ENVIRONMENTAL RESOURCE INVENTORY

Submitted To:
Barnegat Township
Environmental Commission

Submitted By:
Birdsall Engineering, Inc.

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CONSULTING & ENVIRONMENTAL ENGINEERS

APPENDIX A
ENVIRONMENTALLY SENSITIVE AREAS DATA

SECTION III. ENVIRONMENTALLY SENSITIVE AREAS

A. DOUBLE CREEK WATERSHED

The Double Creek Watershed is located chiefly east of US Route 9 in the northeastern sector of Barnegat Township. The wetlands adjacent to the south of the lagoons at Pebble Beach are connected to the estuarine waters of Double Creek.

Many small fresh water tributaries empty into Double Creek and its counterpart to the south, the Gunning River fresh water wetland and estuary. These tributaries are noteworthy in having a vegetative cover of wetland forest (PF401). This deciduous wetland forest is several thousand acres in area extending southward beyond Taylor Lane into Stafford Township.

Some remnants of the originally more extensive fresh water Atlantic White cedar wetland forests (PFO4) are also present in these two watersheds. One of the more conspicuous Atlantic white cedar wetlands is in a northern tributary of Double Creek. It is located at US Route 9 about 0.15 miles north of Rose Hill Road.

Vegetation, Flora and Fauna of The Watershed

Vegetation of Deciduous Wetland Forests and Associated Areas

Wetlands

This deciduous wetland forest is dominated by trident red maple (**Acer rubrum**). Relatively few of the other tree species commonly associated with deciduous wetland forest are present. These are black gums (**Nyssa sylvatica**, American holly (**Ilex opaca**) and swamp magnolia (**Magnolia virginiana**). Where land disturbance has occurred, and on upland edges, black cherry (**Prunus serotina**), sassafras (**Sassafras albidum**) and gray birch (**Betula populifolia**) are usually found.

In the understory shrubs and vines, the most frequent species encountered are high blueberry (**Vaccinium corymbosum**), arrowwood (**Viburnum dentatum**), Japanese honeysuckle (**Lonicera japonica**) and grape (**Vitis labrusca**). Much of the wetlands, especially at the edges, is unfavorably impacted by the ground-covering Japanese honeysuckle, a pervasive vine which strongly inhibits the growth of native herbs.

Vegetation of the Atlantic White Cedar Wetland Forest

This area is dominated by Atlantic White Cedar (**Chamaecyparis thyoides**) along with occasional Pitch Pine (**Pinus rigida**) and red maple (**Acer rubrum**).

An inspection of this area provides evidence of adverse environmental impact by the considerable amounts of deposited soil materials as sediment along with much accumulated trash from Route 9. Many young trees (5 - 10 years of age), mostly white cedars, have been killed either from pollution or from frost.

This smaller tributary is notable in that there is a population of nearly one hundred plants of the endangered plant species known as swamp pink (**Helonias bullata**). This tributary must be protected from continuing pollution from storm water runoff. The presence of the swamp pink makes imperative the designation of this wetland an **environmentally sensitive** area requiring special protection measures.

Uplands

The open uplands, apparently succeeding from open field areas following former agricultural activity, are dominated by redcedars (**Juniperus virginiana**) and the black cherry, while oak species have matured to form a considerable canopy in smaller sections. The oaks include willow oak (**Quercus phellos**) with post oak (**Q. stellata**), white oak (**Q. alba**) and southern red oak (**Q. falcata**). Most frequently occurring shrubs are the upland sumac (**Rhus copallinum**) along with scrub oak (**Quercus ilicifolia**).

Fauna of the Watershed

The presence of common herptiles, birds and mammals is documented in the species lists shown in the original inventory. The Atlantic white cedar wetland forest and the large deciduous wetland forest area contiguous to the east and to the south are known to be the breeding and foraging area for two threatened species, the great blue heron (**Ardea herodias**) and the barred owl, (**Strix varia**).

The barn owl (**Tyto alba**), has been reported from the wetland forests and their upland borders. It is likely that the red-tailed hawk (**Buteo jamaicensis**) and the great horned owl, (**Bubo virgianus**) are also breeding and foraging in these extensive wetlands. Some of this area is already part of the Forsythe Natural Wildlife Refuge. Preservation of these valuable coastal wetland forests is greatly to be desired. They should be designated as an **environmentally sensitive area**.

B. GUNNING RIVER WATERSHED

The Gunning River system has three upland tributaries and an extensive estuarine complex lying south of the Double Creek system. The extensive freshwater forests and the estuary are known to be foraging and perhaps nesting places for the bird species described for the Double Creek watershed. The presence of the barred owl was confirmed along Taylor Lane by the antiphonal responses of male and female to broadcast recordings of the call of that species.

No additional plant species have been detected here.

C. LOCHIEL BROOK (CREEK) WATERSHED

This extensive system drains most of the northern sector of the Township between the Garden State Parkway and US Route 9. It originates in two steep-sided drainage valleys, one "arm" rising near Barnegat Boulevard and the other in the Lincoln Heights sector near Hamilton Road, an unimproved earthen road. They flow northeasterly toward an abandoned cranberry bog whose northern edge is close to the township's northern boundary. Here an all-weather stream drains to a more extensive wetland in which the Barnegat-Ocean Townships' boundary is located. The Lochiel Creek ultimately enters Barnegat Bay at Pebble Beach.

VEGETATION OF THE WETLAND SYSTEM

The upper drainage wetlands in both "arms" are tree covered and classed as **deciduous wetlands forests** (specified as **PFO1** and **PFO1/4** in the National Wetlands Inventory Classification system). Principal tree species are sour gum (**Nyssa sylvatica**) and red maple (**Acer rubrum**); pitch pines (**Pinus rigida**) are present mostly at the edges of these wetlands. Understory shrubs are chiefly high blueberry (**Vaccinium corymbosum**) and sweet pepperbush (**Clethra alnifolia**). The ground cover is dominated by cinnamon fern (**Osmunda cinnamomum**) and (**Sphagnum spp.**) peat mosses.

The soils underlying these wetlands is the hydric series known as **Atsion** which gives way to **Manahawkin Muck** downstream.

Approximately 0.3 miles north of Rose Hill Road the wetland zone increases in width from 200 feet to 400 feet or more while the vegetation changes from forest cover to a scrub shrub and herbal wetlands in which the shrubs and herbs emerge from what is usually standing water. This vegetation complex, known as **PSS1/EM**, is not distinguished on the National Wetlands Inventory

map, but this classification is shown further downstream. Map # 1 shows these wetland classifications.

Inasmuch as one proposed alignment of Barnegat Boulevard extension crosses and bisects this open wetland area at a place which seems to be a former dike, the dike and surrounding wetlands were investigated. The open upstream area of wetland is inferred to have been a former cranberry bog reservoir; the wetlands downstream portion to a second dike and road crossing are obviously abandoned cranberry bogs.

In the standing water of the reservoir are numerous herbs, some of them growing on tussocks formed by sedges such as Howe's sedge (**Carex howei**) and coast sedge (**Carex exilis**). Shrubs such as the red chokeberry (**Aronia arbutifolia**) and lambkill (**Kalmia angustifolia**) also find a supporting habitat on the tussocks. In the standing water the dominant herbs are water willow (**Decodon verticillata**) and blunt manna grass (**Glyceria obtusa**). The presence of dead sour gum and red maple trees suggests the rise of water levels in this "reservoir" in the relatively recent past.

North and downstream from the "reservoir" area, the stream channel and wetland are again forested with a dominantly deciduous species complex (PFO1). Several small streams, either spring or seep fed, flow into the broader wetland corridor, which is at least 800 feet in width; it also receives water from a smaller northwestern wetland tributary which merges with the main stream in the cranberry bog.

Downstream, in the former cranberry bog, the Atlantic white cedar (**Chamaeccyparis thyoides**) is dominant, with older trees at the edges and younger trees and saplings centrally located. Some of the central open "old bog" is covered by standing water and two dominant "colonial" sedge species,Walter's sedge (**Carex walteriana**) and button sedge (C. **bullata**). This shallow open water with its herbaceous cover and young cedar trees makes the presence of the pine barrens treefrog (**Hyla andersoni**) likely. A rich diversity of **Sphagnum** (bog or peat moss species) is here also.

Downstream from a road-covered dam which forms the northern terminus of the cranberry bog, the Lochiel Creek corridor is heavily forested with a mixture of evergreen and deciduous species. As it flows eastward,toward US Route 9, the Lochiel Creek forest is predominantly evergreen (Atlantic white cedar) close to the abandoned Tuckerton Railroad right of way. East of Route 9, some of the wetland has been filled and developed. The remainder is a deciduous forest to the Pebble Beach residential lagoon area.

D. MILL CREEK DRAINAGE SYSTEM

FOUR MILE BRANCH

The headwaters of this stream are located south of Bay Avenue and west of the Garden State Parkway. A smaller eastern branch rises west of Lighthouse Drive, while the larger western branch rises a mile or more west of Nautilus Drive.

Both branches have relatively narrow (150 to 300 foot) channel widths with relatively steep banks apparently produced by the eroding effect of the streams on the gravelly Downer and Woodmansie soils. A series of operating cranberry bogs has been developed in the westernmost portion of the larger branch.

VEGETATION OF THE FOUR MILE BRANCH

Atlantic white cedar (**Chamaecyparis thyoides**) is dominant in many sectors of the stream both upstream and downstream from the cranberry bogs. Where the cedar has not recovered from lumbering, black gum (**Nyssa sylvatica**) and trident red maple (**Acer rubrum**) are found in larger or smaller populations. These forests provide dense shade reducing the likelihood of the occurrence of endangered or threatened plant species.

Numerous roadways and cul-de-sacs, chiefly unpaved and without residential development have provided some disturbance and soil deposition in the streamway. Some of the roadways have been paved and have a scattered residential component. At some of the stream crossings, some clearing of the stream channel has occurred. These openings raise the possibility for endangered plant species to be present now or in the future.

THREATENED AND ENDANGERED SPECIES

The occurrence of the barred owl, the great blue heron and the pine snake, each with a threatened status, is likely in one or more locations in this extensive wetland system. No verification has yet been made. The same is true for endangered or threatened plant species.

EIGHT MILE BRANCH

A tiny portion of the Eight Mile Branch of Mill Creek rises at the southern Township boundary with Stafford Township. This stream flows through the Fawn Lakes community and thence eastward on the south side of Route 72. No threatened or endangered species are known in this small stream area.

