

NEW JERSEY'S
REGULATORY RESPONSE
TO A CHANGING CLIMATE

NJPACT REAL

**NJ Protecting Against Climate Threats
Resilient Environments and Landscapes**

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27 September 2024



Office of the State Floodplain Administrator



Ensuring that all
State projects
meet minimum
NFIP standards



Reporting
activities
authorized within
the Special Flood
Hazard Area

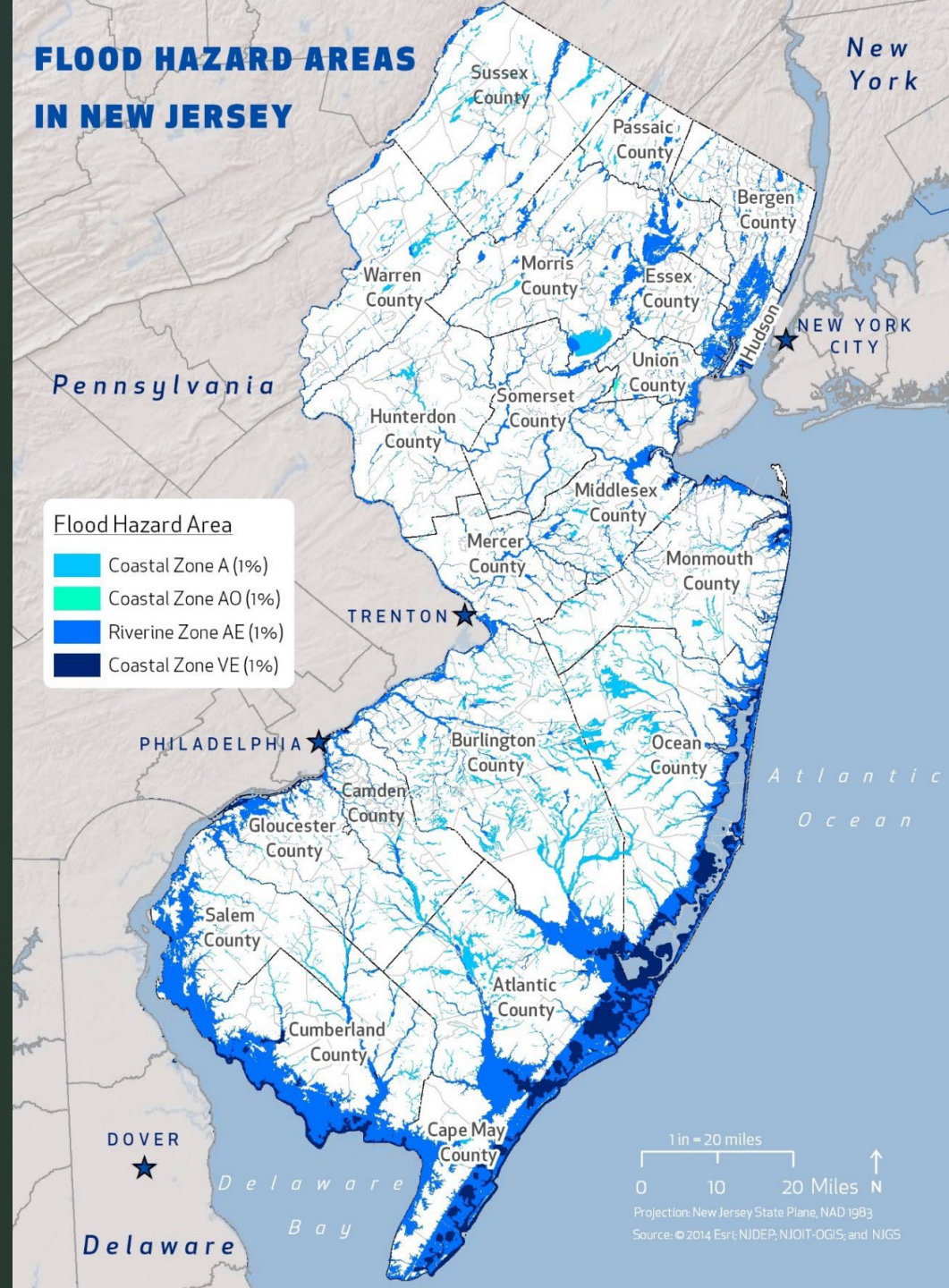


NJDEP has been
working closely
with NJDOT and
other State
agencies



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.



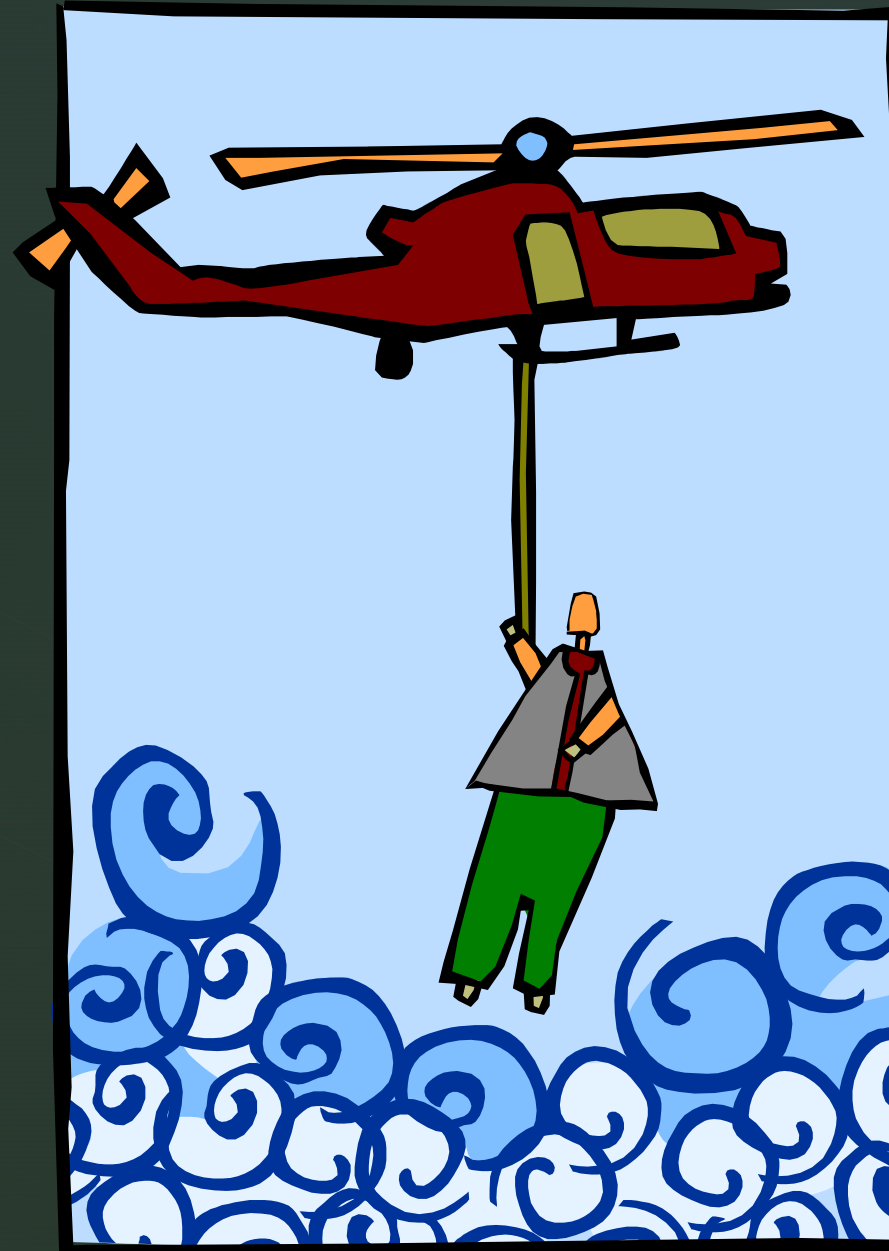
FLOOD RISK ASSESSMENT

- 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.



TERMINOLOGY

What is a 100-Year Flood?

- More accurately described as a 1% flood
- Within a given year, this particular flood has a 1% probability of occurring
- On average, a flood of this magnitude occurs about once a century
- Generally depicted on FEMA Flood Insurance Rate maps

What is a 500-Year Flood?

