N.J.A.C. 7:13-12.5. Adding this requirement at N.J.A.C. 7:13-6.7(b)1 would ensure that any new, reconstructed, enlarged, or elevated structure within a flood hazard area, which is authorized under a permit-by-rule, general permit-by-certification or a general permit, similarly meets the applicable standards of the Uniform Construction Code.

As noted above, FEMA's Federal Flood Reduction Standards are already referenced by the CZM rules and, similar to N.J.A.C. 5:23, must be adhered to locally. Nearly every community in the State participates in the National Flood Insurance Program, which enables residents to obtain federal flood insurance and qualifies communities for Federal assistance post-disaster. Each participating community identifies a floodplain administrator who is responsible for ensuring all construction activities meet minimum NFIP standards as established in the locally adopted floodplain management ordinance. Thus, any building in FEMA-mapped floodplains must meet these minimum requirements prior to obtaining a building permit. If a participating community does not enforce its floodplain management ordinance and issues a building permit that does not meet minimum NFIP standards, FEMA can reduce the community's NFIP rating, subjecting all residents in the community to higher flood insurance rates, or remove the community from the NFIP entirely, in which case residents would not be able to purchase Federally backed flood insurance or qualify for Federal assistance post-disaster.

FEMA has compared the FHACA rules to minimum NFIP standards; noting gaps between the State and Federal programs, which has led to confusion and puts the State at risk of authorizing construction that does not meet minimum NFIP standards and local floodplain ordinances. Since the FHACA rules did not previously reference 44 C.F.R. Part 60, a project could conceivably meet the requirements of N.J.A.C. 7:13, for example through a hardship exception request under N.J.A.C. 7:13-15.1, and obtain a FHACA permit, but violate minimum NFIP standards. Given the threat to public health, safety and welfare due to our changing climate and the expanding flood hazard areas that we are experiencing, it is of the utmost importance that the State's flood hazard area regulations do not contradict minimum federal requirements or other relevant State rules and regulations.

7:13-10.1 Requirement to obtain an individual permit

N.J.A.C. 7:13-10.1(a) is proposed for amendment to require individual permits to meet the applicable design and construction standards of The Uniform Construction Code at N.J.A.C. 5:23 and the Federal flood reduction standards at 44 C.F.R. Part 60, which mirrors the proposed requirement at N.J.A.C. 7:13-6.7(b)1 for permits-by-registration, general permits-by-certification, and general permits. This is to ensure that all regulated activities authorized under an individual

permit are designed and constructed in accordance with all relevant State and Federal regulations in addition to N.J.A.C. 7:13.

7:13-12.6 Requirements for a railroad, roadway, or parking area

The Department proposes amending 7:13-12.6 Requirements for a railroad, roadway, or parking area to provide necessary flexibility for public transportation entities where strict compliance with these rules may not be feasible due, in part, to limitations unique to large-scale linear transportation projects while preserving existing flexibility for parking areas. 12.6(b)2 currently requires an applicant for an individual permit for a railroad or public roadway to construct the travel surface as close to one foot above the flood hazard area design flood elevation, found at (b)1, based upon the factors in existing 12.6(e). This provision also requires the applicant show that it is not feasible to elevate the travel surface of the railroad, roadway, or parking area at least one foot above the flood hazard area design flood elevation, required at (b)1.

The proposed new (b)2 would apply to a "public transportation entity," a term which is also proposed to be defined in N.J.A.C. 7:13-1.2. This term is defined to distinguish transportation agencies from other public entities that are not municipalities, counties, or other highway agencies.

The requirements for public transportation entities would be found at proposed (b)2 and would establish the scope of when a public transportation entity cannot meet the requirements at (b)1. Under proposed (b)2i, this scope would include projects that consist of safety or state of good repair improvements to lawfully existing railroads or roadways. Examples of such projects include, but are not limited to, guiderail repair or replacement, intelligent transportation system

installation and modification, rockfall mitigation, safety signage repair or replacement, pavement preservation and resurfacing, intersection safety improvements, in-kind bridge deck or superstructure repair or replacement, installation of ramps that comply with the Americans with Disabilities Act (ADA), and safety projects that are limited in scope.

Additionally, projects that have progressed through a public transportation entity's project development process such that significant modifications to the project design are infeasible, as proposed in 12.6(b)2ii, would be eligible for consideration under the factors in (b)3 pertaining to strict compliance exceptions. To be eligible for this provision, the public transportation entity must have achieved the milestone prior to the effective date of the rule and demonstrate that strict compliance with 12.6.(b)1 would necessitate reevaluation of the selected preferred alternative or equivalent milestone, a significant redesign, or significant modifications or additions to private land acquisition, whether in fee or easement. Similarly, proposed new 12.6(b)2iii provides a framework for which the Department will consider approval of railroads or public roadways lower than one foot above the design flood elevation and is similar to the requirements found at existing 12.6(e) but would add additional considerations. The proposed five factors at proposed 12.6(b)2iii(1)-(5) would include: 1) prohibitively high construction costs or costs that exist proportionally high compared with the benefit of strict compliance, 2) excessive flood storage volume displacement, 3) a design that does not meet necessary transportation safety, geometric design, or access point requirements, such as those adopted by the American Association of State Highway and Transportation Officials, 4) a design that causes adverse environmental impacts, 5)

and a design that exacerbates flooding or causes other adverse impacts to properties or drainage patterns.

Under the proposed 12.6(b)3, in order to evaluate the request under proposed 12.6(b)2ii or iii, the applicant would demonstrate, through a certification by a licensed professional engineer and supporting documentation, that the applicant has made every reasonable effort to construct the railroad or roadway as close to the elevation in (b)1 as practicable. In so doing, at proposed (b)3i, the Department will consider access to existing railroads or roadways whose travel surfaces are at an elevation lower than specified in (b)1. Proposed 12.6(b)3ii would also require that a railroad or roadway should be designed, to the maximum extent practicable, to resist damage, displacement, and loss of service due to anticipated flooding based on projected rainfall, while proposed 12.6(b)3iii, would require a showing that no extraordinary risk is posed. Finally, 12.6(b)3iv requires that information is provided to support the threshold determination that the project meets the conditions of 12.6(b)2ii or iii, as applicable.

To ensure rapid evaluation of public infrastructure projects that are critical to maintaining public safety and identification of deficiencies in the information provided to support the necessary demonstrations under proposed 12.6(b)3 to avoid inefficient expenditures of public funds where waivers are sought, the Department is proposing a new 12.6(b)5 to require identification of any deficiencies in the information provided under 12.6(b)3 during its completeness review conducted in accordance with N.J.A.C. 7:13-21.2.

In addition to the above requirements, the Department proposes requiring signage for these projects for travel surfaces that are lower than one foot above the flood hazard area design flood elevation, at (b)1. Similar to existing 12.6(e)4, new (b)4 would require adequate signage in prominent locations along any new, reconstructed or expanded section of railroad or roadway.

Finally, the Department proposes to amend 12.6(e) to preserve existing flexibility for construction and reconstruction of roadways, railroads, and parking areas for applicants other than a public transportation entity that cannot meet applicable elevation standards. It remains applicable for a public transportation entity for proposed parking areas only. A public transportation entity that cannot fully elevate a roadway or railroad must comply with the requirements of proposed 12.6(b). The Department is distinguishing parking areas from roadways and railroads for a public transportation entity because there is generally more opportunity to meet elevation standards for a parking area than there may be for the construction or reconstruction of a roadway or railroad.

APPENDIX 1 - APPROXIMATING THE FLOOD HAZARD AREA DESIGN FLOOD ELEVATION

While N.J.A.C. 7:13-3.5 is not proposed for amendment, the underlying methodology of N.J.A.C. 7:13-3.5 would change. Appendix 1 describes how to use the approximation method (Method 5), set forth at N.J.A.C. 7:13-3.5, whereby an applicant can conservatively estimate the flood hazard area design flood elevation and extent of the flood hazard area in the absence of State or Federal flood mapping and without performing calculations. The appendix would be repealed

in its entirety and replaced with amendments to account for climate change via the incorporation of an additional one-foot factor of safety.

The rationale for adding one additional foot to the approximated flood hazard area is due to the inherently conservative nature of the method. This methodology was originally developed for use in the Flood Hazard Area Control Act Rules adopted November 5, 2007. To derive the flood depths for the approximation method, the Department analyzed every available FEMA flood insurance study in the State and developed a mathematical relationship between the 100-year flood depth of a regulated water and its drainage area. This resulted in the generation of 14 separate equations that depicted the average 100-year water surface elevation as a function of drainage area in each of the State's watershed management areas. The Department then plotted a trend line and raised it such that all data points fell below that line. Subsequently, the Department added an additional 0.5-foot safety factor to each trend line, and rounded flood depths up to the next-highest foot. Such actions safeguarded that the actual flooding along a regulated water would be no greater than what is represented by Method 5. Essentially, the approximated flood depths were established between 0.5 and 1.5 feet above the highest FEMA 100-year flood elevation in each watershed management area. Therefore, the flood depths associated with Method 5 were more conservative than those associated with its Methods 1 through 4 and Method 6 counterparts. Due to this degree of conservatism that informed the 2007 version of the Flood Hazard Area Control Act Rules, the Department proposes to increase the flood depths in Table 1, Figure 1, and Figure 3 by one foot to account for impacts due to climate change.

Social Impact

This rule proposal will have a positive social impact in several ways. This rulemaking facilitates the construction, reconstruction, and elevation of structures in fluvial flood hazard areas to a safer height and incorporates the best available State-specific precipitation data for use in flood hazard area and stormwater management calculations. These amendments will help minimize flood damage potential throughout the fluvial flood hazard areas of the State and help protect people, property, and infrastructure from the harmful and sometimes devastating impacts of flooding.

Given the State's dense population and extensive level of existing development within fluvial flood hazard areas, flooding causes severe, repetitive, and deleterious social, environmental, and economic impacts. Flooding is responsible for the large majority of disaster-related damage reported within the State, and according to the 2019 New Jersey State Hazard Mitigation Plan, floods are the most frequent natural disaster in New Jersey, and can occur at any time throughout the course of any year (NJ Office of Emergency Management, 2019). As has been observed in the wake of storm events that have resulted in record-breaking rainfall in New Jersey – such as Hurricane Irene and the remnants of Tropical Storm Ida – flooding causes major social disruptions due to the need to relocate flood victims and provide emergency services to affected residents, which necessarily diverts emergency personnel from other essential tasks, as well as the long-term social, economic, and emotional impact on residents as a result of damaged or destroyed homes, schools, businesses, and infrastructure upon which residents rely. Flooding also presents significant health risks and results in prolonged interruptions to private businesses, reduced access to emergency care, and interruption of essential government functions. Certain structures can experience severe and repetitive flood damage, which threatens public safety and results in

economic loss and adverse social impacts. Significant damage can also result from collapsed structures and improperly secured structures and materials that are carried along by floodwaters.

