

NEW JERSEY'S REGULATORY RESPONSE TO A CHANGING CLIMATE

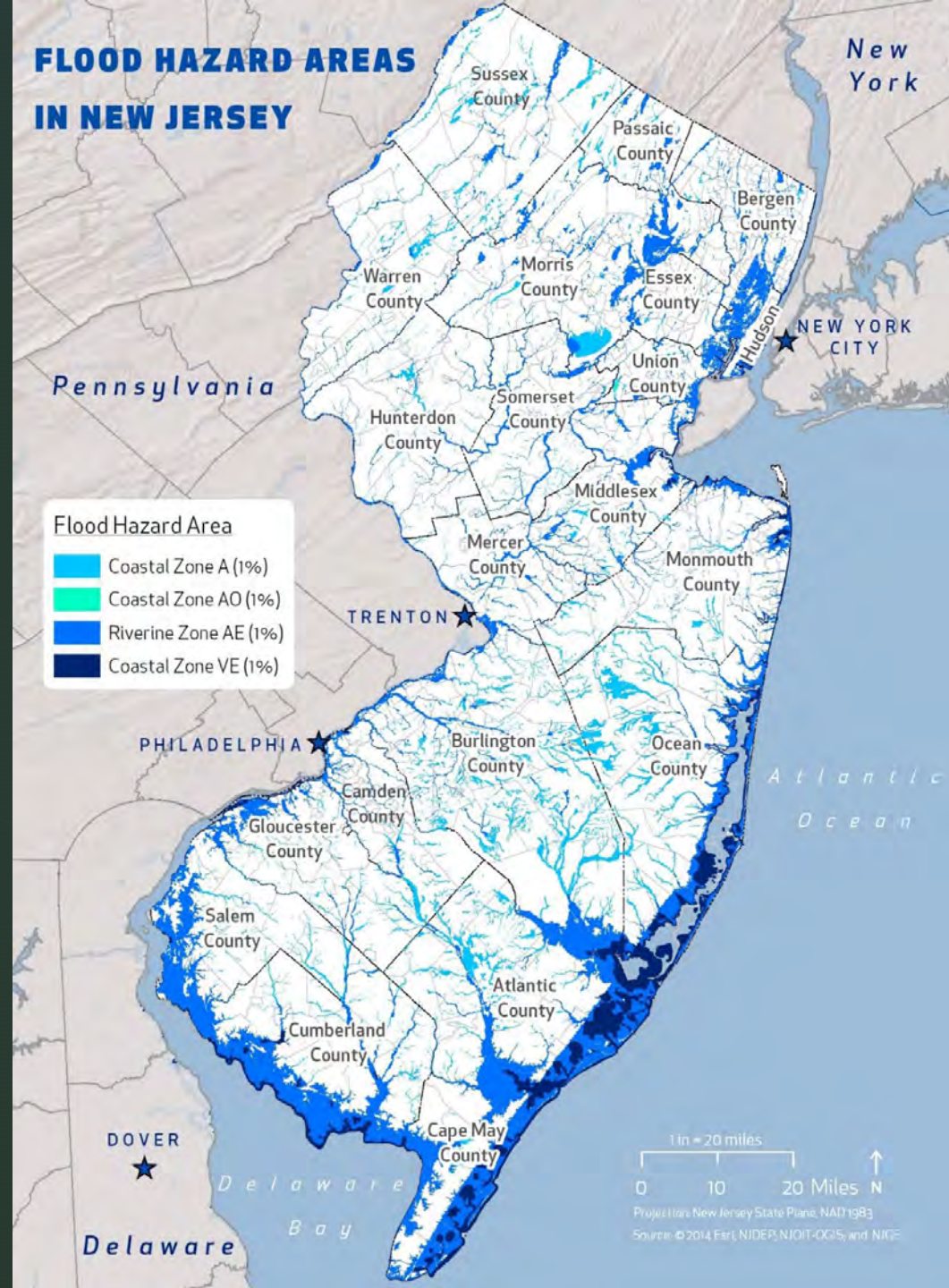
NJPACT: Protecting Against Climate Threats
15 September 2023

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NJ Department of Environmental Protection



FLOOD RISK ASSESSMENT

- New Jersey's colonial settlements were along navigable waterways.
- As a result, many of the State's population centers are located within flood hazard areas today.
- Older development was often built without regard for potential flood risk.



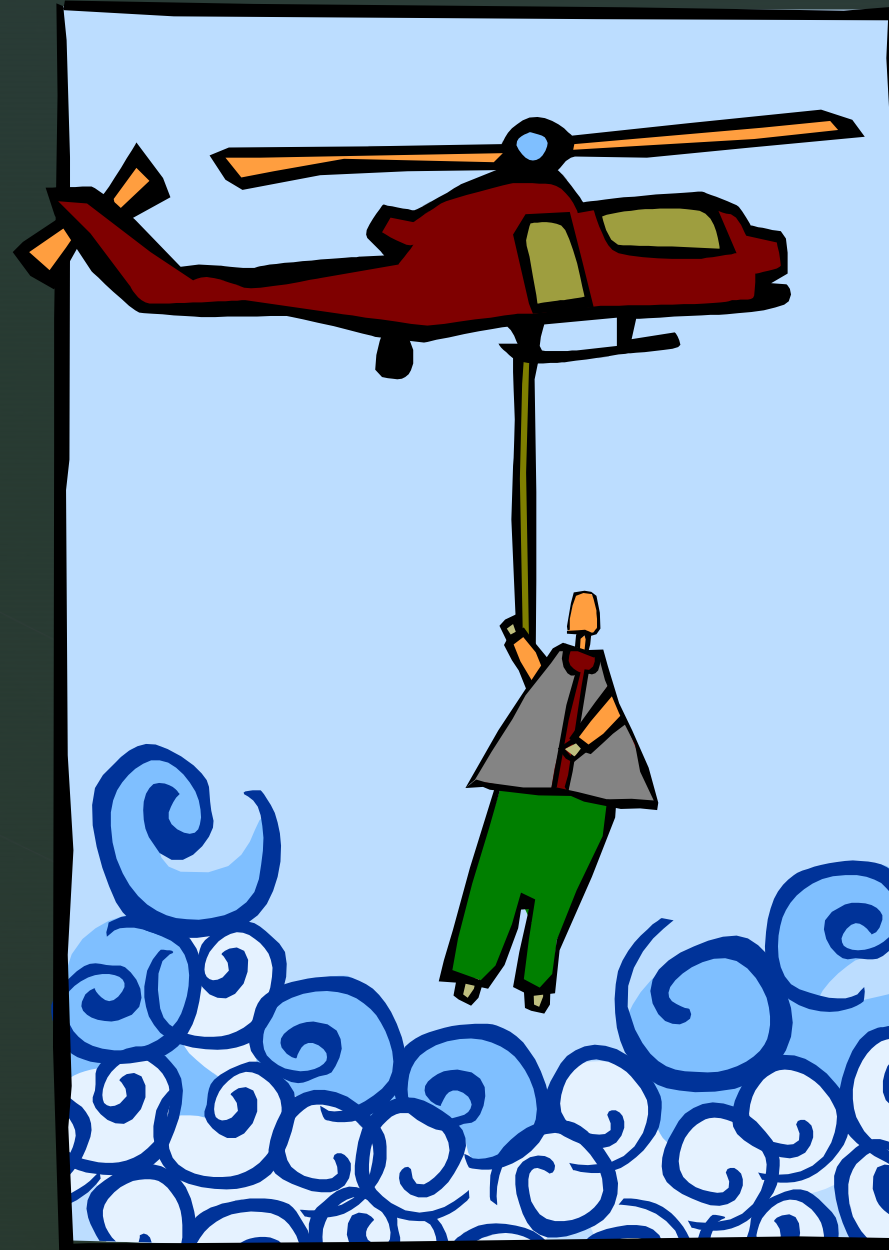
FLOOD RISK ASSESSMENT

- Flood risk is generally measured by what has happened in the past.
- Based on data collected over the past 50+ years, as shown on FEMA flood insurance rate maps.
- Not an accurate predictor of today's flood risk.
- Not a sound methodology for predicting flood risk due to climate change.



FLOOD RISK ASSESSMENT

- People need to be aware of flood risks when buying, renting, occupying or developing property.
- Mapping is a good starting point to assess risk but flooding often exceeds mapped floodplain limits.
- Floods don't stop at a line on a map.



SNAPSHOT OF NJ

- Population 9.267 million (2021)
- Most densely populated state in the nation
- Approximately 16% of NJ lies within a flood hazard area
- According to 2019 State Hazard Mitigation Plan, NJ has:
 - \$241 billion of general building stock exposure to the 1% annual chance flood
 - Roughly 3 million properties not covered by an NFIP policy
 - 16,809 repetitive loss properties (73% are single family homes)
 - 1,238 severe repetitive loss properties (83% are single family homes)
 - 1,707 critical facilities and infrastructure located in the 1% flood hazard area
- \$15.3 billion in obligations under post-disaster grants (1990-2021)
- Highest foreclosure rate in the nation, with one in every 605 properties in some stage of foreclosure (Experian, 2018)

“Flooding is NJ’s #1 Natural Hazard” (FEMA, August 4, 2004)



STATEWIDE FLOODPLAIN MANAGEMENT

- Longstanding statewide program dating back to 1929
- NJ design flood in fluvial areas is calculated as 125% of the 1% peak discharge and is always at least one foot above FEMA's 1% elevation
- One foot of freeboard required above design flood elevation for buildings and roads
- Statewide 0% flood storage displacement standard
- Critical buildings and multi-residence buildings in fluvial areas must have "dry access" during flood events
- Progressive statewide stormwater management policies
- Progressive stream corridor protection standards

Despite the above, flood damage in NJ continues to increase.

▶ SOCIOECONOMIC IMPLICATIONS

- Most densely populated state
- + Chronic flooding issues
- + 16% of state lies in a flood hazard area
- + Enormous development pressure
- + Development can increase flooding
- + Climate change
- = **Unsustainable Condition**

Executive and Administrative Orders

EO 100 signed by Governor Murphy

AO 2020-01 signed by Commissioner McCabe

- Directed NJDEP to integrate climate change considerations, including sea level rise and chronic flooding into its regulatory and permitting programs





NEW JERSEY'S INCREASING TEMPERATURES & PRECIPITATION

- ▶ Higher temperatures increase the energy in the atmosphere, which increases the potential for more intense storm events
- ▶ By the end of the 21st century, heavy storm events are projected to occur 200 to 500% more often and with more intensity than in the 20th century
- ▶ Major flood events hit New Jersey in 2000, 2004, 2005, 2006, 2007, 2010, 2011, 2012, 2016, and 2021

▶ INTENSIFYING RAINFALL & FLOODING IN NEW JERSEY

- The data presently used to analyze flood potential in waterways and in the design of stormwater infrastructure is outdated and includes data only through 1999.
- The precipitation expectations that presently guide state policy, planning and development criteria do not accurately reflect current precipitation intensity conditions.