MILL CREEK MAINSTEM

This stream also rises in south central Barnegat Township just north of the Brighton at Barnegat settlement. It has a small area within the Township; its main drainage area is within the Township of Stafford. No threatened or endangered species are known from these headwaters, although many are known downstream in Stafford Township.

E. OYSTER CREEK DRAINAGE

Just west of the Four Mile Branch headwaters, some of the drainage of Oyster Creek rises near the Lacey Township boundary. It is not significant in areal extent in Barnegat; no threatened or endangered species have been recorded from this area, although the probability for the presence of the pine snake is high.

F. OSWEGO (WADING) RIVER DRAINAGE

Headwaters of this system rise in Barnegat or Lacey Townships and thence through Little Egg Harbor and Bass River Townships to the Mullica River estuary and Great Bay. Nearly twenty square miles of Pine Barrens are drained by the several branches of this system which include the Yellow Dam Branch, the Sykes Branch and two branches of the East Branch of the Oswego River. The water quality in this system has remained acceptable and typical of Pine Barrens streams over a fifteen year testing interval between 1977 and 1992. See Table I, page 3.

In the Sykes Branch sector, which is distinguished by the presence of a large area of dwarfed trees known as the West Plains or pygmy forest, an upland rare plant species known as the broom crowberry (**Corema conradii**) is located. It has been classed as a State of New Jersey endangered species (S-2) by the NJDEPE Office of Natural Heritage.

On the Yellow Dam Branch near County Route 539 the rare plant species, Pine Barrens Gentian (**Gentiana autumnalis**) has been located. There is potential for the endangered plant species Knieskern's Beaked Rush, (**Rhyncospora knieskernii**) and the Pine Barrens Reedgrass, (**Calamovilfa brevipilis**), but their presence has yet to be verified.

Similarly, this watercourse and its associated wetlands have the potential (still unverified) for the pine snake and the barred owl. In 1989, the pine barrens trefrog (**Hyla andersoni**) was noted in this watershed close to the intersection of County 539 and State Road 72.

Much of the Yellow Dam Branch northwest of County Route 539 has been acquired as public land by the Division of Fish & Game of the NJ DEPE and incorporated as part of the Greenwood Forest Wildlife Management Area. It is desirable that all of this ecologically unique area be preserved as a valuable habitat for both plants and animals.

TABLE II

RARE, THREATENED OR ENDANGERED SPECIES IN BARNEGAT TOWNSHIP

COMMON OR COLLOQUIAL NAME	SCIENTIFIC NAME	THREATENED OR ENDANGERED STATUS *
	Plants	
Swamp Pink	Helonias bullata	G2, S2
Pine Barrens Gentian	Gentiana autumnalis	G3, S3
Broom Crowberry	Corema conradii	G3? S2
Pine Barrens Reedgrass ?	Calamovilfa brevipilis	G3 S3
	Animals	
Barred Owl	Strix varia	T
Great Blue Heron	Ardea herodias	T
Pine Barrens Treefrog	Hyla andersoni	E
Northern Pine Snake	Pituophis m. melanoleucus	T

* Key -- Plants
S--State Status G-- Global or World Ranking **
Animals
T -- Threatened E-- Endangered ?--Strong possibility, but still some uncertainty about status or occurrence in Barnegat Township

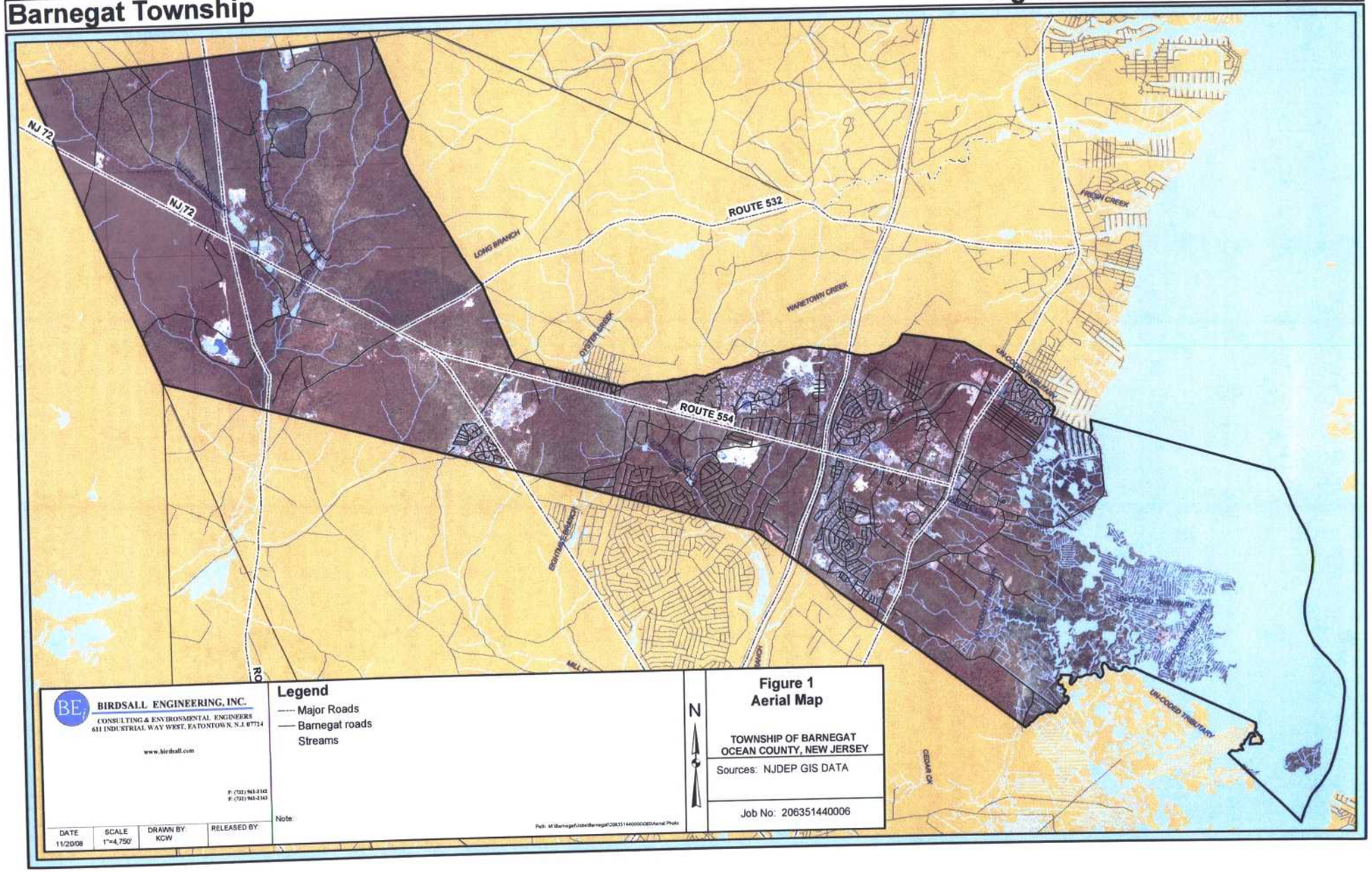
** a "2" status means 6 - 20 known occurrences
a "3" status means 21 - 100 known occurrences

Threatened means species which may become endangered if conditions around them begin to or continue to deteriorate.

Endangered means species whose prospects for survival are in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance or contamination. Assistance is needed to prevent future extinction in New Jersey.

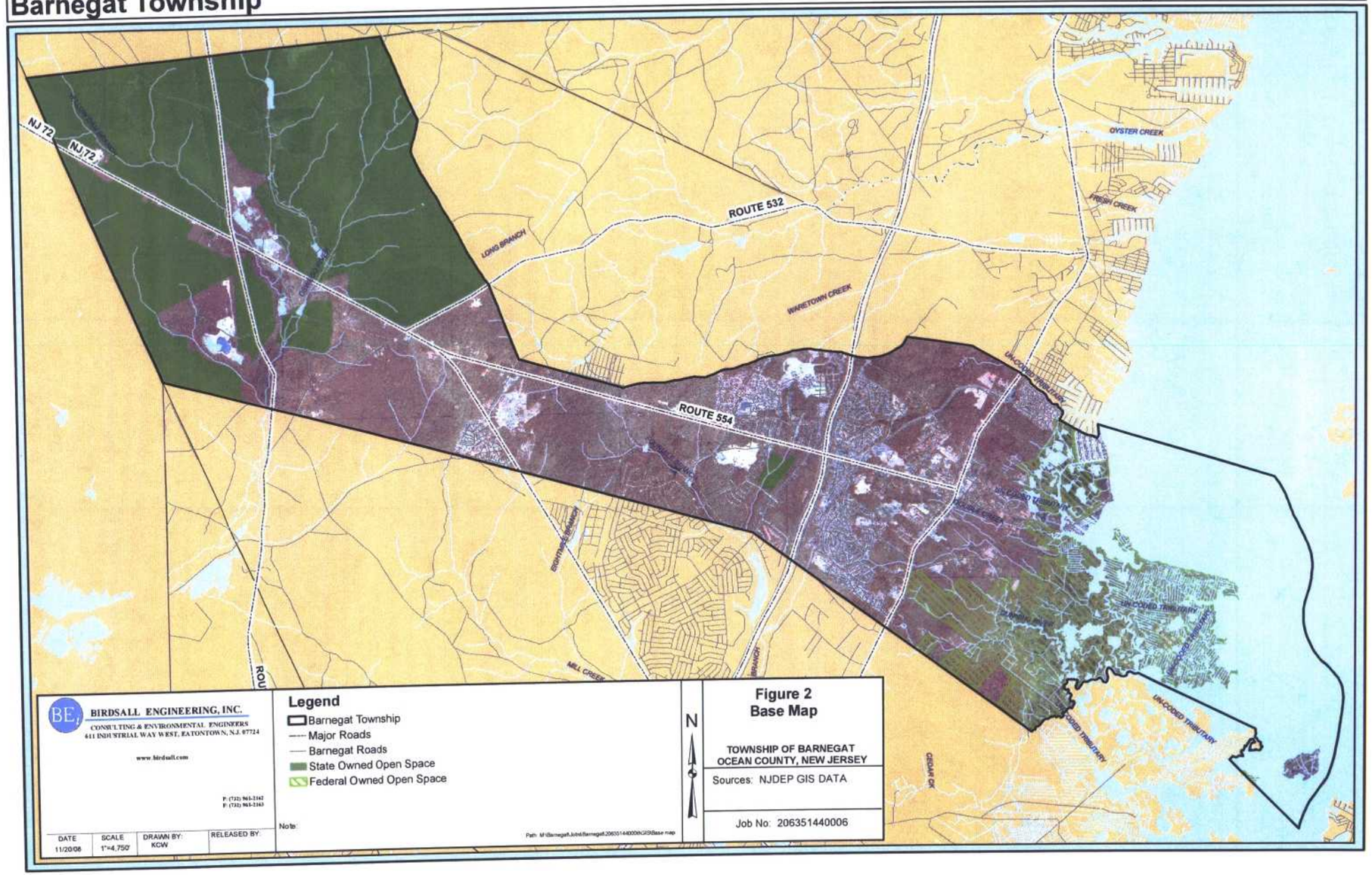
Barnegat Township

Figure 1: Aerial Photo (2002)