Concrete, recent examples of the social impacts that can result from flooding are the impacts associated with the remnants of Tropical Storm Ida. From September 1 to September 3, 2021, the remnants of Tropical Storm Ida subjected New Jersey residents, particularly those in the northern and central regions of the State, to record rainfall and flooding. According to preliminary data from the National Weather Service and a report from the State Climatologist, Newark, NJ experienced an all-time record for highest one-hour rainfall total (3.65 inches) on September 1, 2021 (ONJSC, 2021). (National Weather Service). The official death toll from the remnants of Tropical Storm Ida is thirty lives lost (Office of the Governor, 2021). Hundreds of New Jersey residents were displaced from their homes due to significant flooding or other related factors, such as loss of power or access from damaged infrastructure, which made their residence uninhabitable.

It is also possible that, as a result of these amendments, flood risks will be more clearly identifiable to the public, thereby promoting greater awareness amongst communities in their efforts to promote climate resilience planning and preparedness, including a more fully informed analysis of risk and comparison of costs and benefits of investments in areas at greater risk of flooding. An example of a public resource that a municipality may take advantage of in their strategic planning efforts is the Department's Blue Acres program, which provides for buyouts of properties in flood-prone areas of New Jersey to be restored to a naturalized floodplain, often with socially beneficial recreational opportunities for the public. Since the inception of the Blue Acres program, the Department has been able to assist municipalities and individual homeowners to

restore and preserve open space within the State's flood hazard areas and offer people living in these areas the opportunity to pursue residences in places that are at significantly less risk of flooding. These proposed amendments not only support resilience efforts to identify properties that are at significant flood risk and encourage responsible use of these properties, but also set standards that will protect and inform future investments in New Jersey which may lead to more resilient enhancements to and investments in development throughout the State, particularly in areas that must contend with the high social costs of repetitive flood damage (e.g., abrupt displacement, business interruption, temporary suspension or delay of public services, home foreclosure).

It is the Department's expectation that, over time, the public will experience fewer deleterious impacts from periodic flooding as a result of these amendments. These proposed amendments thus provide a net social benefit through the protection of public health, safety, and welfare, as well as benefits for the quality of the State's surface waters.

Economic Impact

The Department anticipates that this rule proposal would have an overall positive economic impact for the state of New Jersey by reducing the State's exposure to flood risk and its associated economic impacts. There is a clear and immediate economic need to reduce the risk of flooding in New Jersey as the risks to people, businesses, and governments are large and increasing over time. A February 2021 report by First Street Foundation found that there are 94,146 residential properties in New Jersey that currently have substantial flood risk. First Street calculated an expected collective annual loss of $415.4 million (First Street Foundation, 2021). Note that First

Street's estimates understated the actual costs of flooding in 2021. In part, this is a result of a changing climate shifting weather patterns, resulting in increased precipitation and storm frequency.

The economic impacts of these changes can already be observed. For example, in New Jersey, it is estimated that, "…approximately one-third (36 percent) of the cost of flood damages over 1988 to 2017 is a result of historical precipitation changes…" (Davenport et al., 2021). With estimates of 60 percent of flood damage going unfunded by the National Flood Insurance Program (NFIP), private markets, or disaster relief (Congressional Budget Office, 2020), New Jersey properties within flood hazard areas face significant financial risk and vulnerability. In the 2021 report cited above, First Street Foundation projects that over the next 30 years, an additional 10,870 New Jersey properties are expected to incur financial loss due to flooding and average annual loss per property is expected to increase by 53 percent over the same period (First Street Foundation, 2021).

The most easily identifiable costs of flooding include loss of life, injury, and property damage and destruction. However, additional flood-related expenses include clean up, evacuation, emergency services, providing temporary housing to displaced residents and businesses, lost revenue from business interruption, increased cost of capital in at-risk areas, and the opportunity costs of any relief funds provided. These additional costs have a clear economic impact. According to the 2019 CBO report cited above, between 2005 and 2016 the Federal Government spent $28 billion—or 14 percent of total outlays--on emergency services such as debris removal and temporary shelter in response to hurricane winds and storm-related flooding (note that State and local spending on emergency services are not included in this figure.) Even more concretely, a

study by researchers from Climate Central, Rutgers University, and Stevens Institute of Technology showed that approximately 13 percent ($8.1 billion) of the $62.7 billion in losses incurred by New York, New Jersey and Connecticut following Superstorm Sandy can be attributed to climate change.

Increasing severity and frequency of flooding also present additional challenges to public entities that fund disaster relief, such as FEMA. The average flood claim payout from FEMA's NFIP between 1996 and 2019 in New Jersey was $37,600 (FEMA, 2020), with approximately 12 percent of claims for properties outside the SFHA (direct communication). Recent events show that in any given year, extreme weather events can place substantially more properties outside of FEMA's 100-year floodplain at risk. As of October 6, 2021, of the 195 NFIP claims following Tropical Storm Henri, 75 (38.5 percent) were from outside the flood zone. Similarly, 31 percent of the NFIP claims submitted by October 6, 2021 for the remnants of Tropical Storm Ida-related damages were from outside FEMA's 100-year floodplain (direct communication). FEMA estimates that more than $26.2 million in federal grants, loans and flood insurance programs have been approved for residents and businesses recovering from the remnants of Tropical Storm Ida (FEMA, 2021), with average New Jersey claim payouts averaging $28,000 (direct communication). According to a July 2020 report by the Rutgers NJ Climate Change Resource Center, "As of August 2019, New Jersey [NFIP] policyholders had cumulatively received roughly $5.268 billion (2018 USD) in total payments on 160,169 claims" (Bradt et al., 2020). Significant portions of this funding went to properties damaged in fluvial or compound flooding events. For example, Hurricane Irene is seventh on the list of the top ten most significant flood events in the United States based on NFIP payouts from 1978-2019; the NFIP paid over 1.3 billion to more than

44,000 policyholders for damages related to Hurricane Irene (National Hurricane Center, 2019). FEMA expenses, including flood insurance payouts, are expected to rise as climate change increases the probability of severe storm events such as Hurricane Irene and the remnants of Tropical Storm Ida. This will place an increased burden on the already stressed NFIP system and potentially limit the funds available for other uses. Other Federal and State disaster assistance programs, such as low-interest SBA loans for flood-impacted businesses, will also face increasing stress as damages increase.

The on-going and increasing risks of flooding caused by climate change also present an immediate economic challenge for homeowners and the housing market. Bernstein et al. (2019) show that in coastal communities, properties with greater flooding risk show a decline in price appreciation over time, even if the property itself does not experience a flood. Following a flooding event, a decline in property value for the flooded home is well documented (Bin and Polasky, 2004; Carbone et al., 2006; Hallstrom and Smith, 2005; and Bin and Landry, 2013). Climate-related flooding risk can have a negative impact on the housing market beyond falling property values.

Declining property values and slow housing sales are directly linked with an increased risk of mortgage default and foreclosure, as observed throughout the 2008-2009 financial crisis (Mian and Sufi, 2009). Nuisance flooding increases the risk of default by placing downward pressure on home values. Bin and Landry (2013) found that home prices typically recover ten years after a flooding event. However, if a community experiences repeated flooding events during that time, the homeowner will not have a chance to recover equity. The Union of Concerned Scientists (UCS) predicts that homeowners who experience this chronic inundation will choose to abandon their

homes (Union of Concerned Scientists, 2018). The UCS also identifies New Jersey as one of the States most at risk for climate related flooding—alongside Florida and New York. After examining the 2017 hurricane season, Fannie Mae found a significant increase in defaults in Texas, Florida, Puerto Rico, and the U.S. Virgin Islands.

In light of the above facts, these proposed rules would likely have an overall positive economic impact for the state of New Jersey, primarily through reductions in the State's exposure to flood risk, which is likely to strengthen the State's future economic outlook. The Department recognizes that, in some cases, property elevations or flood-proofing measures may create an increase in certain upfront construction costs. However, as a result of the proposed amendments, people and property will become more resilient to flood events and substantial costs caused by flooding and flood damage will be reduced. By ensuring that structures and infrastructure are constructed in ways that consider the increased risk of at least one flood event occurring during the life of the improvement, the Department expects an immediate economic benefit from reducing flood risk that will accrue over time and be distributed throughout the statewide economy.

The proposed amendments are expected to reduce New Jersey's exposure to flood risk in two ways. First, the proposed amendments would result in increased protection for people and property by ensuring that structures are planned and constructed in a manner that is informed by likely changes during the life of the structure by requiring the use of projected precipitation data and adding an additional factor of safety to the fluvial flood hazard area design flood elevations established by available mapping products and approximation. Second, the proposed amendments would reduce flood risk exposure by requiring the consideration of projected precipitation amounts

at N.J.A.C. 7:8 to ensure that stormwater BMPs are adequately designed to manage the observed and expected increases in precipitation due to climate change.

In both cases, the proposed rules would generate economic benefits by reducing the cost of floods in New Jersey. Because of the nature of climate-related flood risk, it is difficult to express the level of avoided costs produced by adopting the proposed rules precise monetary terms. However, research generally shows a positive return-on-investment for flood mitigation. For example, elevating an existing home is far more expensive than building a new one to a higher design standard. However, even in this case, the National Institute of Building Sciences found that a dollar invested in elevation retrofits produced $1.74 in avoided property damages, along with an additional 23 cents in additional benefits (National Institute of Building Sciences, 2019). Even absent a flooding event, property owners may see savings since business owners, government entities, and individual homeowners that elevate their buildings and/or residences in accordance with these amendments will likely see a reduction in flood insurance premiums; according to FEMA, elevating a home is the fastest way for individual homeowners to reduce their flood insurance costs (FEMA, 2021).

It is also important to consider the long-term nature of the benefits associated with the proposed amendments. In the previous example, an individual homeowner that experiences an immediate reduction in flood insurance premiums will continue to see those reduced premiums over time. And as flood risks increase over time, the relative savings will also increase when compared to properties that are not elevated. In addition, if there is a significant flooding event, the elevated building is less likely to suffer major damage. Moody's Investors Service determined that “New Jersey's adoption of stronger building codes, especially along the state's 130-mile

coastline, is ‘credit positive’ and indicated that “New Jersey's economic vulnerability to increased flooding is substantive” and that “total storm damage in New Jersey since 1980 is equivalent to 5.7 percent of the State's gross domestic product, compared with 3.1 percent for the United States for the same time period.” A 2021 report by First Street Foundation found that an additional 10,870 New Jersey properties are expected to experience financial loss from flood damage over the next 30 years; average expected annual loss per property is expected to increase by 53 percent over that same time period (First Street Foundation, 2021). Given this significant financial exposure, the reality is that investment in resilience leads to savings in recovery. It also increases awareness of and fosters a desire to avoid unmitigated climate risks among investors. It also leads to actions that will empower smarter development, protect residents from the looming threat of sea level rise, improve air quality statewide and incentivize cleaner technologies necessary for the economic and environmental resilience of the State.