November 2021: NJDEP and the Northeast Regional Climate Center, a National Oceanic and Atmospheric Administration (NOAA) partner, released studies showing past and projected increases in precipitation

CURRENT PRECIPITATION

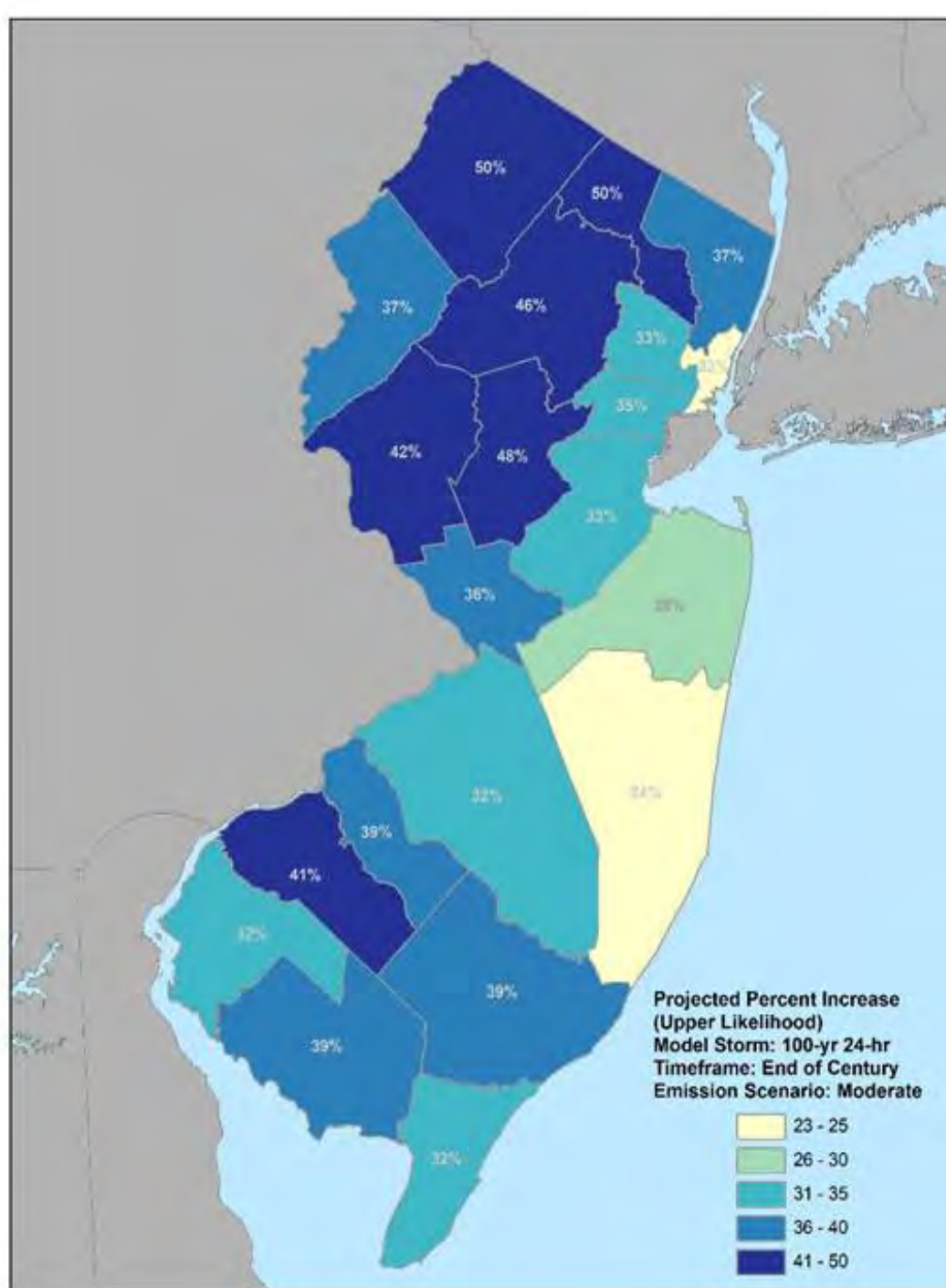
Since 1999:

- The 2-year storm has increased as much as 5%
- The 10-year storm has increased as much as 7%
- The 100-year storm has increased as much as 15%

FUTURE PRECIPITATION

Over the coming decades:

- The 2-year storm is likely to increase by as much as 24%
- The 10-year storm likely to increase as much as 27%
- The 100-year storm likely to increase as much as 50%



More Rain =
More Stormwater
Runoff

More Runoff =
Increased Riverine
Flow

More Flow =
Higher Flood
Elevations

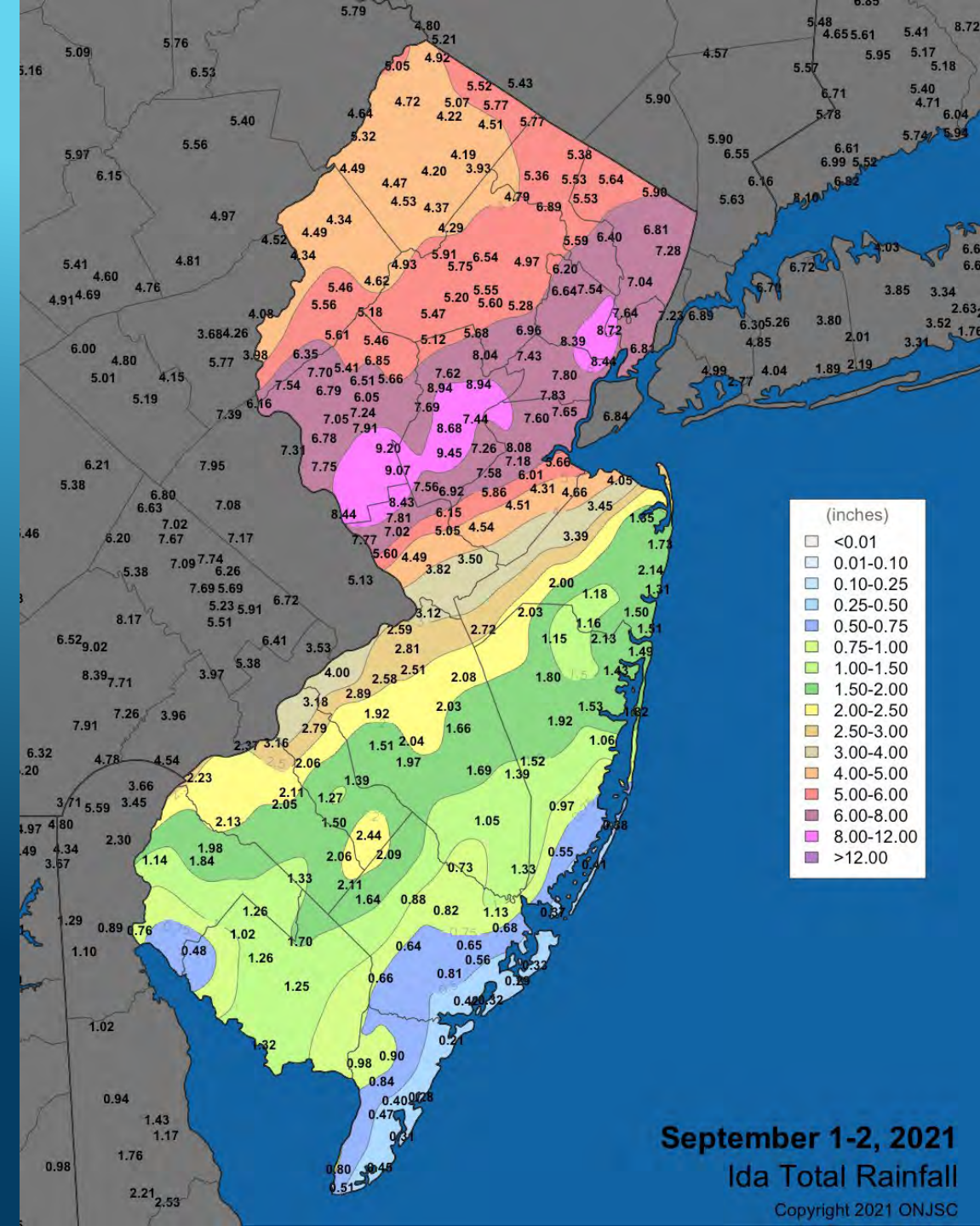
EFFECTS OF INCREASING PRECIPITATION

- Adds stress on already overtaxed infrastructure and overwhelms stormwater management systems
- Increased fluvial flood depths
- Increased risk to life and property



REMNANTS OF TROPICAL STORM IDA

- ▶ September 1, 2021
- ▶ Record rainfalls reported
 - ▶ State Climatologist: Newark experienced the highest one-hour rainfall total (3.65 inches) ever recorded there
 - ▶ National Weather Service documented over 10 inches of rainfall in parts of Hunterdon, Essex, Middlesex and Union Counties



IDA COMPARED WITH FLOOD HAZARD RULES: CASE STUDIES

Prior FHACA Rules set the design flood elevation (DFE) as the higher of:

