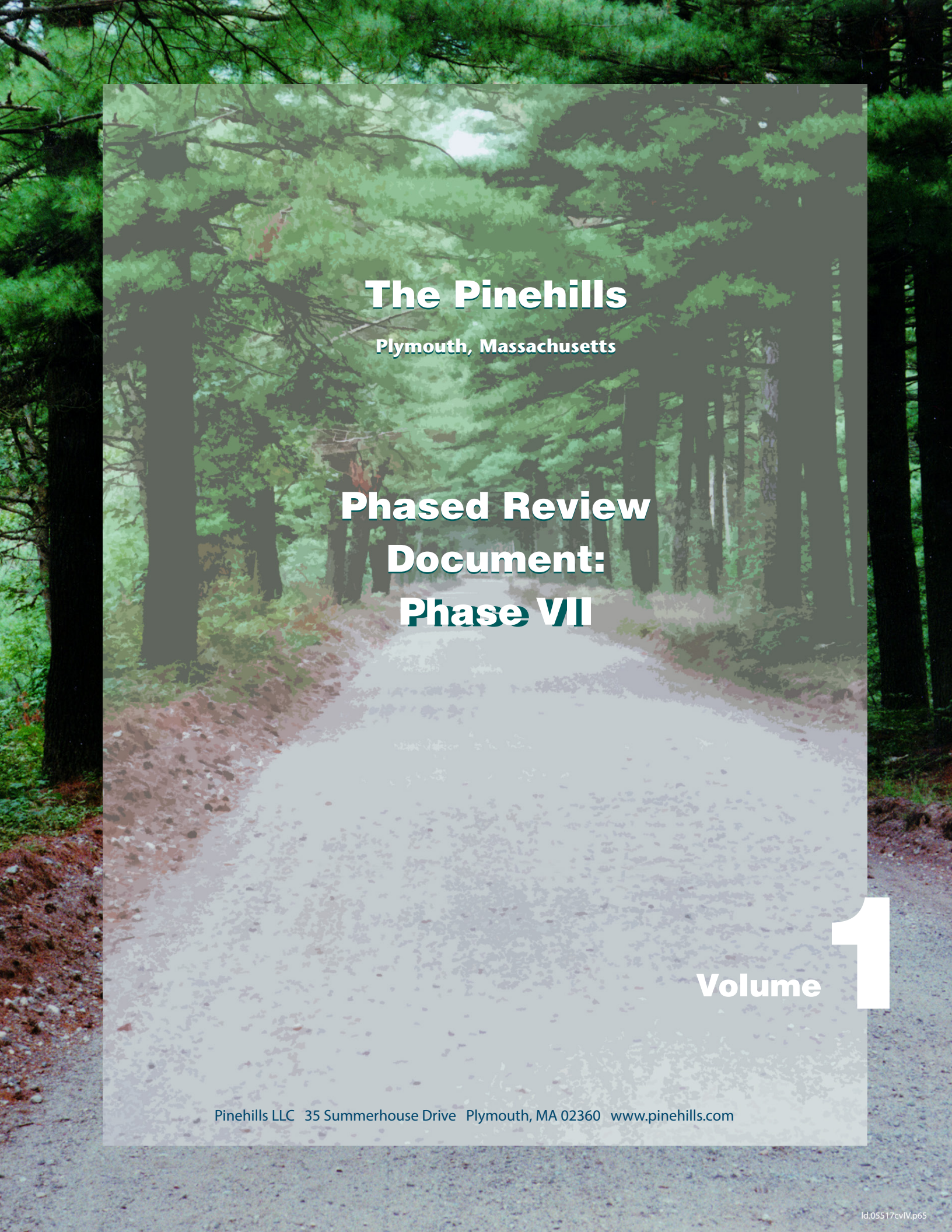


The Pinehills

Plymouth, Massachusetts

Phased Review Document: Phase VII

Volume 1

Pinehills LLC 35 Summerhouse Drive Plymouth, MA 02360 www.pinehills.com

Id.05517cvIV.p65

The Pinehills

33 Summerhouse Drive
Plymouth, MA 02360
Phone 508/209-9000
Fax 508/209-9050
www.pinehills.com

November 13, 2020

Kathleen A. Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: EOEA Number 11519
NPC10/PRD7

Dear Secretary Theoharides,

Pinehills LLC is pleased to submit this Notice of Project Change No. 10 (NPC 10) and Phased Review Document: Phase VII (PRD VII) for The Pinehills, a master planned mixed-use community on 3,256 acres in the Town of Plymouth. The attached document was developed in accordance with the special review procedure established in the April 17, 1998 MEPA Certificate calling for a comprehensive environmental assessment of the complete Pinehills Community in combination with detailed analysis of its individual phases. The Proponent is now seeking MEPA review of the seventh and final phase of development, along with the addition of 1.8 acres of land to the Project Site.

PRD VII includes review of the remaining 500,000sf of commercial building planned for The Pinehills Village Green area including multi-family for rent and general commercial office uses. The additional 1.8 acres of land being added to the Project Site will be left as natural open space and included as a part of the 392 acre natural open space northerly nature preserve. PRD VII is based on the allowed uses and densities described as the preferred alternative (Alternative #4) in the "Infrastructure Plan & Phased Review Document: Phase I", submitted to your office in October 1998 and Secretary's Certificate issued on December 8, 1998.

Both the originally proposed community (as outlined in the ENF) and Alternative #4 describe a place of spectacular beauty to be constructed according to a Master Plan, developed with extensive local input from Plymouth residents and town officials. The zoning and Master Plan for this site take community planning far beyond what is typical

of Massachusetts zoning for clustered development. It achieves a standard of environmental and historic preservation, community aesthetic, road network and land use design only possible in a master planned community. It creates a community where homes and business are being constructed on only 30% of the land, with the remaining 70% of the land being allocated for both open space uses and common facilities. The unique mix of residential and commercial uses are connected, not only by a network of winding roads, but also by miles of paved and natural trails, allowing residents to walk to their local shopping district, a choice of restaurants, a spa and other recreational activities, and even to work. As of January 1, 2019, The Pinehills community has an assessed value in excess of $1.44 billion and contributes nearly $23.6 million in "net" property tax revenues annually to the Town of Plymouth. Looking back on over two decades of construction, Pinehills LLC is proud both of the detailed multi-year planning process undertaken with the Town of Plymouth, and the marketplace's enthusiastic acceptance of this kind of community that has led to the filing of our final PRD VII at this time.

Please publish notice of availability of the NPC/PRD for public review in the November 23, 2020 edition of The Environmental Monitor. We understand that public comments will be due by December 23rd, and a Certificate will be issued on December 30th. We look forward to your review of this project. If you have any questions, please contact Deborah Sedares of the Pinehills LLC (Tel.508-209-9000).

Sincerely,
PINEHLLS LLC

John J. Judge,
President

The Pinehills Community

Plymouth, Massachusetts

EEA No. 11519

SUBMITTED TO

Executive Office of Energy and
Environmental Affairs MEPA Office
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

PREPARED FOR

Pinehills LLC
33 Summerhouse Drive
Plymouth, Massachusetts 02360
www.pinehills.com

PREPARED BY

99 High Street, 10th Floor
Boston, MA 02110
617.728.7777

November 16, 2020

This Page Intentionally Blank

Note: This pdf is bookmarked. Click the arrow on the left side of the page, then the bookmark icon to access internal document links.