Although the overall economic benefits of the proposed amendments are expected to outweigh the costs, the Department recognizes that the amendments would likely result in increased short-term costs for certain individuals, firms, agencies and communities that are required to implement additional flood resilience measures when building within areas that are subject to dangerous flood conditions. The Department anticipates that the proposed amendments will increase the amount of land and property in the State that is within a regulated fluvial flood hazard area. Since development and redevelopment within a fluvial flood hazard area is a regulated activity under the Flood Hazard Area Control Act Rules, the Department anticipates that the number of properties requiring a permit to conduct regulated activities within fluvial flood hazard areas may increase. This could result in increased costs for application fees, site evaluation,

engineering, design, raw materials, and labor. The Department notes, however, that many of these costs are standard expenses incurred by development or redevelopment, regardless of whether the property is within a flood hazard area or not, and that relevant consideration is marginal cost increases of flood protection which are expected to be minor. For example, when retrofitting an existing home, the cost of elevation is driven by the following factors: the size of the home, the number of floors, the type or stability of the foundation, local and state permitting, and current rates for labor and materials. Generally, the main driver is the type or stability of the foundation (slab on grade, raised slab, piers) that is required and/or chosen by the homeowner or business. Generally, increasing the elevation height of a home will marginally increase the total project cost.

In addition to the above points, just because a property has an increasing flood risk does not mean that it is not usable. For example, it might be prudent for a local municipality to invest in adding recreational amenities and preserving several acres of contiguous open space in a fluvial flood hazard area that has not garnered interest from private developers, rather than allowing the land to remain underutilized.

The Department anticipates that applicants conducting regulated activities that are subject to N.J.A.C. 7:8 may be required to provide expanded or additional stormwater BMPs due to the amendments which require the applicant to apply a change factor to the projected rainfall depths as part of the calculation to determine adequate stormwater BMPs for a site. Similar to the potential economic impacts discussed for compliance with the amendments related to the design flood elevation above, costs associated with expanded or additional stormwater BMPs could include application fees, site evaluation, engineering, design, raw materials, and labor associated with

constructing and/or installing stormwater BMPs for projects subject to N.J.A.C. 7:8. Similar to elevations and flood-proofing, the Department notes that costs attendant to stormwater design, construction and permitting are standard expenses incurred by development or redevelopment, regardless of whether the property is within a flood hazard area or not, and that the relevant consideration is marginal cost increase attendant to managing increasing amounts of stormwater due to increased rainfall. Ensuring the management of stormwater based on increased rainfall is likely to have an overall positive economic impact for the state of New Jersey, through reductions in the State's exposure to flood risk that can be achieved through sound stormwater management. The Department expects that the State will derive economic benefits from application of these proposed amendments that will accrue over time and be distributed throughout the statewide economy.

Given the above, the Department anticipates that the proposed amendments will result in increased public safety, minimization of property damage, and reduced need for relief measures, all of which will result in long term economic savings related to decreased damages and loss of property in the event of a flood that exceed the short-term costs of compliance with these amendments and thus will have a net positive economic impact.

Environmental Impact

These proposed amendments will have an overall positive environmental impact. The amendments will require stormwater management BMPs to be adequately sized to account for current and projected precipitation amounts, which the Department anticipates will better manage the volume and rate at which stormwater enters our waterbodies thereby increasing the State's resilience to flood events and improving the quality of the State's waterways. The Department also

anticipates that this will subsequently reduce both the total amount of debris created during flood events that must be disposed of in landfills, as well as the amount of debris and pollutants that commonly enter floodwaters when buildings are inundated. It is very common for debris from a storm to aggregate in watercourses once floodwaters recede. This debris can create blockages and contribute to future flooding and creates deleterious effects on the biota that live, breed, and feed within these watercourses and their flood hazard areas. Therefore, these proposed amendments will have a positive environmental impact.

Federal Standards Statement

N.J.S.A. 52:14B-1 et seq. (P.L. 1995, c. 65) requires State agencies that adopt, readopt or amend State regulations that exceed any Federal standards or requirements to include in the rulemaking document a comparison with Federal law.

The Department's authority for regulating development within flood hazard areas comes solely from State statutes, specifically N.J.S.A. 58:16A-50 et seq., 58:10A-1 et seq., 58:11A-1 et seq., and 13:1D-1 et seq. The Flood Hazard Area Control Act Rules are not promulgated under the authority of, or in order to implement, comply with, or participate in any program established under Federal law or under a State statute that incorporates or refers to Federal laws, Federal standards, or Federal requirements. The Federal Emergency Management Agency (FEMA) delineates special flood hazard areas in the State for the purposes of the National Flood Insurance Program. However, there is no Federal agency or program that directly requires regulation of activities in flood prone areas based on their potential flooding impacts. The Code of Federal Regulations, at 44 CFR Part 60, enables FEMA to require government entities that participate in the National Flood Insurance

Program (NFIP) to adopt certain flood hazard reduction standards for construction and development in 100-year flood plains. However, a government entity's participation in the NFIP is voluntary, and FEMA does not otherwise regulate land uses in flood hazard areas. Thus, since there are no standards under the authority of, or that exceed federal law, a cost-benefit analysis is not required, pursuant to N.J.S.A. 52:14B-23.

However, while the proposed amendments do not derive authority from any Federal law or under any State statute that incorporates or refers to Federal laws, standards or requirements, the FHACA Rules allow the use of FEMA flood insurance studies in order to determine the extent of the flood hazard area design flood. FEMA periodically updates these studies, in which case the flood elevation at a particular location can change. This would, in turn, alter the extent of the flood hazard area and the elevation at which buildings must be constructed, in cases where an applicant chooses to use a FEMA flood insurance study.

There are several Federal programs concerning stormwater runoff and nonpoint source pollution control. These proposed amendments do not change the limits or applicability of those Federally derived programs. Instead, they would change the way that the limits are evaluated, which is not discussed in the Federal programs. The Federal programs are discussed below.

Clean Water Act

The Federal Clean Water Act (33 U.S.C. §§ 1251 et seq.) requires permits under Section 402 of that Act (33 U.S.C. § 1342) for certain stormwater discharges. The Department's requirements to obtain such permits are set forth in the New Jersey Pollutant Discharge

Elimination System rules, N.J.A.C. 7:14A, rather than in the Stormwater Management rules being proposed for amendment.

Section 319 of the Clean Water Act (33 U.S.C. § 1329) authorizes a Federal grant-in-aid program to encourage states to control nonpoint sources. The Department developed a management program for nonpoint source pollution control under which it issues grants to local, regional, State and interstate agencies, as well as to nonprofit organizations to, among other things, develop or monitor BMPs to control stormwater.

The Clean Water Act's Municipal Separate Storm Sewer System (MS4) Program identifies five minimum control measures to address stormwater management at the minimum standards as described in 40 CFR 122.34(b). Specifically, 40 CFR 122.34(b)(5) requires the MS4 permittee to identify the minimum elements to address the runoff from new development and redevelopment projects. In New Jersey, the requirements to manage stormwater from new development and redevelopment projects are established in the Stormwater Management rules and municipalities are required to have stormwater programs that equal or exceed the requirements of those rules. The amendments proposed herein do not modify the scope of applicability of those rules. The amendments are specific to the rainfall data used and the calculations methods, neither of which are discussed in the Federal MS4 rules.

Coastal Zone Management Act

Under Section 6217(g) of the Coastal Zone Management Act Reauthorization and Amendments of 1990 (CZARA), P.L. 101-508, the USEPA has published "Guidance Specifying Management Measures for Sources of Nonpoint Pollution In Coastal Waters" (CZARA 6217(g) Guidance). States may opt to participate or not participate in the overall coastal zone management

program, with no penalty for non-participation other than the loss of Federal grants for this program. No mandatory Federal standards or requirements for nonpoint source pollution control are imposed. The CZARA 6217(g) Guidance includes management measures for stormwater runoff and nonpoint source pollution control from land development, as well as many other source types. The Department has developed a coastal zone management program, including a component addressing coastal nonpoint source pollution control. The Stormwater Management rules at N.J.A.C. 7:8 are one means by which the Department implements its nonpoint source pollution control program.

As with the Federal MS4 rules discussed above, the CZARA 6217(g) Guidance does not include any specifics regarding rainfall data or calculation methods. Accordingly, N.J.S.A. 52:14B-1 et seq. (P.L. 1995, c.65) does not require any further analysis.

Jobs Impact Statement

These proposed amendments are expected to increase the application of fluvial flood hazard area to lands in the State. The Department consequently expects an increase in the number of development and redevelopment projects required to comply with N.J.A.C. 7:13. Notably, these amendments do not create a new regulated area, but rather expand existing flood hazard areas to be consistent with increases in precipitation observed over the last twenty years and likely future climate-influenced precipitation. In many cases, this regulated area will extend further within existing developed communities that, while outside of the regulated area as presently identified, have experienced repeated flooding events. The Department anticipates that development and redevelopment within these communities will continue, and these amendments will help ensure that such development and redevelopment is more resilient to existing flood risks that are also

projected to worsen in the years ahead. In some instances, the application of these amendments may lead to greater job growth in the construction and/or building industry, including, but not limited to, elevation and/or flood-proofing of structures, installation of green infrastructure stormwater management systems, and more flood resistant infrastructure including roadways and utility lines. As an example, based on the scale of damage that the remnants of Tropical Storm Ida caused to individual homes, multi-family dwellings, businesses, and infrastructure, significant rebuilding and repair is projected to occur in many impacted communities over the coming months and years. As much of this rebuilding and restoration will need to be done in compliance with these rules and will often involve elevating or flood-proofing structures, the Department anticipates that these proposed rules will lead to an upswing in job creation related to building resiliency, including in the construction and trade industries, as well as the construction-related manufacturing and consulting sectors. The Department does not anticipate that the marginal increase in the costs of compliance to ensure flood resilience within these communities would deter the investments in recovery that would fuel related job growth. However, the Department recognizes that, as a social reaction to repeated flooding, coupled with the perceived costs of compliance with elevations or flood-proofing rules, some residents or businesses may be deterred from development or redevelopment within flood hazard areas. The Department anticipates that the increase in construction work related to compliance with these rules will likely outweigh the minor deterrence to development.

Agricultural Impact Statement

Pursuant to N.J.S.A. 52:14B-4, the Department has evaluated these proposed amendments to determine the nature and extent of the impact of the adopted amendments on the agriculture

industry. To the extent that any habitable buildings used in the agricultural industry lie within the fluvial flood hazard areas regulated by these proposed amendments, those buildings may be impacted by the requirements to elevate or flood-proof such buildings in cases where new development or substantial improvement occurs. However, the Department believes that the benefits of those impacts in terms of protection of public health and safety outweigh any detrimental economic effect of these amendments on the agricultural industry in the same way that other sectors of the population will benefit from increased protection, long-term flood damage cost avoidance, and decreased flood insurance premiums. With regard to cropland and management of vegetation, these proposed rules do not include amendments that are expected to have an impact on those types of activities.

Regulatory Flexibility Analysis

In accordance with the New Jersey Regulatory Flexibility Act, N.J.S.A. 52:14B-16 et seq., the Department has determined that a number of contractors, builders, and property owners that will be affected by these proposed rules are "small businesses" as defined by the Regulatory Flexibility Act at N.J.S.A. 52:14B-17. The proposed amendments apply to any person or entity owning property containing a flood hazard area who intends to or is required to construct, reconstruct, relocate, or elevate an existing building above the flood hazard area design flood elevation or flood-proof that building to address flooding impacts.