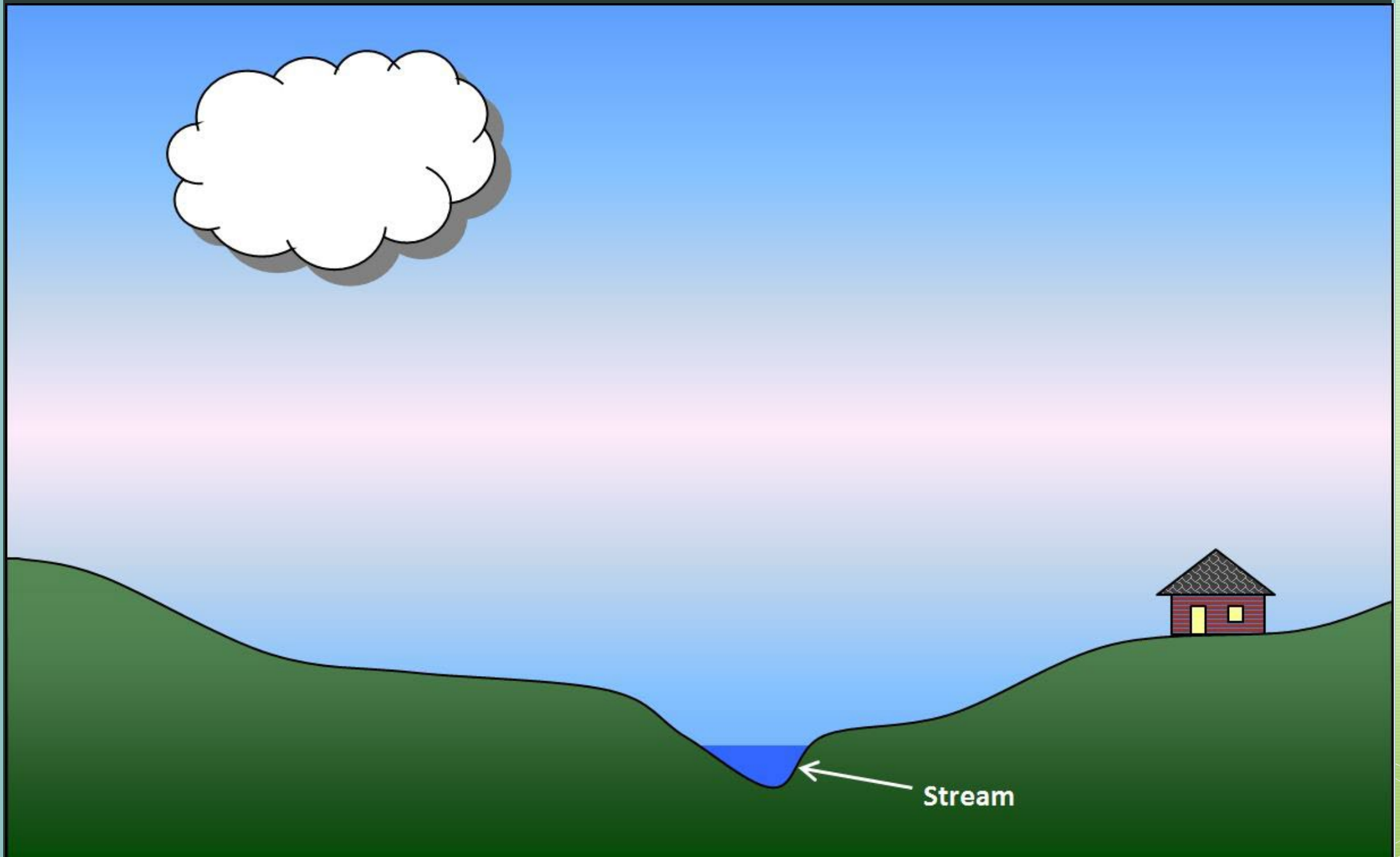
- More accurately described as a 0.2% flood
- Within a given year, this particular flood has a 0.2% probability of occurring
- On average, a flood of this magnitude occurs about once every 500 years

SNAPSHOT OF NJ

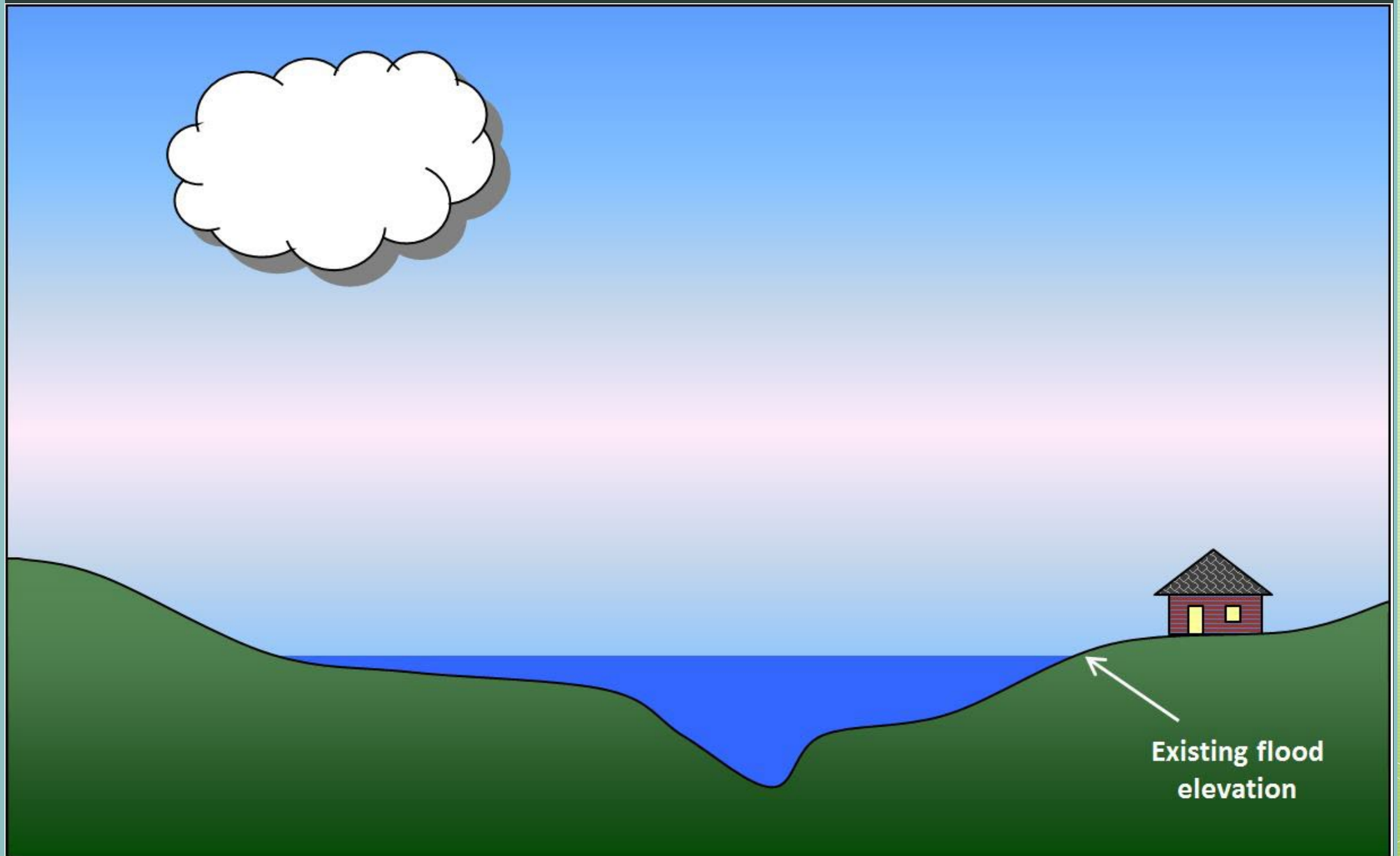
- Population 9.267 million (2021)
- Most densely populated state in the nation
- Approximately 16% of NJ lies within a flood hazard area
- According to 2019 State Hazard Mitigation Plan, NJ has:
 - \$241 billion of general building stock exposure to the 1% annual chance flood
 - Roughly 3 million properties 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)