Table of Contents

List of Tables

List of Figures

Distribution List

Kathleen A. Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114
MEPA@mass.gov

U.S. Environmental Protection Agency
NPDES Division
ATTN: MEPA Office
JFK Federal Building
Boston, MA 02203-0001
Moraff.ken@Epa.gov

U.S. Army Corps of Engineers
New England District – Regulatory Div.
696 Virginia Road
Concord, MA 01742-2751
gregory.r.penta@usace.army.mil

Department of Environmental Protection
Southeast Regional Office
20 Riverside Drive
Lakeville, MA 02347
george.zoto@mass.gov
jonathan.hobill@mass.gov

Department of Environmental Protection
One Winter Street, 2nd Floor
Boston, MA 02108
helena.boccadoro@mass.gov

Department of Environmental Protection
Southeast Regional Office
20 Riverside Drive
Lakeville, MA 02347
george.zoto@mass.gov
jonathan.hobill@mass.gov

Department of Environmental Protection
Division of Wetlands & Waterways
One Winter Street
Boston, MA 02108
lisa.rhodes@mass.gov

Department of Environmental Protection
Division of Water Pollution Control
One Winter Street
Boston, MA 02108-4746
arthur.johnson@mass.gov

Lionel Lucien
MassDOT Public/Private Development Unit
10 Park Plaza, Suite4150
Boston, MA 02116
lionel.lucien@dot.state.ma.us

MassDOT District 5
Attn: MEPA Coordinator
1000 County Street
Taunton, MA 02780
barbara.lachance@dot.state.ma.us

MassDOT Office of Transportation Planning
10 Park Place - Room 3510
Boston, MA 02116
catrina.meyer@dot.state.ma.us

MassDOT Environmental Services
David J. White, Acting Director
10 Park Place - Room 4260
Boston, MA 02116
MassDOTEnvironmental@dot.state.ma.us

ATTN: MEPA Review Coordinator
Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114-2136
robert.boeri@mass.gov
patrice.bordonaro@mass.gov

Massachusetts Historical Commission
Massachusetts Archives Building
220 Morrissey Boulevard
Boston, MA 02125
brona.simon@state.ma.us

Department of Conservation & Recreation
251 Causeway Street
Boston, MA 02114-2104
nathaniel.tipton@mass.gov
Dan.driscoll@mass.gov
James.comeau@mass.gov

Division of Marine Fisheries
ATTN: MEPA Review Coordinator
251 Causeway Street, Suite 400
Boston, MA 02114
john.logan@state.ma.us

Department of Agricultural Resources
ATTN: MEPA Coordinator
251 Causeway Street, Suite 500
Boston, MA 02114
Laura.Maul@mass.gov
John.Lebeaux@mass.gov

Natural Heritage and Endangered Species Program
ATTN: MEPA Review Coordinator
1 Rabbit Hill Road
Westborough, MA 01581
Melany.Cheeseman@mass.gov
emily.holt@mass.gov

Mary Waldron, Executive Director
Old Colony Planning Council
70 School Street
Brockton, MA 02301
mwaldron@ocpcrpa.org

Melissa Arrighi, Town Manager
Town of Plymouth
26 Court Street
Plymouth, MA 02360
marrighi@plymouth-ma.gov
ljohnson@plymouth-ma.gov

Lee Hartman

Director of Planning and Development
Plymouth Planning Department
26 Court Street
Plymouth, MA 02360
lhartmann@plymouth-ma.gov

Kenneth A Tavares, Chairman
Board of Selectmen
Town of Plymouth
26 Court Street
Plymouth, MA 02360
cbadot@plymouth-ma.gov

Bruce Howard, Chairperson
Richard Vacca, Conservation Planner Town of Plymouth Conservation Commission
26 Court Street
Plymouth, MA 02360
rvacca@plymouth-ma.gov

Malcolm MacGregor, Chairman
Plymouth Planning Board
26 Court Street
Plymouth, MA 02360
lhartmann@plymouth-ma.gov

Jonathan Beder, Director
Public Works Department
Town of Plymouth
26 Court Street
Plymouth, MA 02360
jbeder@plymouth-ma.gov

Karen Keane, Director
Board of Health
Town of Plymouth
26 Court Street
Plymouth, MA 02360
kkeane@plymouth-ma.gov

Plymouth Area Chamber of Commerce
100 Armstrong Road, Suite 204
Plymouth, MA 02360
Amy@plymouthchamber.com

Mettie Whipple, President
Eel River Watershed Association
128 Sandwich Road
Plymouth, MA 02360
mettie@eelriverwatershed.org
design@mettiewhipple.com

Office of Congressman Keating
ATTN: MEPA Review Coordinator
50 Resnik Road
Plymouth, MA 02360

Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs ■ MEPA Office

For Office Use Only
Executive Office of Environmental Affairs
MEPA Analyst:
Phone: 617-626-

Notice of Project Change

The information requested on this form must be completed to begin MEPA Review of a NPC in accordance with the provisions of the Massachusetts Environmental Policy Act and its implementing regulations (see 301 CMR 11.10(1)).

EEA # **11519**		
Project Name: The Pinehills		
Street Address: 33 Summerhouse Drive		
Municipality: Plymouth, MA	Watershed: Plymouth/Carver Aquifer	
Universal Transverse Mercator Coordinates:	Latitude: 44° 52' 47" Longitude: -70° 35' 10"	
Estimated commencement date: 2021	Estimated completion date: 2023	
Project Type: Residential	Status of project design: 100 %complete	
Proponent: Pinehills LLC		
Street Address: 33 Summerhouse Drive		
Municipality: Plymouth	State: MA	Zip Code: 02360
Name of Contact Person: Deborah Sedares		
Firm/Agency: Pinehills LLC	Street Address: 33 Summerhouse Drive	
Municipality: Plymouth	State: MA	Zip Code: 02360
Phone: (508) 209-9000	Fax: (508) 209-9050	E-mail: dsedares@pinehills.com

With this Notice of Project Change, are you requesting:

a Single EIR? (see 301 CMR 11.06(8))	☐Yes ☒No
a Special Review Procedure? (see 301CMR 11.09)	☐Yes ☒No
a Waiver of mandatory EIR? (see 301 CMR 11.11)	☐Yes ☒No
a Phase I Waiver? (see 301 CMR 11.11)	☐Yes ☒No

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?

The Project changes presented in this NPC do not result in the exceedance of any MEPA review thresholds. The Pinehills Project as originally presented in the ENF exceeded the following thresholds that were in effect in 1998:

- Non-residential project involving alteration of 50 or more acres of land (301 CMR 11.25(1));
- Project using 100,000 gallons per day or more from a public water supply (301 CMR 11.25(8));
- Construction of a new non-residential project with gross interior floor space of 500,000 square feet or more (301 CMR 11.25(15));
- Construction of 350 or more new residential units (301 CMR 11.25(18));
- Project providing 1,000 or more new parking spaces and/or generating 3,000 or more new vehicle trips per day (301 CMR 11.25(19)).

Which State Agency Permits will the project require?
The Project changes presented in this NPC do not result in the need for additional State Agency Permits. State permits for the Pinehills Project have been needed to provide water supply, construct a wastewater treatment plant and install septic systems, and to indirectly access a state highway.

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:
The Pinehills does not involve financial assistance, land transfer or acquisition by or on behalf of a state agency.

PROJECT INFORMATION

In 25 words or less, what is the project change? The project change involves . . .
The Project Site has expanded through the acquisition of 1.8 acres of land.

Date of publication of availability of the ENF in the Environmental Monitor: (Date: March 11, 1998)

Was an EIR required?	☒Yes	☐No; if yes,
was a Draft EIR filed?	☐Yes (Date:)	☒No
was a Final EIR filed?	☒Yes (Date: See below)	☒No
was a Single EIR filed?	☐Yes (Date:)	☒No

Have other NPCs been filed? ☒Yes (Date: See below) ☐No

Phased Review Documents were filed on 8/15/98, 7/27/99, 2/28/01, 7/15/02, 8/27/04, and 8/1/13.
Other NPCS were filed 8/17/1998, 2/28/2001, 5/15/2001, 7/15/2002, 2/27/2004, 6/16/2006, 2/15/2007, 5/30/2014 and 8/5/2019.

If this is a NPC solely for lapse of time (see 301 CMR 11.10(2)) proceed directly to **ATTACHMENTS & SIGNATURES**.

PERMITS / FINANCIAL ASSISTANCE / LAND TRANSFER
List or describe all new or modified state permits, financial assistance, or land transfers not previously reviewed: **dd w/ list of State Agency Actions (e.g., Agency Project, Financial Assistance, Land Transfer, List of Permits)**

The Pinehills does not involve financial assistance, land transfer or acquisition by or on behalf of a state agency.

