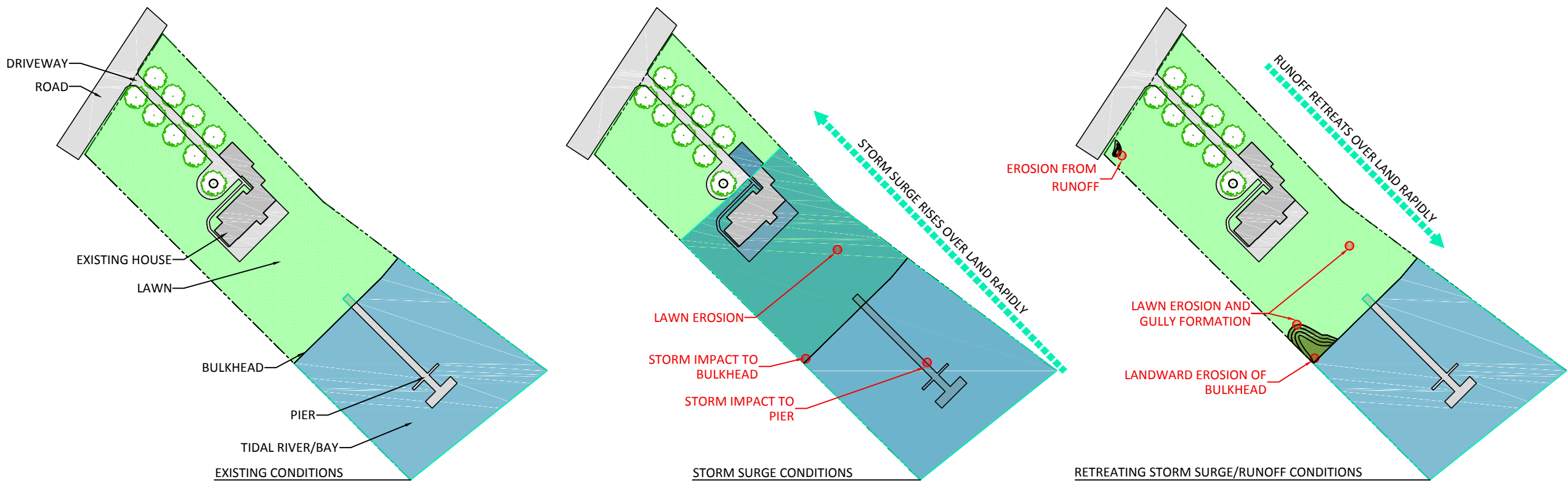


EXISTING CONDITIONS

SHORELINE WITHOUT BUFFER PLANTING

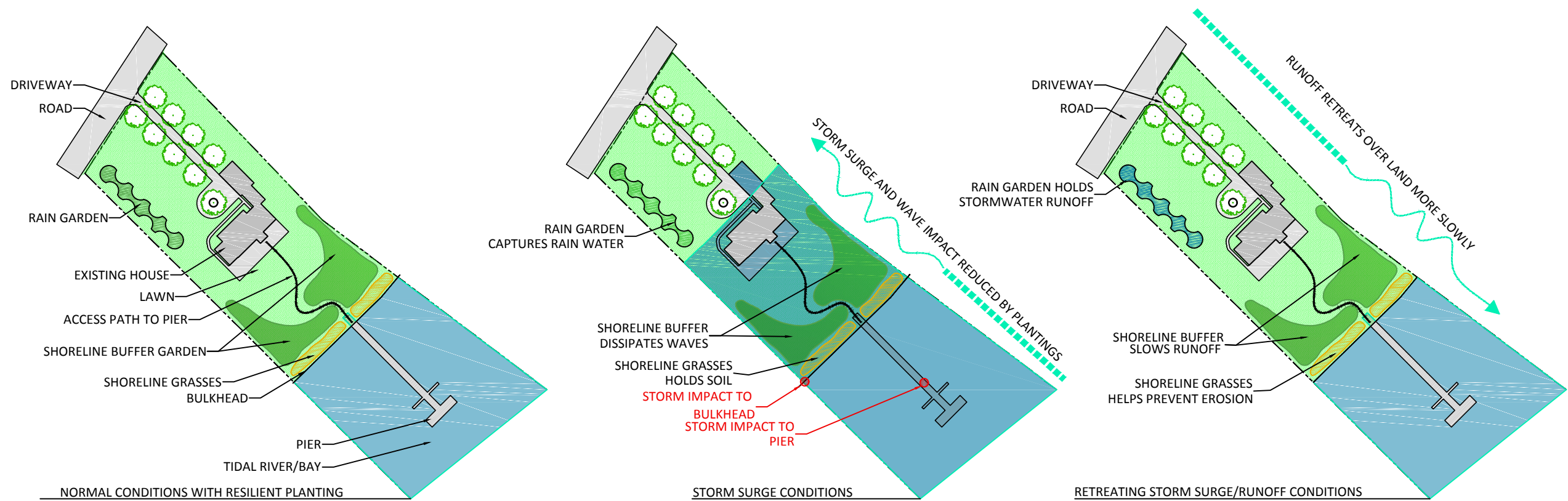
A WATERFRONT PROPERTY THAT IS COMPOSED OF MOSTLY TURF, OR MOWED LAWN TO THE LAND-WATER INTERFACE, IS AT HIGH RISK OF STORM IMPACTS. THE IMPACTS COME FROM BOTH THE TIDAL SURGES AND UPLAND RUNOFF, WHICH IS DUE TO RAIN AND RETREATING STORM SURGES. THE TURF ESSENTIALLY ALLOWS WATER TO MOVE WITH GREAT VELOCITY OVER ITS SURFACE, WHICH UPLIFTS TOPSOIL AND TRANSPORTS IT OUT INTO THE TIDAL RIVER OR BAY. AS BOTH TIDAL SURGES AND UPLAND RUNOFF WORK AGAINST THE LAND, IN THIS SCENARIO, THERE IS VERY LITTLE GROUND COVER OR ROOT STRUCTURE PRESENT TO ABSORB IMPACTS CAUSED BY MOVING WATER. FAST MOVING WATER CAUSES EROSION IN LAWN LANDWARD OF THE BULKHEAD AND A GULLY TO FORM. IT DAMAGES THE BULKHEAD ALLOWING HIGH TIDES TO FLOOD BEHIND THE BULKHEAD AND CAUSES ADDITIONAL EROSION THAT TURF GRASS CANNOT CONSTRAIN.