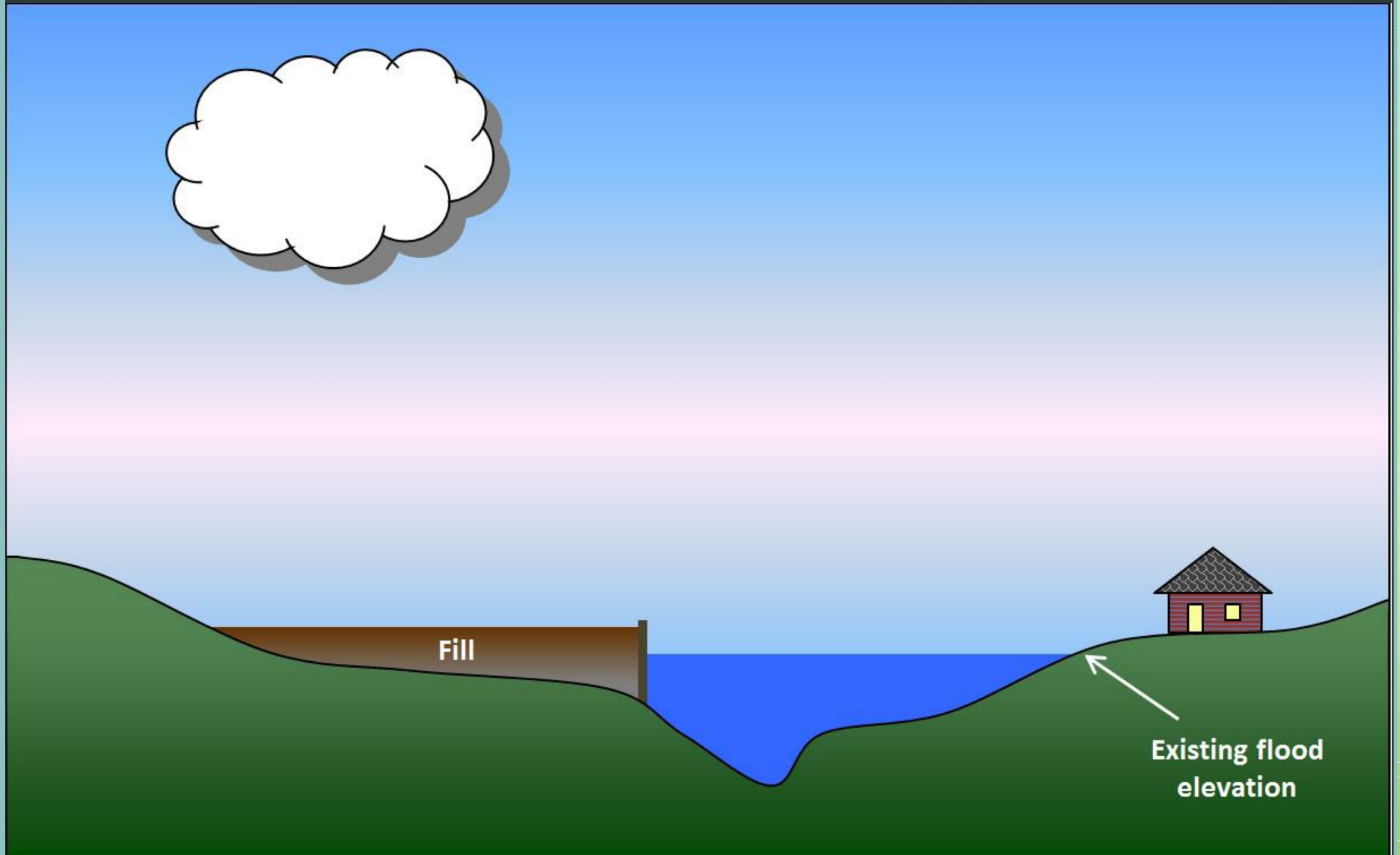
DEVELOPMENT CAN INCREASE FLOODING



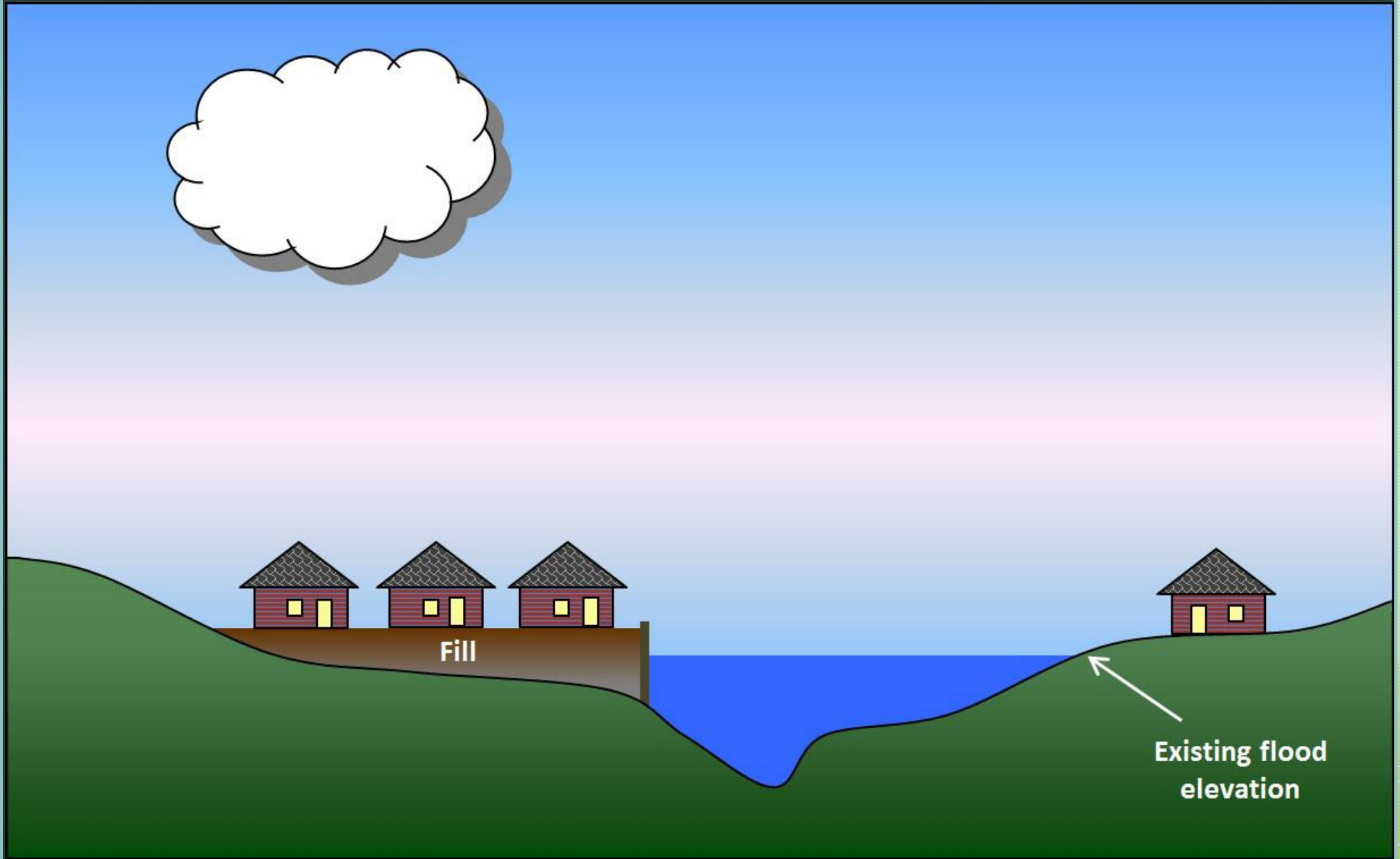
DEVELOPMENT CAN INCREASE FLOODING



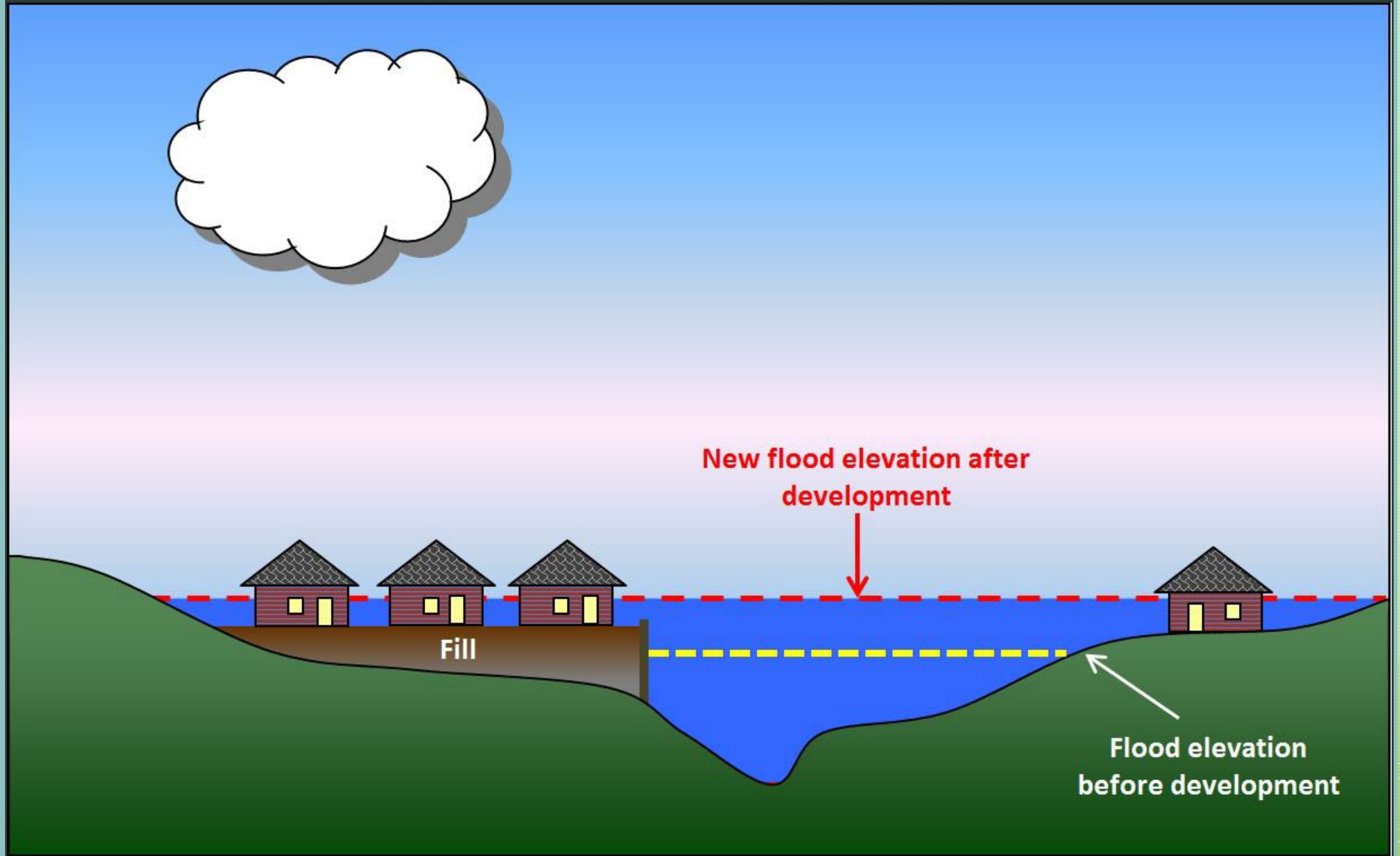
DEVELOPMENT CAN INCREASE FLOODING



DEVELOPMENT CAN INCREASE FLOODING



DEVELOPMENT CAN INCREASE FLOODING



A woman with long blonde hair, wearing a light blue sleeveless top and dark pants, is walking away from the camera on a wooden boardwalk. She is holding the hand of a young child with blonde hair, wearing a light blue dress. They are walking towards a house in the background. The scene is dimly lit, suggesting dusk or dawn. The overall mood is somber and reflective.