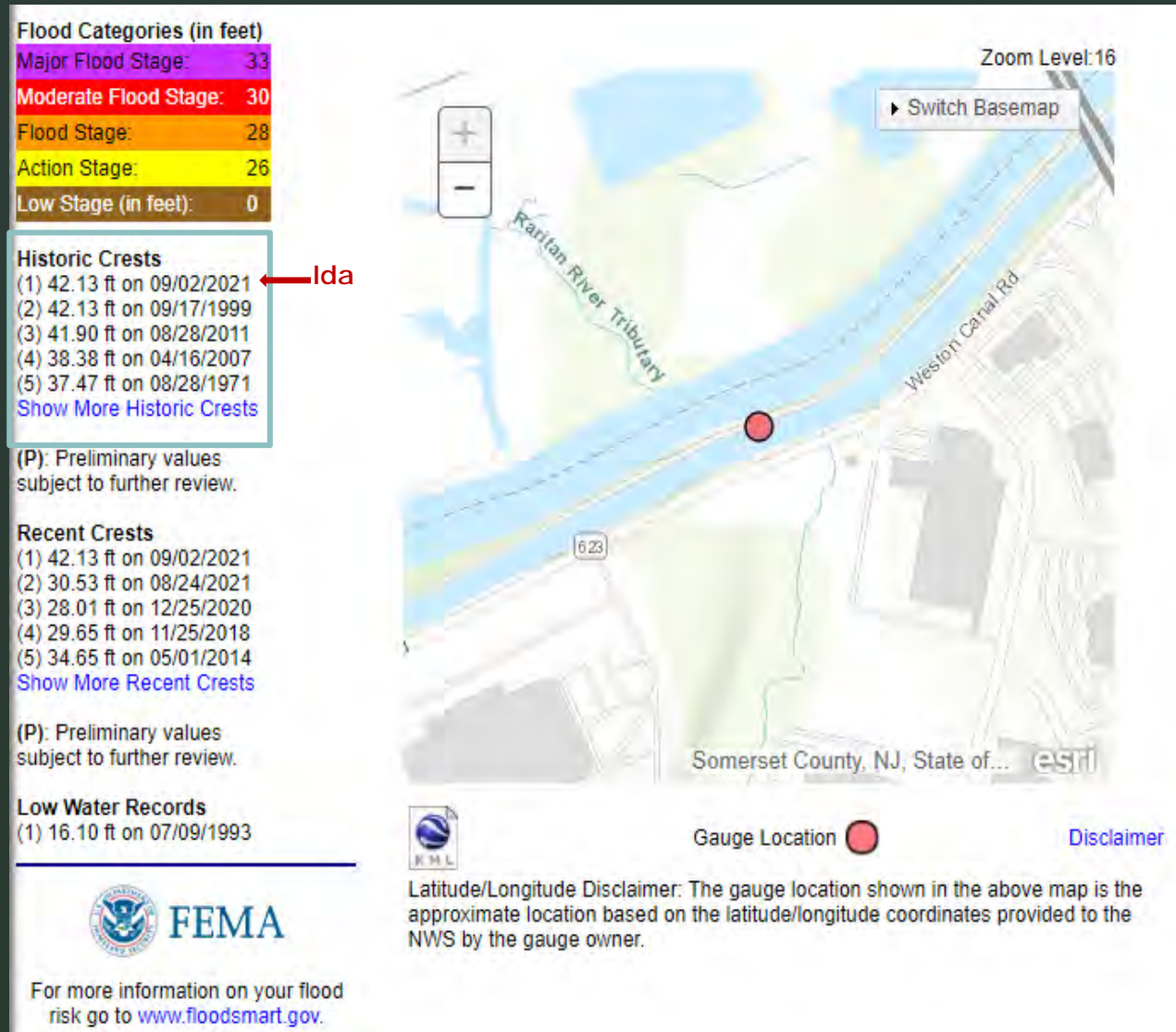
- Flood elevation mapped by NJDEP (where available)
- FEMA 100-year elevation plus 1 ft

Ida case studies show average elevations of 3.1 feet above FEMA's 100-year flood elevation.

- This is 2.1 ft higher than the prior DFE



RARITAN RIVER AT BOUND BROOK



- Flooding during Ida equaled 1999's Hurricane Floyd, which was the highest elevation ever recorded at Bound Brook.
- The 500-year flood elevation at this location has been exceeded **three times since 1999.**

MILLSTONE RIVER AT MANVILLE



BEFORE IDA

MILLSTONE RIVER AT MANVILLE



DURING IDA

MILLSTONE RIVER AT MANVILLE



FEMA FLOOD MAP



PRE-IDA



POST-IDA



INLAND FLOOD PROTECTION RULE

Adopted 7/17/23

Applies to:

- Stormwater Management rules, N.J.A.C. 7:8
- Flood Hazard Area Control Act rules, N.J.A.C. 7:13

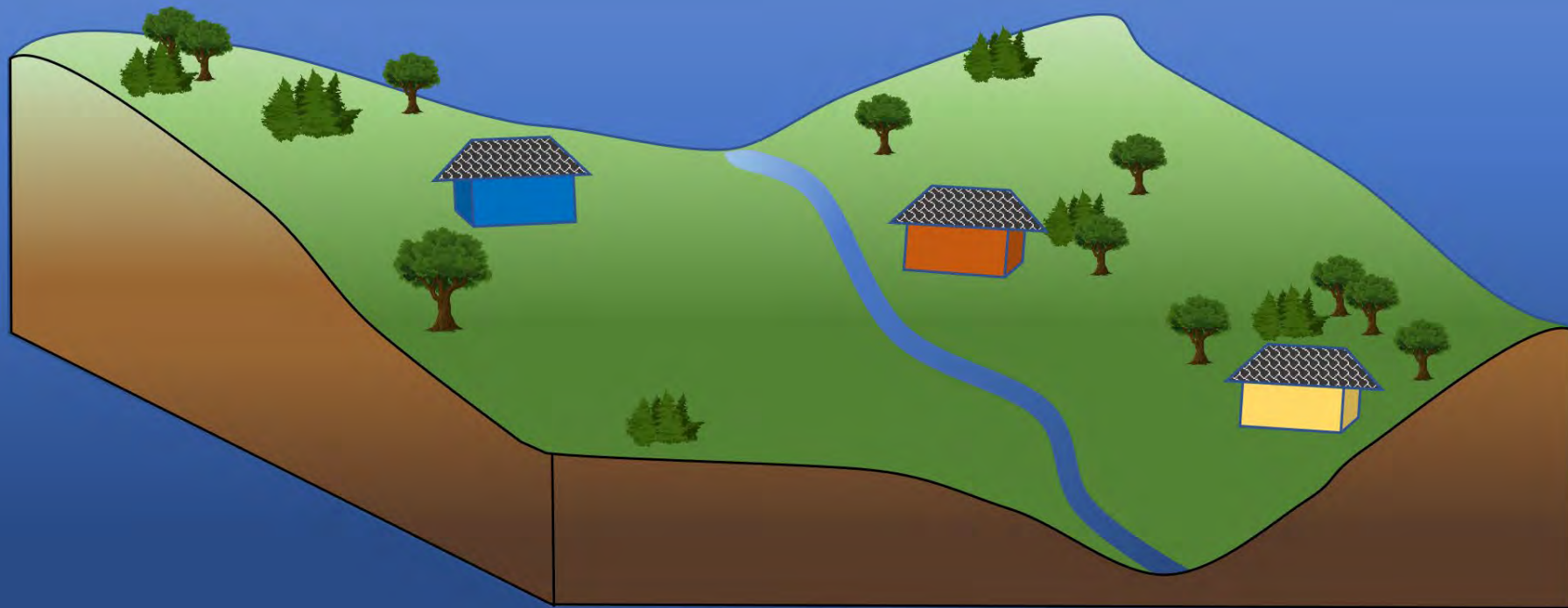
SWM Key Points:

- Requires stormwater systems to be designed to manage runoff for both today's storms and anticipated future storms.
- Prevents use of Rational and Modified Rational methods for stormwater calculations.

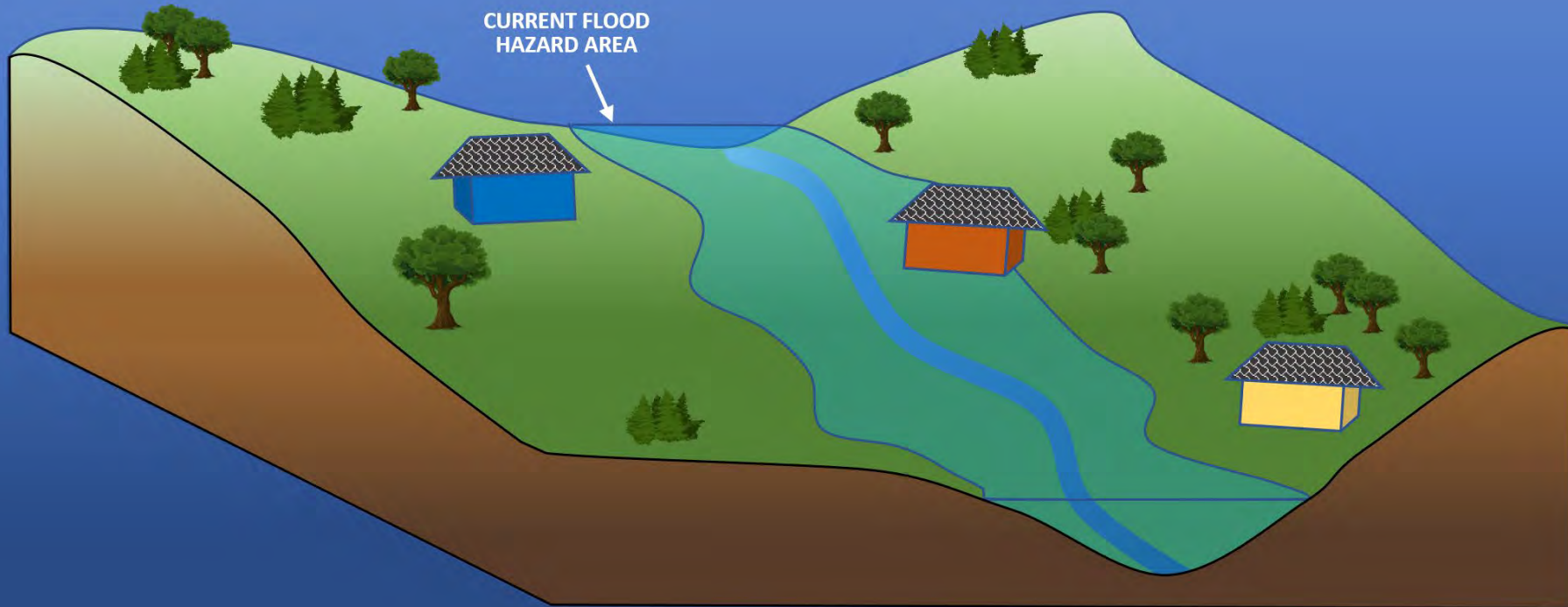
FHA Key Points:

- Raises fluvial design flood elevations by two feet when State/FEMA flood mapping is used.
- Requires use of future projected precipitation when calculating flood elevations.
- Ensures that permits and authorizations under the FHACA rules meet minimum NFIP standards.