It is not possible for the Department to accurately estimate the number of small businesses affected by the concurrently proposed amendments. The Flood Hazard Area Control Act Rules regulate new development, redevelopment, and other activities in flood hazard areas based on

impacts to and from flooding. As such, these proposed rules would have the same impact on a small business as on any other applicant proposing such activities in a flood hazard area.

The proposed rules would require applicants intending to build within flood hazard areas to first apply for construction permits where appropriate, which requires a certain amount of reporting and recordkeeping during the initial design and construction phase. The costs to small businesses in this regard are the same as to any applicant seeking to construct within flood hazard areas, including surveying costs, engineering and environmental consultant fees, and permit application fees. The actual costs vary depending upon the size of the development and the particular site conditions. Furthermore, a copy of the permit and approved drawings must be maintained at the worksite and available for inspection, and the existing rules require reporting to the Department if unanticipated environmental damage occurs during or after construction, as well as any change in construction plans, transfer of ownership or any noncompliance with the rules. Permittees are also required to furnish within a reasonable time any information that the Department requests to determine compliance with a permit or to determine whether cause exists for suspension or termination of a permit. These are basic requirements intended to ensure that permitted activities are undertaken in accordance with the requirements of the rules as well as any conditions that may be placed on a permit, and do not affect small businesses differently than any other applicant undertaking activities in a flood hazard area. These proposed amendments would not alter these requirements or add any additional reporting or recordkeeping requirements for small businesses or any other person. Since these proposed amendments are the minimum necessary to protect public safety, health and the environment, adopting differing standards

applicable to small businesses is neither appropriate nor sufficiently protective of the residents of New Jersey from the deleterious impacts of flooding.

Housing Affordability Impact Analysis

In accordance with N.J.S.A. 52:14B-4 as amended effective July 17, 2008, by P.L. 2008, c. 46, the Department has evaluated these proposed amendments to determine the impact, if any, on the affordability of housing. Amending the existing flood hazard area elevation standards and incorporating the best available data on precipitation, both current and climate projected, would provide protection to New Jersey residents and businesses in flood hazard areas and will help individuals and communities avoid future flood losses. This would in some cases cause the lowest floor of buildings that are being reconstructed and elevated to be situated higher than was required previous to this rulemaking. However, it is anticipated that the added cost of compliance in such a case will be offset over the life of the structure as a result of lower flood insurance rates applicable to elevated structures. Because the proposed amendments are limited to areas of the State within fluvial flood hazard areas, and any initial construction costs are anticipated to be minor, there is an extreme unlikelihood that the rules will evoke a change in the overall average costs associated with housing in the State.

Smart Growth Impact Statement

In accordance with N.J.S.A. 52:14B-4, as amended effective July 17, 2008, by P.L. 2008, c. 46, the Department has evaluated these proposed amendments to determine the impact, if any, on housing production in Planning Areas 1 or 2, or within designated centers, under the State Development and Redevelopment Plan (State Plan). These proposed amendments require buildings to be constructed at higher elevations based upon anticipated future flood elevations,

require the use of the best available precipitation data, both current and climate change projected, and remove the option to use an older, less reliable calculation method. Amending the existing flood hazard area elevation standards and incorporating the best available data on precipitation would provide additional protection to New Jersey residents and businesses in flood hazard areas and helps individuals and communities avoid future flood losses. Because the adopted amendments at N.J.A.C. 7:13 are limited to areas of the State within flood hazard areas, and any initial construction costs associated with the amendments to N.J.A.C. 7:13 and 7:8 are anticipated to be minor, it is unlikely that the rules will evoke a change in housing production within Planning Areas 1 or 2 or within designated centers.

Racial and Ethnic Community Criminal Justice and Public Safety Impact

The Department has evaluated this rule proposal and determined that they will not have an impact on pretrial detention, sentencing, probation or parole policies concerning adults and juveniles in the State. Accordingly, no further analysis is required.

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Full text of the proposal follows (additions indicated in boldface **thus**; deletions indicated in brackets [thus]):

N.J.A.C. 7:8 – STORMWATER MANAGEMENT

7:8-1.2 Definitions

The following words and terms, when used in this chapter, shall have the following meanings unless the context clearly indicates otherwise.

…

"Public transportation entity" means a Federal, State, county, or municipal government, an independent State authority, or a statutorily authorized public-private partnership program pursuant to P.L. 2018, c.90 (N.J.S.A. 40A:11-52 et seq.), which performs a public roadway or railroad project that includes new construction, expansion, reconstruction, or improvement of a public roadway or railroad.

"Public roadway or railroad" means a pathway for use by motor vehicles or trains, which is intended for public use and is constructed by or on behalf of a public transportation entity. A public roadway or railroad does not include a roadway or railroad constructed as part of a private development, regardless of whether the roadway or railroad is ultimately to be dedicated to and/or maintained by a governmental entity.

…

7:8-1.6 Applicability to major development

(a) (No change.)

(b) [The following major] **Major** development shall be subject to the stormwater management requirements in effect [on March 1, 2021] **prior to {effective date of these rules} as follows**:

1. Major development that does not require any of the Department permits listed in (c) below and [that has submitted an application] **for which a complete application has been submitted prior to {effective date of these rules} shall be subject to the stormwater management requirements in effect pursuant to (b)2 or (b)3 below, provided** that **the application** includes both the application form and all accompanying documents required by ordinance for one of the following approvals pursuant to the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.) [prior to March 2, 2021]:

i. – iv. (No change.)

v. Preliminary subdivision approval where no subsequent site plan approval is required **[; and].**

2. **An application required by ordinance for approval under (b)1 that has been submitted prior to March 2, 2021, shall be subject to the stormwater management requirements in effect on March 1, 2021.**

3. An application required by ordinance for approval under (b)1 that has been submitted on or after March 2, 2021, and prior to {effective date of these rules} shall be subject to the stormwater management requirements in effect on March 2, 2021.

4. Major development for which a technically complete application was submitted to the Department for one of the approvals listed at (c) below prior to [March 2, 2021]**{effective date of these rules}**, **shall be subject to the stormwater management requirements as follows,** provided that the application included a stormwater management review component[.]**:**

i. A technically complete application submitted to the Department for any of these approvals prior to March 2, 2021, shall be subject to the stormwater management requirements in effect on March 1, 2021; and

ii. A technically complete application submitted to the Department for any of these approvals on or after March 2, 2021, and prior to {effective date of these rules} shall be subject to the stormwater management requirements in effect on March 2, 2021.

(c) For the purposes of this section, the term "permit" shall include transition area waivers under the Freshwater Wetlands Protection Act. In order to qualify under (b)2 above, a technically complete permit application must have been submitted to the Department for the major development under the following statutes, provided that the permit included a stormwater management review component, prior to [March 2, 2021] **the applicable date listed in (b)4i and ii above**:

1. – 5. (No change.)

(d) - (e) (No change.)

(f) Notwithstanding any rule to the contrary, a major development for any public roadway or railroad project conducted by a public transportation entity that has determined a preferred alternative or reached an equivalent milestone before the {effective date of these rules} shall be subject to the stormwater management requirements in effect prior to the {effective date of these rules}.

7:8-5.4 Groundwater recharge standards

(a) (No change.)

(b) The minimum design and performance standards for groundwater recharge are as follows:

1. The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at N.J.A.C. 7:8-5.7, either:

i. (No change.)

ii. Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the **projected** two-year storm **as defined and determined pursuant to N.J.A.C. 7:8-5.7(d)** is infiltrated.

2. – 3. (No change.)

7:8-5.6 Stormwater runoff quantity standards

(a) (No change.)

(b) In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at N.J.A.C. 7:8-5.7, complete one of the following:

1. Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the **current and projected** two-, 10-, and 100-year storm events**, as defined and determined pursuant to N.J.A.C. 7:8-5.7(c) and (d), respectively,** do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;

2. Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site

for the **current and projected** two-, 10-, and 100-year storm events**, as defined and determined pursuant to N.J.A.C. 7:8-5.7(c) and (d), respectively,** and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;

3. Design stormwater management measures so that the post-construction peak runoff rates for the **current and projected** two-, 10-, and 100-year storm events**, as defined and determined pursuant to N.J.A.C. 7:8-5.7(c) and (d), respectively,** are 50, 75, and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed; or

4. (No change.)

(c) (No change.)

7:8-5.7 Calculation of stormwater runoff and groundwater recharge

(a) Stormwater runoff shall be calculated in accordance with the following:

1. The design engineer shall calculate runoff using [one of the following methods:

i. The] **the** USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in Chapters 7, 9, 10, 15, and 16, Part 630, Hydrology National Engineering Handbook, incorporated herein by reference as amended and supplemented. This methodology is additionally described in Technical Release 55--Urban Hydrology for Small Watersheds (TR-55), dated June 1986, incorporated herein by reference**,** as amended and supplemented. Information regarding the

methodology is available from the Natural Resources Conservation Service website at https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044171.pdf or at United States Department of Agriculture Natural Resources Conservation Service, 220 Davison Avenue, Somerset, New Jersey 08873**.** [or

ii. The Rational Method for peak flow and the Modified Rational Method for hydrograph computations. The rational and modified rational methods are described in "Appendix A-9 Modified Rational Method" in the Standards for Soil Erosion and Sediment Control in New Jersey, July 1999, as amended and supplemented. This document is available from the State Soil Conservation Committee or any of the Soil Conservation Districts listed at N.J.A.C. 2:90- 1.3(a)4. The location, address and telephone number for each Soil Conservation District is available from the State Soil Conservation Committee, PO Box 330, Trenton, NJ 08625. The document is also available at http://www.nj.gov/agriculture/divisions/anr/pdf/2014NJSoilErosionControlStandardsComplete.pdf.]

2. For the purpose of calculating [runoff coefficients]**curve numbers** and groundwater recharge, there is a presumption that the pre-construction condition of a site or portion thereof is a wooded land use with good hydrologic condition. The term "[runoff coefficient]**curve number**" applies to [both] the NRCS methodology at N.J.A.C. 7:8-5.6(a)1i[and the Rational and Modified Rational Methods at N.J.A.C. 7:8-5.6(a)1i]. A [runoff coefficient] **curve number** or a groundwater recharge land cover for an existing condition may be used on all or a portion of the site if the design engineer verifies that the hydrologic condition has existed on the site or portion of the site for at least five years without interruption prior to the time of application. If more than

one land cover has existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in good hydrologic condition (if the land use type is pasture, lawn, or park), with good cover (if the land use type is woods), or with good hydrologic condition and conservation treatment (if the land use type is cultivation).

3. – 5. (No change.)

(b) (No change.)

(c) The precipitation depths of the current two-, 10-, and 100-year storm events shall be determined by multiplying the values determined in accordance with 1 and 2 below:

1. The applicant shall utilize the National Oceanographic and Atmospheric Administration (NOAA), National Weather Service's Atlas 14 Point Precipitation Frequency Estimates: NJ, in accordance with the location(s) of the drainage area(s) of the site. This data is available at: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=nj; and

2. The applicant shall utilize Table 5-5 below, which sets forth the applicable multiplier for the drainage area(s) of the site, in accordance with the county or counties where the drainage area(s) of the site is located. Where the major development lies in more than one county, the precipitation values shall be adjusted according to the percentage of the drainage area in each county. Alternately, separate rainfall totals can be developed for each county using the values in the table below.