PROPOSED CONDITIONS

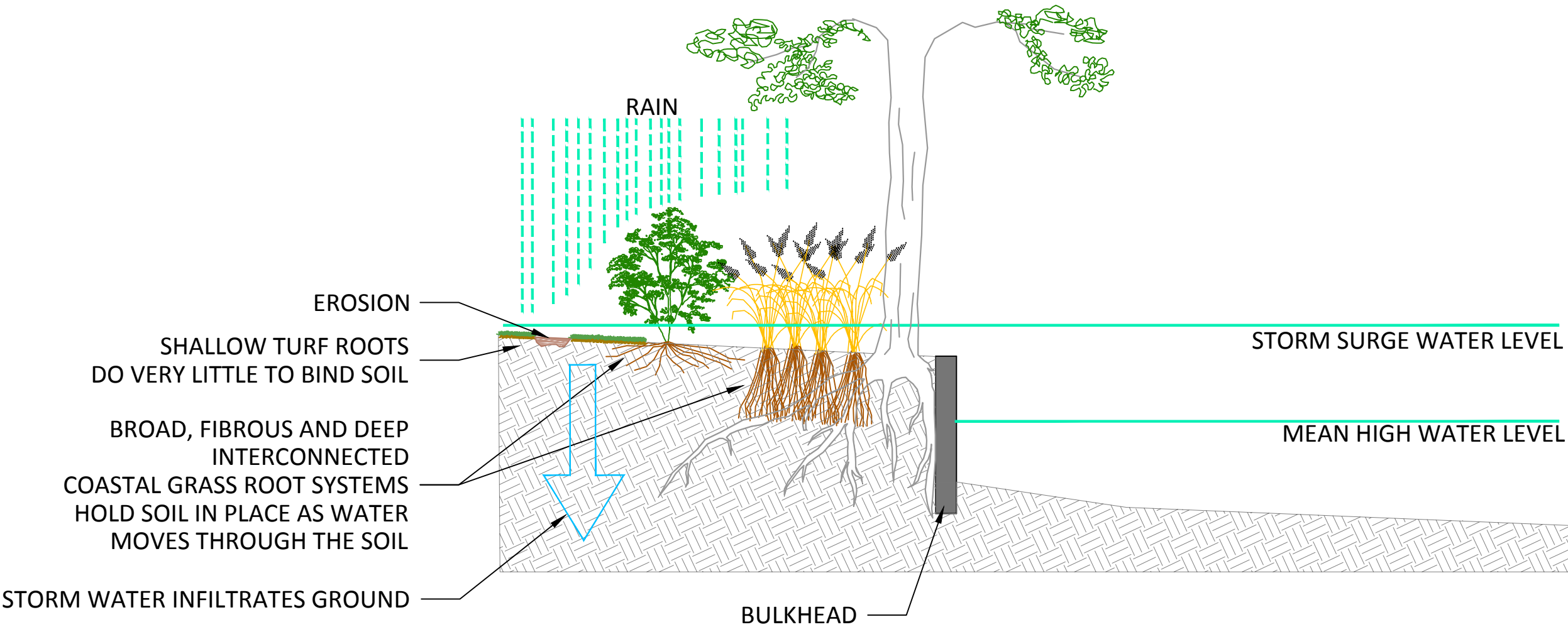
STORM RESILIENT BUFFER

BY INTRODUCING A BUFFER MADE OF SHORELINE GRASSES, SHRUBS, AND TREES AT THE WATER'S EDGE, THE LANDSCAPE BECOMES MORE RESILIENT AGAINST STORM IMPACTS. SHORELINE GRASSES, SHRUBS, AND TREES PROVIDE A DIVERSE VERTICAL BUFFER TO HELP DISSIPATE UPLAND WAVE ENERGY CAUSED BY WIND AND STORM SURGES; AN EXTENSIVE GROUND COVER TO SLOW TIDAL WATERS AND UPLAND RUNOFF; AND A DENSE AND DEEP ROOT SYSTEM THAT BINDS SOIL. FURTHERMORE, IN THIS SCENARIO, A RAIN GARDEN IS REPRESENTED, WHICH CAPTURES FLOODING WATERS AND DETAINS IT TO REDUCE THE AMOUNT OF WATER RUNNING OFF THE LANDSCAPE AT ONCE.