Are you requesting a finding that this project change is insignificant? A change in a Project is ordinarily insignificant if it results solely in an increase in square footage, linear footage, height, depth or other relevant measures of the physical dimensions of the Project of less than 10% over estimates previously reviewed, provided the increase does not meet or

exceed any review thresholds. A change in a Project is also ordinarily insignificant if it results solely in an increase in impacts of less than 25% of the level specified in any review threshold, provided that cumulative impacts of the Project do not meet or exceed any review thresholds that were not previously met or exceeded. (see 301 CMR 11.10(6))
☐**Yes** ☒**No; if yes, provide an explanation of this request in the Project Change Description below.**

FOR PROJECTS SUBJECT TO AN EIR

If the project requires the submission of an EIR, are you requesting that a Scope in a previously issued Certificate be rescinded?
☐**Yes** ☒**No; if yes, provide an explanation of this request_____.**

If the project requires the submission of an EIR, are you requesting a change to a Scope in a previously issued Certificate?
☐**Yes** ☒**No; if yes, provide an explanation of this request_____.**

SUMMARY OF PROJECT CHANGE PARAMETERS AND IMPACTS

Summary of Project Size & Environmental Impacts	Previously reviewed	Net Change	Currently Proposed
LAND			
Total site acreage	3,255.2	1.8	3,257
Acres of land altered	1,220	0	1,220
Acres of impervious area	N/A	N/A	232[a]
Square feet of bordering vegetated wetlands alteration	0	0	0
Square feet of other wetland alteration *(LUWW)*	175	0	175
Acres of non-water dependent use of tidelands or waterways	0	0	0
STRUCTURES			
Gross square footage *(commercial)*	1,300,000	0	1,300,000
Number of housing units	3,063	2	3,065
Maximum height (in feet)	35	0	35
TRANSPORTATION			
Vehicle trips per day	19,358 adt (weekday) 19,266 adt (Saturday)	4,162 adt (weekday) 1,504 adt (Saturday)	23,520
Parking spaces	1,575	0	1,575
WATER/WASTEWATER			
Gallons/day (GPD) of water use	650,000	-124,000	526,000
GPD water withdrawal	650,000	0	650,000
GPD wastewater generation/ treatment	410,000	+23,773	433,773
Length of water/sewer mains (miles)	41	0	41

a. Impervious area includes site-wide roadways and estimated building footprint in the Village District.

Does the project change involve any new or modified:

1. conversion of public parkland or other Article 97 public natural resources to any purpose not in accordance with Article 97? ☐**Yes** ☒**No**

2. release of any conservation restriction, preservation restriction, agricultural preservation restriction, or watershed preservation restriction? ☐**Yes** ☒**No**

3. impacts on Rare Species**?** ☐**Yes** ☒**No**

4. demolition of all or part of any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth? ☐**Yes** ☒**No**

5. impact upon an Area of Critical Environmental Concern? ☐**Yes** ☒**No**

If you answered 'Yes' to any of these 5 questions, explain below:

PROJECT CHANGE DESCRIPTION (attach additional pages as necessary). The project change description should include:

(a) a brief description of the project as most recently reviewed

(b) a description of material changes to the project as previously reviewed,

(c) if applicable, the significance of the proposed changes, with specific reference to the factors listed 301 CMR 11.10(6), and

(d) measures that the project is taking to avoid damage to the environment or to minimize and mitigate unavoidable environmental impacts. If the change will involve modification of any previously issued Section 61 Finding, include a draft of the modified Section 61 Finding (or it will be required in a Supplemental EIR).

Please see attached document for Project overview and MEPA history.

ATTACHMENTS & SIGNATURES

Attachments:

1. Secretary's most recent Certificate on this project
2. Plan showing most recent previously reviewed proposed build condition
3. Plan showing currently proposed build condition
4. Original U.S.G.S. map or good quality color copy (8-1/2 x 11 inches or larger) indicating the project location and boundaries
5. List of all agencies and persons to whom the proponent circulated the NPC, in accordance with 301 CMR 11.10(7)

Signatures:

Date Signature of Responsible Officer or Proponent	11/10/20 Date Signature of person preparing NPC (if different from above)
John J. Judge Name (print or type)	Stephanie Kruel Name (print or type)
Pinehills LLC Firm/Agency	VHB Firm/Agency
33 Summerhouse Drive Street	99 High Street, 10th Floor Street
Plymouth, MA 02360 Municipality/State/Zip	Boston, MA 02129 Municipality/State/Zip
508-209-9000 Phone	617-607-2972 Phone

1

Summary

The Pinehills is a master planned mixed-use community on 3,256 acres in the Town of Plymouth. In 1998 a Certificate was issued establishing an SRP wherein the Infrastructure Plan and each phase of development of would be subject to MEPA review. The Proponent is now seeking MEPA review of the seventh and final phase of development, along with the addition of 1.8 acres of land to the Project Site under the 10th Notice of Project Change.

This chapter includes general Project information, a summary of required permits, a description of The Pinehills, a description of the procedural framework established for the Project, an accounting of MEPA review history, and a summary of existing conditions, impacts, and mitigation. NHESP and the MassDEP Southeast Regional Office submitted comment letters during the public comment period on the 9th Notice of Project Change. Responses to these comments can be found in Chapter 9.

1.1 Project Information

Project Name:	The Pinehills Clark Road Plymouth, Massachusetts
EOEA Number:	11519
Proponent:	Pinehills LLC 33 Summerhouse Drive Plymouth, Massachusetts 02360

1.2 Summary of Required Permits

Development of The Pinehills does not involve land transfer or acquisition by or on behalf of a state agency. State permits are required to provide water supply, construct and operate a wastewater treatment plant and install septic systems, and to indirectly access a state highway. Local permits and approvals have been required for building construction and work within jurisdictional wetlands. A federal permit to allow stormwater discharges during construction is also necessary. Table 1.1 below lists the required permits and agency actions along with the status of each.

Table 1.1 Required Permits and Agency Actions

Agency	Permit	Status
Federal Permits/Approvals		
U.S. Environmental Protection Agency *from Construction Activities*	NPDES General Permit for Stormwater Discharges	Filed with each Phase Phase 1A (1999A) filed 4/99 Phase 1B (1999B) filed 11/99 Phase 2000A filed 1/2001 NPDES Renewal October 2003
State Permits/Approvals		
MA Department of Environmental Protection	Water Withdrawal Permit No. 9P-4-21-239.03: for public water supply wells for Pinehills Water Company	Approved June 16, 1999; Modified July, 2004; Extension August 31, 2010; Further Extension August 7, 2012, Further Extension August 31,2014, Further Extension August 31, 2015, Further Extension July 24, 2016 pending renewal; Renewal of WWP No. 9P3-4-21-239.03 issued February 21, 2019; Application pending for new withdrawal permit to increase permitted withdrawal volume, approval expected in 2020.
	Water Withdrawal Permit No. 9P4-4-21-239.04: irrigation wells for Pinehills Golf Club	Approved May 19, 2000; Extension August 31, 2010; Further Extension August 7, 2012, Further Extension August 31,2014, Further Extension August 31, 2015, Further Extension July 24, 2016 pending renewal; Renewal of WWP No. 9P4-4-21-239.04 issued February 21, 2019
	Water Withdrawal Permit No. 9P4-4-21-239.09: irrigation wells for OS Golf Club LLC	Approved July 3, 2003; Extension August 31, 2010; Further Extension August 7, 2012, Further Extension August 31,2014, Further Extension August 31, 2015, Further Extension July 24, 2016 pending renewal; Renewal of WWP No. 9P4-4-21-239.09 issued February 21, 2019
	Water Withdrawal Permit No. 9P4-4-21-239.11: irrigation wells for Common Area Irrigation	Approved October 3, 2007; Modified May 22, 2009; Extension August 31, 2010; Further Extension August 7, 2012, Further Extension August 31,2014, Further Extension August 31, 2015, Further Extension July 24, 2016 pending renewal; Renewal of WWP No. 9P4-4-21-239.11 issued February 21, 2019
	New Source Approvals for water supply	Approved February 1999; Modified November 18, 1999; Further modified December 14, 2012

Agency	Permit	Status
	New Source Approval for additional withdrawal for water supply	Pump Test/Source Final Report approved May 14, 2020, conditioned upon issuance of water withdrawal permit (see above)
	Water Supply Approval (BRPWS-20) for water main, booster pump and tank construction	Approved October 30, 2000
	Groundwater Discharge Permit for discharge from wastewater treatment plant	Approved Effective April 3, 2000 (Appealed) Revised Permit dated January 12, 2001 Final Decision on Appeal dated January 17, 2001 Modified and Approved June 28, 2002 Renewal Approved March 27, 2008
	Final Design Approval (wastewater treatment plant)	Approved September 7, 2000 Revisions Approved November 1, 2000 Revisions Approved January 5, 2001 Phase II Approved June 7, 2006 Phase III Approved January 4, 2017May, 2019
MA Department of Transportation	Indirect Access Permit #5-1999-0969	Approved December 20, 1999 Amended and Approved June 28, 2000 Amended and Approved, July 23, 2001 Amended and Approved, June 19, 2003 Amendment pending
MA Historical Commission	Memorandum of Agreement	Signed September 2003
MA Division of Fisheries and Wildlife: Natural Heritage and Endangered Species Program	Project review *as to any impact to endangered species*	MESA Project Review – The Pinehills, Plymouth, MA NHESP Tracking No. 06-20704; approved June 14, 2017, work on-going
	Turtle Crossing Mitigation Agreement	On-going, as needed
Local Permits/Approvals		
Town Meeting	OSMUD Zoning Changes	Approved September 1998
	OSMUD Zoning Changes and Development Plan	Approved June 2000
	OSMUD Zoning Changes and Amendment to Development Plan	Approved April 2004
	OSMUD Zoning Changes and Amendment to Development Plan	Approved April 2005
	Amendment to Development Plan	Approved October 2008
	OSMUD Zoning Changes	Approved April 2010
	Amendments to Development Plan	Approved October 2013