Table 5-5: Current Precipitation Adjustment Factors

County	Current Precipitation Adjustment Factors		
	2-year Design Storm	10-year	100-year
Atlantic	1.01	1.02	1.03
Bergen	1.01	1.03	1.06
Burlington	0.99	1.01	1.04
Camden	1.03	1.04	1.05
Cape May	1.03	1.03	1.04
Cumberland	1.03	1.03	1.01
Essex	1.01	1.03	1.06
Gloucester	1.05	1.06	1.06
Hudson	1.03	1.05	1.09
Hunterdon	1.02	1.05	1.13
Mercer	1.01	1.02	1.04
Middlesex	1.00	1.01	1.03
Monmouth	1.00	1.01	1.02
Morris	1.01	1.03	1.06
Ocean	1.00	1.01	1.03
Passaic	1.00	1.02	1.05
Salem	1.02	1.03	1.03

Somerset	**1.00**	**1.03**	**1.09**
Sussex	**1.03**	**1.04**	**1.07**
Union	**1.01**	**1.03**	**1.06**
Warren	**1.02**	**1.07**	**1.15**

(d) Table 5-6 below sets forth the change factors to be used in determining the projected two-, 10-, and 100-year storm events for use in this chapter, which are organized alphabetically by county. The precipitation depth of the projected two-, 10-, and 100-year storm events of a site shall be determined by multiplying the precipitation depth of the two-, 10-, and 100-year storm events determined from the National Weather Service's Atlas 14 Point Precipitation Frequency Estimates pursuant to (c)1 above, by the change factor in Table 5-6 below, in accordance with the county or counties where the drainage area(s) of the site is located. Where the major development and/or its drainage area lies in more than one county, the precipitation values shall be adjusted according to the percentage of the drainage area in each county. Alternately, separate rainfall totals can be developed for each county using the values in the table below.

Table 5-6: Future Precipitation Change Factors

County	**Future Precipitation Change Factors**		
	2-year	**10-year**	**100-year**

	Design Storm		
Atlantic	**1.22**	**1.24**	**1.39**
Bergen	**1.20**	**1.23**	**1.37**
Burlington	**1.17**	**1.18**	**1.32**
Camden	**1.18**	**1.22**	**1.39**
Cape May	**1.21**	**1.24**	**1.32**
Cumberland	**1.20**	**1.21**	**1.39**
Essex	**1.19**	**1.22**	**1.33**
Gloucester	**1.19**	**1.23**	**1.41**
Hudson	**1.19**	**1.19**	**1.23**
Hunterdon	**1.19**	**1.23**	**1.42**
Mercer	**1.16**	**1.17**	**1.36**
Middlesex	**1.19**	**1.21**	**1.33**
Monmouth	**1.19**	**1.19**	**1.26**
Morris	**1.23**	**1.28**	**1.46**
Ocean	**1.18**	**1.19**	**1.24**
Passaic	**1.21**	**1.27**	**1.50**
Salem	**1.20**	**1.23**	**1.32**
Somerset	**1.19**	**1.24**	**1.48**
Sussex	**1.24**	**1.29**	**1.50**

Union	**1.20**	**1.23**	**1.35**
Warren	**1.20**	**1.25**	**1.37**

N.J.A.C. 7:13 – FLOOD HAZARD AREA CONTROL ACT RULES

SUBCHAPTER 1. GENERAL PROVISIONS

7:13-1.1 Purpose and scope

(a) – (b) (No change.)

(c) The purpose of this chapter is to minimize damage to life and property from flooding caused by development within flood hazard areas, to preserve the quality of surface waters, and to protect the wildlife and vegetation that exist within and depend upon such areas for sustenance and habitat.

1. Flooding presents a significant risk to [the] public health, safety, and welfare**, and the environment** due to loss of life, injury, [and] property damage**, and ecological degradation**. Unless properly controlled, development within flood hazard areas obstructs and displaces floodwaters[, which] **and** exacerbates the frequency, intensity, duration, and extent of flooding. **The adverse socioeconomic and environmental impacts of more frequent and intensifying flooding are well documented and are further exacerbated by the effects of climate change, which expands the area of the State subject to flooding and warrants appropriate measures be taken to plan for both present and future flood conditions.** Loss of life, injury, and property damage also result from collapsed structures, unsecured materials, and other debris carried by

floodwaters. Furthermore, improperly built structures are subject to severe and repetitive flood damage, resulting in the displacement of residents**, loss, damage, or interruption of essential public and private services and infrastructure,** and prolonged economic disruption or loss.

2. (No change.)

(d) (No change.)

7:13-1.2 Definitions

The following words and terms, when used in this chapter, shall have the following meanings unless the context clearly indicates otherwise. Additional definitions specifically applicable to N.J.A.C. 7:13-13, Mitigation, are set forth at N.J.A.C. 7:13-13.1.

…

"Flood hazard area design flood" means a flood equal to the 100-year flood plus an additional amount of water in fluvial areas to account for possible future increases in flows due to development**, climate change** [or]**and** other factors. This additional amount of water also provides a factor of safety in cases when the 100-year flood is exceeded. N.J.A.C. 7:13-3 describes the various methods of determining the flood hazard area design flood for a particular water as well as the additional amount of water to be added in various situations.

…

"Public transportation entity" means a Federal, State, county, or municipal government, an independent State authority, or a statutorily authorized public-private partnership program pursuant to P.L. 2018, c.90 (N.J.S.A. 40A:11-52 et seq.), which performs a public

roadway or railroad project that includes new construction, expansion, reconstruction, or improvement of a public roadway, parking area or railroad.

…

SUBCHAPTER 2. APPLICABILITY AND ACTIVITIES FOR WHICH A PERMIT OR AUTHORIZATION IS REQUIRED

7:13-2.1 When a permit or authorization is required

(a) – (b) (No change.)

(c) Undertaking a regulated activity in a regulated area does not require an approval listed at (b) above in the cases listed in (c)1 through 4 below. For the purpose of this subsection, each distinct construction activity in a project, such as each building, road**,** or utility crossing, is considered a distinct regulated activity.

1. The regulated activity is part of a project for which all elements that were subject to the Flood Hazard Area Control rules in effect prior to [November 5, 2007] **{effective date of these rules}**, have been approved under a permit issued pursuant to those rules, provided:

i. The regulated activity is specifically approved under the permit, or was not subject to the requirements of this chapter prior to [November 5, 2007] **{effective date of these rules}**;

ii. The application for the permit was received by the Department and was complete for review prior to [November 5, 2007] **{effective date of these rules}**; and

iii. The permit is valid when the regulated activity is undertaken;

2. - 3. (No change.)

4. The regulated activity is part of a project that was subject to neither the requirements of this chapter, nor N.J.A.C. 7:7, prior to [November 5, 2007] **{effective date of these rules}**, and [one]**both** of the following [applies]**apply**:

[i. The regulated activity is authorized under one or more of the following approvals pursuant to the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.), prior to November 5, 2007:

(1) Preliminary or final site plan approval;

(2) Final municipal building or construction permit;

(3) Minor subdivision approval where no subsequent site plan approval is required;

(4) Final subdivision approval where no subsequent site plan approval is required; or

(5) Preliminary subdivision approval where no subsequent site plan approval is required; or

ii. The regulated activity does not require an approval identified in (c)4i above, and one or more of the following construction activities were completed onsite prior to November 5, 2007:

(1) The foundation for at least one building or structure;

(2) All of the subsurface improvements for a roadway; or

(3) The installation of all of the bedding materials for a utility line.]

i. The regulated activity received all necessary Federal, State, and local approvals prior to {effective date of these rules}; and

ii. The regulated activity had commenced prior to {effective date of these rules}.

(1) For the purpose of this paragraph, commencement of regulated activities means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, the placement of subsurface improvements for a roadway, the installation of all of the bedding materials for a utility line, or any work beyond the stage of excavation. Permanent construction does not include land preparation, such as clearing, grading and filling.

(d) - (e) (No change.)

SUBCHAPTER 3. DETERMINING THE FLOOD HAZARD AREA AND FLOODWAY

7:13-3.3 Flood hazard area and floodway based on a Department delineation (Method 1)

(a) (No change.)

(b) Under Method 1:

1. The flood hazard area design flood elevation [is that which is] **shall be equal to two feet above the design flood elevation** shown on the flood profile adopted as part of the Department delineation**, unless subsequent to {effective date of these rules}, the Department revises a flood profile in accordance with N.J.A.C. 7:13-3.8 to account for changes in flood elevations due to increased precipitation, in which case the flood hazard area design flood elevation is that which is shown on the revised flood profile**; and

2. (No change.)

(c) – (e) (No change.)

7:13-3.4 Flood hazard area and floodway based on FEMA flood mapping (Methods 2 through 4)

(a) – (d) (No change.)

(e) Under Method 3 (FEMA fluvial method):

1. The flood hazard area design flood elevation shall be equal to [one foot] **three feet** above the FEMA 100-year flood elevation; and

2. (No change.)

(f) Under Method 4 (FEMA hydraulic method):

1. For a regulated water in a fluvial flood hazard area:

i. A hydraulic analysis, such as a standard step backwater analysis, shall be performed to determine the flood [hazard area design flood] elevation using 125 percent of the 100-year flow rate reported by FEMA flood mapping for the regulated water (see (c)3i above)**. The flood hazard area design flood elevation under this method shall be equal to two feet above the flood elevation determined herein**; and

ii. A hydraulic analysis, such as a standard step backwater analysis, shall be performed to determine the floodway limit using the 100-year flow rate reported by FEMA flood mapping for the regulated water[,]**. The floodway limits shall be determined herein** assuming a maximum rise of 0.2 feet in the 100-year flood elevation as follows:

(1) – (2) (No change.)

2. – 4. (No change.)

7:13-3.6 Flood hazard area and floodway determined by calculation (Method 6)

(a) – (b) (No change.)

(c) Under Method 6:

1. For a regulated water in a fluvial flood hazard area:

i. Except as provided in (c)1ii below, the flood hazard area design flood elevation shall be determined as follows:

(1) A hydrologic analysis shall be performed to determine the peak flow rate for the **anticipated future** 100-year flood for the regulated water **using the adjustment factors listed in Table 3.6B in accordance with (c)6 below.** The hydrologic analysis shall assume existing land use coverage in the drainage area, as of the date of the verification application to the Department; and

(2) A hydraulic analysis, such as a standard step backwater analysis, shall be performed to determine the flood hazard area design flood elevation using 125 percent of the **anticipated future** 100-year **peak** flow rate determined under (c)1i(1) above;

ii. The use of calculations not described in (c)1i above to determine the flood hazard area design flood elevation is conditionally acceptable provided:

(1) (No change.)