Barnegat Township

Figure 2: Base Map



Barnegat Township

Figure 3: USGS Topographic Map

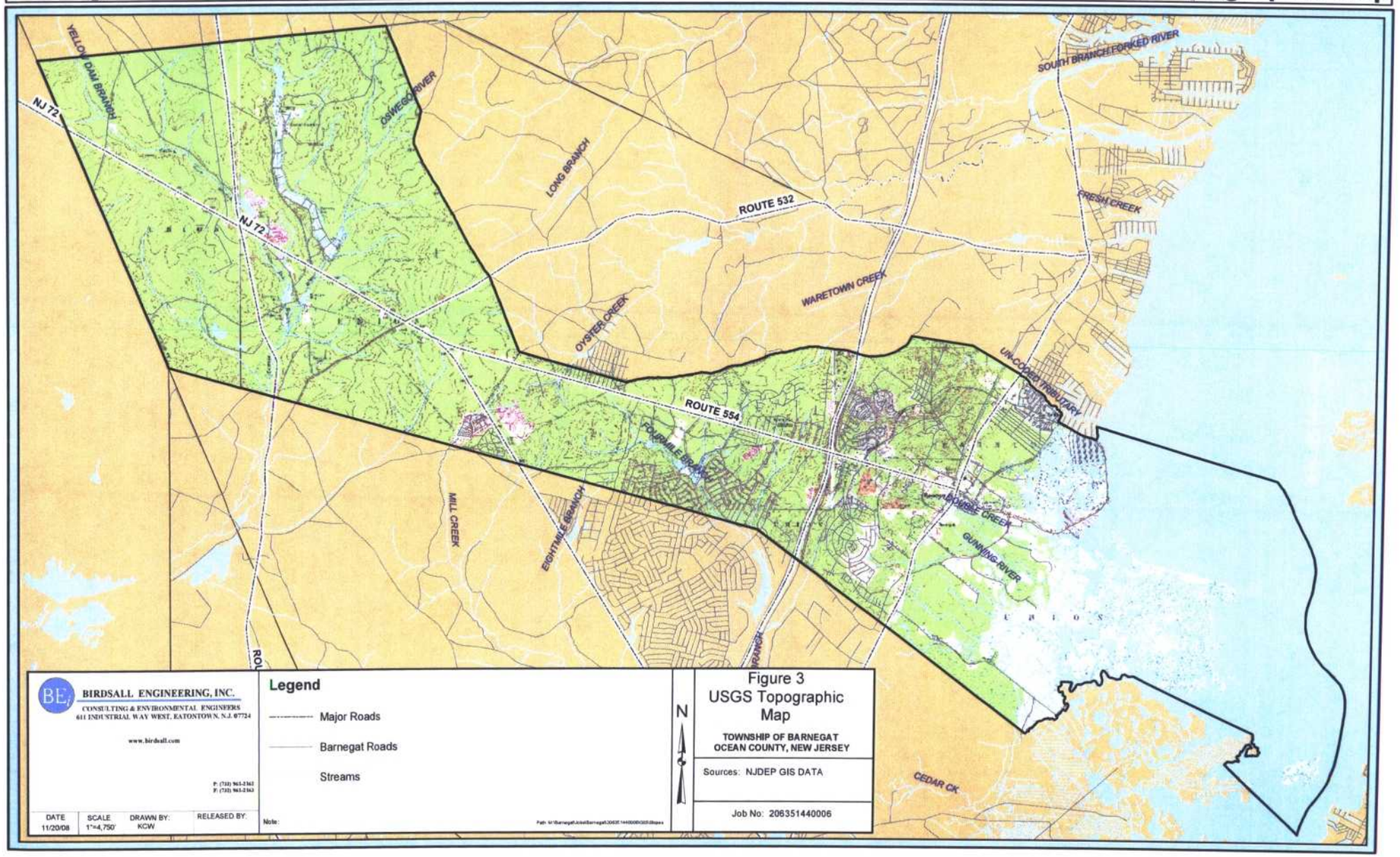


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Figure 4: Soils (2005)