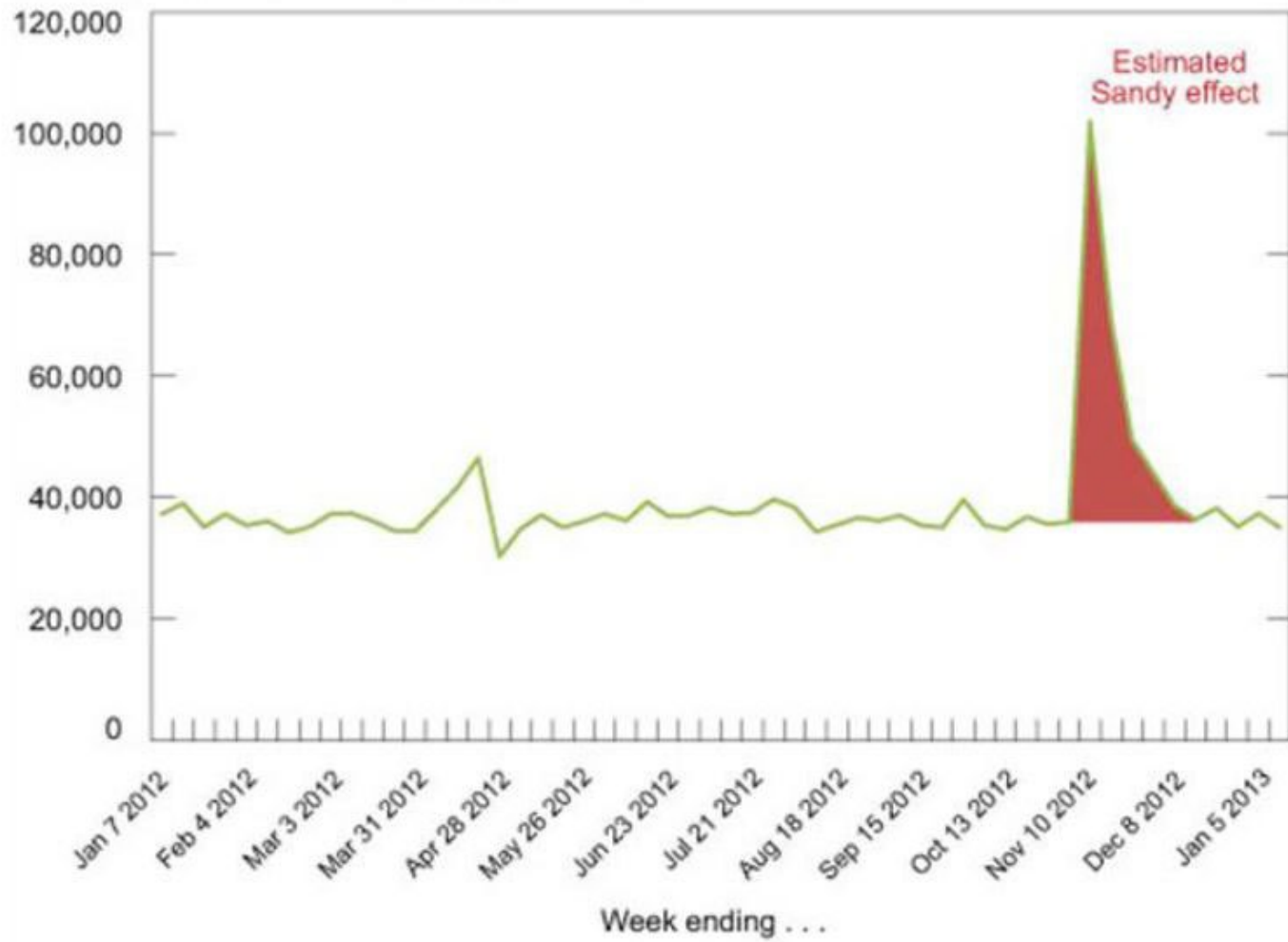
▶ SOCIOECONOMIC IMPLICATIONS

Superstorm Sandy alone:

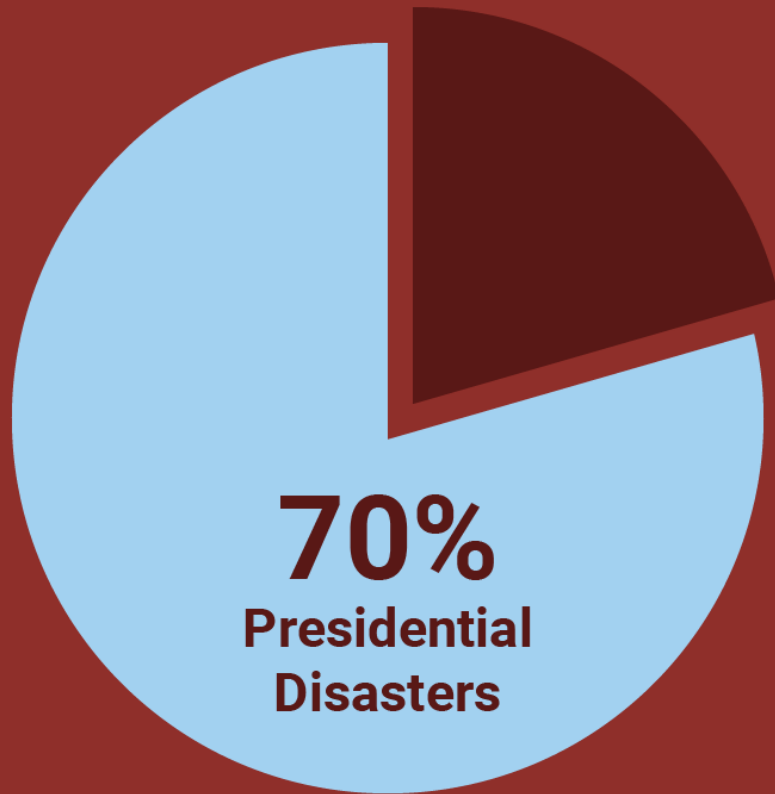
- Two million households in the state lost power
- 346,000 homes were damaged or destroyed
- Economic losses to businesses of over \$30 billion
- 37 people in NJ were killed

Primary, secondary, and tertiary impacts felt for years

Number of initial claims for unemployment insurance



Source: Liberty Street Economics use of data from the U.S. Department of Labor and Haver Analytics



2008-2017

According to Pew Charitable Trusts, flood-related natural disasters accounted for over **70% of presidential disaster declarations from the years between 2008-2017.**

▶ 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



A silhouette of a person standing on a grid floor, pointing towards a large screen that displays a weather map. The person is on the left side of the frame, and the screen occupies the right side. The background is dark, and the screen shows a light-colored map with various weather patterns.

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**

EFFECTS OF INCREASING PRECIPITATION

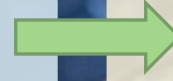
1

More Rain =
**More Stormwater
Runoff**



2

More Runoff =
**Increased
Riverine Flow**



3

More Flow =
**Higher Flood
Elevations**

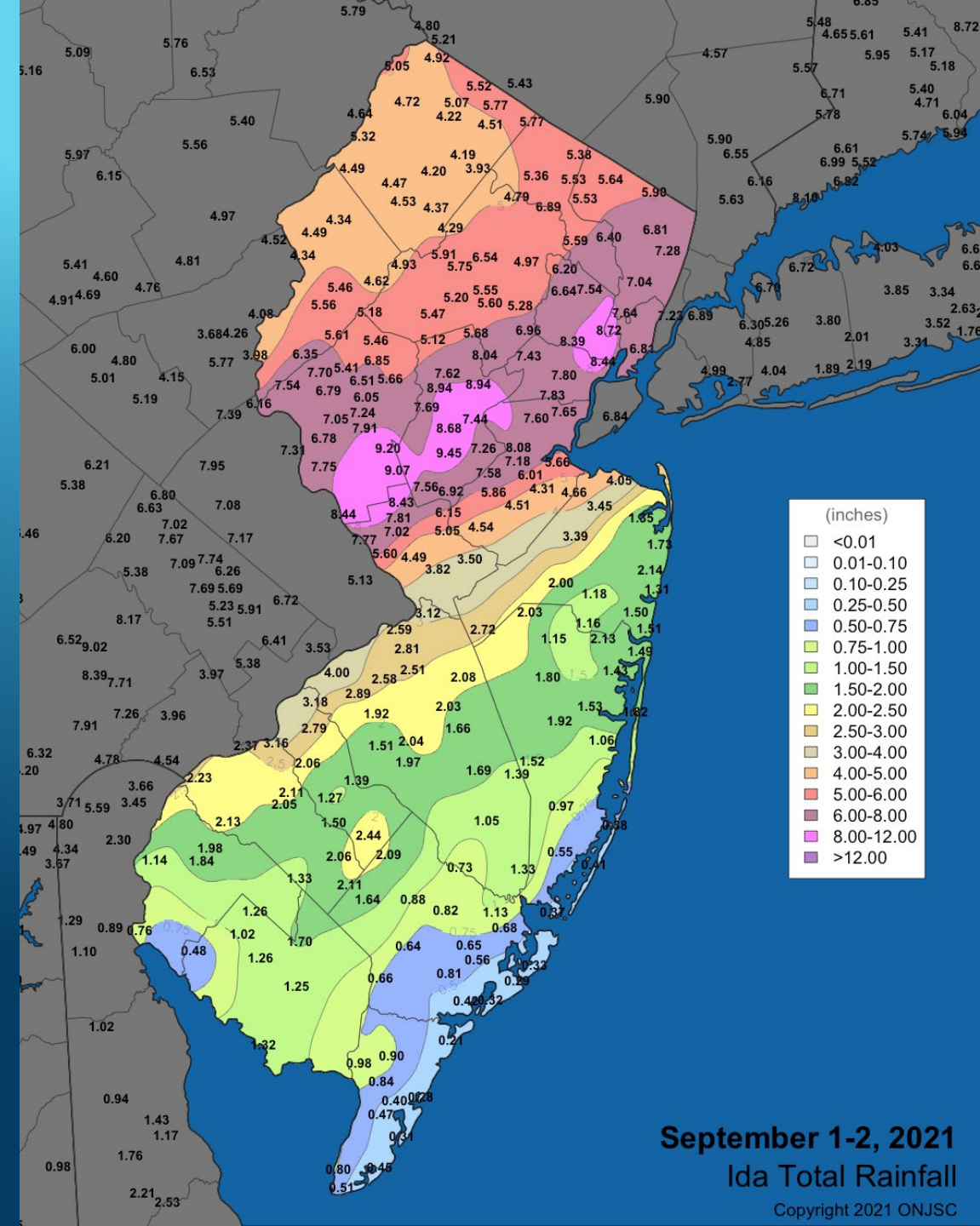
EFFECTS OF INCREASING PRECIPITATION

- 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:

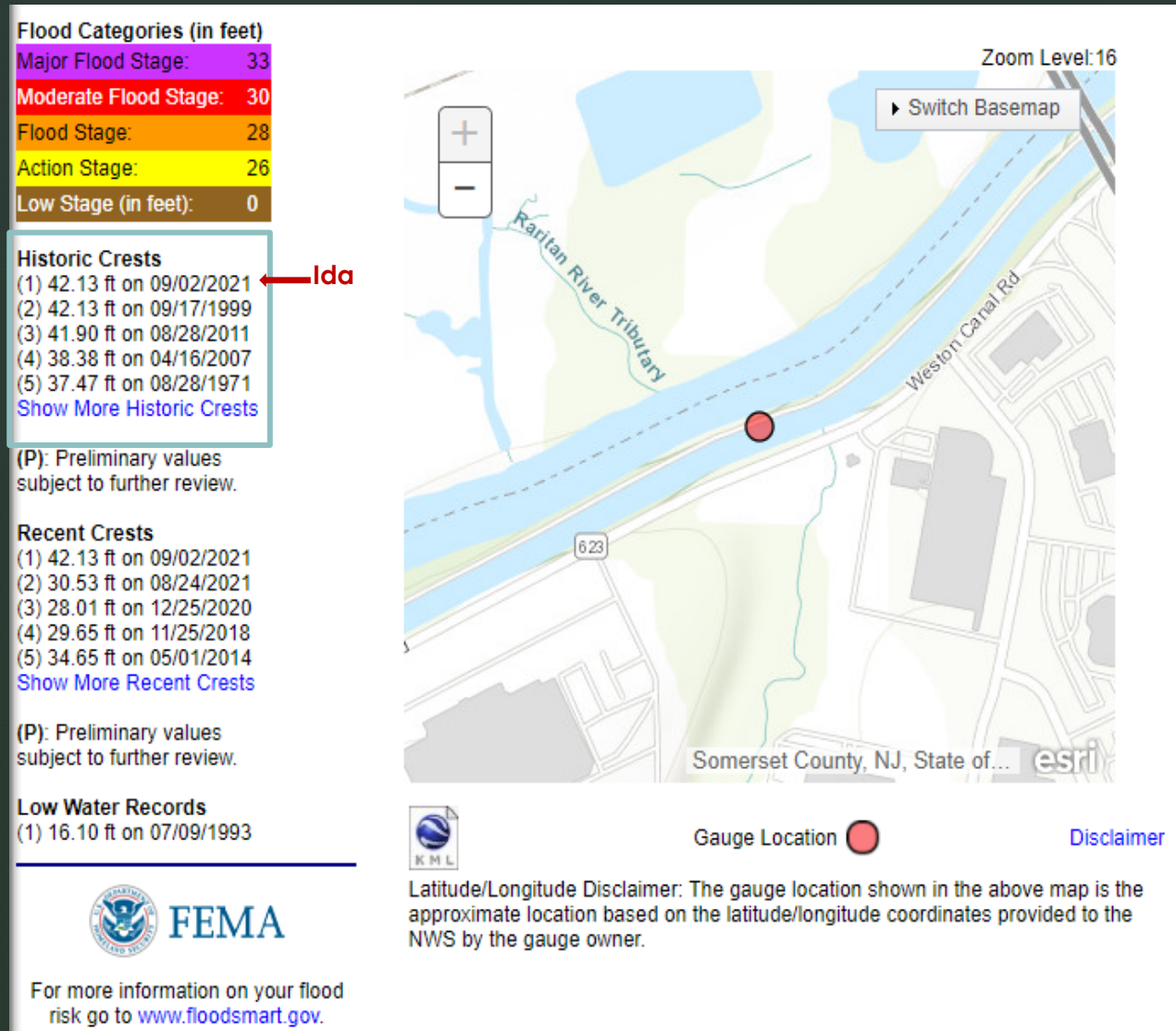
- Flood elevation mapped by NJDEP (where available)
- FEMA 100-year elevation plus 1 ft

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.

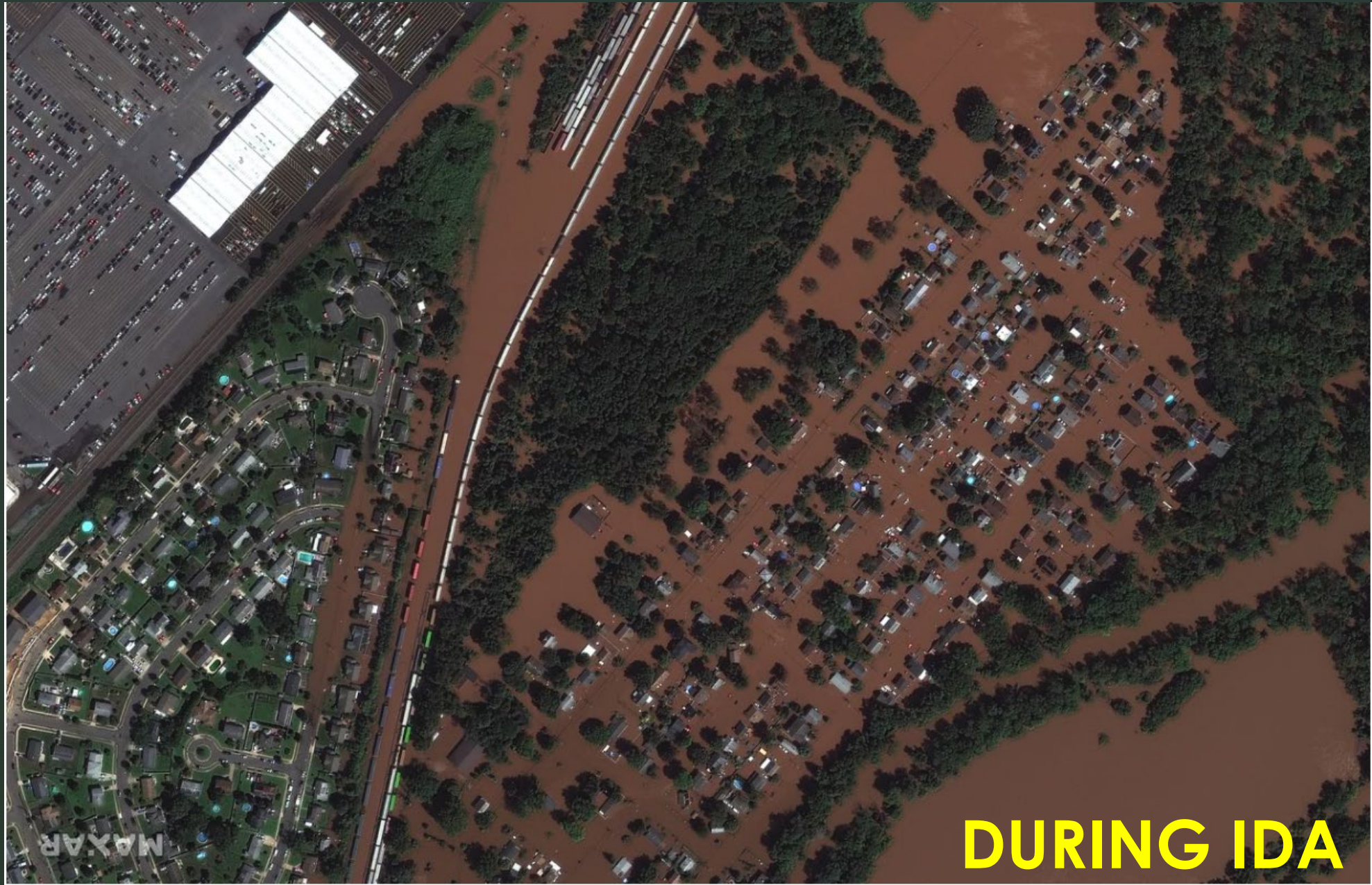
- The 500-year flood elevation at this location has been exceeded **three times since 1999**.