(2) The flood hazard area design flood elevation is determined using a flood that is no less than 125 percent of the peak flow and volume of [a] **the anticipated future** 100-year flood **determined under (c)1i(1) above**; and

iii. **The floodway limits shall be determined as follows**:

(1) A hydrologic analysis shall be performed to determine the peak flow rate for the current 100-year flood for the regulated water using the adjustment factors listed in Table 3.6A in accordance with (c)5 below. The hydrologic analysis shall assume existing land

use coverage in the drainage area, as of the date of the verification application to the Department;

(2) A hydraulic analysis, such as a standard step backwater analysis, shall be performed to determine the floodway limit using the 100-year flow rate determined under [(c)1i(1)]**(c)1iii(1)** above, assuming a maximum rise of 0.2 feet in the 100-year flood elevation as follows:

(1) – (2) Recodify as (A) – (B) (No change in text.)

2. – 4. (No change.)

5. Table 3.6A below sets forth the adjustment factors necessary to determine the current 100-year precipitation depths for use in this chapter. The precipitation depth of the current 100-year storm event shall be determined by multiplying the values determined in accordance with i and ii below:

i. The applicant shall utilize the National Oceanographic and Atmospheric Administration (NOAA), National Weather Service's Atlas 14 Point Precipitation Frequency Estimates: NJ, in accordance with the location(s) of the drainage area(s) of the site. This data is available at: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=nj; and

ii. The applicant shall utilize Table 3.6A below, which sets forth the applicable multiplier for the drainage area(s) of the site, in accordance with the county or counties where the drainage area(s) of the site is located. Where the drainage area lies in more than one county, the precipitation values shall be adjusted according to the percentage of the drainage area in each county. Alternately, separate rainfall totals can be developed for each county using the values in the table below.

Table 3.6A: Current Precipitation Adjustment Factors

County	Current Precipitation Adjustment Factors
Atlantic	1.03
Bergen	1.06
Burlington	1.04
Camden	1.05
Cape May	1.04
Cumberland	1.01
Essex	1.06
Gloucester	1.06
Hudson	1.09
Hunterdon	1.13
Mercer	1.04
Middlesex	1.03
Monmouth	1.02
Morris	1.06
Ocean	1.03
Passaic	1.05
Salem	1.03

Somerset	**1.09**
Sussex	**1.07**
Union	**1.06**
Warren	**1.15**

6. Table 3.6B below sets forth the change factors to be used in determining the projected 100-year storm event for use in this chapter, which are organized alphabetically by county. The precipitation depth of the projected 100-year storm event of a site shall be determined by multiplying the precipitation depth of the 100-year storm event determined from the National Weather Service's Atlas 14 Point Precipitation Frequency Estimates pursuant to (c)5i above, by the change factor in Table 3.6B below, in accordance with the county or counties where the drainage area(s) of the site is located. Where the project and/or its drainage area lies in more than one county, the precipitation values shall be adjusted according to the percentage of the drainage area in each county. Alternately, separate rainfall totals can be developed for each county using the values in the table below.

Table 3.6B: Future Precipitation Change Factors

County	Future Precipitation Change Factors
Atlantic	**1.39**
Bergen	**1.37**

Burlington	**1.32**
Camden	**1.39**
Cape May	**1.32**
Cumberland	**1.39**
Essex	**1.33**
Gloucester	**1.41**
Hudson	**1.23**
Hunterdon	**1.42**
Mercer	**1.36**
Middlesex	**1.33**
Monmouth	**1.26**
Morris	**1.46**
Ocean	**1.24**
Passaic	**1.50**
Salem	**1.32**
Somerset	**1.48**
Sussex	**1.50**
Union	**1.35**
Warren	**1.37**

7:13-6.7 Conditions applicable to a permit-by-rule or to an authorization pursuant to a general permit-by-certification or a general permit

(a) (No change.)

(b) The following conditions are incorporated by reference in each permit-by-rule, general permit-by-certification, or general permit:

1. Any new, reconstructed, enlarged, or elevated structure within a flood hazard area**:**

i. [shall] **Shall** be secured to resist flotation, collapse, and displacement due to hydrostatic and hydrodynamic forces from floodwaters**; and**

ii. Shall comply with the applicable design and construction standards of the following:

(1) The Uniform Construction Code, N.J.A.C. 5:23; and

(2) The Federal flood reduction standards, 44 C.F.R. Part 60.

2 - 5. (No change.)

(c) - (e) (No change.)

7:13-10.1 Requirement to obtain an individual permit

(a) (No change.)

(b) A regulated activity or project subject to an individual permit shall meet:

1. The applicable area-specific requirements at N.J.A.C. 7:13-11; [and]

2. The applicable activity-specific requirements at N.J.A.C. 7:13-12[.]**; and**

3. The applicable design and construction standards of the following:

i. The Uniform Construction Code, N.J.A.C. 5:23; and

ii. The Federal flood reduction standards, 44 C.F.R. Part 60.

7:13-12.6 Requirements for a railroad, roadway, and parking area

(a) (No change.)

(b) The Department shall issue an individual permit to construct or reconstruct a railroad or public roadway only if one of the following requirements is satisfied:

1. (No change.)

[2. The applicant demonstrates that it is not feasible to construct the travel surface of the proposed railroad or public roadway at least one foot above the flood hazard area design flood elevation pursuant to (e) below, and instead constructs the travel surface as close to this elevation as feasible.]

2. The applicant is a public transportation entity and any of the following apply:

i. The project is limited in scope and consists solely of safety or state of good repair improvements to a lawfully existing railroad or roadway such that there is no reasonable opportunity to meet (b)1 above as part of the project's overall scope and purpose; or

ii. Prior to the {effective date of these rules}, the project reached a milestone in its development and design such that meeting (b)1 above would necessitate reevaluation of the selected preferred alternative or equivalent milestone, a significant redesign, or significant modifications or additions to private land acquisition plans, whether in fee or easement; or

iii. Strict compliance with (b)1 above would result in one of more of the following:

(1) Prohibitively high construction costs or construction costs that are disproportionately high compared with any benefit that would be obtained by strict compliance with (b)1 above;

(2) A design that necessitates excessive volumes of fill that exceed the flood storage displacement limits, for which flood storage cannot feasibly be created in compensation either onsite or offsite;

(3) A design that does not meet necessary transportation safety, geometric design, or access point requirements, such as those adopted by the American Association of State Highway and Transportation Officials;

(4) A design that causes unavoidable adverse impacts to the environment (including, but not limited to, impacts to the channel, riparian zone, or aquatic or terrestrial resources) that cannot be adequately mitigated; or

(5) A design that exacerbates flooding or causes unavoidable adverse impacts to offsite properties or preexisting drainage patterns.

3. An applicant seeking authorization under (b)2(ii) or (iii) above shall demonstrate through a certification from a licensed professional engineer and supporting documentation that:

i. Every reasonable effort has been taken to construct or elevate as much of the railroad or roadway as close as practicable to the elevation required by (b)1 above given the scope of the project;

(1) Access to railroads or roadways that are lower than the elevation requirements of this section will be considered in the evaluation of reasonable effort; and

ii. The railroad or roadway is designed to the maximum extent practicable to resist damage, displacement, and loss of service due to anticipated flooding based on the projected rainfall depths used in this chapter.

iii. No extraordinary risk is posed to any person using each proposed railroad or roadway that is constructed at an elevation less than required by (b)1 above; and

iv. The project meets the requirements of (b)2ii or iii above, as applicable.

4. Any project authorized in accordance with this section shall provide an adequate number of permanent signs that are posted in prominent locations along any new, reconstructed, or expanded section of railroad or roadway that does not meet (b)1 or 2 above, alerting the public to the likelihood of flooding based on the projected rainfall depths used in this chapter.

5. The Department shall review and identify any deficiencies in the information provided under (b)3 above during completeness review under N.J.A.C. 7:13-21.2.

(c)-(d) (No change.)

(e) An applicant, **other than a public transportation entity,** seeking to demonstrate that it is not feasible to construct the travel surface of a railroad, roadway**,** or parking area at least one foot above the flood hazard area design flood elevation, **or a public transportation entity seeking to demonstrate that it is not feasible to construct the travel surface of a parking area at least one foot above the flood hazard area design flood elevation,** as is required for various activities in this section, shall**:**

1.-4. (No change.)

(f) (No change.)

APPENDIX 1

APPROXIMATING THE FLOOD HAZARD AREA DESIGN FLOOD ELEVATION

As described in detail at N.J.A.C. 7:13-3, the Department and FEMA have adopted flood mapping along many of the State's waters. In absence of a Department delineation[1], or FEMA flood mapping that meets the requirements of N.J.A.C. 7:13-3.4(b), an applicant may use the approximation method described at N.J.A.C. 7:13-3.5 in conjunction with this appendix.

Note that this method approximates only the flood hazard area design flood elevation. This method does not approximate the floodway limit. Many activities are restricted within floodways and some calculations cannot be performed if the floodway limit is unknown. Therefore, the Department shall issue an individual permit for a regulated activity within an

approximated flood hazard area only if the regulated activity meets the requirements at N.J.A.C. 7:13-3.5(f).

HOW TO USE METHOD 5 (APPROXIMATION METHOD)

1. Determine which Watershed Management Area (WMA) the project is located within based on Figure 5 below. The Department can help in this determination at the applicant's request.[2]

2. Determine the contributory drainage area (CDA) of the water in question. USGS provides topographical mapping that can be used to make this determination. The Department can also help in this determination at the applicant's request.

3. Find the approximate depth of flooding from Table 1 below based on the WMA and CDA.

4. Find the low point elevation of each roadway crossing or other water control structure within 1 mile downstream of the site.[3] Figure 1 illustrates a typical roadway profile with a low point.

5. The approximate flood hazard area design flood elevation will be the higher of the following (see Figures 1 through 4):

- **The depth from Table 1, measured above the average streambed.[4]**
- **The depth from Table 2, measured above the highest roadway low point described in 4 above.**

NOTES

1. See Appendix 2 for a complete list of delineations and N.J.A.C. 7:13-3.3 for more detail.

2. If a project spans more than one WMA, the approximate flood hazard area shall be determined separately within each WMA.

3. Some roadway or railroad crossings over very large bridges need not be included if the Department determines that such crossings will not affect flooding on the site. Contact the Department for further information.

4. The average streambed is the general "smooth" grade of the bottom of the channel, and does not include small pockets of erosion, individual boulders or other minor irregularities. The average streambed always has a positive slope toward downstream.