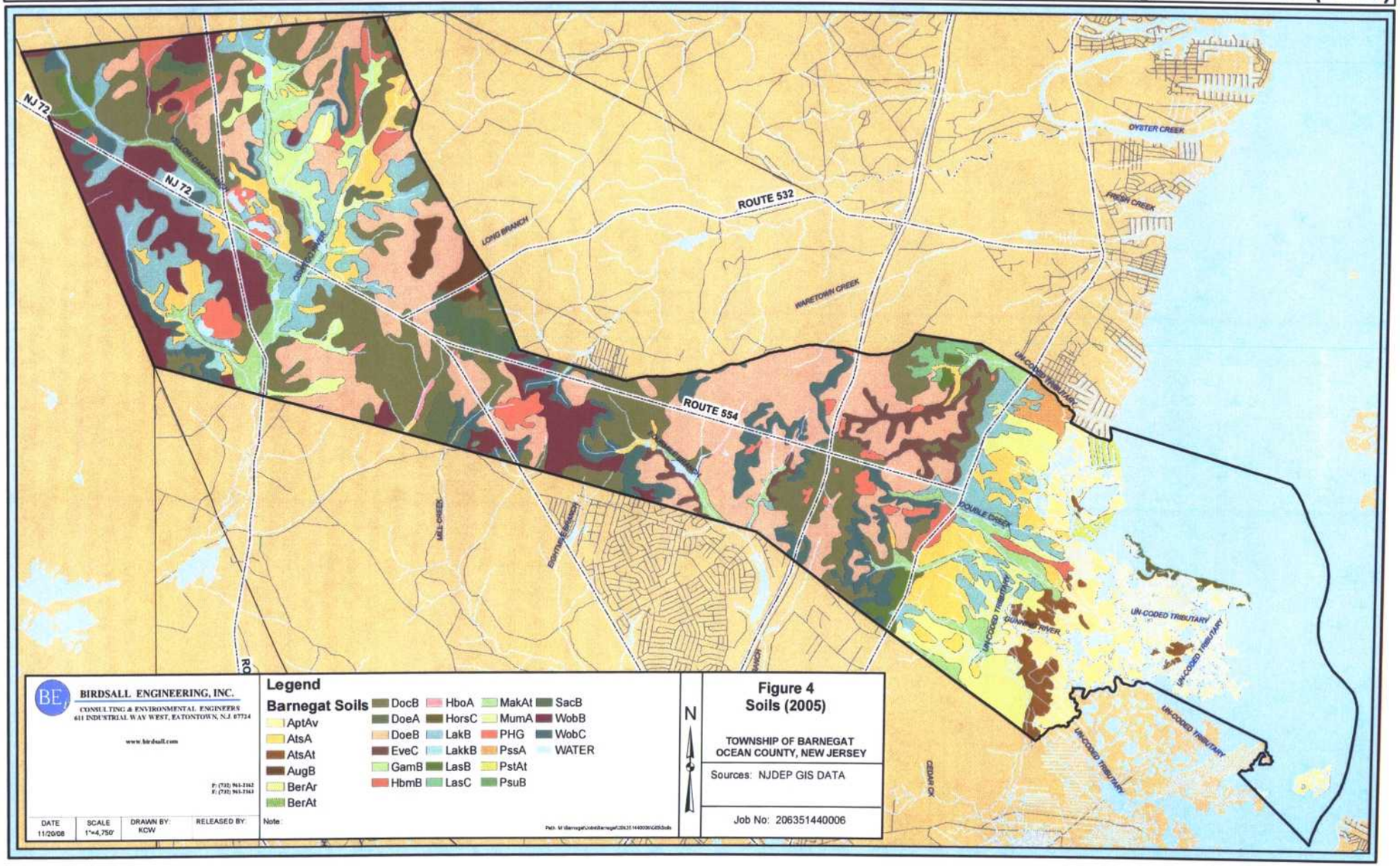

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Figure 5: Watersheds

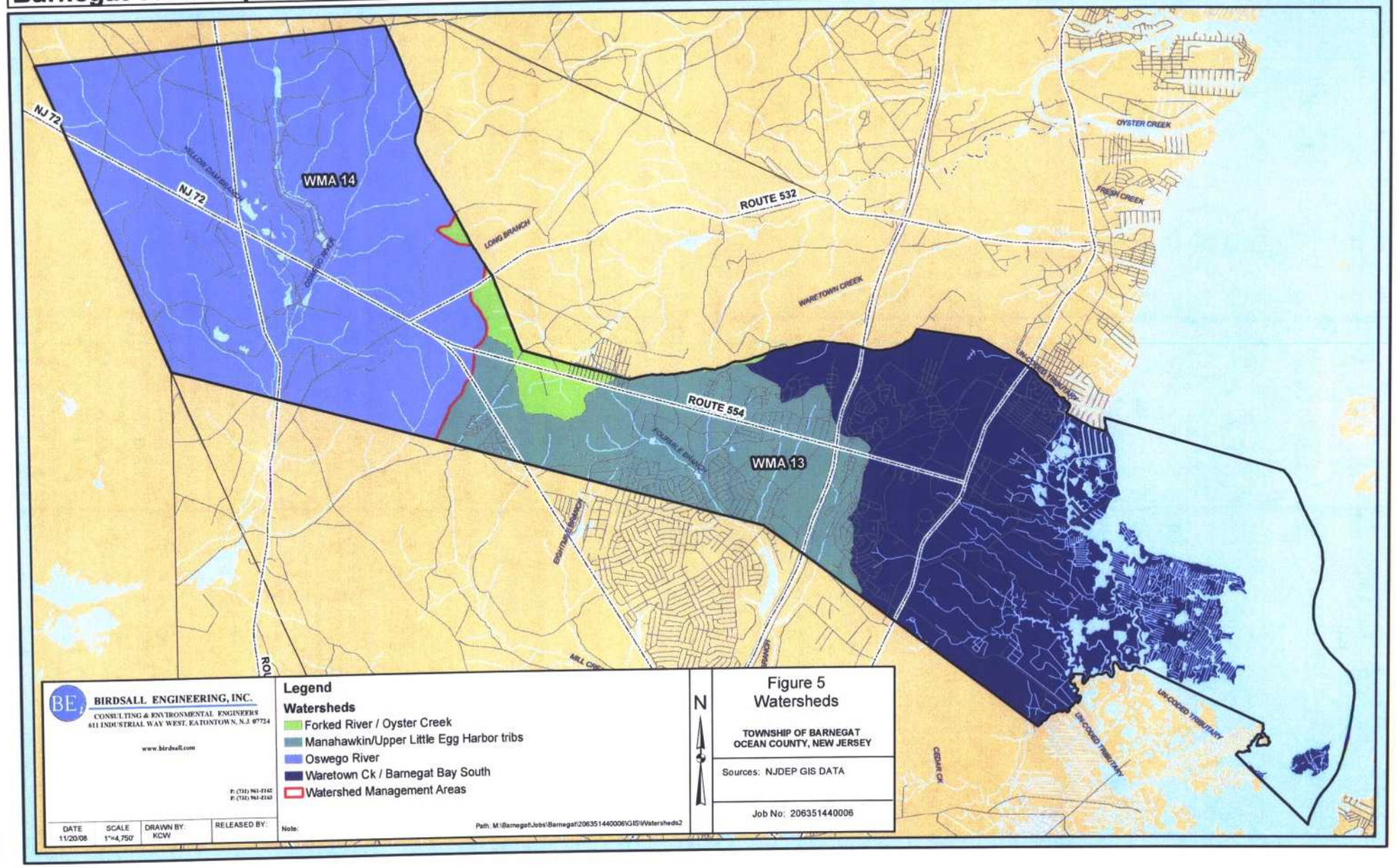

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Figure 6: Subwatersheds

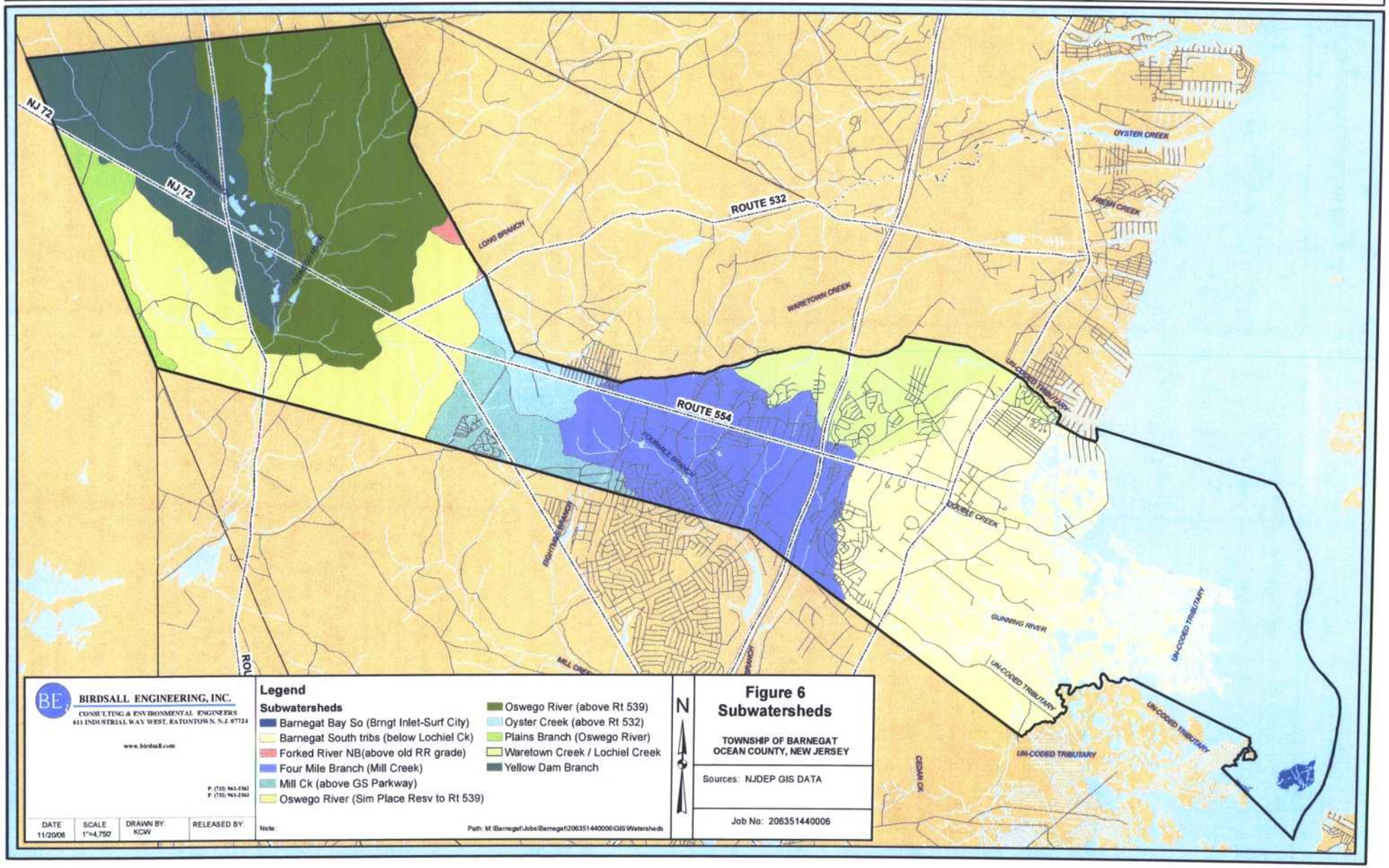

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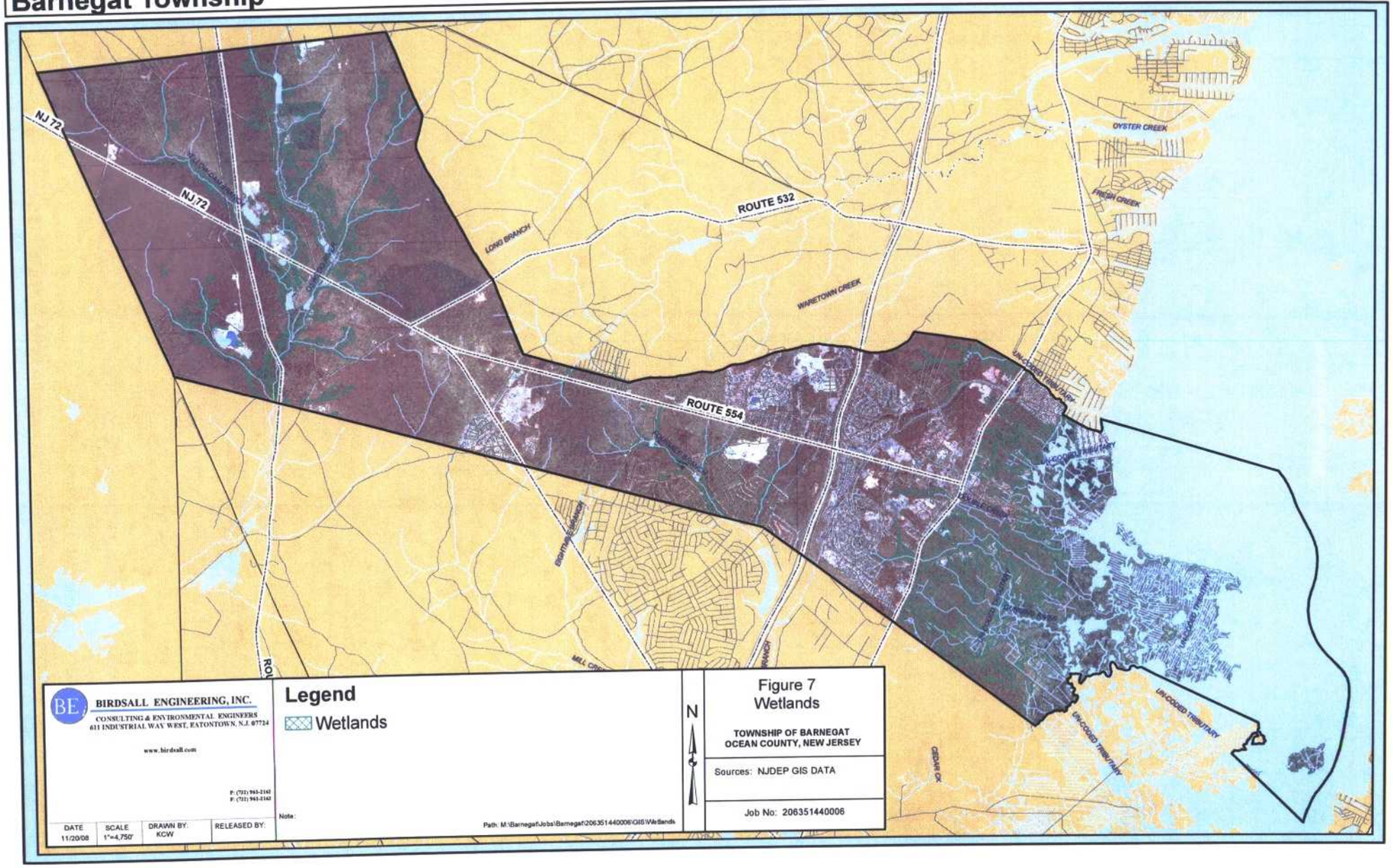
Figure 7: Wetlands



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DATE	SCALE	DRAWN BY:	RELEASED BY:
11/20/08	1"=4,750'	KCW	