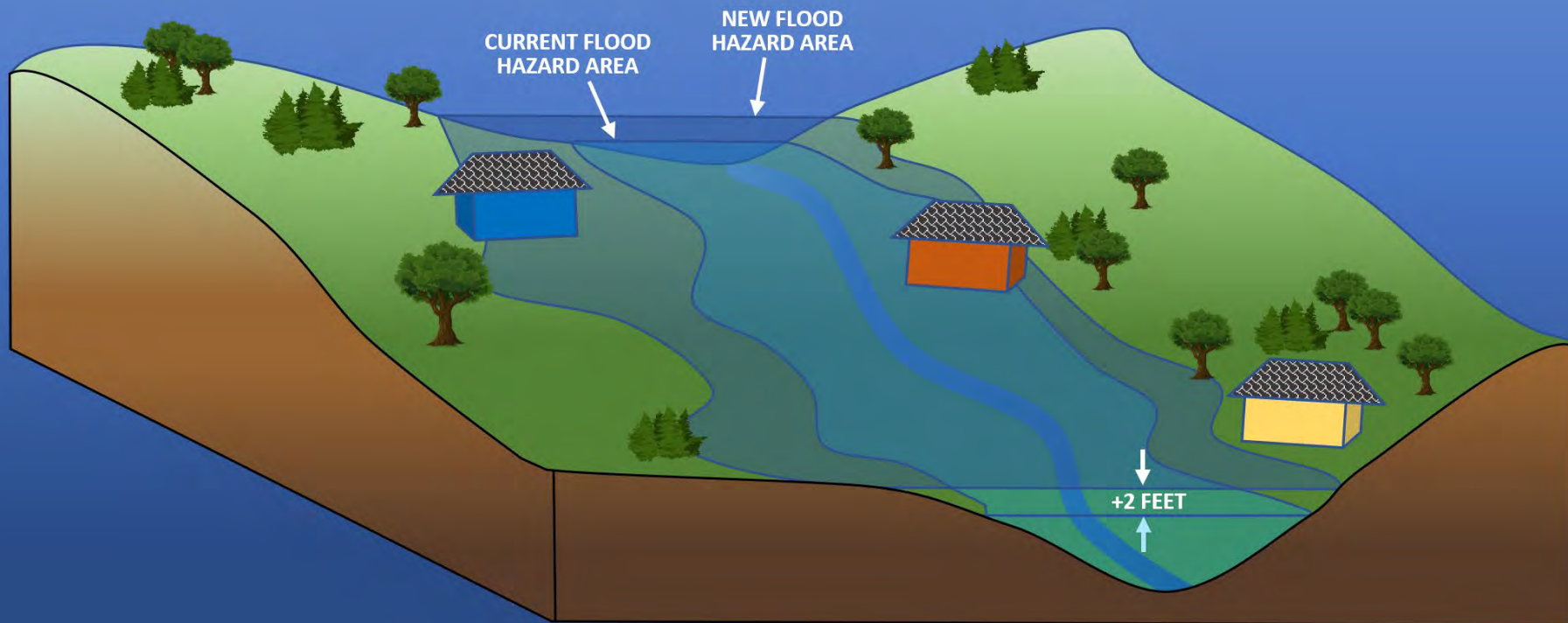
Effect of New Flood Hazard Area Area Design Flood Elevation



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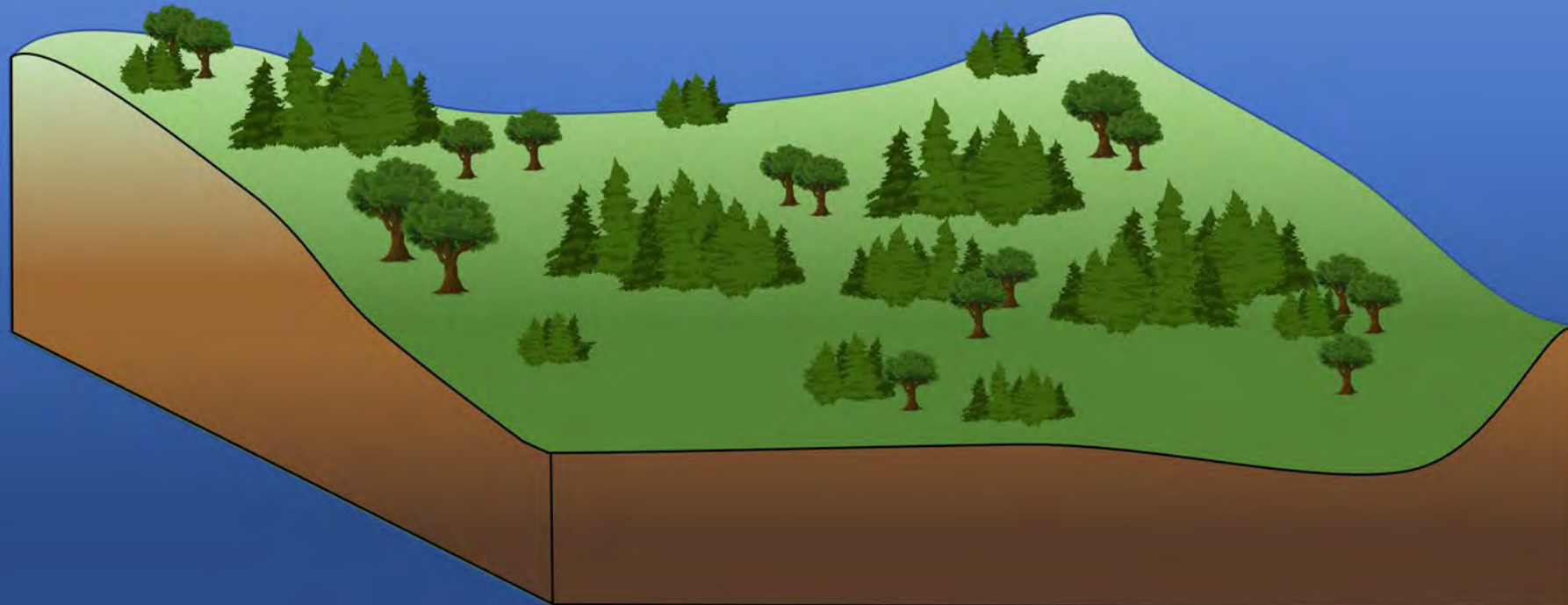
Effect of New Flood Hazard Area Design Flood Elevation



STORMWATER EXAMPLE:

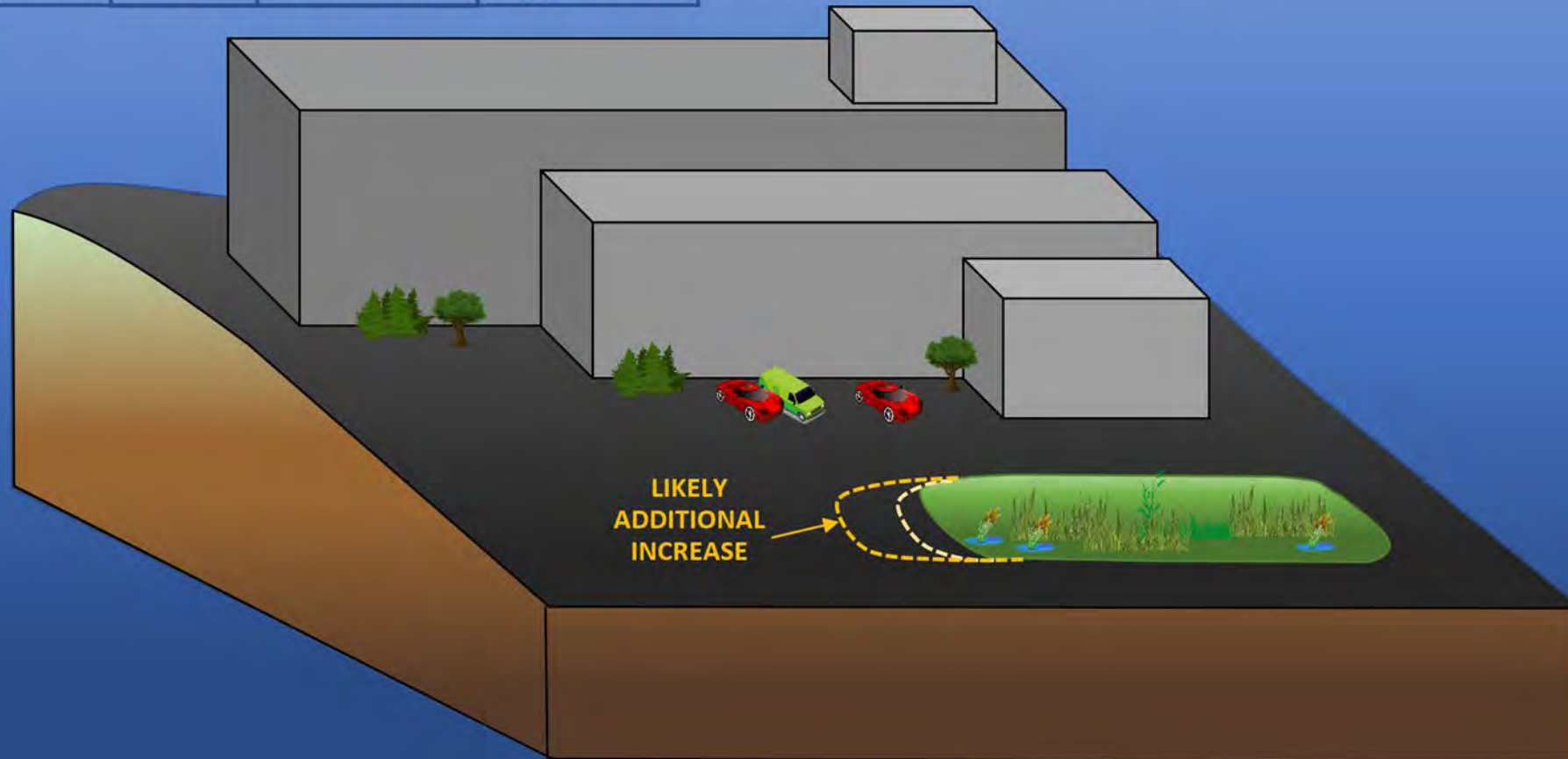
2.5 Acre Site

Existing Conditions: Forested and Undeveloped
Sussex County



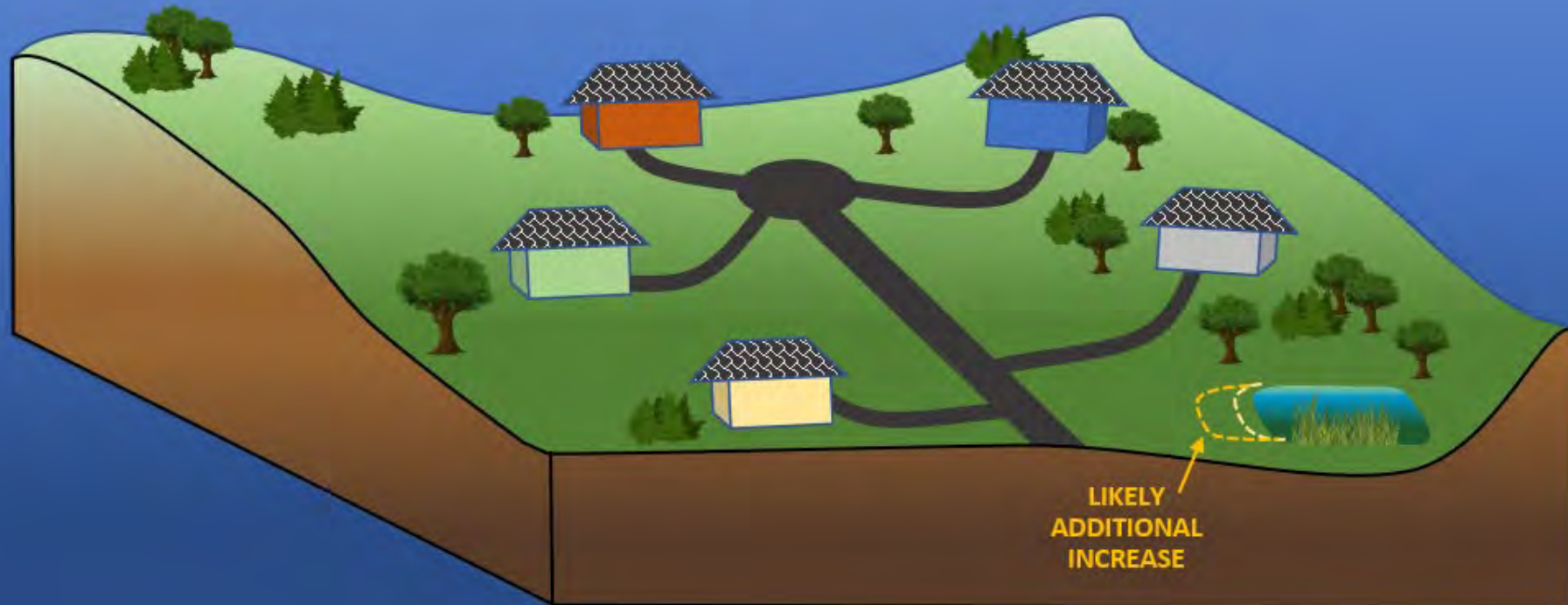
SIZE OF BMP (% OF SITE)