Agency	Permit	Status
Plymouth Planning Board	Special Permits as per Zoning Overlays (Open Space Mixed Use Development)	Master Plan approved April 1999; First building phase –Phase IA (1999A) approved April 1999 Second building phase – Phase IB (1999B) approved September 1999 Third building phase – Phase 2000A approved March 2000 Amending Development Plan Approved May 8, 2001 Amending Development Plan Approved June 19, 2001
	Subdivision Control Law Review	On-going
Plymouth Conservation Commission	NOI DEP No. 057-1884	OOC Issued March 21, 2003
	NOI DEP No. 057-1943	OOC Issued September 18, 2003
	NOI DEP No. 057-2090	OOC Issued September 14, 2005
	NOI DEP No. 057-2269	OOC Issued June 20, 2007
	NOI DEP No. 057-2408	OOC Issued March 17, 2009
	NOI DEP No. 057-2409	OOC Issued March 17, 2009
	NOI DEP No. 057-2486	OOC Issued June 2, 2010
	NOI DEP No. 057-2811	OOC Issued January 27, 2016
	NOI DEP No. 057-3006	OOC Issued April 17, 2019
	NOI DEP No. 057-3053	OOC Issued January 29, 2020
Plymouth Department of Inspectional Services	Building Permits	Filed with each building as necessary

1.3 Description of The Pinehills

Pinehills LLC has undertaken the development of a master-planned, mixed-use community (The Pinehills) on a largely undeveloped, approximately 3,256-acre parcel of land in Plymouth, Massachusetts (Figure 1.1). The Pinehills has been carefully designed to protect key natural and cultural resources while establishing buildable areas that are compatible with, and gain value from, the overall beauty and rural character of the land. Building construction has occurred on higher ground, where residents are able to enjoy the abounding scenic vistas internal and external to The Pinehills. When complete, only 30 percent of the land will be built upon with 70 percent remaining as open space and common facilities as provided under the Town of Plymouth Open Space Mixed Use Development (OSMUD) zoning by-law and the Development Plan approved thereunder.

The Pinehills is currently permitted for construction of 2,145 limited occupancy community (LOC) homes ; 920 planned retirement (PR) homes; up to four 18 hole golf courses; and 1.3 million square feet of mixed use commercial and general commercial development including a hotel, retail and service uses, multi-family for rent and mixed use residential uses over retail, general commercial uses and office uses.

1.3.1 Summary of Phased Development

The Pinehills is being constructed in multiple phases over an approximately twenty-five-year period with the final phase of development, Phase VII (hereinafter referred to as "PRD: Phase VII"), scheduled to commence in 2021. The conceptual phasing plan articulated in the Master Plan for The Pinehills has evolved and changed as design developed and in response to market conditions. The sections below describe the project components reviewed by MEPA under each phase.

Phase I

The Phase I project was a mixed-use Neighborhood Green District consisting initially of a village green, conference center with a 250-room hotel, 100,000 sf of retail space, 100,000 sf of office space, and 400 residential units, the majority in a cluster pattern adjacent to an 18-hole golf course with clubhouse located north of the Neighborhood Green District; a private 139,000-gpd wastewater treatment plant (to serve Phases I-VI); 26,300 linear feet of private roadway; and a public water supply system to serve the full build-out project. Phase I involved the development of approximately 797 acres of the 3,037-acre Pinehills project site.

Phase II

The Phase II project included 425 homes, 100,000 sf of general commercial space, 50,000 sf of retail space, 100,000 sf of office space, an 18-hole golf course with clubhouse, a tree farm and/or nursery, and approximately 6,200 linear feet of private roadway and an increase in the capacity of the wastewater facility. Phase II also expanded the geographic area of The Pinehills project site by 13.49 acres for a total of approximately 3,050 acres of developable area. Phase II involved the development of approximately 701 acres of proposed new development.

Phase III

Phase III involved the construction of 800 homes, 50,000 sf of general commercial space, a wastewater treatment and disposal facility (Pinehills Private Sewer Treatment Facility- PPSTF), a pond, a water supply tank and booster station, and approximately 74,300 linear feet of private road. During Phase III the geographic area of The Pinehills project site was enlarged by 9.71 acres for a total of approximately 3,060 acres of developable area.

Phase IV

The Phase IV project involved the construction of 350 homes, an 18-hole private golf course, an irrigation pond, an irrigation well, and approximately 28,000 linear feet of private roadway within the 635-acre Phase IV development area. In Phase IV, the development area of The Pinehills was expanded to include the addition of a 42-acre parcel approximately (3,102 acres total) located in the northwestern comer of the project site adjacent to the Route 3 and Bump Rock Road intersection.

Phase V

The Phase V project involved the construction of 320 Planned Retirement Deed-Restricted homes and approximately 17,400 linear feet of private roadway on two separate development parcels (156 acres total) located within The Pinehills project area. The north parcel (84 acres) is located in the northeastern portion of The Pinehills project site adjacent to Old Sandwich Road. The south parcel (72 acres) included Clam Pudding Pond and is located at the southern boundary of The Pinehills project site and east of Old Sandwich Road. The Proponent filed the 5th Notice of Project Change in April 2004 proposing the expansion of the project area with the addition of a 71.95- acre parcel of property (approximately 3,174 acres total) abutting Old Sandwich Road in the southern portion of the project site. The proposed expansion of the project area and increase in the proposed development did not result in a significant change to the project's overall environmental impacts. The Phase V project included the restoration of an existing non-productive cranberry bog complex (approximately 1.9 acres) located midway between the North and South development parcels, approximately 500 feet north of the historic Tavern and Rye Field east of Old Sandwich Road.

Phase VI

The Phase VI project involved the construction of 757 limited occupancy (LOC) homes on 409 acres located east of Old Sandwich Road in the northeastern section of the 3,243-acre Pinehills development area (including an additional 69.41-acre area). Access to the Phase 6 site was provided by the extension of Long Ridge Road located on the north side of Clark Road/Beaver Dam Road and the extension of Sacrifice Rock Road located on the east side of Old Sandwich Road.

1.3.2 Final Phase: PRD VII

The Phase VII activities will be situated in areas previously approved for development. This phase includes up to 500,000 square feet of commercial development not previously reviewed. In addition, a portion of the previously reviewed retail development square footage has been reassessed in this PRD as general commercial (50,000 sf) and office (50,000 sf) development uses, for a total of 550,000 sf of general commercial and 250,000 sf of office space. The project will retain the potential to develop up to 50,000 sf of retail space, for a total of 1.3M sf of commercial development.

An additional 13 acres of land will be added as part of this phase (11.2 reviewed under the 8th NPC, and 13 Limited Occupancy Community (LOC) homes .an additional 1.8 acres to be reviewed under the 10th NPC). During this Phase, 69.45 million gallons per year (MGY) of authorized public drinking water supply volume will be drawn down from The Pinehills existing supply wells.

1.4 Procedural Framework

The following sections describe the municipal and state review procedures that have been set up to review the Project and its environmental impacts.

1.4.1 Local Process

The Plymouth Planning Board and Plymouth Board of Appeals granted the proponent's Master Plan Special Permits in May 1998. September 1998 Special Town Meeting action modified relevant zoning for The Pinehills. Pinehills LLC then filed a modified master plan Special Permit proposal in accordance with the modified zoning. This was approved in April 1999. Further Phase Special Permits were granted in September 1999 and March 2000. In June 2000, action was taken at Plymouth Town Meeting to further modify zoning to provide that development within OSMUD can be approved by either a Development Plan approved by Town Meeting or a Master Plan Special Permit approved by the Planning Board. Accordingly, the Pinehills Master Plan submitted with the ENF was modified as a Development Plan and approved by Town Meeting in June 2000 and further amended by vote of Town Meeting on April 13, 2004, April 4, 2005 and October 27, 2008. The now current Master Plan/Development Plan describes 1.3 million square feet of commercial development (excluding the industrial and warehouses uses), 2132 "Limited Occupancy Community" homes and 920 planned retirement homes. And, it will provide for 2,280 acres as open space and common facilities.