Barnegat Township

Figure 8: Geology

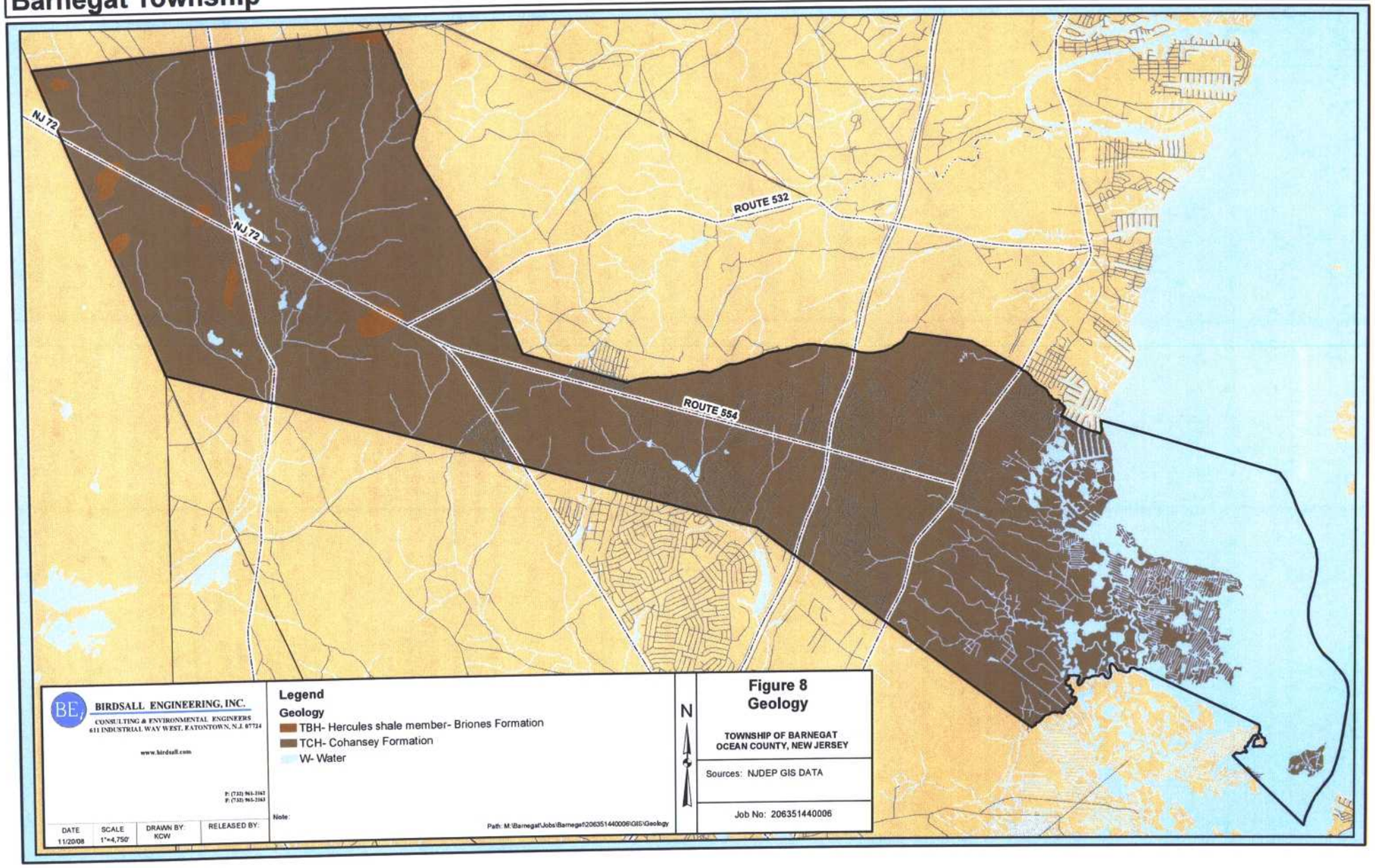

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Figure 9: Surface Water & C-1 Waterways

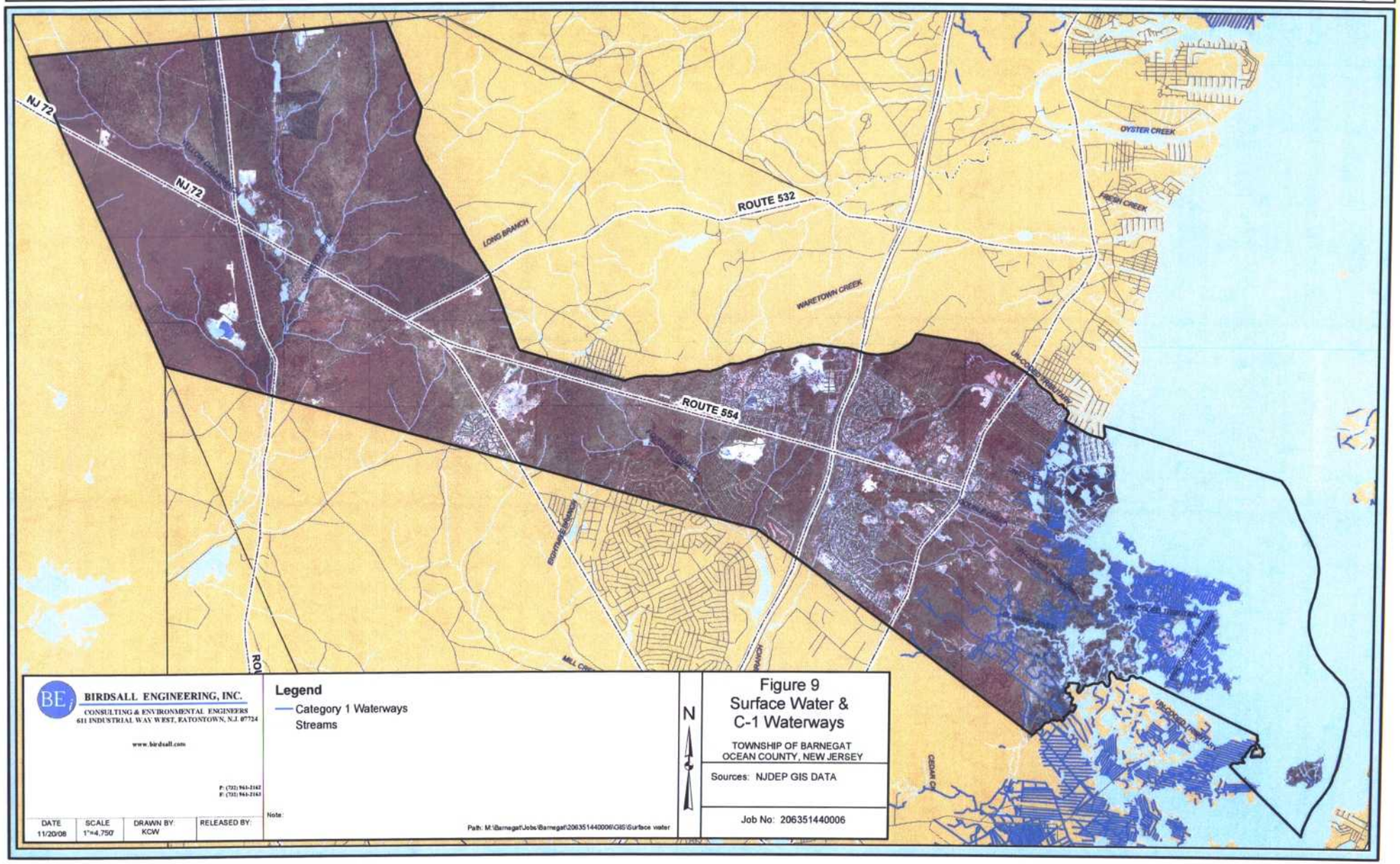

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Figure 10: Public Water Supply Wells

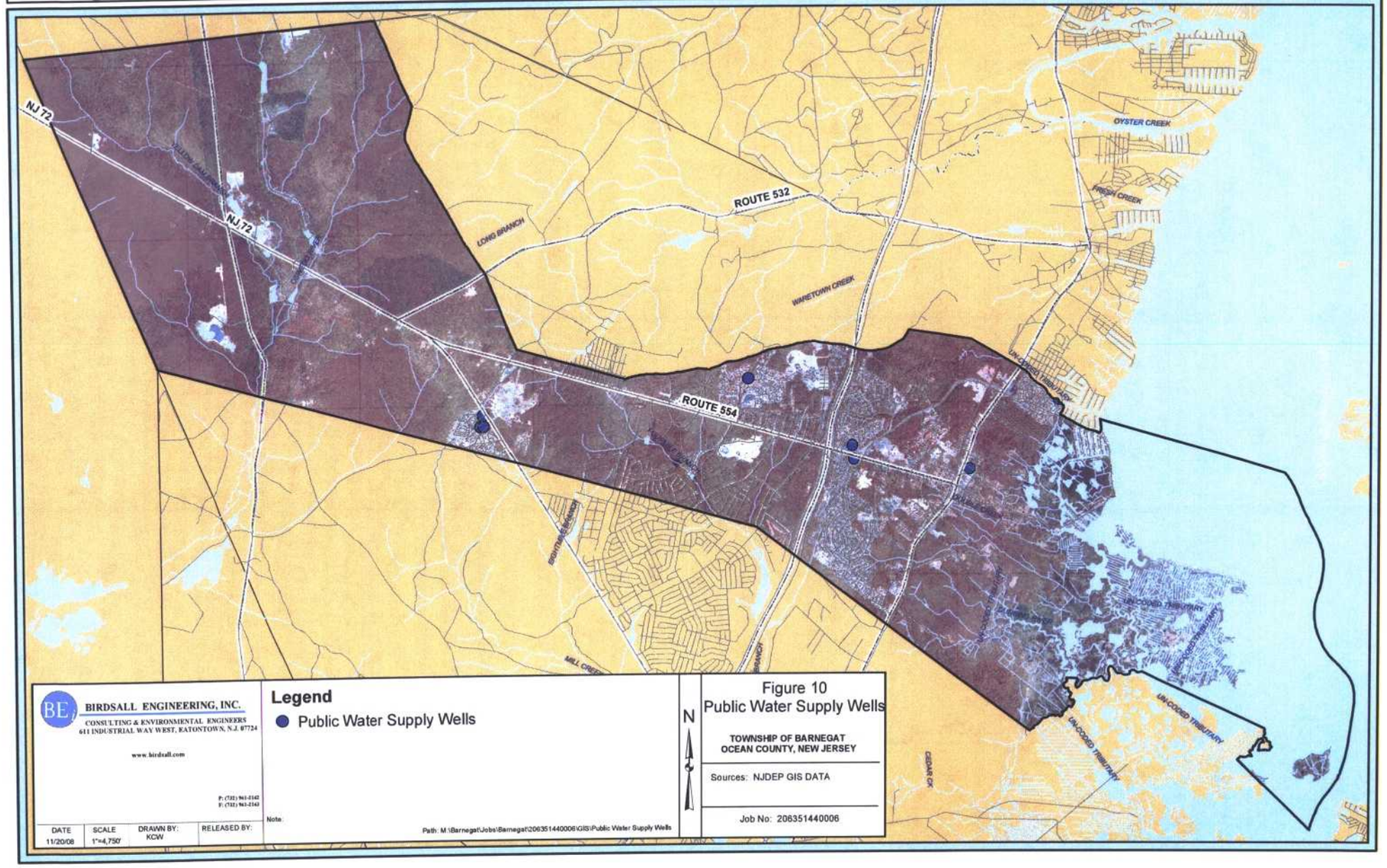

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Figure 11: Groundwater Recharge (Inches/year)