	Existing (1999 data)	New Current (2019 data)	New Future (2100 projection)
Soil A	11.0%	11.0% +0.0%	11.7% +0.7%
Soil B	8.8%	9.0% +0.2%	11.3% +2.5%
Soil C	8.6%	9.0% +0.4%	11.1% +2.4%
Soil D	11.2%	11.4% +0.2%	13.6% +2.4%



SIZE OF BMP (% OF SITE)

	Existing (1999 data)	New Current (2019 data)	New Future (2100 projection)
Soil A	4.1%	4.1% +0.0%	4.7% +0.6%
Soil B	3.9%	4.1% +0.2%	5.5% +1.6%
Soil C	4.3%	4.5% +0.2%	5.9% +1.6%
Soil D	5.9%	6.1% +0.3%	8.0% +2.1%



Stormwater Management Rules

Subchapter 5. Design and Performance Standards for Stormwater Management Measures: Two new tables at N.J.A.C. 7:8-5.7 for adjusting NOAA Atlas 14 precipitation for 2019 and 2100:

Table 5-5:
Current Precipitation Adjustment Factors

County	2-Year Design Storm	10-Year Design Storm	100-Year Design Storm
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

Use this to adjust 1999 rainfall to 2019

Table 5-6:
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

Use this to adjust 1999 rainfall to 2100

Flood Hazard Area Control Act rules

Subchapter 3: Determining the Flood Hazard Area and Floodway

Method 1: Department delineation

- New design flood elevation is 2 feet above NJFHADFE shown on Department delineation

Method 2: FEMA tidal method

- Unchanged – will be addressed in upcoming NJPACT proposal

Method 3: FEMA fluvial method

- New design flood elevation is 3 feet above FEMA 1% flood elevation



Flood Hazard Area Control Act rules

Subchapter 3: Determining the Flood Hazard Area and Floodway



Method 4: FEMA hydraulic method

- Use 125% of FEMA's 1% peak flow rate to calculate flood elevation
- New design flood elevation is 2 feet above the calculated elevation

Method 5: Approximation method

- Flood elevations in the table and for overtopped roadways were increased by 1 foot

Method 6: Calculation method

- Use adjustment factors listed at new Table 3.6B to determine 1% peak flow rate using 2100 precipitation, and increase by 125%
- Same multipliers used in SWM rules

Flood Hazard Area Control Act rules

Subchapter 3: Determining the Flood Hazard Area and Floodway

Note: Obtaining a flood hazard area verification or applicability determination prior to rulemaking does not exempt a new project from the new standards.

- Verifications and APDs are a snapshot in time of our jurisdiction.
- Just like freshwater wetlands LOIs, site conditions can change over time.



Flood Hazard Area Control Act rules

Section 6.7: Conditions Applicable to a Permit-by-Rule or to an Authorization Pursuant to a General Permit-by-Certification or a General Permit

Section 10.1: Requirement to Obtain an Individual Permit

- Most standards in FHACA rules far exceed federal minimums.
- New standard ensure that activities authorized under the FHACA rules do not fall below minimum federal requirements under the NFIP.



RESILIENT ENVIRONMENT AND LANDSCAPES (REAL)

Primary Elements

1. **Adjust Coastal Flood Hazard Areas** to account for rising sea levels and attendant storm surge, extending jurisdictional area further inland, requiring higher first-floor elevations or floodproofing.
2. **Remedy FEMA's concerns** about State's consistency with National Flood Insurance Program (NFIP) through clarifying amendments to the FHA rules.
3. **Support renewable energy** through amendments that balance habitat conservation with novel infrastructure demands (e.g., location of offshore wind support infrastructure).
4. **Encourage nature-based solutions;** sound stormwater management practices; improved water quality in degraded (urban) and source (headwaters) areas.
5. **Improve DEP permitting processes,** including pathways for expediting projects.



COASTAL INUNDATION & FLOOD DAMAGE

Rutgers University's Science and Technical Advisory Panel (STAP) Report indicates a 50% probability that sea level rise will exceed 3.3 feet and a 17% probability that sea level rise will exceed 5.1 feet by 2100 assuming moderate emissions.

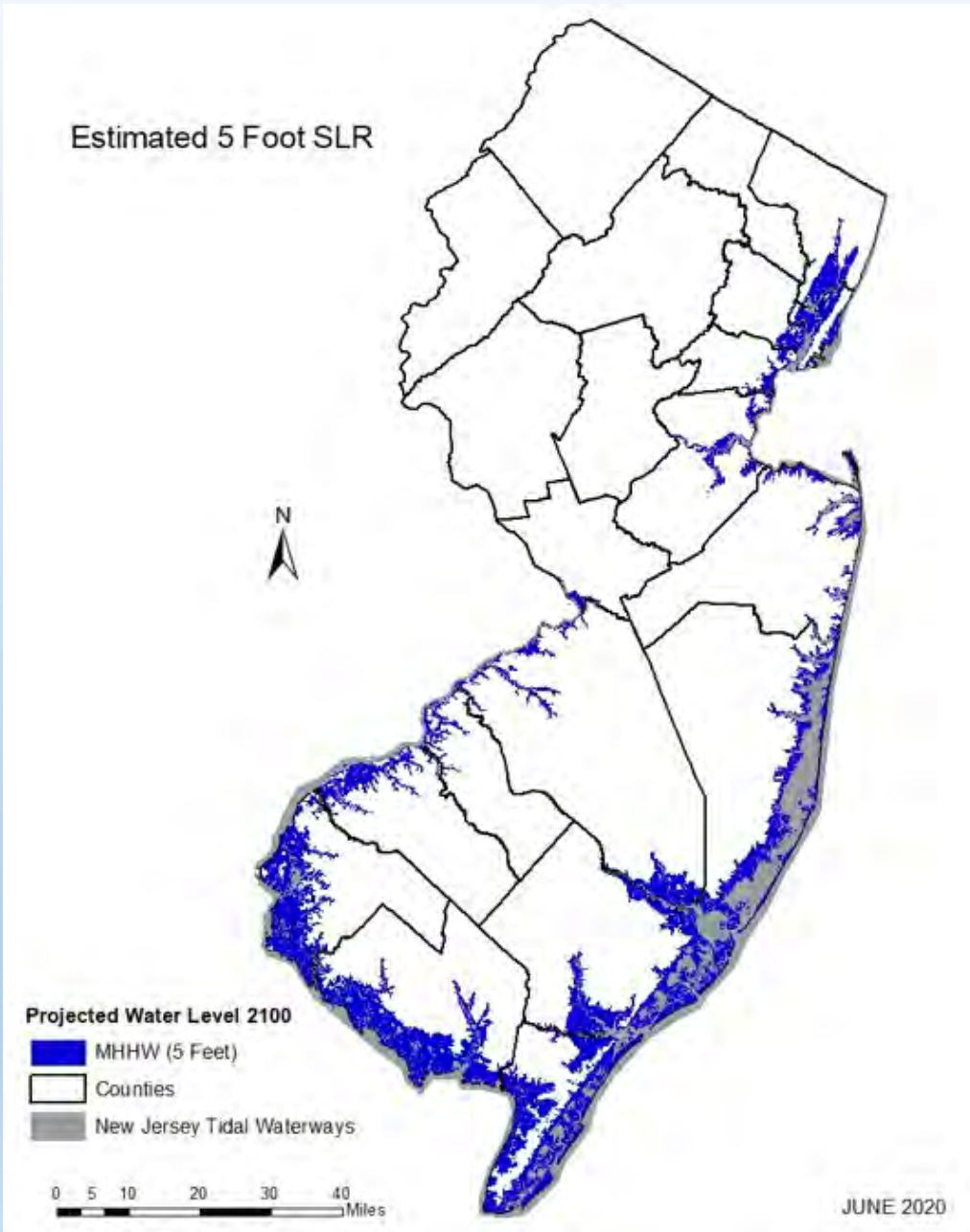
Sea-level rise:

Table ES-1: New Jersey Sea-Level Rise above the year 2000 (1991-2009 average) baseline (ft)*

		2030	2050	2070			2100			2150		
				Emissions								
Chance SLR Exceeds				Low	Mod.	High	Low	Mod.	High	Low	Mod.	High
Low End	> 95% chance	0.3	0.7	0.9	1	1.1	1.0	1.3	1.5	1.3	2.1	2.9
Likely Range	> 83% chance	0.5	0.9	1.3	1.4	1.5	1.7	2.0	2.3	2.4	3.1	3.8
	~50 % chance	0.8	1.4	1.9	2.2	2.4	2.8	3.3	3.9	4.2	5.2	6.2
	<17% chance	1.1	2.1	2.7	3.1	3.5	3.9	5.1	6.3	6.3	8.3	10.3
High End	< 5% chance	1.3	2.6	3.2	3.8	4.4	5.0	6.9	8.8	8.0	13.8	19.6