Town zoning bylaws for this parcel stipulate minimal impact on municipal services and dictate provision of 'private" utilities including water, wastewater, and solid waste collection services. In addition to these responsibilities, Pinehills LLC provided a location in the Village Green District for a municipal fire station and is providing hydrants and related services to aid in fire protection.

As part of the initial permitting process, the Town asked for an analysis of anticipated net tax benefits of the proposed development. At that time, it was estimated that, at full build out, the development would generate $6.4 million in net property tax benefits to Plymouth. Actual annual net property tax benefits accruing to Plymouth have been substantially greater. As of January 1, 2019, Pinehills had already created over $1,44 Billion in new assessed value which resulted in an annual net property tax benefit of $23.5 million. When the next official assessment is released by Plymouth's Assessor, annual net property tax benefits are expected to exceed $25 million. In a report commissioned by Plymouth's Planning Board (The Connery Report), Pinehills was found to be the most successful economic development initiative in decades.

In 2009. Pinehills LLC established the Pinehills Affordable Housing Charitable Trust funded in part through annual contributions equal to $250 per new home sold in each calendar year. Working cooperatively with Habitat for Humanity of Greater Plymouth and Plymouth's Task Force for The Homeless, through 2020, the Trust has funded nearly one half million dollars in grants resulting in the addition of nineteen (19) qualified affordable housing units in the Town of Plymouth.

1.4.2 State Process

The Pinehills is subject to MEPA jurisdiction and required submission of an Environmental Impact Report (EIR) under the MEPA regulations in effect before July 1, 1998 by virtue of its character, size, and impacts (water usage, parking, and traffic) and the required state permits

and approvals listed in Section 1.2 above. Because the Proponent is not a state agency and does not seek financial assistance from the Commonwealth, MEPA jurisdiction is limited to significant environmental impacts related to the subject matter of the permits required.

The Pinehills is subject to a Special Review Procedure (SRP) and Certificate on the Environmental Notification Form (ENF) issued by the Secretary on April 17, 1998. The SRP and ENF Certificate required preparation of an Infrastructure Plan (IP) for The Pinehills as a whole to establish the overall Master Plan program, and subsequent individual Phased Review Documents (PRDs) detailing the phased implementation of that program, including each phase's potential environmental impacts and proposed mitigation. For any deviation from the original IP, a Notice of Project Change (NPC) was also required.

By direction of the Secretary of Environmental Affairs, PRDs for The Pinehills must:

- Contain information on historic and archaeological resource investigations and mitigation;
- Report findings and recommendations on the evaluation of wildlife; and
- Include proposed traffic mitigation measures.

Each PRD addresses the issues related to that particular phase, evaluating and building upon the assumptions presented in all previous PRDs, as well as actual experience.

1.5 MEPA Review History

To date, Pinehills has submitted the following documents for review and certification under the MEPA Special Review Procedure (date of Certificate in parentheses):

- Environmental Notification Form (April 17, 1998)
- 1st Notice of Project Change (September 25, 1998)
- Infrastructure Plan (IP) and Phased Review Document: PRD I (December 8, 1998)
- Phased Review Document: PRD II (September 16, 1999)
- 2nd Notice of Project Change (April 13, 2001)
- Phased Review Document: PRD III (April 13, 2001)
- 3rd Notice of Project Change (June 22, 2001)
- 4th Notice of Project Change (August 30, 2002)
- Phased Review Document: PRD IV (August 30, 2002)
- 5th Notice of Project Change (April 23, 2004)
- Phased Review Document: PRD V (October 15, 2004)
- 6th Notice of Project Change (August 9, 2006)
- 7th Notice of Project Change (February 15, 2007)
- Phased Review Document: PRD VI (September 27, 2013)
- 8th Notice of Project Change (July 11, 2014)
- 9th Notice of Project Change (September 20, 2019)

› 10th Notice of Project Change (Concurrent with this filing)

› Phased Review Document: PRD VII (This filing)

Table 1.2 below identifies the components of each document reviewed by MEPA.

Table 1.2 Summary of MEPA Review

Phases	Area Added to Site (ac)	Total Site Area (ac)[a]	Improved Area (ac)[b]	LOC Homes	PR Homes	Comm. (sf)	Roads (lf)	Open Space (ac)	Golf Course[c]	Ponds/ Basins[d]
IP (Baseline)	*3,037*	*3,037*	*0*	*1,897[e]*	*920*	*1,300,000*	*TBD*	*2,125.9*	*4@18 holes*	*TBD*
PRD-I	0	3,037	797	400	0	500,000	26,300		1@18 holes	5
PRD-II		3,050	701	425	0	25025,000	6,200	X	1@18 holes	-
PRD-III	13.49	3,060	546	200	600	50,000	74,300	9.44	0	1
PRD-IV	51.71	3,102	635	350	0	0	28,000	36.19	1@18 holes	1
PRD-V	71.95	3,174	156	0	320	0	17,400	50.36	0	1
PRD-VI	69.41	3,244	409	757	0	0	60,560	48.58	0	-
PRD-VII	**13.0**	**3,256**	**13**	**13**	**0**	**500,000**	**11,620**	**9.1**	**0**	**0**
Total Reviewed	**220**	**3,256**	**±3,256**	**2,145**	**920**	**1,300,000**	**212,760**	**2,280**	**3@18 holes**	**8**

LOC = Limited Occupancy Community units MP = Master Plan
PR = Planned Retirement units IP = Infrastructure Plan
NOTES:
a. Total site area is cumulative.
b. "Improved" areas are in their final condition, i.e. are built out and/or designated as open space.
c. Golf Courses includes: Old Sandwich Golf Club - 46,400sf +/-of facilities/amenities; Pine Hills Golf Club- PGC {Rees Jones and Jack Nicklaus Golf Courses} 25,000sf +/- of facilities/amenities.
d. Stormwater Detention Basins/Water Quality Ponds - eight man-made vegetated ponds with sediment forebays located throughout The Pinehills Project Site to provide water quality treatment and nutrient assimilation of stormwater runoff.
e. The final Development Plan approved by the Town on June 7, 2000 reset the number of allowable LOCs to 1,934 based on a zoning change that allowed for a density increase of 1.0 LOC for each Project Site acre over 3000.

1.6 Existing Conditions, Impacts, and Mitigation

A summary of existing conditions, impacts and mitigation related to traffic, air quality, wastewater, water supply, historical and archaeological resources, wetlands and wildlife is provided below. A summary table of all impacts is provided below, while mitigation commitments and their status are included in Chapter 9.

When the ENF was filed with MEPA in 1998, the familiar baseline impact table on today's ENF form was not yet in use, therefore the Infrastructure Plan did not identify total anticipated impacts for land disturbance, impervious surface, wetlands, or parking spaces. Anticipated impacts by phase as presented in each PRD filing are indicated in Table 1.3 below.

Table 1.3 Summary of Assessed Potential Impacts

Phase	Land Disturbance (acres)	Impervious Surface (sf)[a]	Wetland Impacts (sf)	New adt	Parking Spaces (Comm.)	Waste-water Gen (gpd)[b]	Potable Water Use (avg. gpd)[c]	Irrigation Water Use (avg. gpd)
Infrastructure Plan	*N/A*	*N/A*	*N/A*	*29,062*	*N/A*	*555,861*	*1,611,257*	*810,000*
PRD-I	750	150	0	11,924	1,050	158,976	125,073	160,000
PRD-II	125	50	0	6,065	450	396,885	142,938	650,000
PRD-III	250	80	0	2,390	0		193,945	
PRD-IV	260	45	Buffer	986	0		313,960	
PRD-V	70	35	37 lf Bank; 175 sf LUWW; Buffer	450	75		377,163	
PRD-VI	15	3	Buffer	1,966	0		458,178	
PRD-VII	**55**	**19**	**0**	**4,162**	**1,000**	**36,760**	**35,000**	
Total	**1,220**	**232**	**37 lf Bank; 175 sf LUWW; Buffer**	**N/A[d]**	**2,575**	**433,773**	**526,000**	**810,000**

a. Impervious area includes site-wide roadways and estimated building footprint in the Village District.

b. Construction of the Pinehills Private Sewer Treatment Plant (PPSTP) was completed in 2001 in accordance with the terms of MassDEP's Groundwater Discharge Permit. The Plant is located in the southeastern corner of the project site and includes a wastewater treatment plant, a series of groundwater disposal beds located immediately adjacent to the plant and also further north at the Rye field at the intersection of Old Sandwich Road and Old tavern Trail, and a collection and conveyance system. The sewer system is designed to serve nearly all of the Pine hills residences, office and retail uses, hotel, conference center and golf clubhouses. A small number of homes (approximately 177 homes) located in remote area of The Pinehills Project Site are served by individual on-going Title 5-compliant wastewater systems.

c. Construction of the Pinehills Water Company's water supply system was completed in 2001 accordance with the terms of MassDEP's Water Management Act Permit. The Pinehills Water Company Pumping Station is located in the southeastern portion of the project site and includes a pump station serving three gravel-packed wells, a 2-million-gallon capacity concrete water storage tank, a booster pump station and a distribution system comprised of approximately 44 miles of water main.

d. The ADT calculations are not cumulative due to the methodology that is used (logarithmic equations in some cases vs. trip rates in others), therefore a total cannot be reported.