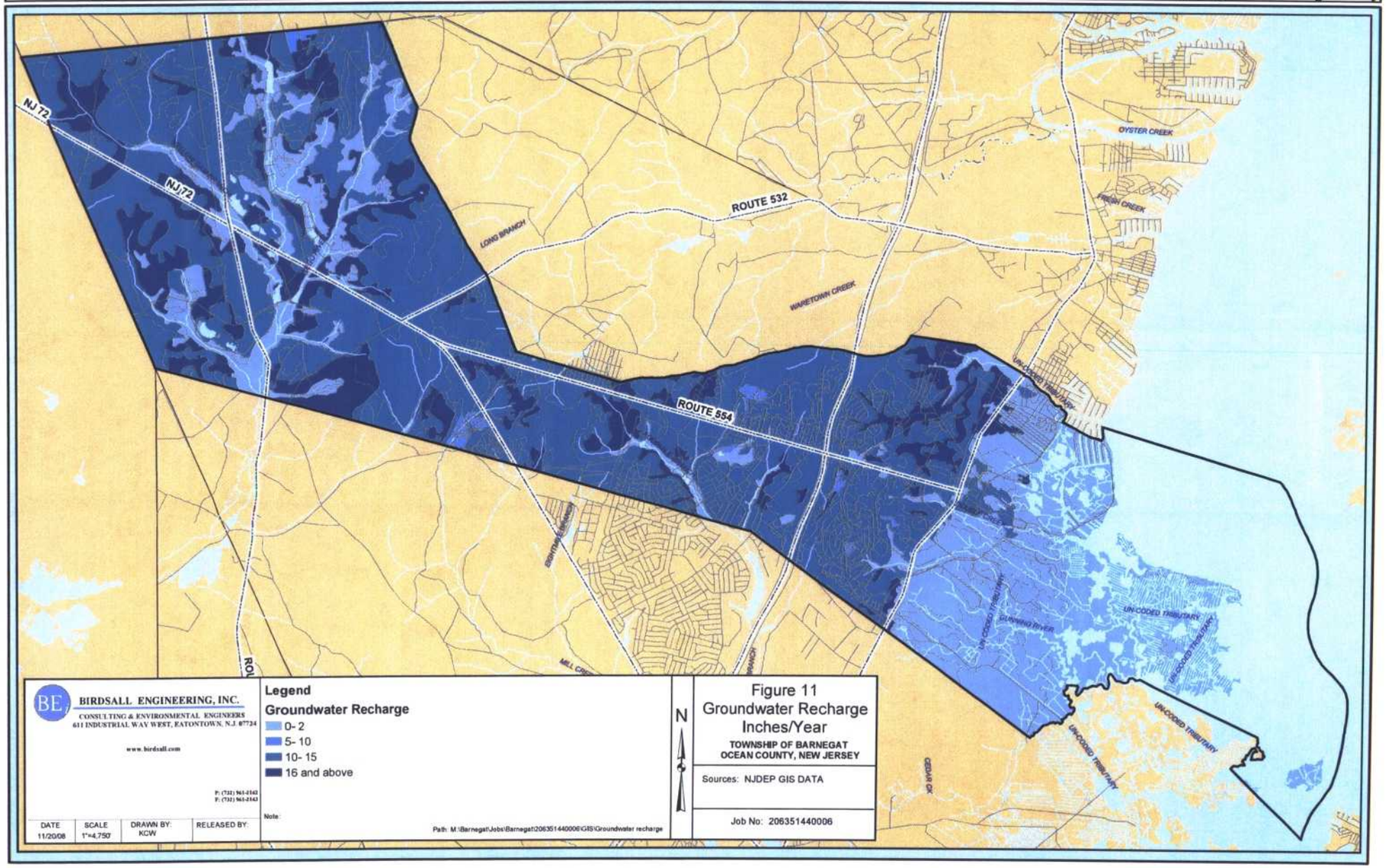

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Figure 12: Well Head Protection Areas

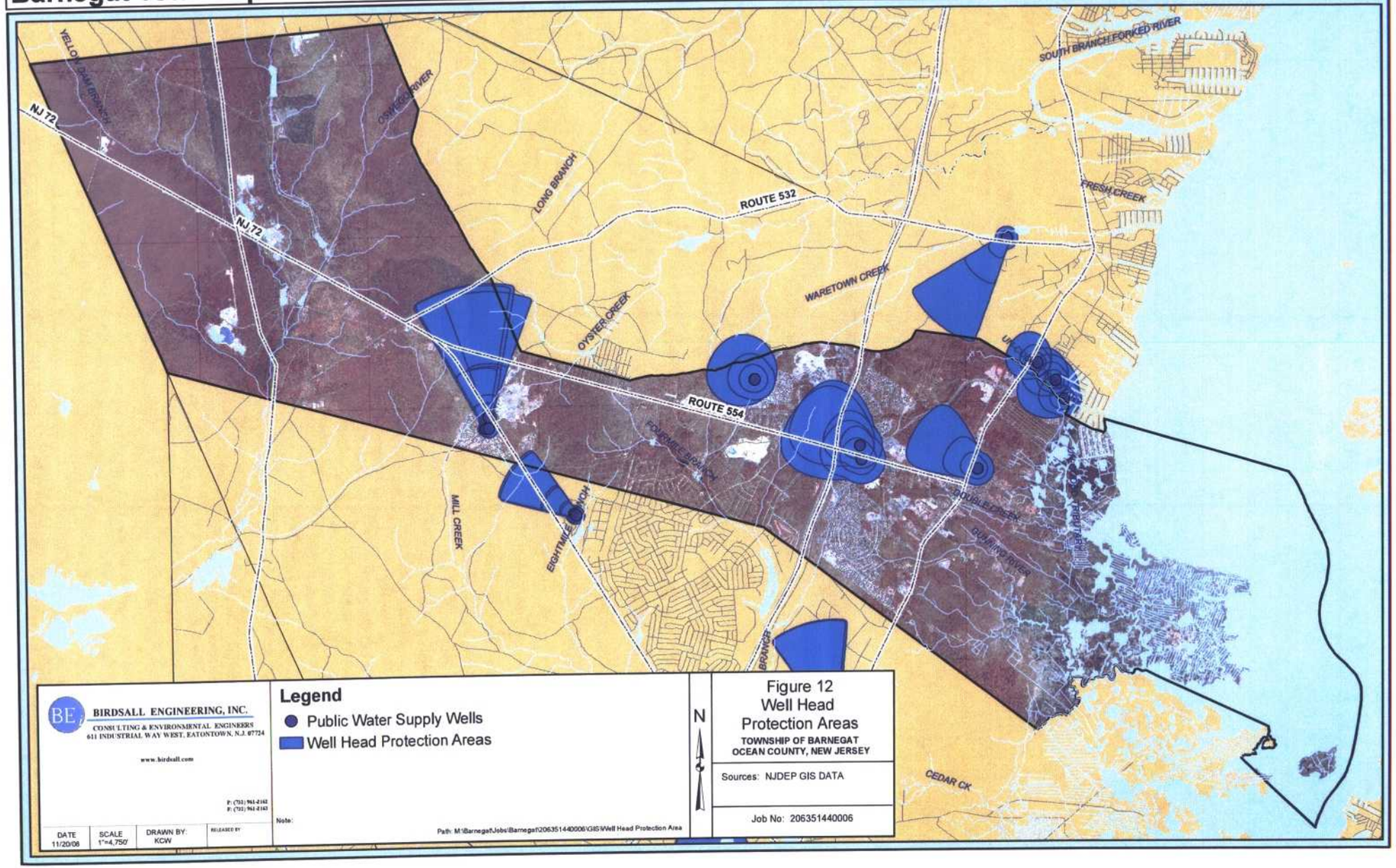

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Figure 13: Landscape Project