MILLSTONE RIVER AT MANVILLE



BEFORE IDA

MILLSTONE RIVER AT MANVILLE



DURING IDA

MAXAR

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

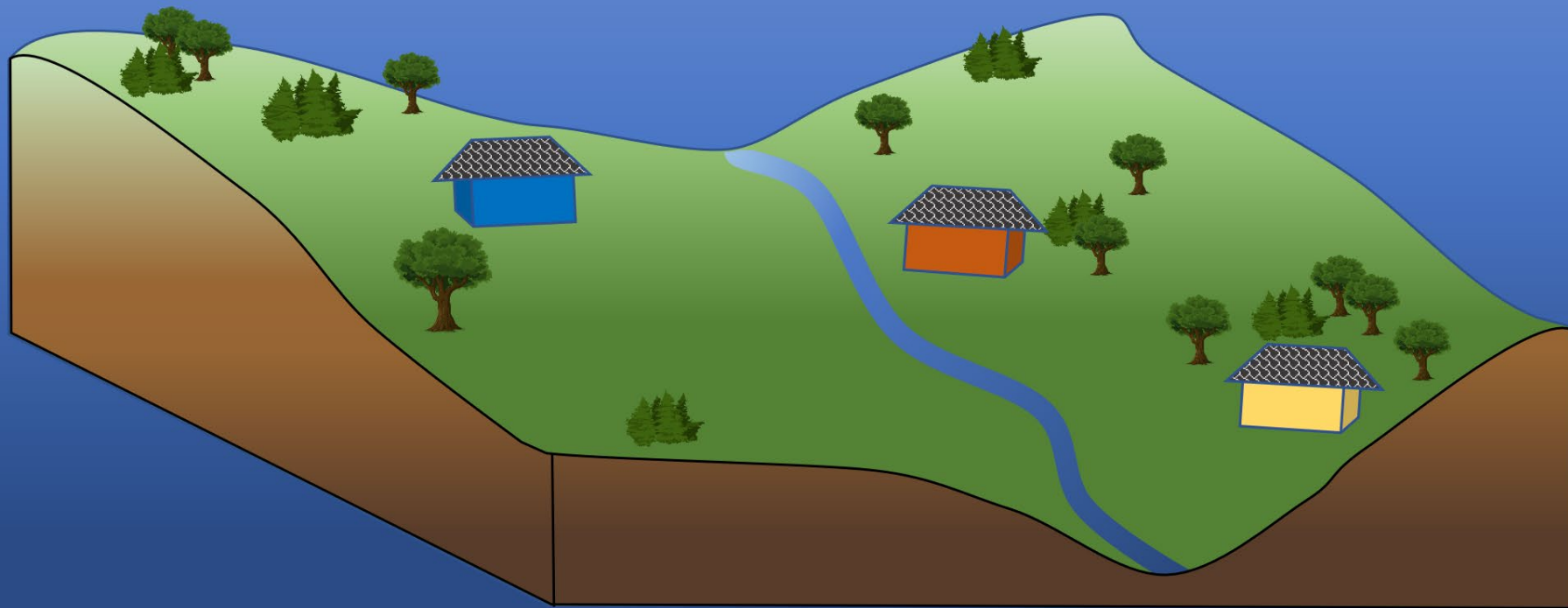
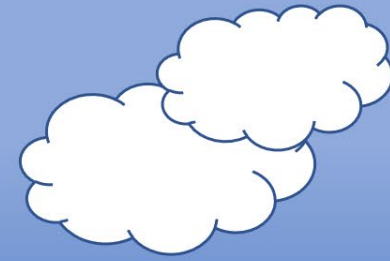
SWM Key Points:

- 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 computation methods for stormwater runoff calculations.

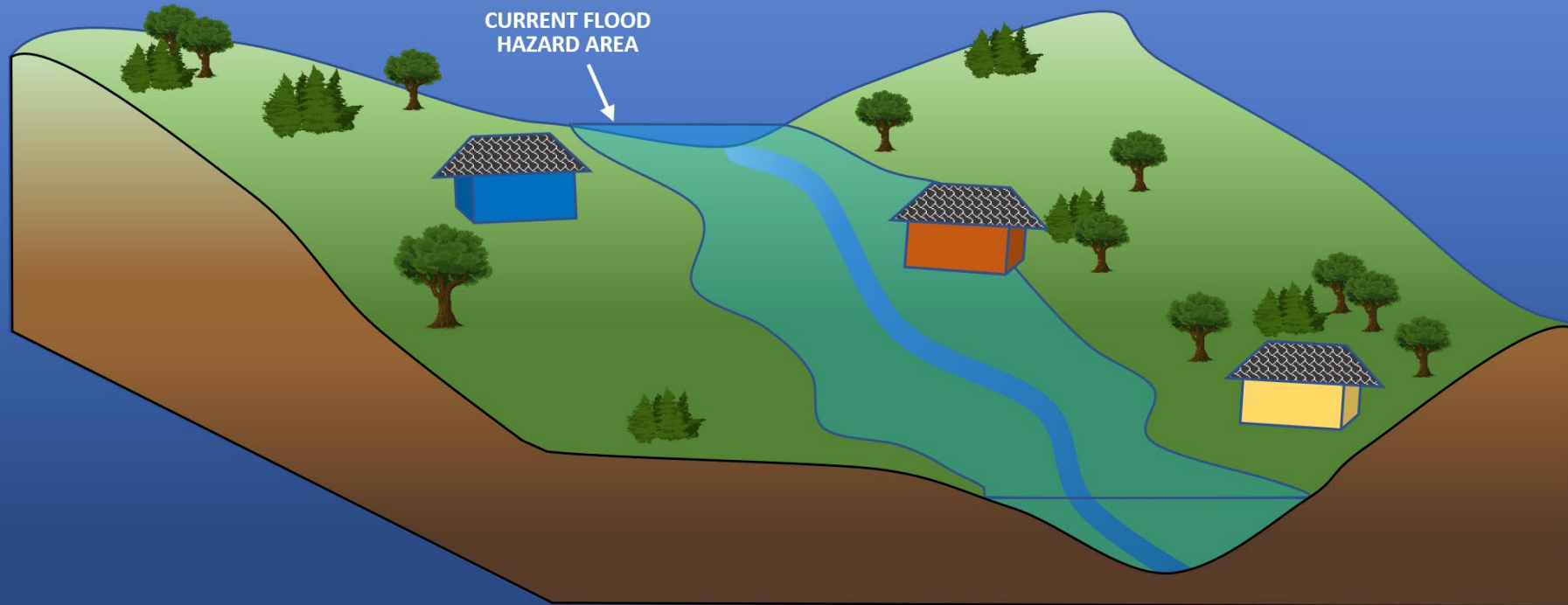
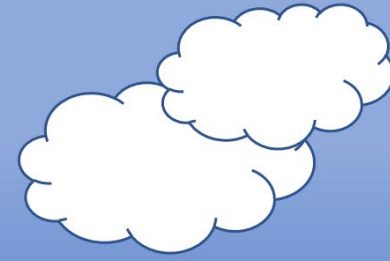
FHA Key Points:

- 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.

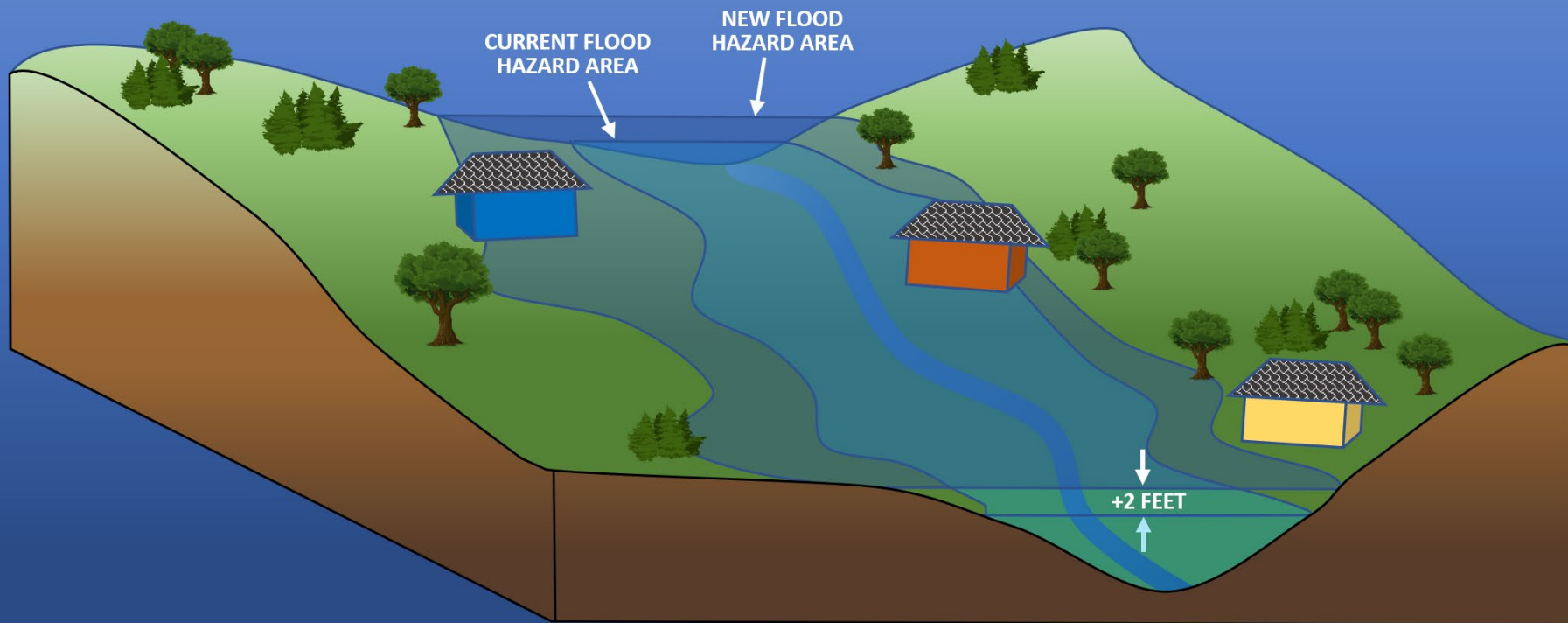
Effect of New Flood Hazard Area Design Flood Elevation



Effect of New Flood Hazard Area Area Design Flood Elevation



Effect of New Flood Hazard Area Design Flood Elevation



NEW FLOOD HAZARD AREA DESIGN FLOOD ELEVATION

IN FLUVIAL FLOOD HAZARD AREAS

BEFORE 7/17/23

- ▶ DFE was equal to the higher of:
 - ▶ FEMA's mapped flood elevation (effective or newer preliminary map, whichever is higher) + 1 foot
 - OR
 - ▶ NJDEP mapped design flood elevation (100-year flow plus 25% factor of safety)
- ▶ Plus one-foot of freeboard for roads and buildings
 - ▶ Therefore, lowest floor of buildings and road surfaces were required to be elevated or flood-proofed to at least FEMA+2