As part of its mitigation commitments, The Pinehills submits the results of their Traffic Monitoring Program to MassDOT on an annual basis (See Appendix C). As configured and occupied as of November 2019, The Pinehills was shown to generate approximately 20,630 daily vehicle trips on an average weekday, which is approximately 29 percent fewer trips than anticipated in the Infrastructure Plan.

1.6.1 Traffic

Chapter 4 includes a Transportation Impact Assessment that identifies existing operating parameters on the surrounding roadway network, examines and refines the assumptions presented in the "Infrastructure Plan and Phased Review Document: Phase I" and the subsequent PRDs prepared in support of Phases II, III, IV, V and VI, and evaluates the anticipated traffic-volume increases as a result of the development of PRD: Phase VII of the community. Chapter 4 includes discussion of specific improvements to the transportation infrastructure that may be needed based on the traffic monitoring report that is submitted

annual to MassDOT as required by the Section 61 Findings. The analysis demonstrates that the additional traffic demands that may be associated with PRD: Phase VII can be accommodated within the confines of the existing transportation infrastructure with defined improvements along Clark Road that are consistent with those defined in the "Infrastructure Plan and Phased Review Document: Phase I." With implementation of the recommendations in Chapter 4, safe and efficient access will be maintained and the proposed development of PRD: Phase VII of the community can be accomplished with minimal traffic impact on the roadway system.

1.6.2 Air Quality

Pinehills LLC commissioned a mesoscale air quality analysis for The Pinehills based on the U.S. Environmental Protection Agency (EPA) MOBILE Source Emission Factor Model and following a protocol approved by the Massachusetts Department of Environmental Protection (DEP). The analysis described in the "Infrastructure Plan and Phased Review Document: Phase I" showed that the preferred alternative would reduce existing mesoscale VOC emissions at full build-out. Given this result, no further analysis was performed.

The traffic report evaluated existing traffic operating parameters on the surrounding roadway network. The traffic counts performed at the existing roadways serving the community as a part of the annual traffic monitoring program have demonstrated that the actual volume of traffic generated by The Pinehills has been below the traffic volume projections that were developed for the original traffic study.

As indicated in the traffic monitoring report, TDM mitigation measures have continued to support maintenance or reduction of the original project-related trip generation, as well as the associated VOC emissions. The TDM measures presented in this and previous MEPA filings constitute all reasonable and feasible mitigation measures for a mixed-use project. The Pinehills will continue to be consistent with the provisions of the Commonwealth's State Implementation Plan (SIP) for attaining the ozone air quality standards.

1.6.3 Water Supply

Chapter 5 discusses water supply and demand, the water distribution system, and irrigation systems. The final water withdrawal will be 237.35 million gallons per year or 0.65 million gallons per day (MGD) (to match average daily demand) and a maximum daily demand of 1.604 MGD. The complete water distribution system will consist of approximately 41 miles of water mains. In 2019, the interceptor wells for the Rees Jones and Nicklaus golf courses produced 56.84 MG with an average pumping rate of 0.266 MGD. In 2019, the irrigation well for the OS golf course produced 12.03 MG with an average pumping rate of 0.06 MGD. A total of twenty-one (21) irrigation wells for common areas have been installed and total withdrawal was 42.71 MGY in 2019.

1.6.4 Wastewater

Chapter 5 discusses the status of the wastewater treatment plan, current and projected wastewater demand, and information about nutrient loading. This wastewater management

plan has not changed since the filing of the PRD: Phase III report in February 2001. The wastewater treatment plant was expanded in 2019 to an average daily capacity of 450,000 gpd and a maximum day capacity of 900,000 gpd. The disposal capacity remains at 660,000 gpd. Currently, the average wastewater flow is approximately 270,000 gpd. At full build out, the average wastewater flow is projected to be 433,773 gpd with a maximum flow of 1,060,705 gpd. The development of nitrogen and phosphorus loading controls were incorporated into the DEP Permit and apply to different areas of The Pinehills community.

1.6.5 Historical and Archaeological Resources

Chapter 6 describes the Massachusetts Historical Commission consulting process as well as the findings of survey and site examination activities conducted during various phases of development. The activities being undertaken under PRD: Phase VII are located in areas previously reviewed for development and already subject to intensive archeological site review under prior PRD: Phases. As such no additional site review is required. This chapter also includes a summary of the historical documentation of the Main House of the Talcott Estate and review of architectural improvements to the historic structure which have occurred since the filing of PRD: Phase VI in September 2013.

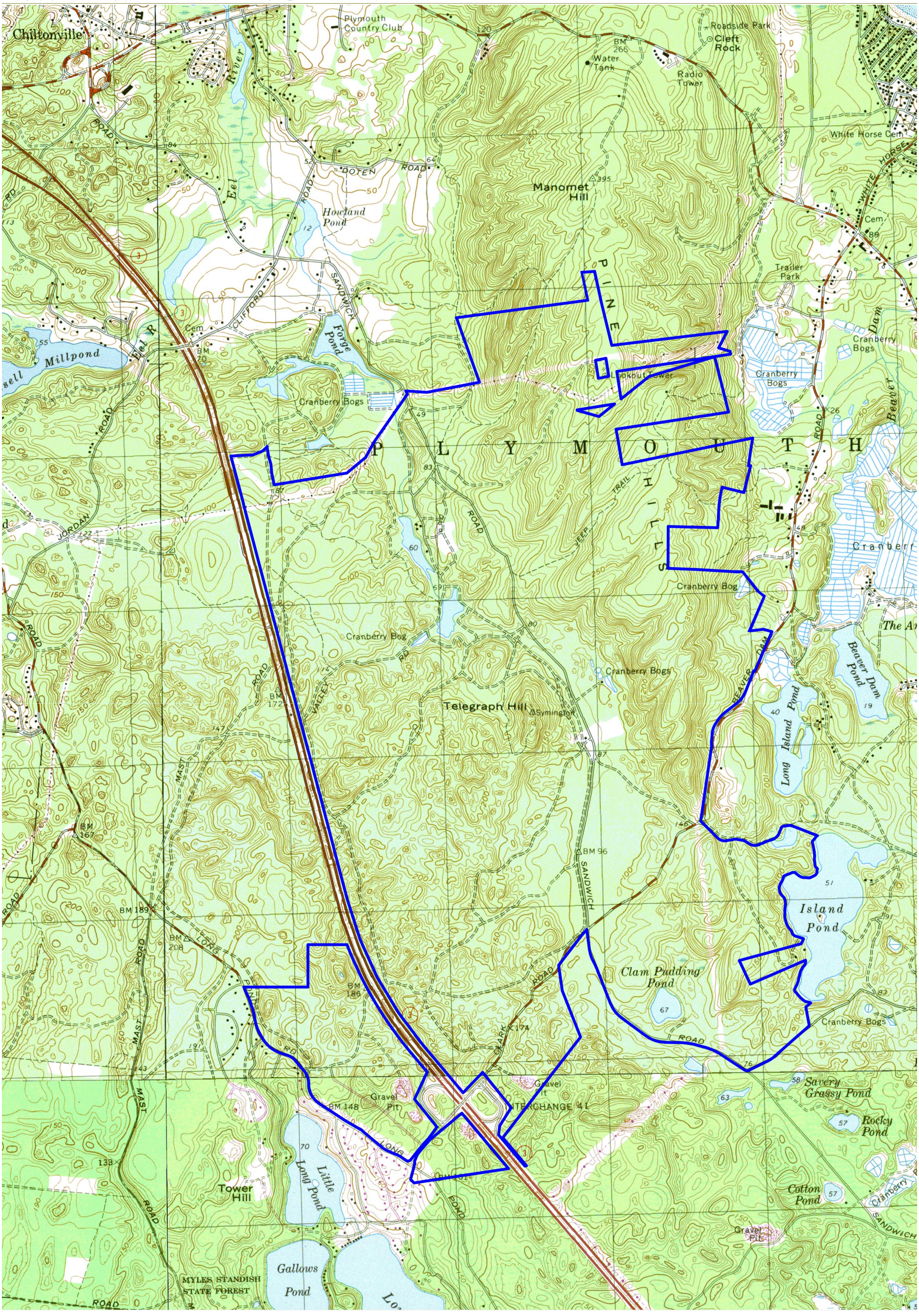
1.6.6 Wetlands

Chapter 7 described the Project Site's wetland areas, identifies potential project impacts, and discusses mitigation measures. Chapter 7 documents compliance with stormwater management standards and provides a history of permitting under the Wetlands Protection Act. PRD: Phase VI will not result in any direct impacts to jurisdictional wetland resource areas. The Project has impacted a total of 37 linear feet of inland bank and 176 square feet of Land Under Water Bodies and Waterways.