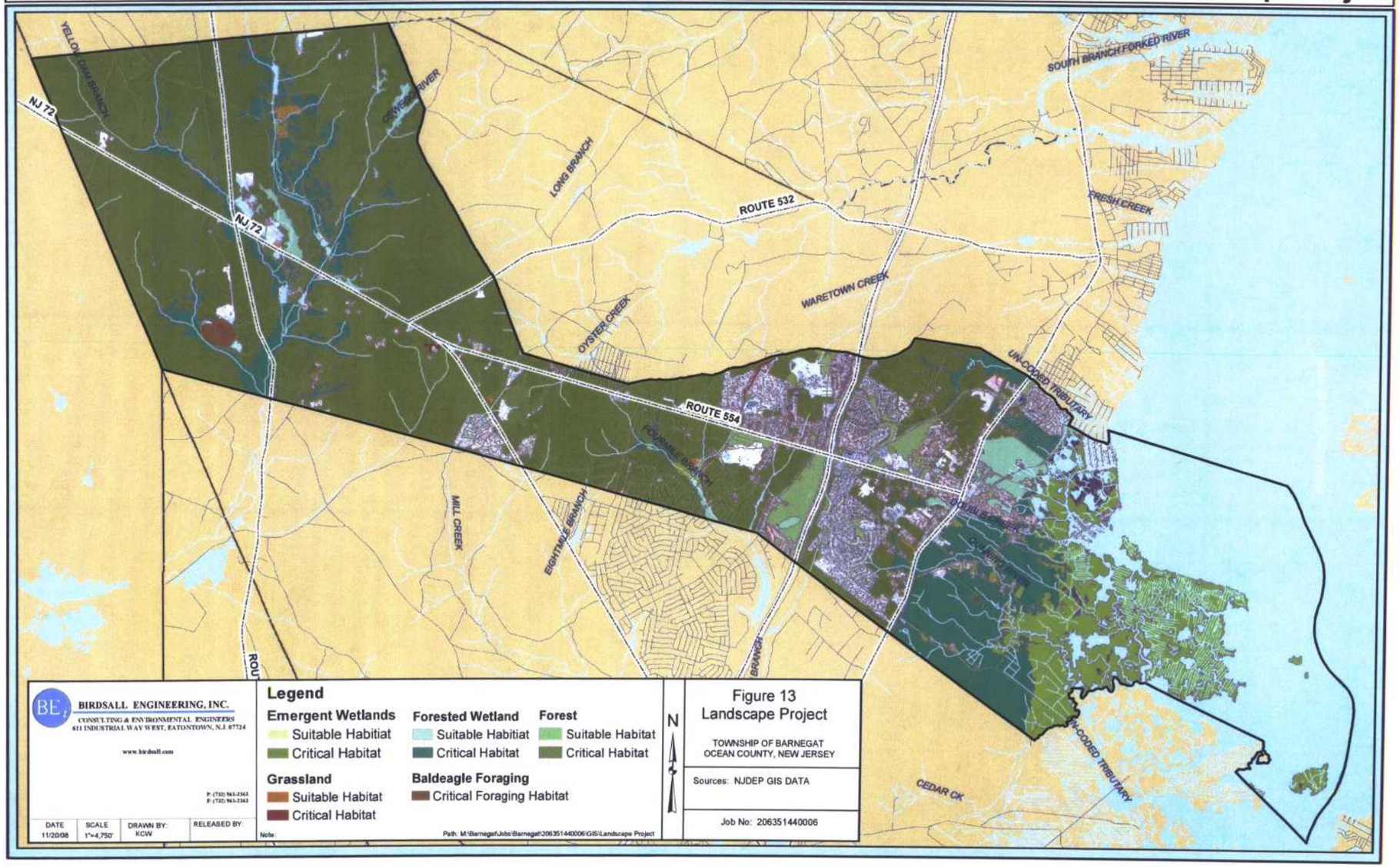

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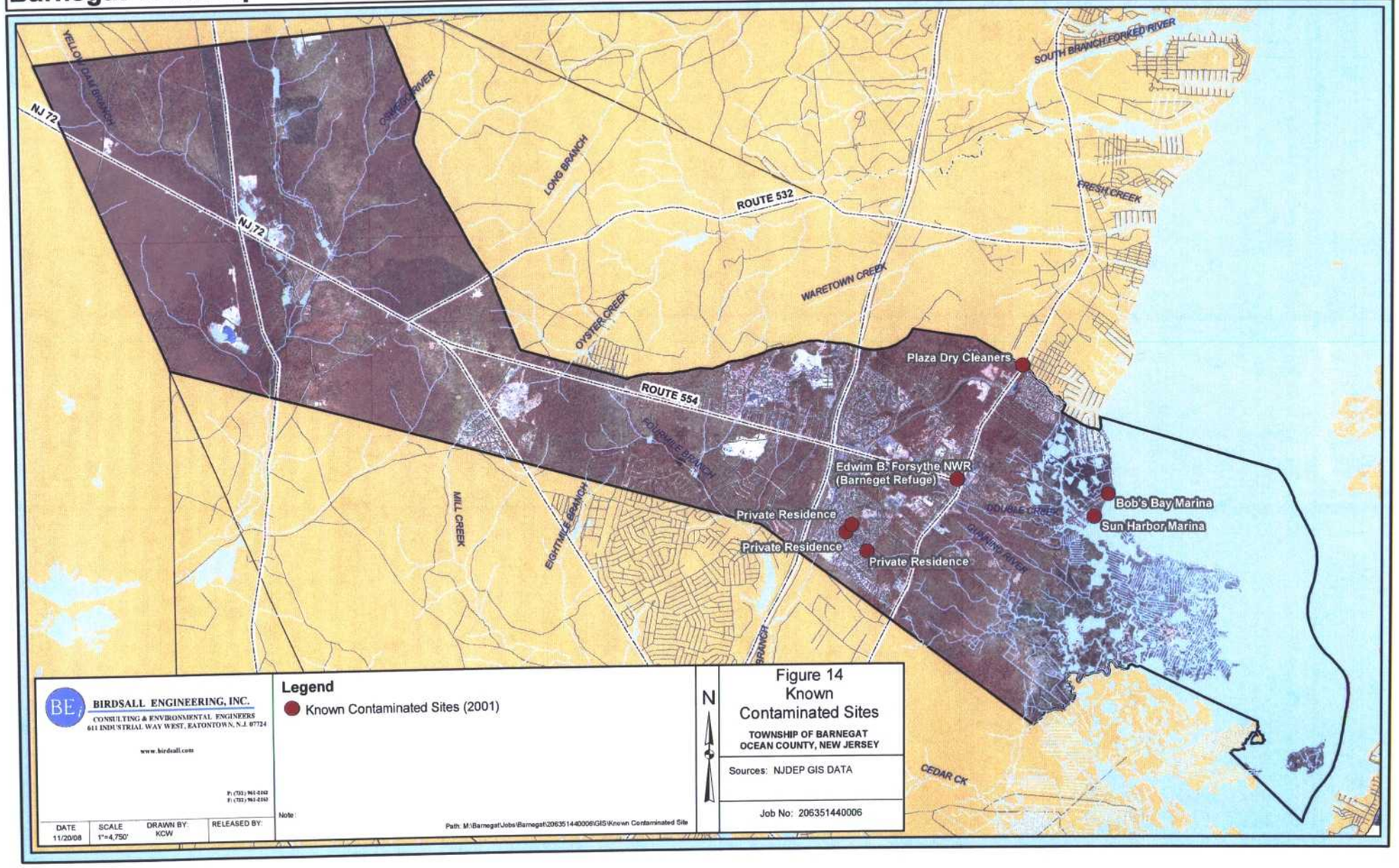
Figure 14: Known Contaminated Sites



Barnegat Township

Figure 15: Land Use (2002)

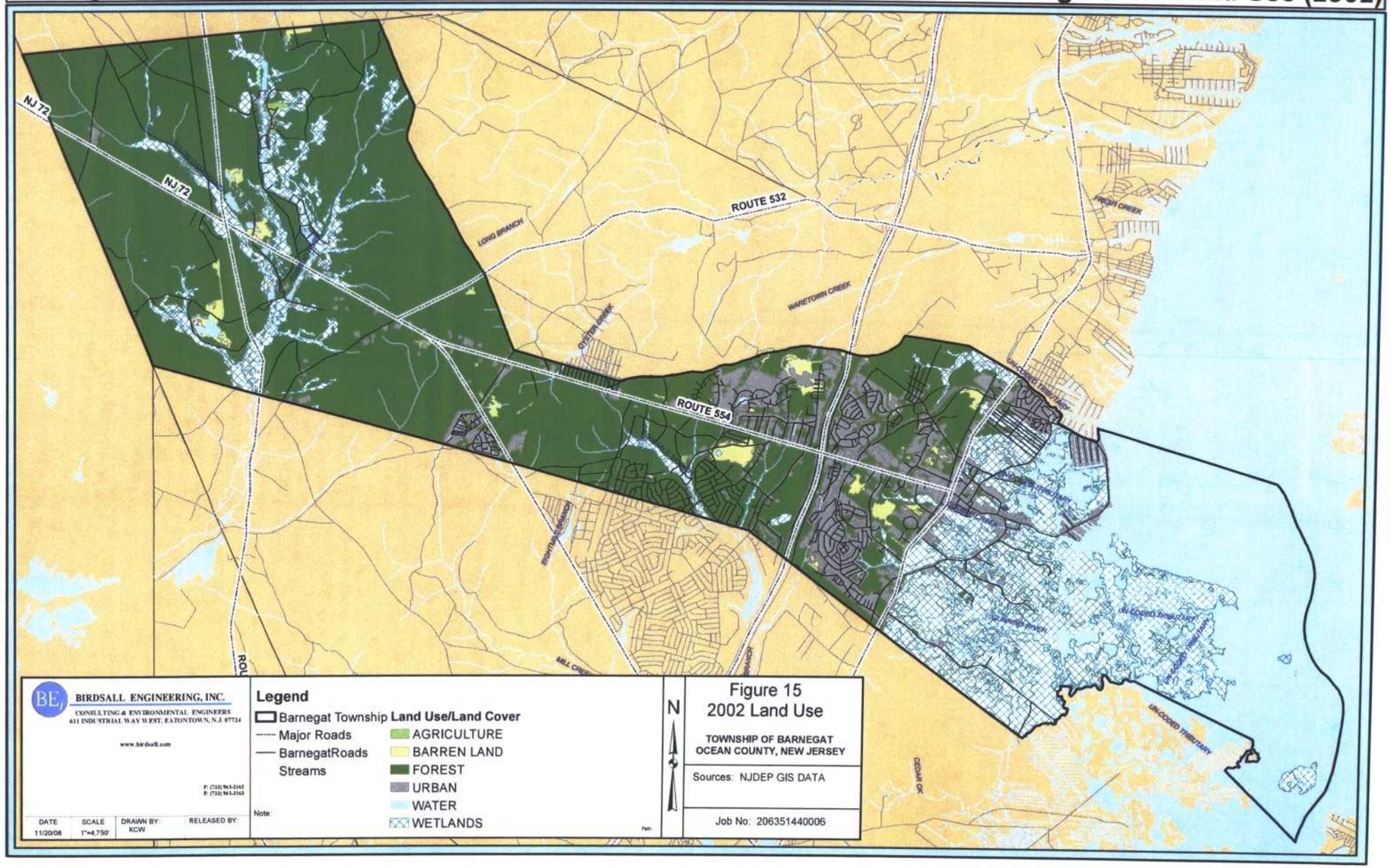


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Figure 16: State Development and Redevelopment Plan