WMA[1] ↓	CONTRIBUTORY DRAINAGE AREA[2] Shaded box indicates area in acres. Unshaded box indicates area in square miles. FOR DRAINAGE AREAS UP TO → THE FLOOD DEPTH IS SHOWN ↓														
1		80	195	495	1.9	4.8	12.1	30.0							
2		80	195	495	1.9	4.8	12.1	30.0							
3			80	150	290	550	1.7	3.2	6.1	11.8	22.6	30.0			
4		70	130	235	430	1.2	2.3	4.1	7.6	13.9	25.4	30.0			
5		95	255	1.0	2.8	7.3	19.2	30.0							
6				85	280	1.4	4.7	15.3	30.0						
7							115	245	510	1.7	3.5	7.4	15.6	30.0	
8			60	115	210	395	1.2	2.2	4.0	7.5	14.1	26.3	30.0		
9		80	130	200	310	485	1.2	1.8	2.9	4.5	7.0	11	17.1	26.7	30.0
10	70	110	165	255	390	605	1.5	2.2	3.4	5.3	8.2	12.6	19.4	30.0	
11		80	145	265	490	1.4	2.6	4.8	8.8	16.1	30.0				
12				115	280	1.1	2.6	6.2	15.0	30.0					
13		85	210	530	2.1	5.1	12.7	30.0							
14		85	210	530	2.1	5.1	12.7	30.0							
15		85	210	530	2.1	5.1	12.7	30.0							
16		85	210	530	2.1	5.1	12.7	30.0							
17		85	210	530	2.1	5.1	12.7	30.0							
18	75	125	205	350	590	1.6	2.6	4.4	7.5	12.6	21.3	30.0			
19	60	115	225	440	1.3	2.6	5.1	9.9	19.2	30.0					
20	60	115	225	440	1.3	2.6	5.1	9.9	19.2	30.0					
DEPTH[3] (feet) →	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**

EXAMPLE

TABLE 1

APPROXIMATE FLOOD DEPTHS ABOVE AVERAGE STREAMBED ELEVATION

(SEE N.J.A.C. 7:13-3.5)

EXAMPLE: Going from left to right in any row, each number represents the upper drainage area limit for the flood depth shown at the bottom of the column. For example, in the row for WMA 10, a water with a drainage area of 70 acres or less has a flood depth of 6 feet. Similarly, any water draining between 70 and 110 acres has a flood depth of 7 feet. In the example illustrated with arrows above, any water with a drainage area of between 19.4 and 30.0 square miles in WMA 10 has a flood depth of 19 feet.

NOTES

1. The numbers in this column denote the Watershed Management Areas shown in Figure 5.

2. Flood depths shall be measured above the average streambed elevation as described elsewhere in this Appendix and as shown in Figure 3 below.

TABLE 2: DEPTH OF FLOOD OVER ROADWAY

FOR A CONTRIBUTORY DRAINAGE AREA OF NO MORE THAN:	200 ACRES	1 MI^2	3 MI^2	10 MI^2	30 MI^2
THE DEPTH OF FLOODING OVER THE LOW POINT OF THE ROADWAY IS:	2.0 FEET	2.5 FEET	3.0 FEET	3.5 FEET	4.0 FEET