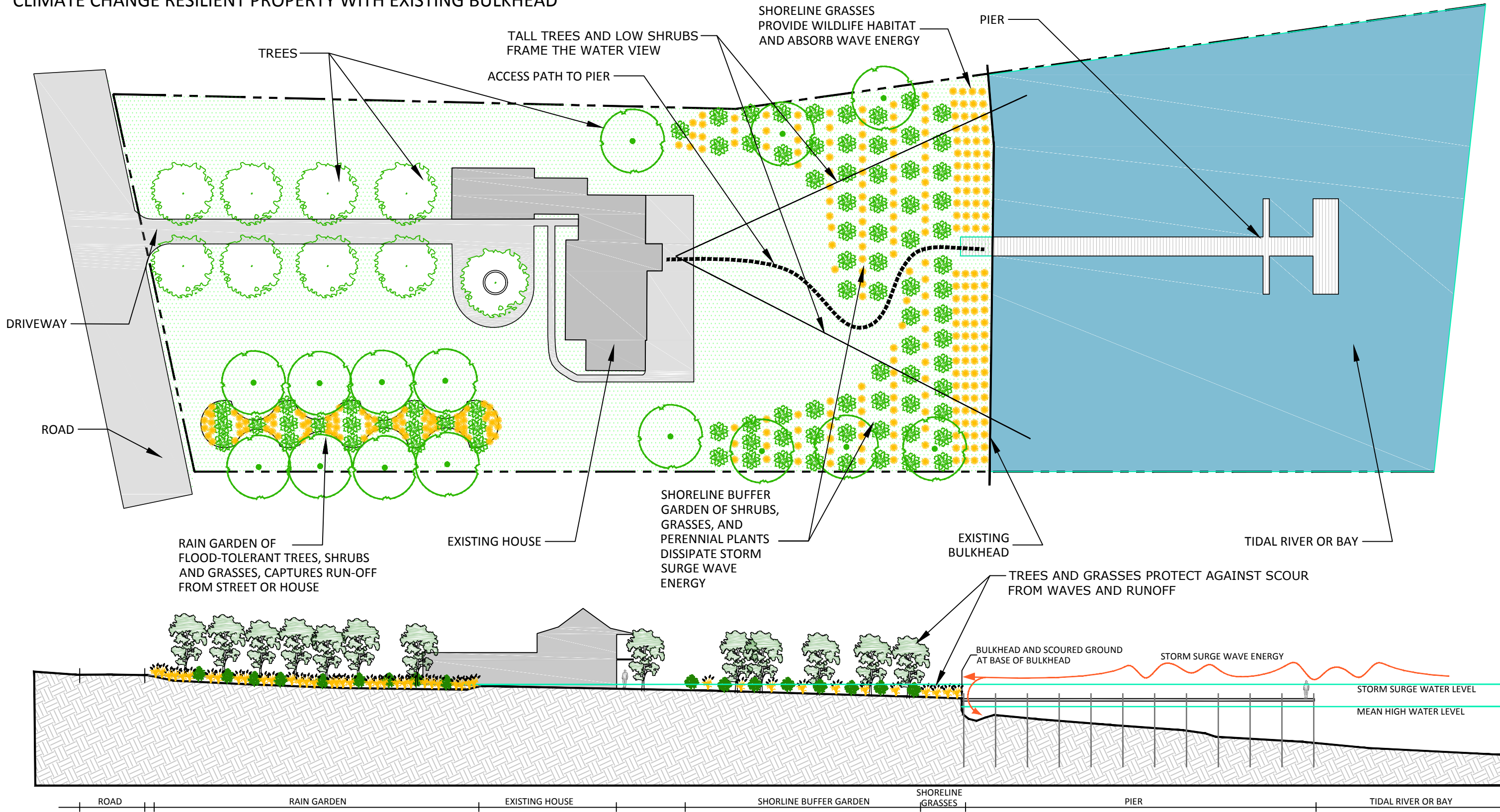


ROOT SYSTEMS

VEGETATION IS DEFINED BY MORE THAN WHAT APPEARS ABOVE THE SURFACE. THE ROOT SYSTEMS FOUND BENEATH THE SURFACE OF THE GROUND MEANDER THROUGH LAYERS OF SOIL SEEKING FOOD AND WATER. SOME ARE BROADER AND DEEPER THAN OTHERS AND SOME HAVE MORE FIBROUS COMPONENTS TO HOLD GROUND AND ABSORB WATER BETTER THAN OTHER SYSTEMS. THE ROOTS OF PLANTS THAT GROW DEEP, REACH BROADLY, AND HAVE FIBROUS TISSUE ARE THE BEST TYPES OF SPECIES TO PLANT ALONG THE SHORELINE IN REGARDS TO STORM RESILIENCE. THESE ROOT SYSTEMS HELP IN BINDING SOIL COMPOSITION, WHICH IN TURN REDUCES THE RISK OF EROSION FROM LANDWARD RUNOFF AND TIDAL SURGES. SOME NATIVE GRASSES, SHRUBS, AND TREES HAVE ROOTS THAT EXTEND 6 OR MORE FEET BENEATH THE SURFACE; AND TREE ROOTS CAN EXTEND FAR BEYOND THE LIMITS OF THE CANOPY.



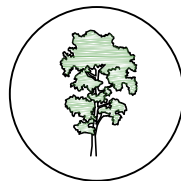
CLIMATE CHANGE RESILIENT PROPERTY WITH EXISTING BULKHEAD



esa
Natural Resources Management
Ecological Restoration

CHOOSING PLANT SPECIES:

WHEN CHOOSING PLANTS FOR A STORM RESILIENT SHORELINE, ONE SHOULD ALWAYS PLAN FOR DIVERSITY IN A RANGE OF TREES, SHRUBS, HERBACEOUS PLANTS, AND GRASSES. SOME VARIABLES TO TAKE INTO CONSIDERATION ARE SOIL TYPES, SALT WATER, AND SHADE TOLERANCE, ROOT DENSITY, CANOPY COVER, AND AESTHETICS. THE PLANTS LISTED TO THE RIGHT ARE NATIVE AND FLOOD TOLERANT AND CAN BE INCORPORATED WITHIN A STORM RESILIENT BUFFER PLAN. THE GRASSES LISTED HAVE DEEP AND DENSE ROOTS.