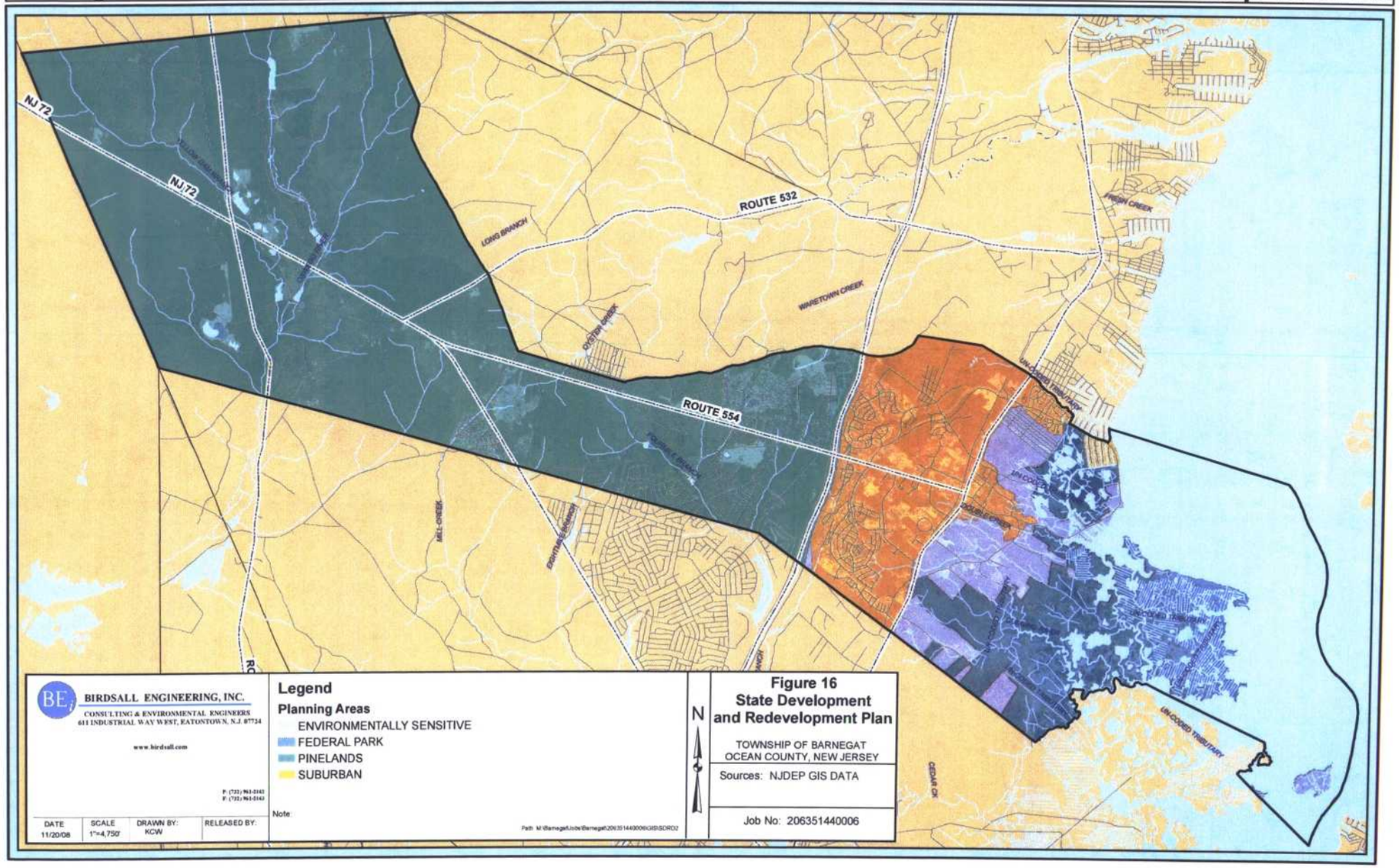

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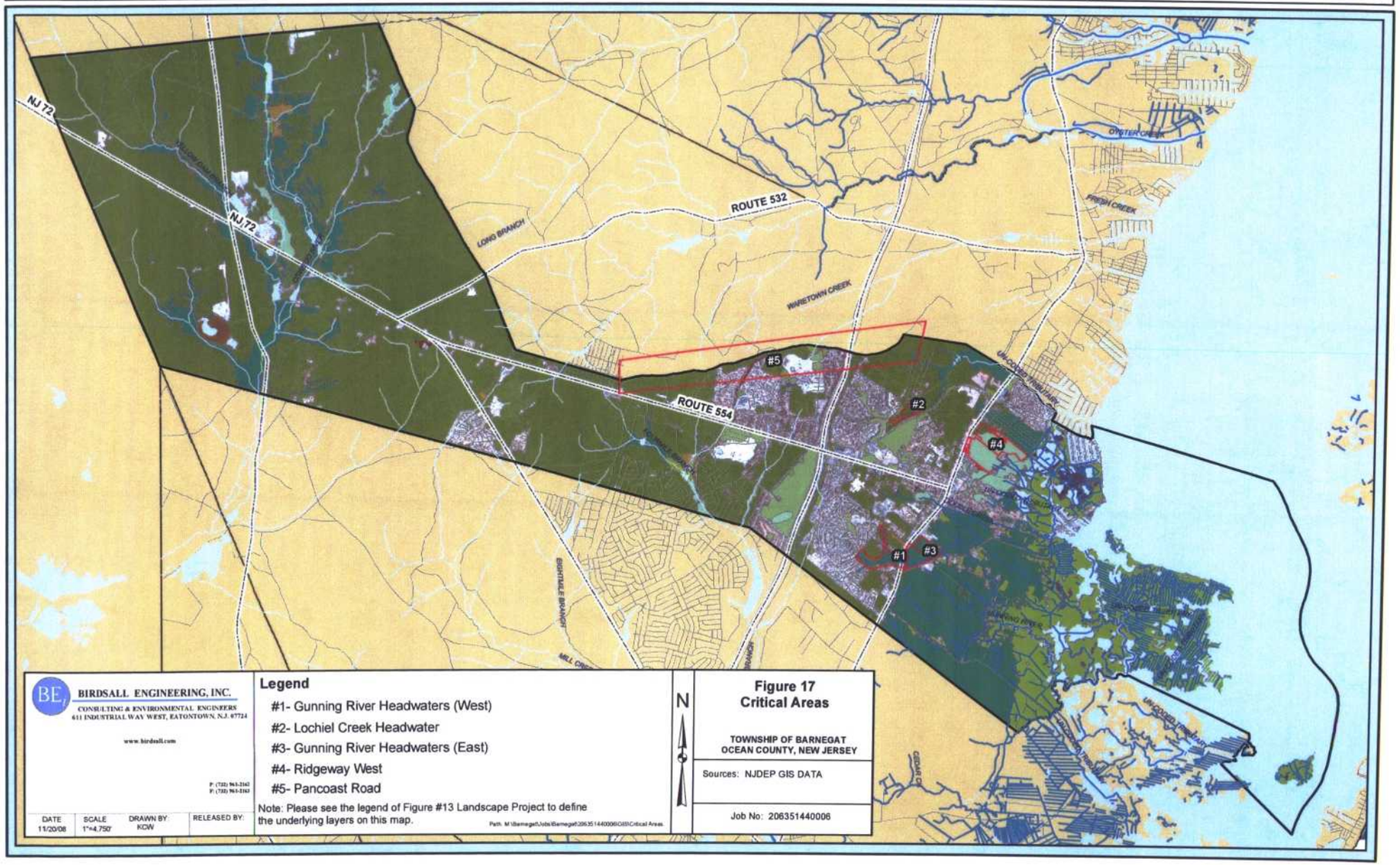
Figure 17: Critical Areas



Barnegat Township **Figure 18: Historic & Cultural Resources**

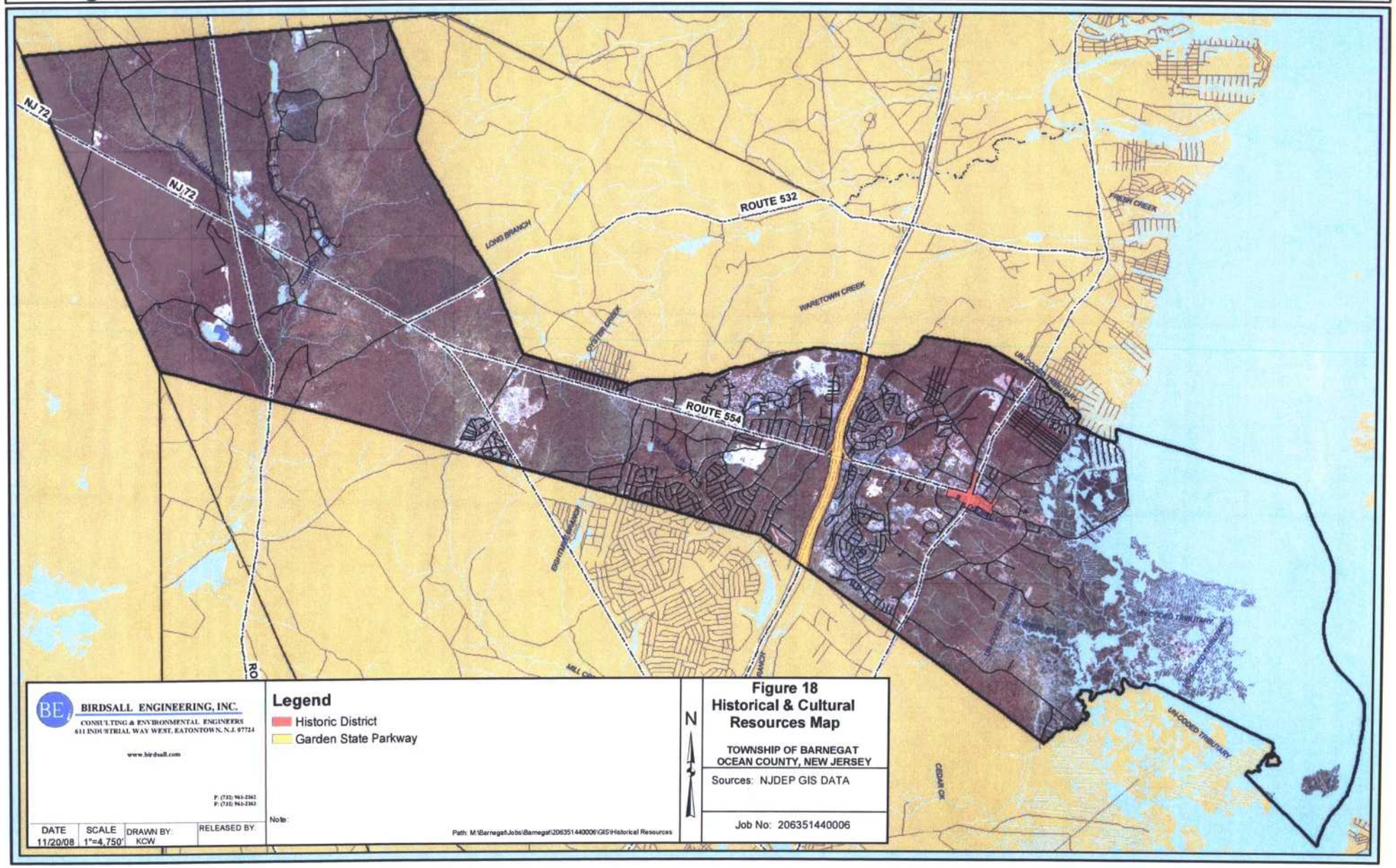


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Figure 19: Zoning