1.6.7 Wildlife

Chapter 8 describes the various wildlife habitat on the Project site with a focus on vernal pools and rare species habitat. It outlines mitigation commitments resulting from consultation with Mass Wildlife's Natural Heritage and Endangered Species Program (NHESP). The overall Pinehills community will set aside at least 2,280 acres as open space and common facilities, the majority of which will remain in a natural condition (not programmed for recreation or infrastructure uses), so as to perpetuate the existing environment and protect existing wildlife populations.

Seventeen vernal pools exist on the site that have been certified by the NHESP. None of these are within the PRD VII area. Despite The Pinehills no longer being mapped as Eastern Box Turtle habitat, Pinehills LLC will comply with the requirements of MESA for development within this area as agreed upon during PRD VI.

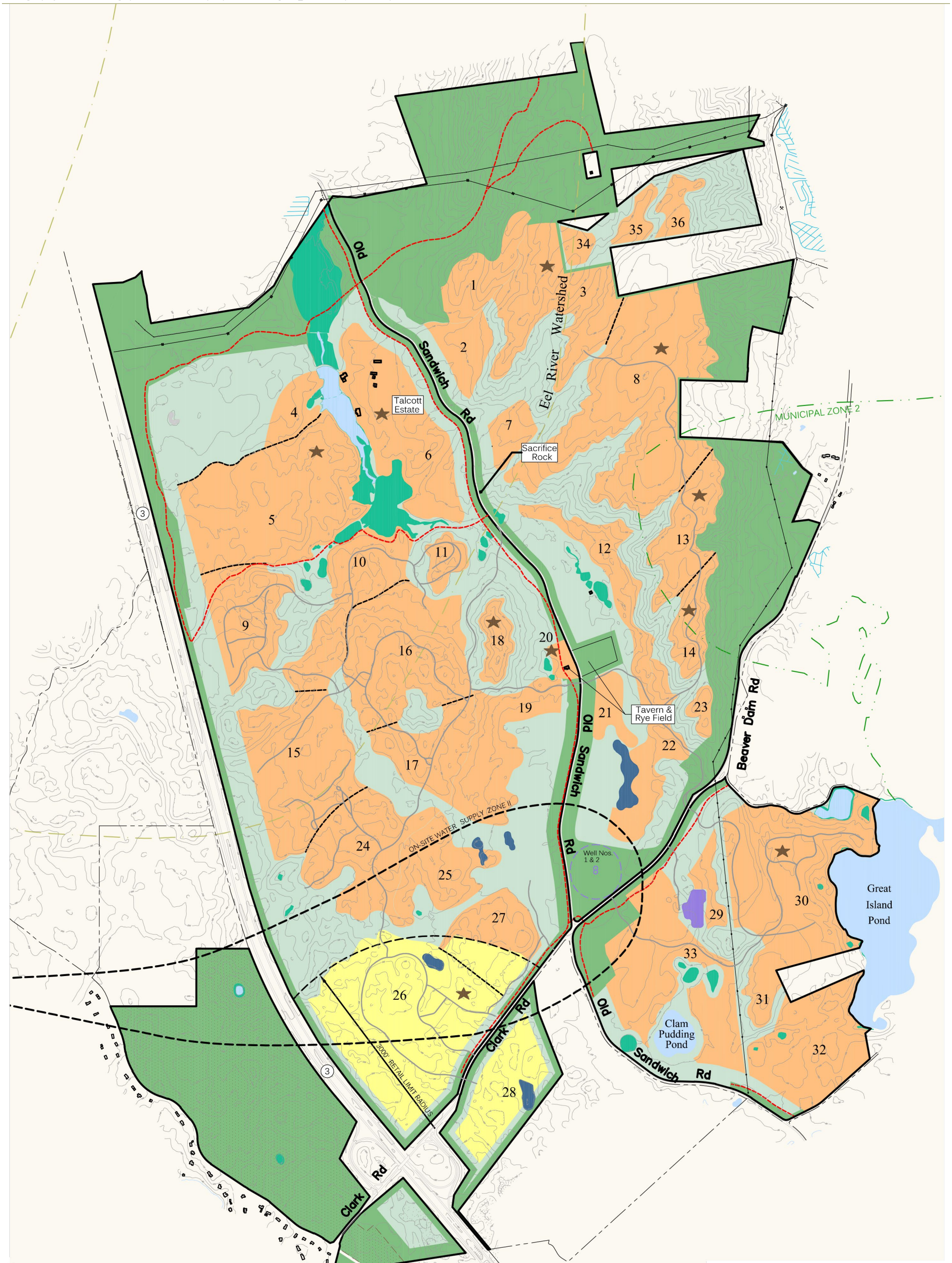


Source: USGS Quadrangles; Manomet, MA and Sagamore, MA

0 1000 2000 Feet

Figure 1.1

Project Location Map



Note:
July 2020 Graphic Master Plan was updated
to show new land incorporated into OSMUD
per 2nd, 3rd, 4th, 5th, 6th, 7th, and 10th Notices of Project Change.

0 400 850 Feet

- xx Residential Buildable Areas
- xx Mixed Use Buildable Areas "Neighborhood Green"
- Reserved Land
- Open Space Areas
- Undisturbed Open Space
- Potential Lodging Locations
- Treatment Plant & Leaching Fields
- Existing Wetland/ Flood Plain Areas
- Previously Existing Waterbodies
- Proposed Ponds
- Public Water Supply & 400' Protective Radius
- Eel River Watershed Boundary
- On-Site Water Supply Zone II
- Public Trails (Proposed)
- Minor / Collector Roads

vhb

Figure 1.2
Graphic Master Plan

1.8 Acres
Added under NPC 10

11.2 Acres
Added under NPC 8

Old Sandwich Rd

Eel River Watershed

Talcott Estate

Sacrifice Rock

Tavern & Rye Field

Beaver Dam Rd

MUNICIPAL ZONE 2

ON-SITE WATER SUPPLY ZONE II

Well Nos. 1 & 2

3000' RETAIL LIMIT RADIUS

Great Pond

Clam Pudding Pond

Clark Rd

Old Sandwich Rd

Note:
July 2020 Graphic Master Plan was updated to show new land incorporated into OSMUD per 2nd, 3rd, 4th, 5th, 6th, 7th, and 10th Notices of Project Change.

0 400 850 Feet

- Residential Buildable Areas
- Mixed Use Buildable Areas "Neighborhood Green"
- Reserved Land
- Open Space Areas
- Undisturbed Open Space
- Potential Lodging Locations
- Treatment Plant & Leaching Fields
- Existing Wetland/ Flood Plain Areas
- Previously Existing Waterbodies
- Proposed Ponds
- Public Water Supply & 400' Protective Radius
- Eel River Watershed Boundary
- On-Site Water Supply Zone II
- Public Trails (Proposed)
- Minor / Collector Roads

Figure 1.3

Phases 1-VII Plan

The Pinehills
Plymouth, Massachusetts

2

Project Description

This chapter describes the project proponent, the Plymouth area and PRD: Phase VII development plans for The Pinehills.

2.1 Proponent

The Proponent for The Pinehills is Pinehills LLC, a limited liability corporation comprised of: Green Plymouth LLC, a Green Company; NED Plymouth LP (formerly NED Plymouth LLC), a New England Development affiliate; and Wallace Associates LLC.