TREES

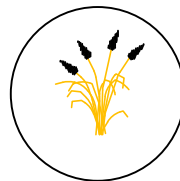
RED MAPLE
SHADBUSH
LOBLOLLY PINE
EASTERN RED CEDAR
BALD CYPRESS
AMERICAN HOLLY



SHRUBS + PLANTS

MARSH ELDER
BAY BERRY
WAX MYRTLE
GROUNDSEL TREE
SWAMP MILKWEED
SILKY DOGWOOD
SEASIDE GOLDENROD
JOE PYE WEED

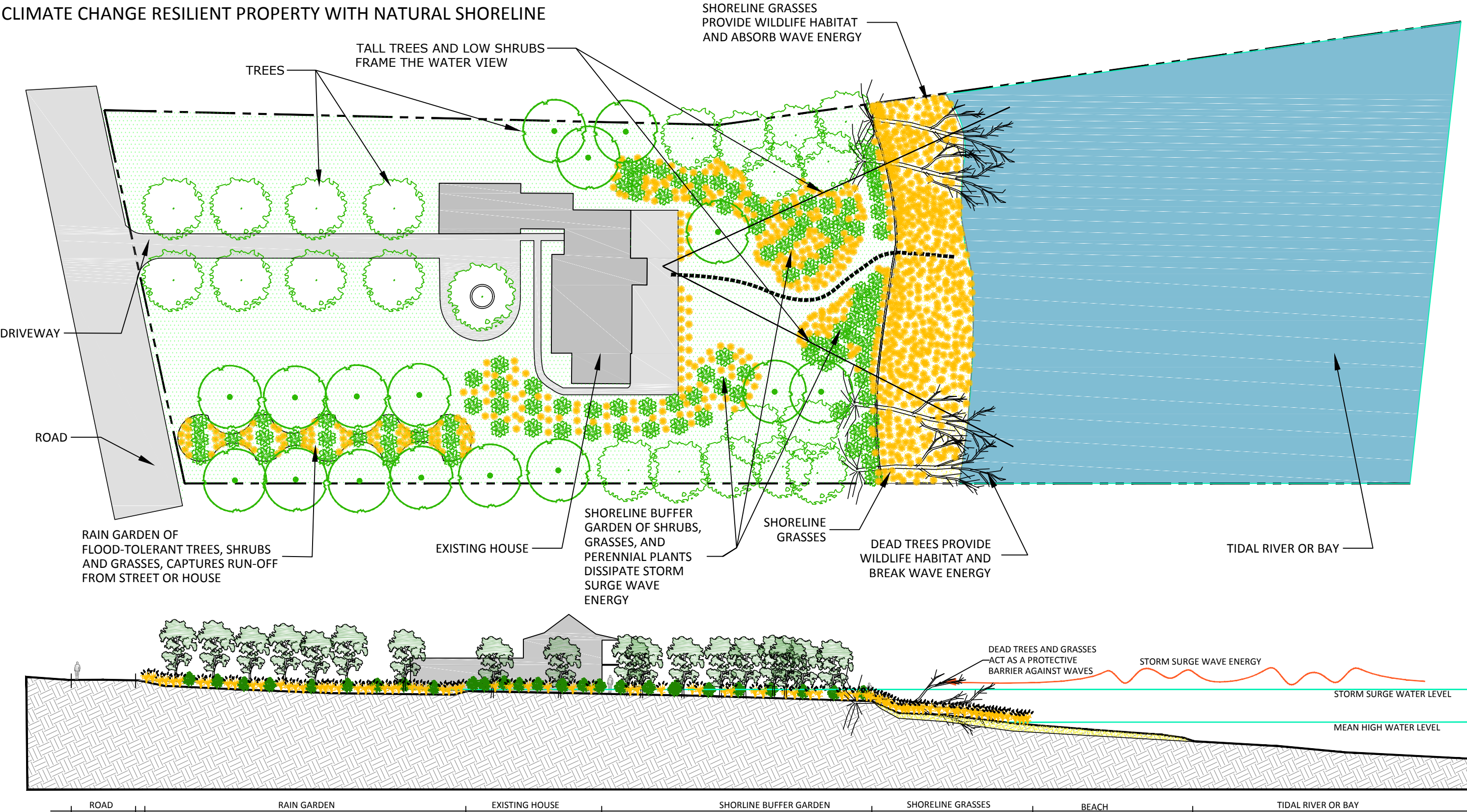
ELDERBERRY
ST. JOHN'S WORT



GRASSES

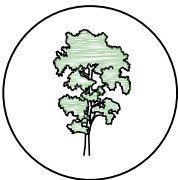
SWITCH GRASS
SEA/RIVER OATS
INDIAN GRASS
BROOM SEDGE
EASTERN GAMMA GRASS
BIG BLUE STEM GRASS

CLIMATE CHANGE RESILIENT PROPERTY WITH NATURAL SHORELINE



CHOOSING PLANT SPECIES:

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TREES

- RED MAPLE
- SHADBUSH
- LOBLOLLY PINE
- EASTERN RED CEDAR
- BALD CYPRESS
- AMERICAN HOLLY



SHRUBS + PLANTS

- MARSH ELDER
- BAY BERRY
- WAX MYRTLE
- GROUNDSEL TREE
- SWAMP MILKWEED
- SILKY DOGWOOD
- SEASIDE GOLDENROD
- JOE PYE WEED

- ELDERBERRY
- ST. JOHN'S WORT



GRASSES

- SPARTINAS
- SWITCH GRASS
- SEA/RIVER OATS
- INDIAN GRASS
- BROOM SEDGE
- EASTERN GAMMA GRASS
- BIG BLUE STEM GRASS
- AMERICAN BEACH GRASS