AFTER 7/17/23

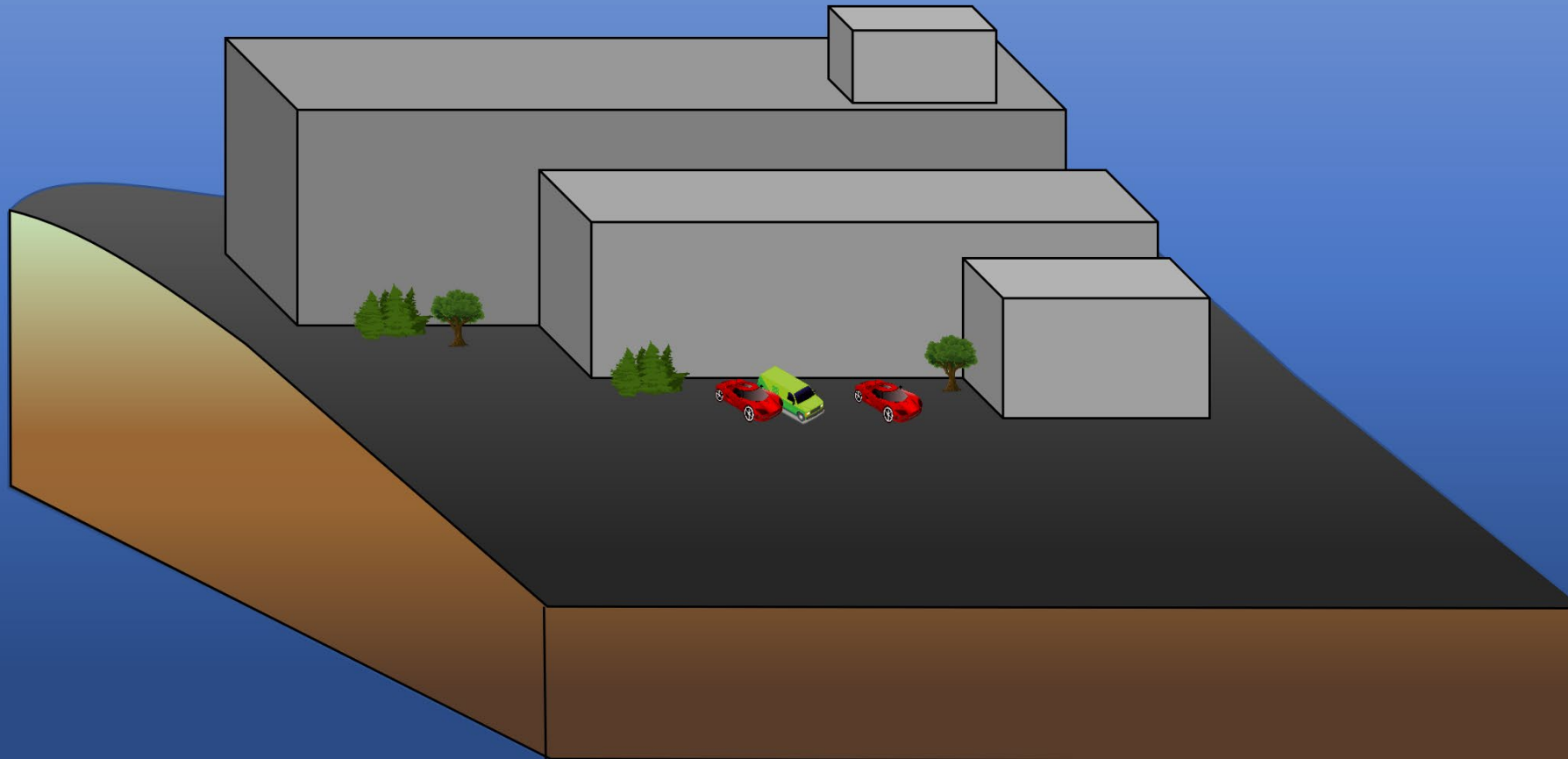
- ▶ DFE is now equal to the higher of:
 - ▶ FEMA's mapped flood elevation (effective or newer preliminary map, whichever is higher) + 3 feet
 - OR
 - ▶ NJDEP mapped design flood elevation (100-year flow plus 25% factor of safety) + 2 feet
- ▶ Plus one-foot of freeboard for roads and buildings
 - ▶ Therefore, lowest floor of buildings and road surfaces must now be elevated or flood-proofed to at least FEMA+4

EXAMPLE:

2.5 Acre Site

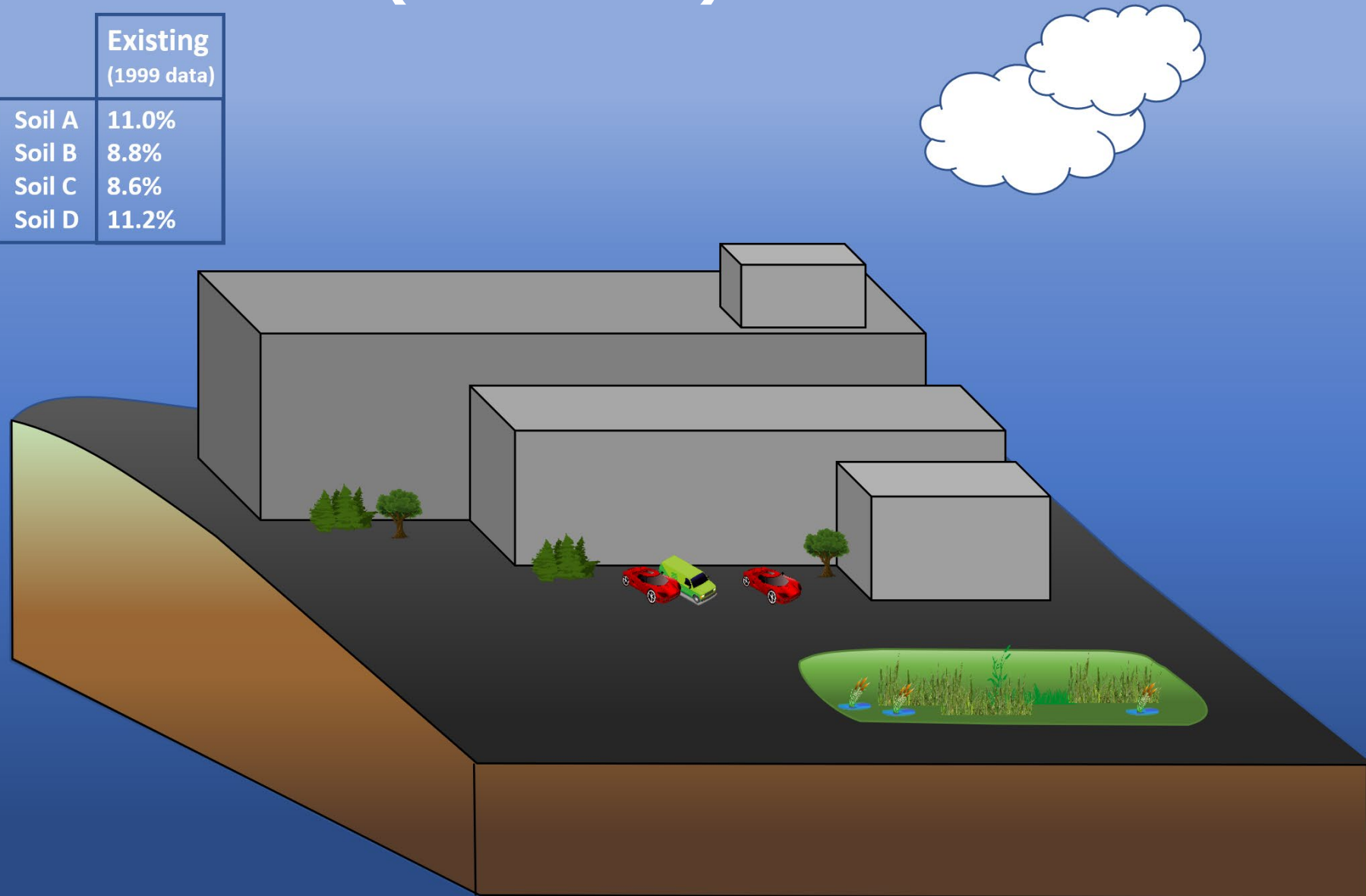
Proposed Conditions: Parking Lot and Warehouse