*2010 (2001-2019 average) Observed = 0.2 ft

FIX DATA GAPS TO PROTECT COASTAL INVESTMENTS



Sea Level Rise =
More land regularly or permanently inundated

More Inundation =
Higher flood elevations

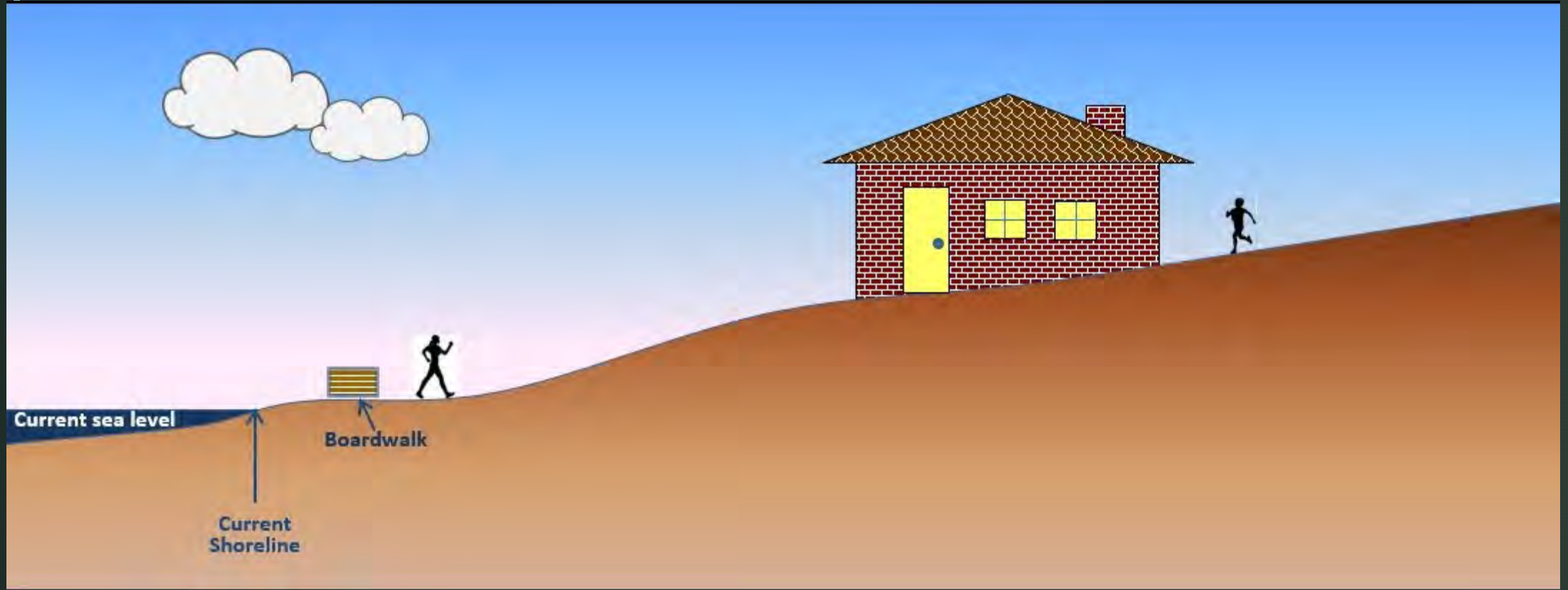
Higher Elevations =
More recurring flood damage

Existing standards are based on outdated historical trends that do not account for sea-level rise and attendant storm surge

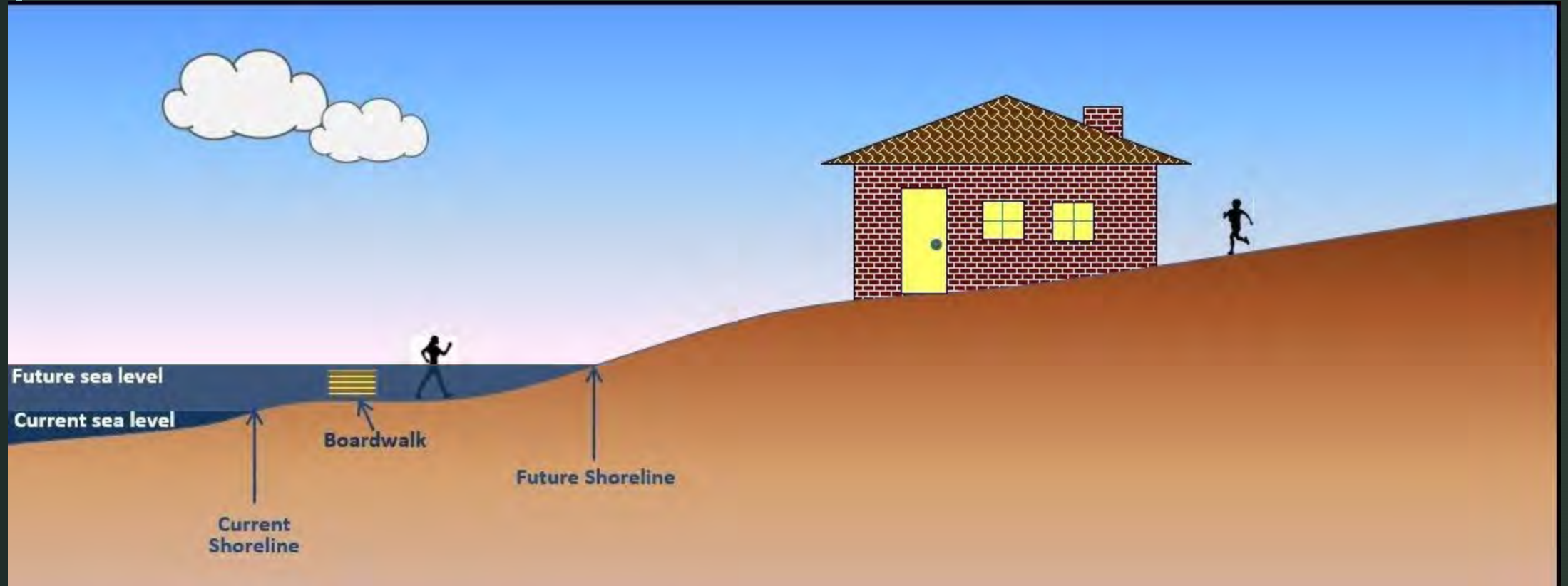
- NJ-specific science: 5.1 ft of sea-level rise by 2100
- Roads and buildings built today are likely to be serviceable in 2100

Reliance on incomplete and inaccurate data leads to inadequate risk assessment and substandard design criteria for buildings and infrastructure.

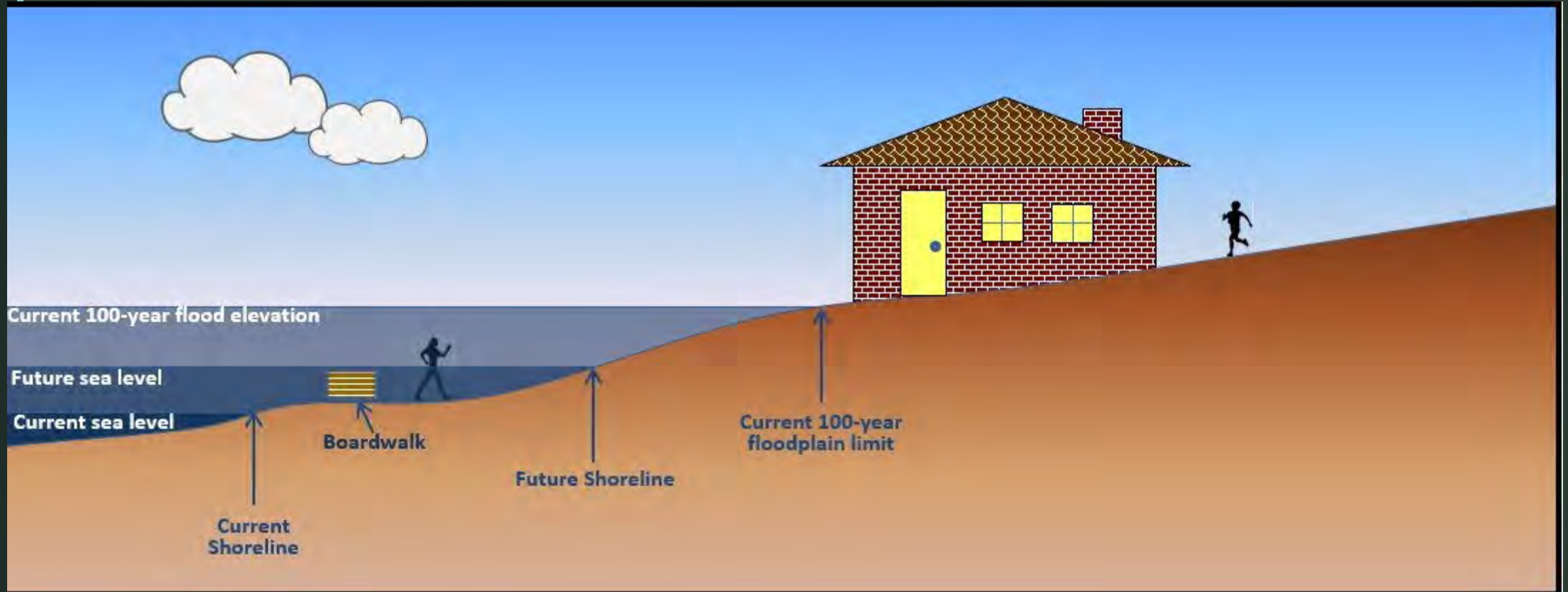
SEA LEVEL RISE & FLOODPLAINS



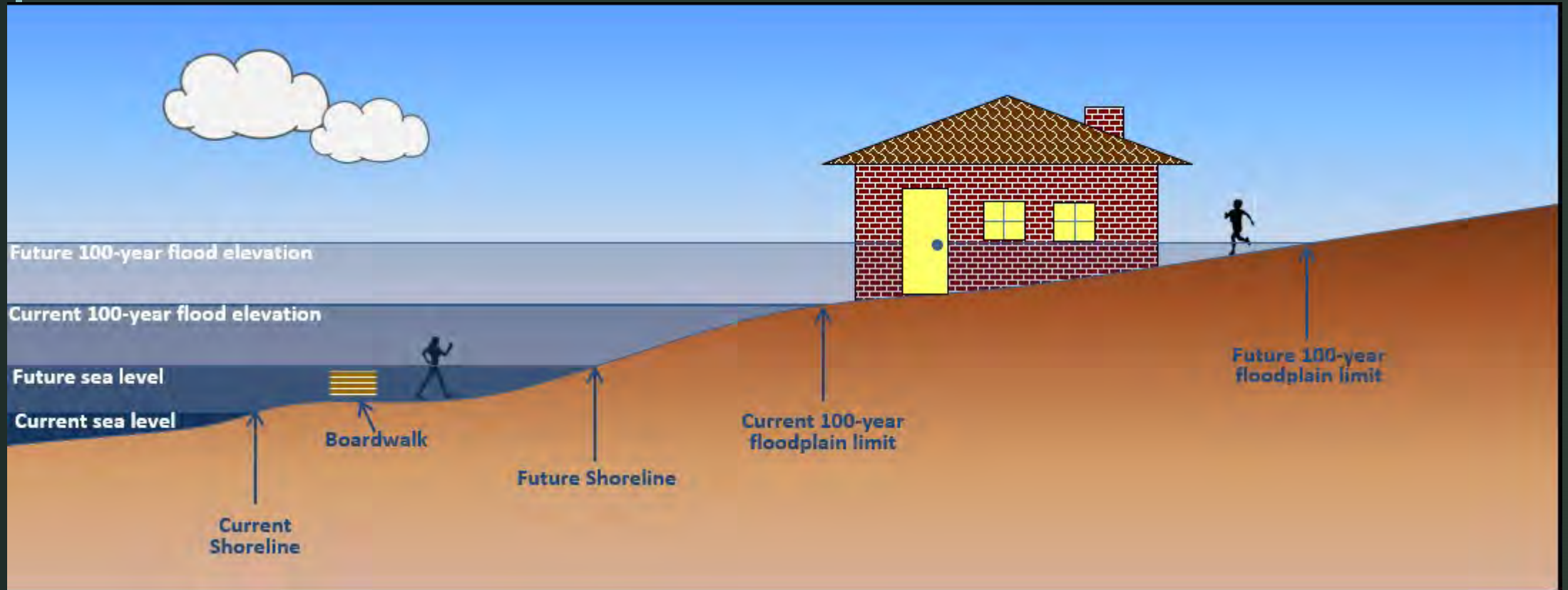
SEA LEVEL RISE & FLOODPLAINS



SEA LEVEL RISE & FLOODPLAINS



SEA LEVEL RISE & FLOODPLAINS



RESILIENT ENVIRONMENT AND LANDSCAPES (REAL)

Adjusting Coastal Flood Hazard Areas due to Sea-Level Rise and Storm Surge

Two fundamental updates to DEP Flood Hazard Area Rules and Coastal Zone Management Rules:

- **Standard:** Fixes sea-level rise (SLR) data gap, requiring higher first-floor elevations (residential/critical) or flood proofing (commercial) in a larger area than regulated today.
- **Process:** Updated risk disclosure in all flood hazard areas. Require an “inundation risk assessment” for residential and critical buildings in inundation risk zone.