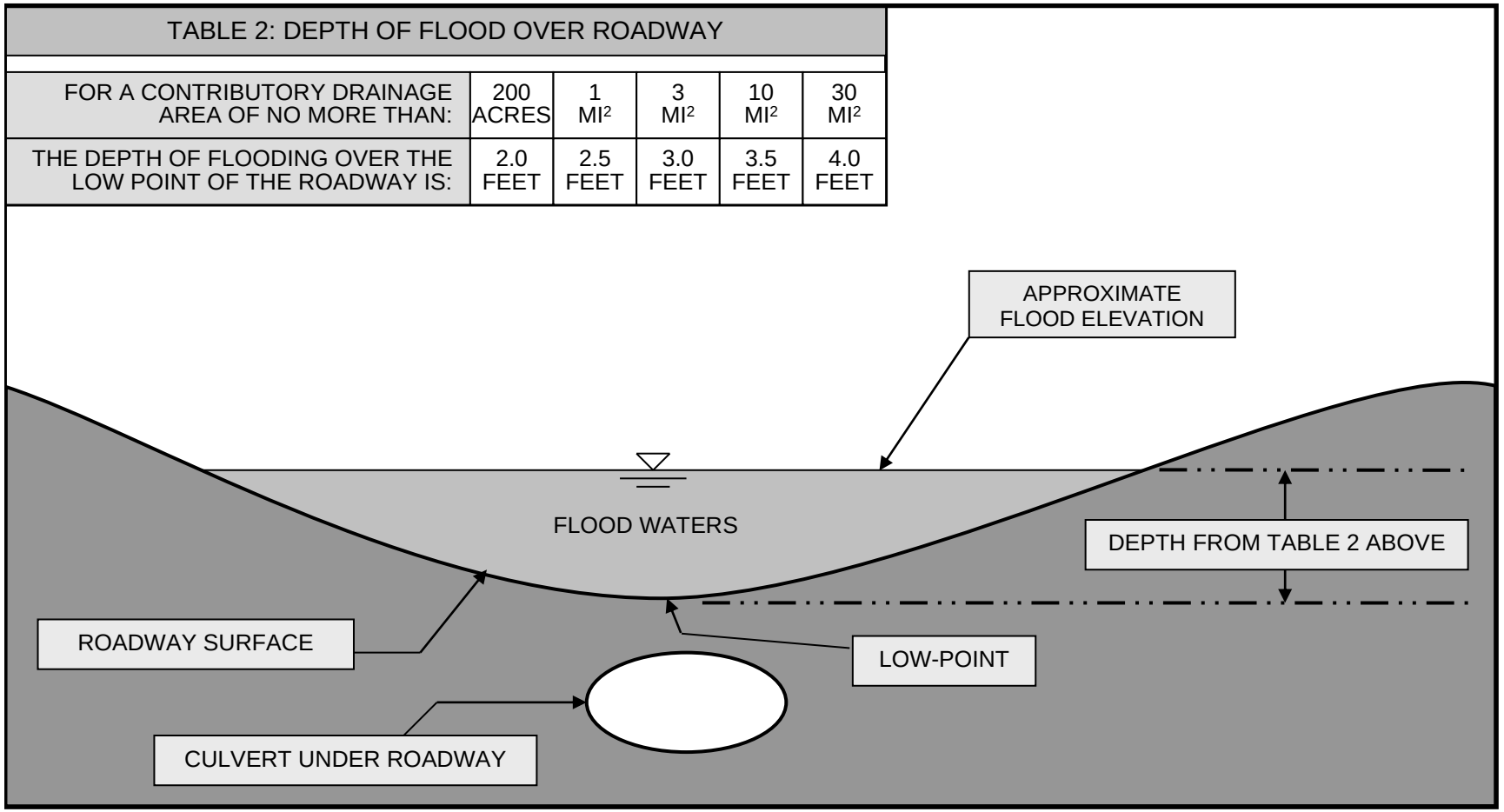


FIGURE 1
PROFILE OF A ROADWAY OVERTOPPED BY FLOOD WATERS
NOT DRAWN TO SCALE

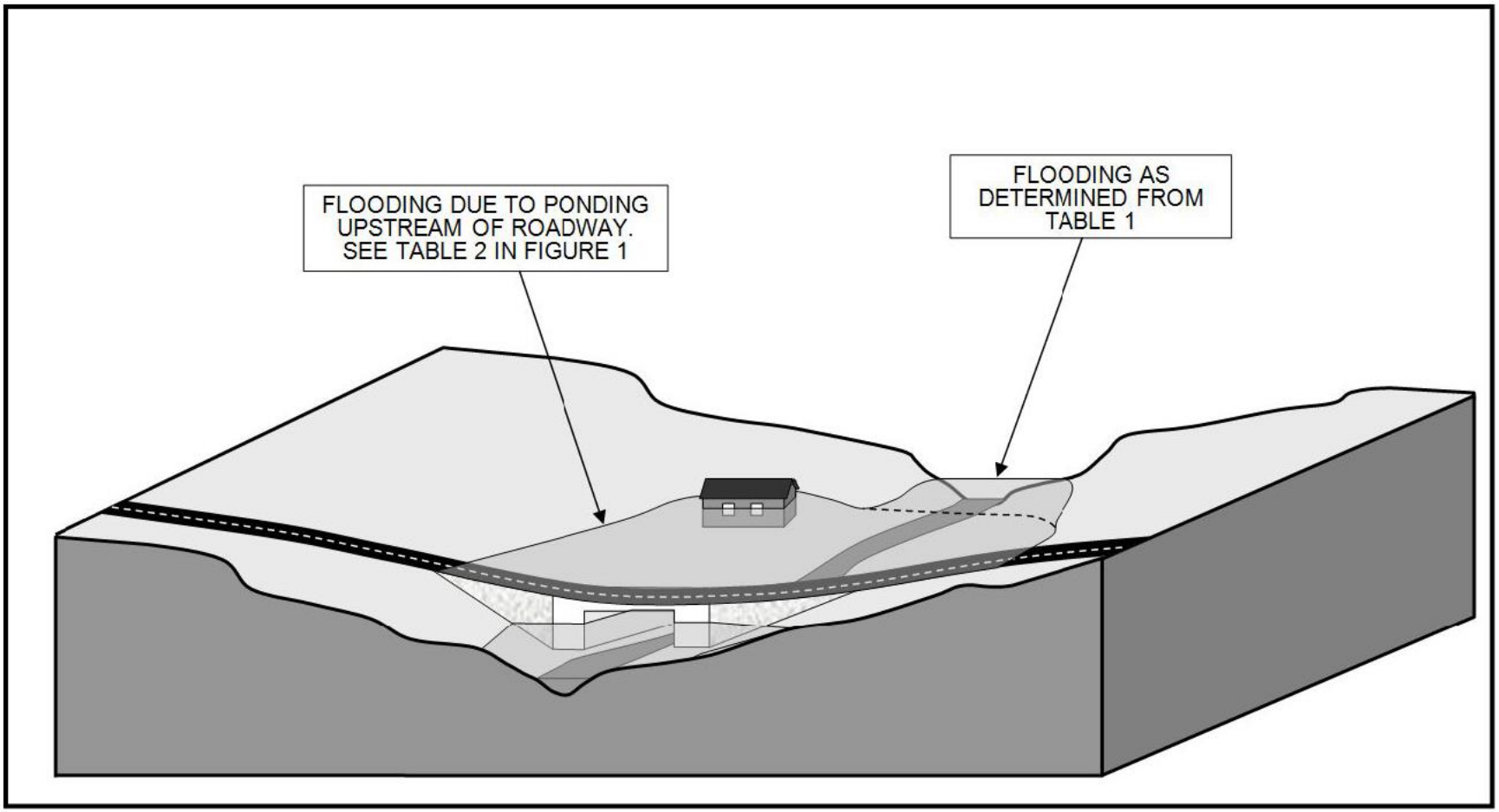


FIGURE 2
THREE-DIMENSIONAL VIEW OF APPROXIMATE FLOOD HAZARD AREA
NOT DRAWN TO SCALE

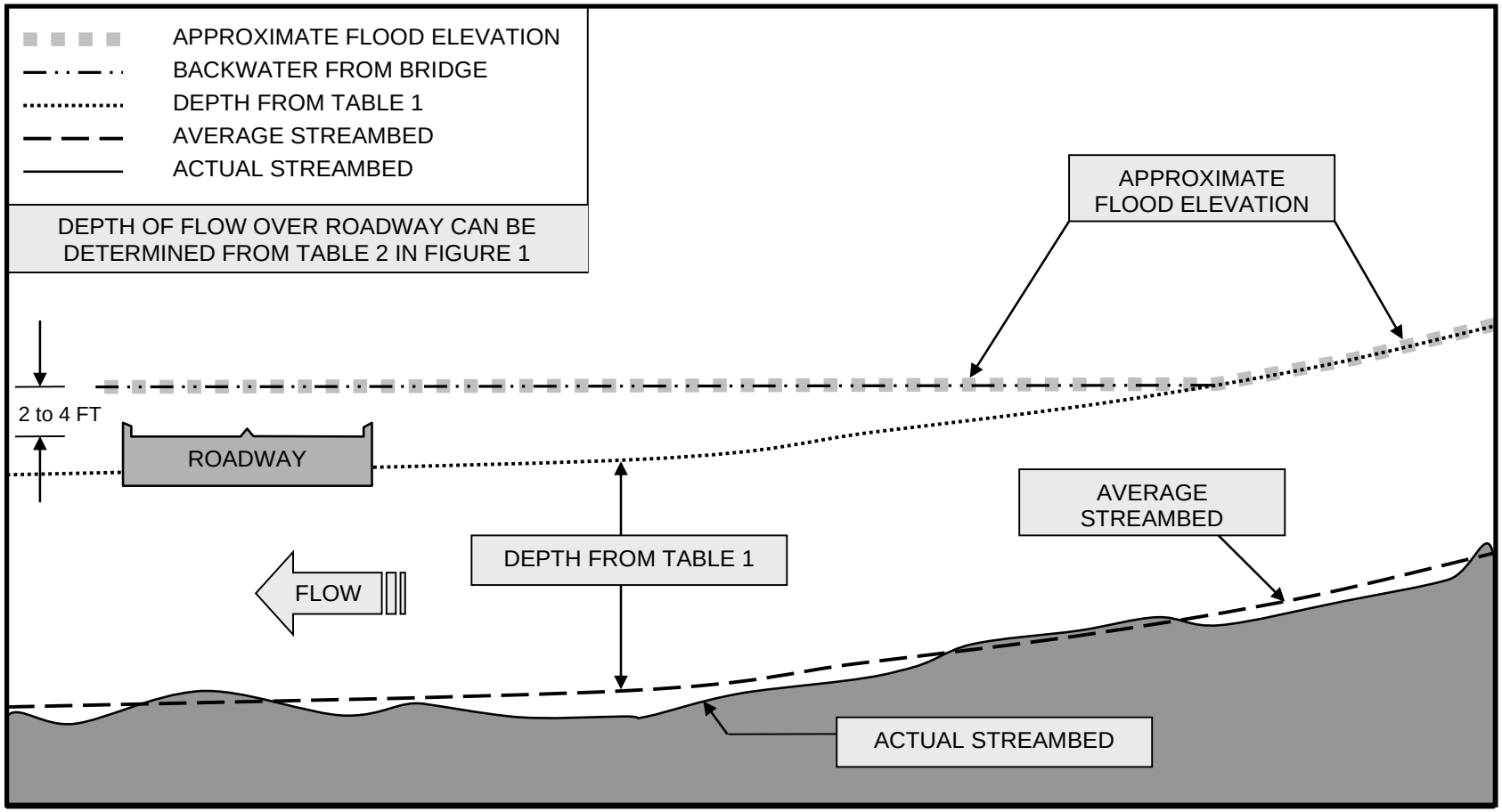


FIGURE 3
PROFILE OF A TYPICAL CHANNEL WITH AN APPROXIMATE FLOOD HAZARD AREA
NOT DRAWN TO SCALE

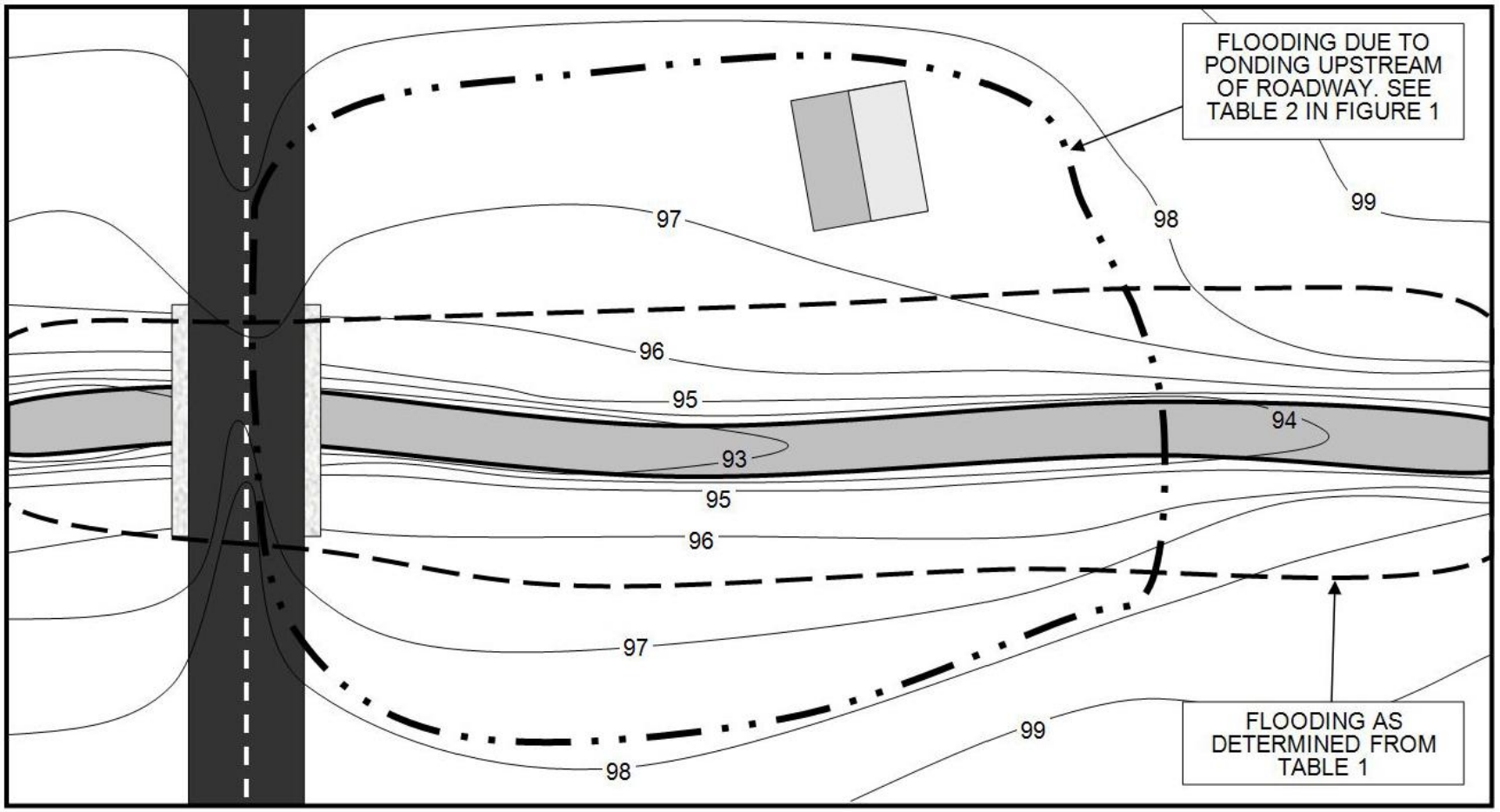
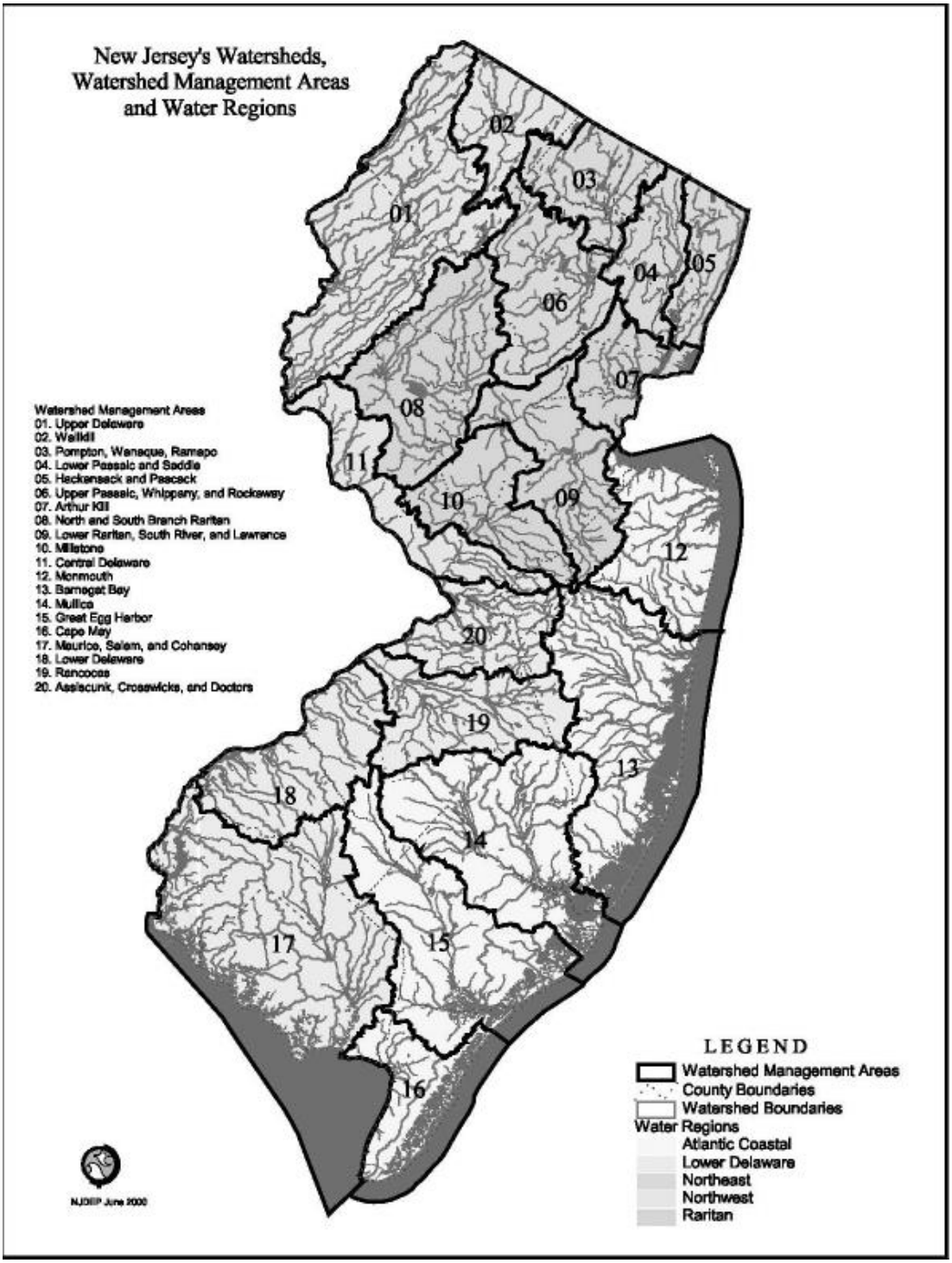


FIGURE 4
PLAN VIEW OF AN APPROXIMATE FLOOD HAZARD AREA
NOT DRAWN TO SCALE



NEW JERSEY'S WATERSHEDS, WATERSHED MANAGEMENT AREAS AND WATER REGION