Sussex County



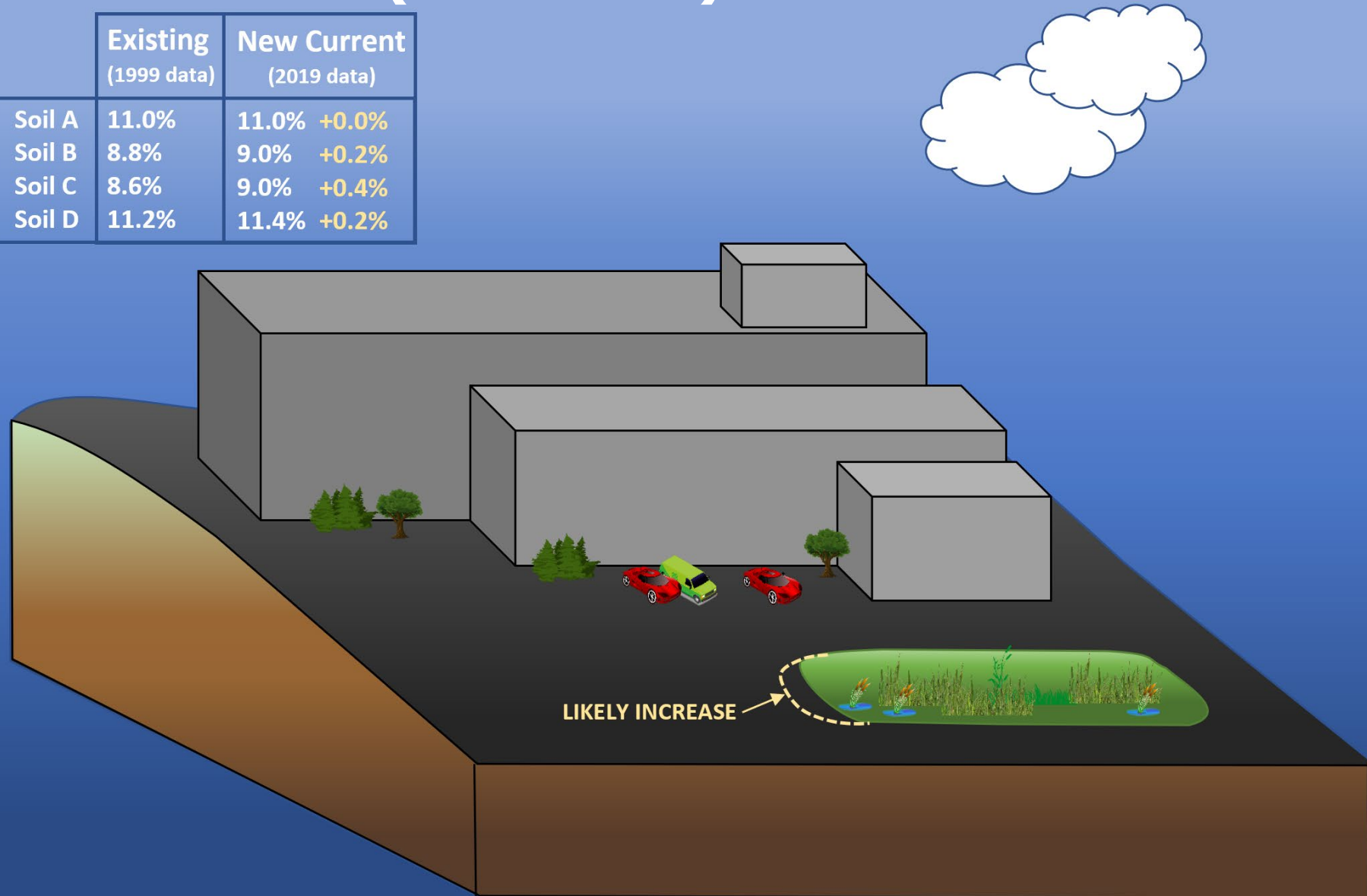
SIZE OF BMP (% OF SITE)

Existing (1999 data)	
Soil A	11.0%
Soil B	8.8%
Soil C	8.6%
Soil D	11.2%



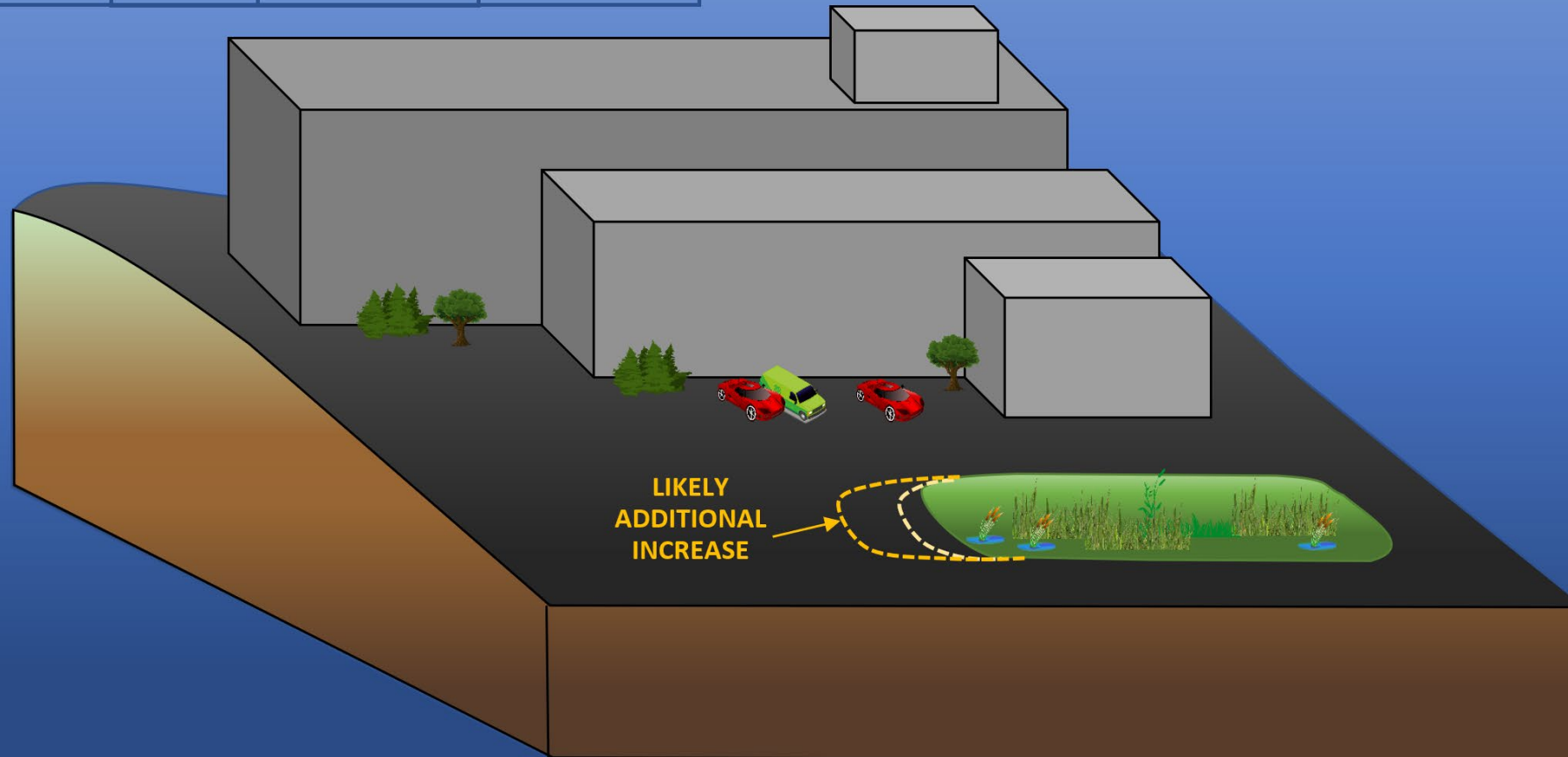
SIZE OF BMP (% OF SITE)

	Existing (1999 data)	New Current (2019 data)
Soil A	11.0%	11.0% +0.0%
Soil B	8.8%	9.0% +0.2%
Soil C	8.6%	9.0% +0.4%
Soil D	11.2%	11.4% +0.2%



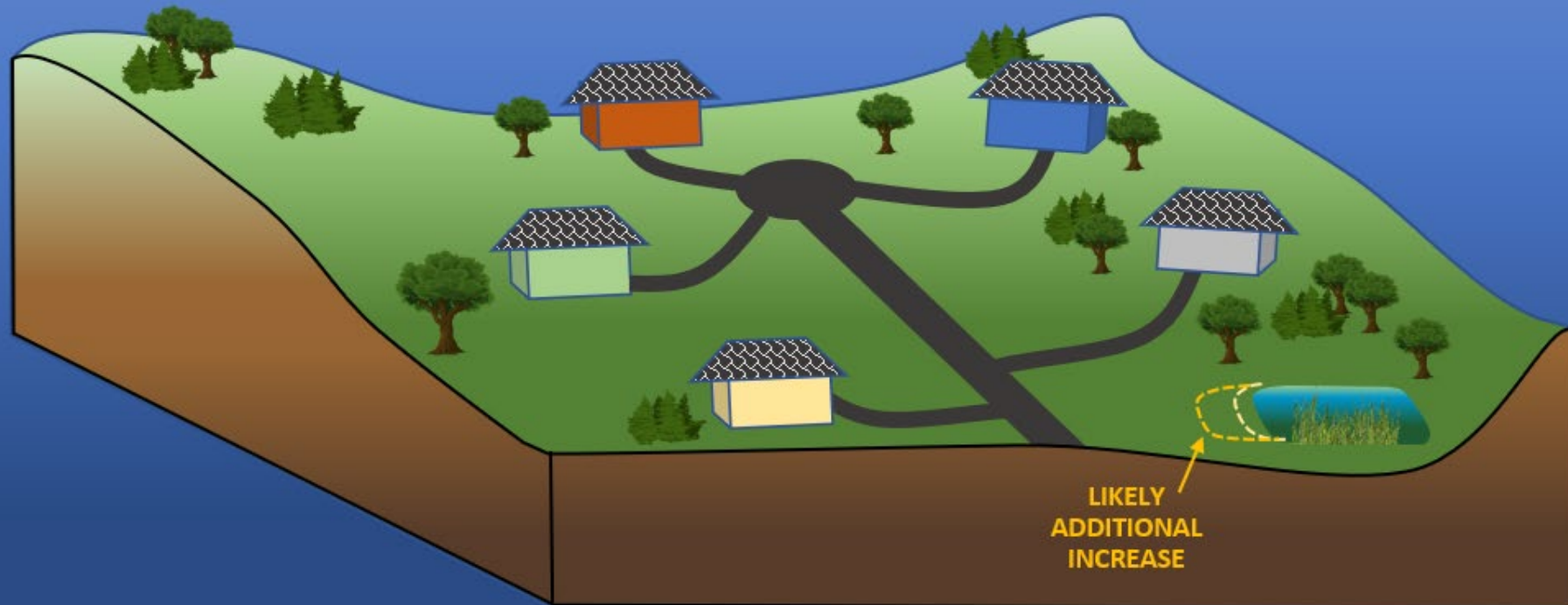
SIZE OF BMP (% OF SITE)

	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%





QUESTIONS?