These changes *do not*:

Create a no-build zone

Affect existing structures (unless substantially damaged or improved)

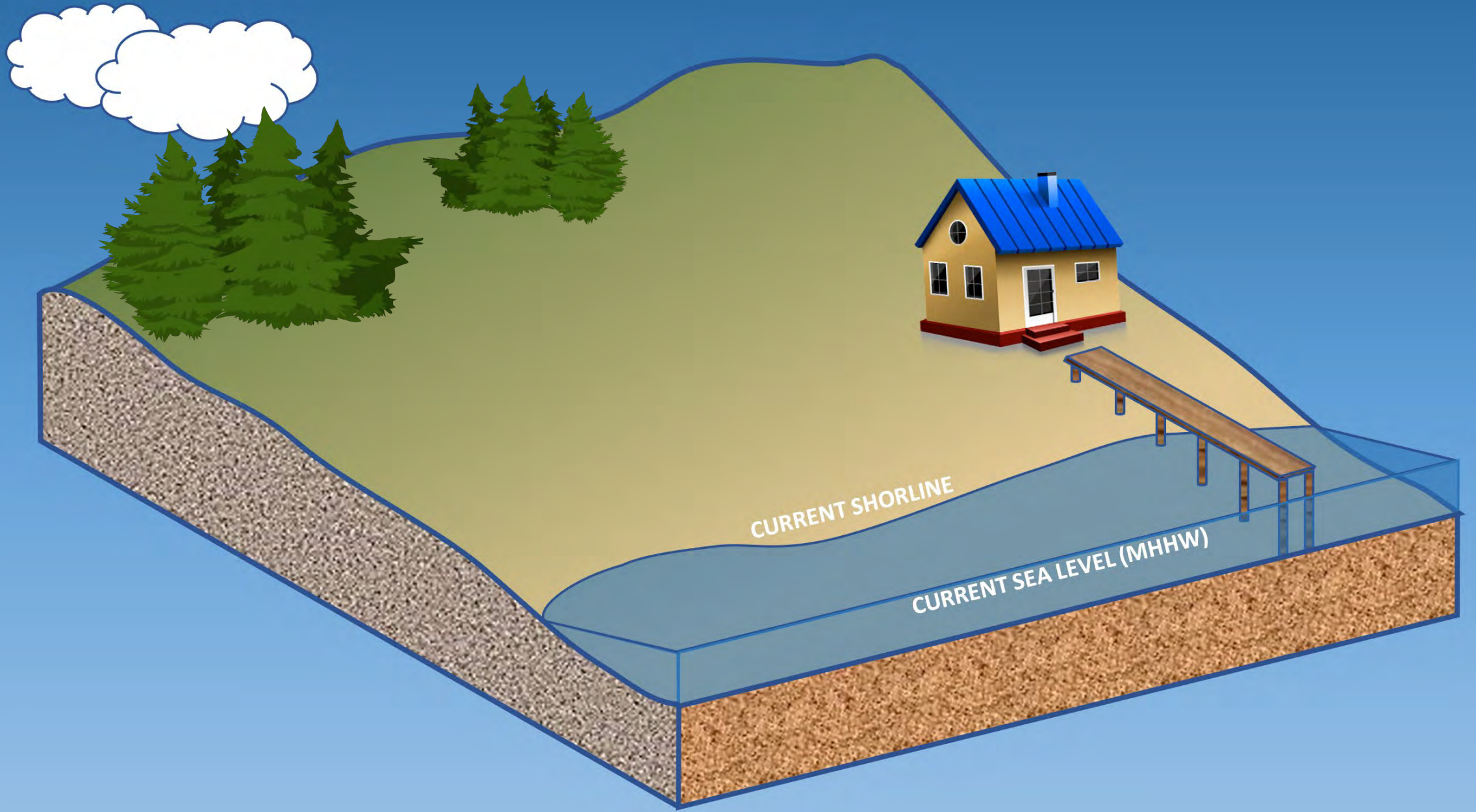
Impede projects already in the pipeline (*i.e.*, submitted to DEP prior to adoption).

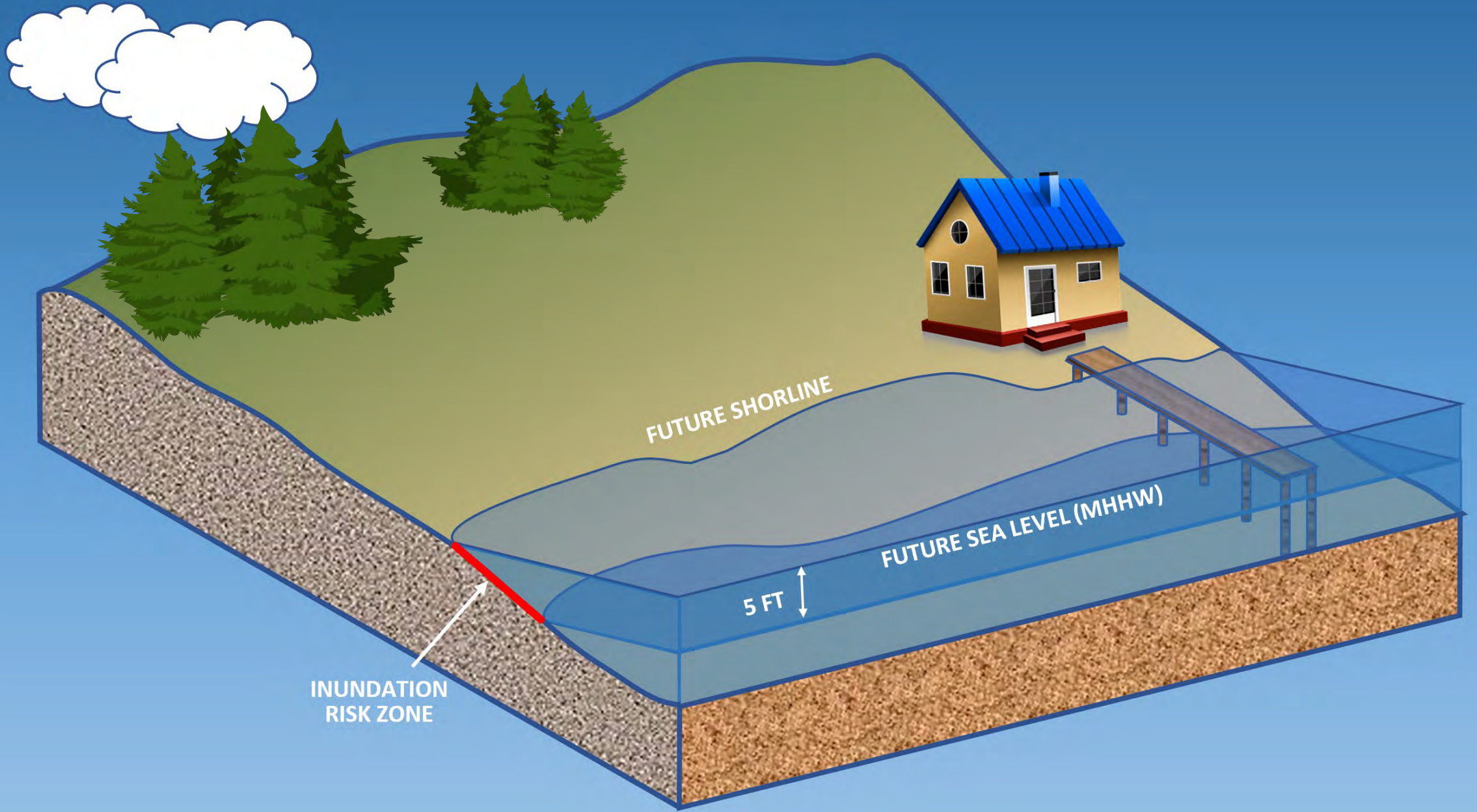
Anticipated timeline:

File proposal in Q3 2023

Adopt new rules in Q3 2024





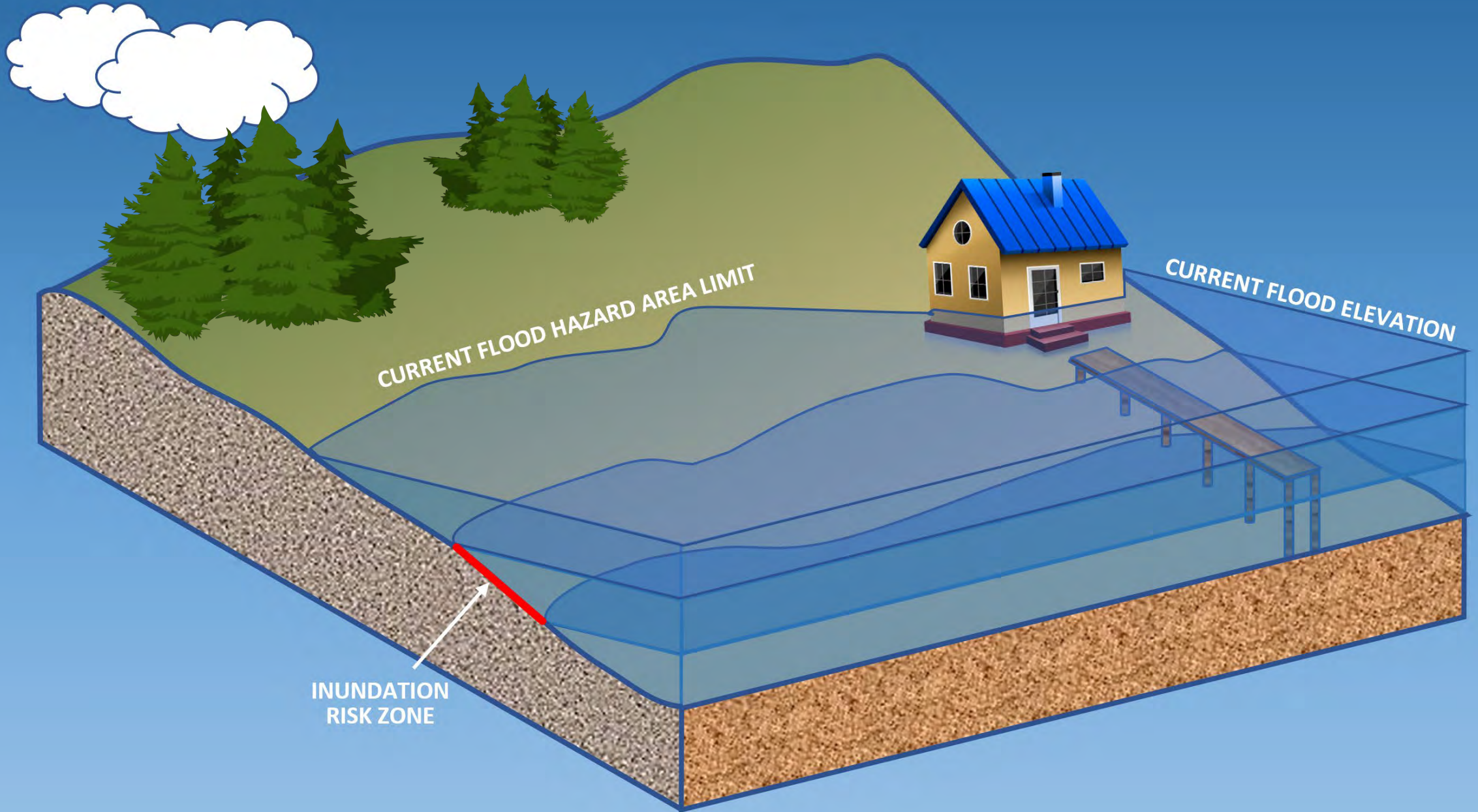


FUTURE SHORLINE

FUTURE SEA LEVEL (MHHW)

5 FT

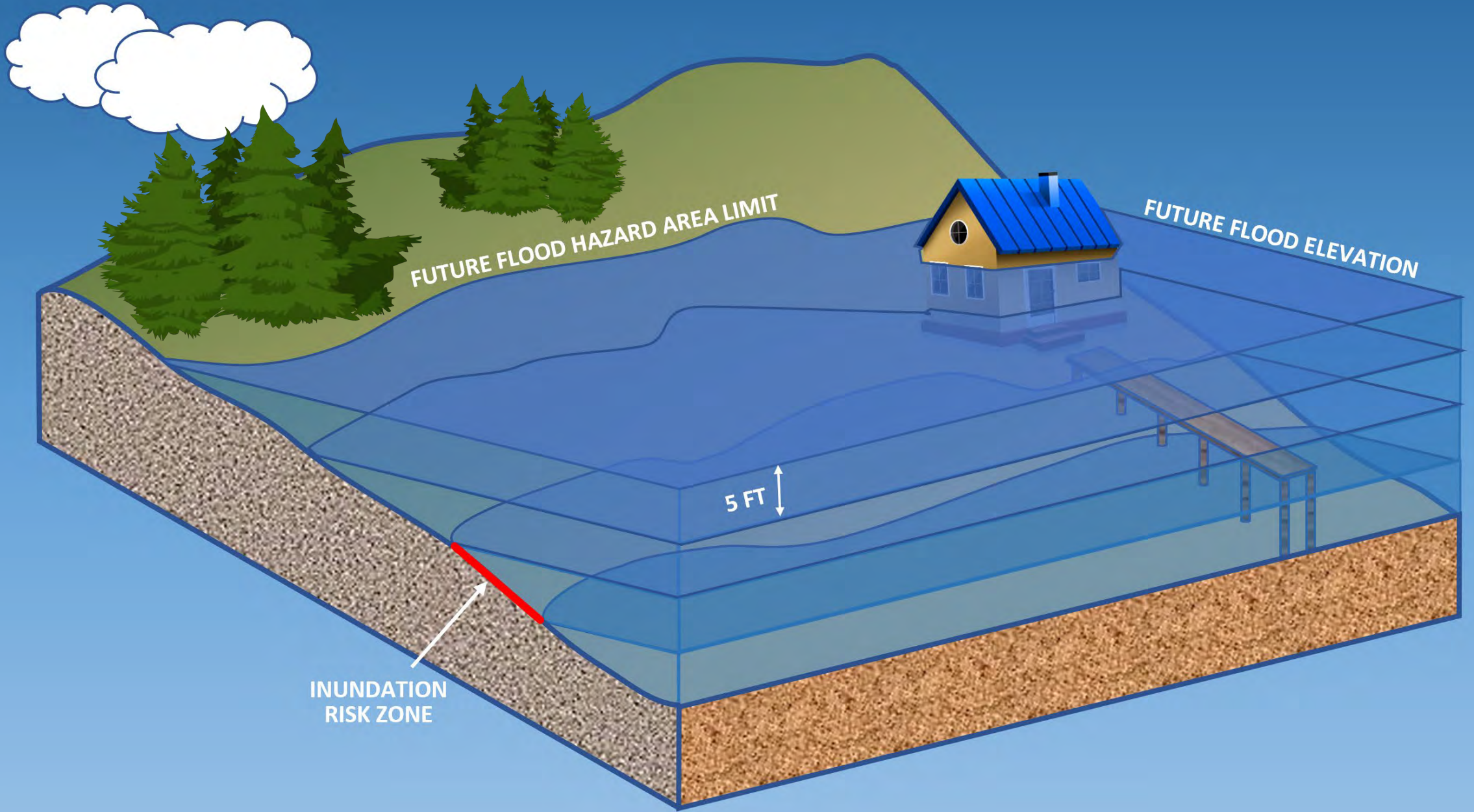
INUNDATION RISK ZONE



CURRENT FLOOD HAZARD AREA LIMIT

CURRENT FLOOD ELEVATION

INUNDATION RISK ZONE



CLIMATE ADJUSTED FLOOD ELEVATION (CAFE) IN THE COASTAL FLOOD HAZARD AREA

- ▶ Today: State's design flood elevation = FEMA's base flood elevation (higher of effective or newer preliminary mapping)
- ▶ Rules also add one-foot of freeboard for roads and buildings
- ▶ Therefore, first-floors and roads must account for flooding to FEMA+1 through elevation or floodproofing
- ▶ Anticipated 5 feet of Sea-Level Rise would increase flood elevations by 5 feet
- ▶ New State design flood elevation would be equal to FEMA+5, plus one-foot factor of safety
- ▶ Therefore, first-floors and roads would be FEMA+6 through elevation or floodproofing

RESILIENT ENVIRONMENT AND LANDSCAPES (REAL)

Primary Elements

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2. **Remedy FEMA concerns** about State's consistency with National Flood Insurance Program (NFIP) through clarifying amendments to the FHA rules.
3. **Support renewable energy** through amendments that balance habitat conservation with novel infrastructure demands (e.g., location of offshore wind support infrastructure)
4. **Encourage nature-based solutions**; sound stormwater management practices; improved water quality in degraded (urban) and source (headwaters) areas.
5. **Improve DEP permitting processes**, including pathways for expediting projects.



RESOLVE FEMA CONCERNS WITH STATE CONSISTENCY

Amendments needed to maintain State eligibility for national flood insurance program.

- ▶ FEMA establishes minimum flood reduction standards under the National Flood Insurance Program (NFIP).
- ▶ Communities who agree to meet or exceed minimum NFIP standards are eligible to receive disaster relief money after storms as well as federally-backed flood insurance for residents and businesses.

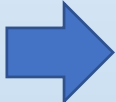
- ▶ In May 2020, FEMA released a detailed assessment of NJ's rules, challenging those where NFIP standards are not uniformly achieved.
- ▶ In general, NJ's rules match or exceed all federal minimums, but there are limited cases where rules must be tightened to ensure uniform compliance and consistent application.
- ▶ REAL resolves areas of potential non-compliance with Federal minimums as identified by FEMA.



FEMA

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Renewable Energy

OFFSHORE WIND

Striking a balance between maintaining habitat while encouraging renewable energy such as offshore wind

- Amend the CZM Rules to address the installation of electric transmission cables associated with offshore wind energy facilities with appropriate mitigation and monitoring to protect both habitat and the public safety of users
- Add public notice requirements for electric transmission cables located in the ocean

RESILIENT ENVIRONMENT AND LANDSCAPES (REAL)

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- ➔ 4. **Encourage nature-based solutions**; sound stormwater management practices; improved water quality in degraded (urban) and source (headwaters) areas.
5. **Improve DEP permitting processes**, including pathways for expediting projects.





Nature-Based Solutions

- Nature-based solutions have multiple co-benefits (i.e. carbon sequestration, habitat, wave attenuation, recreation)
- Streamline permitting process to encourage use of nature-based solutions such as living shorelines.
- Increase resilience of wetlands through beneficial use of dredged material.

Improve Protection of Land & Water Resources

Improve stormwater management :

- Require redevelopment projects to meet same water quality standards as new development
- Promote retention of SW runoff on site
- Require all Major Developments that require a FWW approval to meet SWM rules

Improve riparian zone protections:

- Improve protection of headwater streams in the upper reaches of watersheds
- Place riparian zones on bay side of barrier island complexes



Improve Protection of Land & Water Resources

Improve habitat protection:

- Remove flood hazard area general permit for in-kind bridge/culvert replacement
- Require that threatened & endangered species habitat currently fragmented by roads is addressed through an individual permit

Modernize mitigation requirements:

- Enhance mitigation requirements when riparian zone impacts cumulatively exceed certain limits
- Require evaluation of climate change impacts on the long-term viability of mitigation projects



RESILIENT ENVIRONMENT AND LANDSCAPES (REAL)

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Permits-by-Registration

- New type of authorization that replaces permits-by-rule.
- Applicants would log on to NJDEP's online permitting portal, enter basic information.
- Registration would enable WLM to track cumulative impacts on a watershed-wide basis and adjust standards to address 303(d) impaired waters and TMDLs and/or to reflect the State's planning goals.
- Allows more accurate tracking of regulated activities and better aligns with FEMA's requirement to record and track approvals under the NFIP.






Permits-by-Certification

- Many are rarely used; some will be folded into general permits so that range of activities can be broadened.
 - Proposal would require a NJ licensed professional engineer or architect to apply for and certify each item in an FHA permit-by-certification since most include a requirement that certain information be provided or that engineering certifications are necessary.
- 



For All Permits

Establish improved noticing requirements such as:

- Online notice of start of construction.
 - Online notice of deed restriction filing (permittee can upload a copy of deed notice).
 - Online notice of completion (permittee can upload photos and as-built drawings as available).
 - Automatic response from online system if the above aren't received in a timely manner.
- 



QUESTIONS?

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