2.2 Purpose and Need

Beginning in 2000 Pinehills LLC began building a community whose target market is "empty nesters," people without children or whose children have grown up, who seek to live in an area with a significant amount of open space and who prefer dramatic views from their home to a traditional subdivision configuration of single-family homes. The Pinehills fills a near total void of this type of home in Plymouth and environs.

Buildout of The Pinehills will see construction of three golf courses, f which have already been constructed and are currently operational. Two of the courses are located at the Pinehills Golf Club, the award-winning Rees Jones and Nicklaus Design – a complementary draw to functions and conferences for the inn and spa, which opened in 2014.

Retail and service establishments, such as grocery, dry cleaning, medical services, and gasoline service stations, underserve the area surrounding The Pinehills and are the type of shops and services that have populated The Pinehills Village Green District. In addition to providing these services for those who live in The Pinehills, the Village Green District serves a practical need in the area of Plymouth that lies to the south of the site.

2.3 The Pinehills

The Pinehills is being constructed on an approximately 3,256-acre parcel in Plymouth, Massachusetts. The site is adjacent to Route 3, a major highway linking Boston (45 miles to the north) to Cape Cod (8 miles to the south). The site is generally bounded by Route 3 and Long Pond Road on the west; Island Pond, Beaver Dam Road, and the Pine Hills on the east; Clark Road, Old Sandwich Road and Savery Road and adjacent land on the South, and Manomet Hill and private properties on the north. See Figure 1.1 for site location map.

2.3.1 Master Plan for the Community

Natural resource planning has driven articulation of The Pinehills' land uses. Of paramount interest has been identification of the best locations for water supply and wastewater treatment; protection of historic and archeological resources as well as wetland resources including vernal pools; and reserving land for purposes of wildlife enhancement and natural buffer areas around the community. With this accomplished, remaining lowland areas were identified for other open space and recreational uses including buffers to existing public ways. The Pinehills protects key natural and cultural resources while establishing buildable areas that are compatible with, and gain value from, the overall beauty and rural character of the land. Building construction has occurred on higher ground, where residents are able to enjoy the abounding scenic vistas internal and external to The Pinehills.

Two components of The Pinehills open space and common facilities are remarkable: the sheer number of acres of open space and common facilities and preservation of the unpaved portion of Old Sandwich Road. Only 30 percent of the land will be built upon with 70 percent remaining as open space and common facilities as provided under the Town of Plymouth Open Space Mixed Use Development (OSMUD) zoning by-law and the Development Plan approved thereunder.

The Pinehills will continue to preserve the 200-foot deep white pine plantation that graces both sides of Old Sandwich Road between its intersection with Clark Road and the site of the historic Wright Tavern (also known as Cornish Tavern) and the associated rye field. Relying on the Town of Plymouth's scenic road bylaw as guidance, no residential or commercial structure will be located within 300 feet of either side of this road section other than the Wright Tavern. Today, this early byway is lightly traveled. In order to promote continuation of this condition, the first road constructed in The Pinehills was an alternate route running parallel to and to the west of Old Sandwich Road, which captures 95 percent of project-related traffic that otherwise would have used Old Sandwich Road. The expense associated with constructing this alternate, born entirely by the Proponent, exceeded $3 million. Without it, though, the experience over time for walkers and those driving this route would become degraded. A second alternate route (Long Ridge Road) to the east side of Old Sandwich Road began construction in 2004 and extensions of the road were included in various phases of the Project.

Prior to this filing, The Pinehills was permitted for construction of 2,132 limited occupancy homes; 920 planned retirement homes; up to four 18 hole golf courses; and 1.3 million square feet of mixed use commercial and general commercial development including a hotel, community retail and service uses, mixed use residential uses over retail or general commercial uses and a mix of office and research and development uses. Homes are clustered, with lots for single and multi-family homes that are smaller compared to conventional residential subdivisions. Similarly, a mixed-use area has been created within the Village Green District (referred to as the "Neighborhood Green District" in prior MEPA submissions) located within 3,000 feet of Route 3's Exit 3. Built to a higher density, this area's street and open space layout, architectural scale and design encourage pedestrian use. The framework of the Village Green District provides an efficient use of space by considering all uses together instead of individually.

This vision has attracted businesses to locate in The Pinehills. At this writing nearly 30 office, retail and service establishments are open for business within the Village Green District, including dental and medical facilities, professional offices, banking facilities, US Post Office, municipal fire station, gasoline service station, full service market, liquor store, restaurants, bars, fitness and racquet club, golf club, hotel, spa, and other services and retail establishments.

The Master Plan was developed with considerable public input in order to ensure not only that it adhere to the zoning but provide the following additional community benefits.

1. Hotels, golf courses, retail and commercial businesses will provide jobs and enhance the tax base;
2. Housing oriented to empty nester buyers with few children adding a new market segment to Plymouth that has positive tax benefits;
3. Private roads and utilities;
4. Master Plan layout that respects the land. The Master Plan underlies each design and construction phase;
5. The developer will offer land in the Neighborhood Green to the Town of Plymouth for municipal use (likely to be a fire station);
6. Almost every building in the community will be served by a common, public water supply system. This will ensure adequate fire safety and quality water for community residents and users;
7. Views of the tavern and rye field from Old Sandwich Road will be protected;
8. The stand of large pines on the eastern side of the intersection of Old Sandwich, Beaver Dam and Clark Roads will be open space to preserve rural character;
9. Plymouth residents will have access to a system of trails running north/south and east/west that will connect as part of "the wishbone" to planned off-site public trail systems;
10. Beyond the 200 acres of Reserved Land granted to the Town, The Pinehills features a natural preserve of up to 350 acres to be managed by an open space advocacy, nonprofit entity. Pinehills and the Town of Plymouth have agreed to increase the size of the natural preserve to 392 acres;
11. The architectural integrity of the Talcott estate and the beauty of the pond will be maintained;
12. The plan maintains buffers from existing streets;
13. A new paved road will be constructed by the developer to reroute traffic from the unpaved, historic section of Old Sandwich Road at no cost to the Town; and
14. Through the above, Pinehills LLC assisted the Town of Plymouth to satisfy the terms of the $3.5million "Growth Planning Challenge Grant" as described to the Board of Selectmen in an October 7, 1997 correspondence, including the possibility of conservation restrictions, the value of which would be passed on by Pinehills LLC to the Town or the environmental non-profit entity managing such restriction.

Pinehills LLC has committed to a range of mitigation measures to avoid and/or minimize Project impacts. For a summary of all Project-related mitigation measures and an update on their status, please see Chapter 9.

2.3.2 Phased Review Document: Phase VII

This submission describes the seventh and final phase of The Pinehills community. Phase VII , , includes construction of 13 Limited Occupancy Community (LOC) homes interspersed throughout the Project Site in areas previously designated for development (and previously studied in earlier MEPA filings). Though not originally contemplated in the Infrastructure Plan, this increase in the number of homes is a result of the addition of 13 acres to the Project Site (including 11.2 acers which was described in the 8th NPC). Under local zoning, for each gross acre added to the project site above 3,000, one additional LOC home may be built.

Under NPC 10, filed concurrently with this PRD, an additional 1.8 acres of land previously owned by the Town of Plymouth and deeded to Pinehills LLC will be added to the OSMUD. This land is located along the northern site boundary and was the subject of a land swap transaction with the Town of Plymouth. This transaction resulted in Pinehills LLC conveying to the Town of Plymouth a similar sized parcel of land within the OSMUD for the Town to locate and construct a public safety communications tower..

Phase VII also includes up to 500,000 square feet of commercial development not previously reviewed, including approximately 200 multi-family residential units (considered by the Town of Plymouth to be a general commercial use). In addition, of the total 800,000 sf of commercial development previously reviewed under earlier phased review documents, a portion of the previously reviewed retail development square footage has been reassessed in this PRD as general commercial (50,000 sf) and office (50,000 sf) development uses, revising the totals for the previously reviewed commercial development uses to 500,000 sf of general commercial, 250,000 sf of office space and only 50,000 sf of retail When combined with the PRD VII commercial development, the total commercial development for the project would be 1.3 million sf as proposed and reviewed under the Infrastructure Plan. .

During this Phase, 69.45 million gallons per year (MGY) of authorized public drinking water supply volume will be drawn down from the Pinehills existing supply wells. The additional withdrawal and permit requirements were described under the 9th NPC. A permit application is currently pending review with the MassDEP.

Construction is anticipated to commence in 2021.

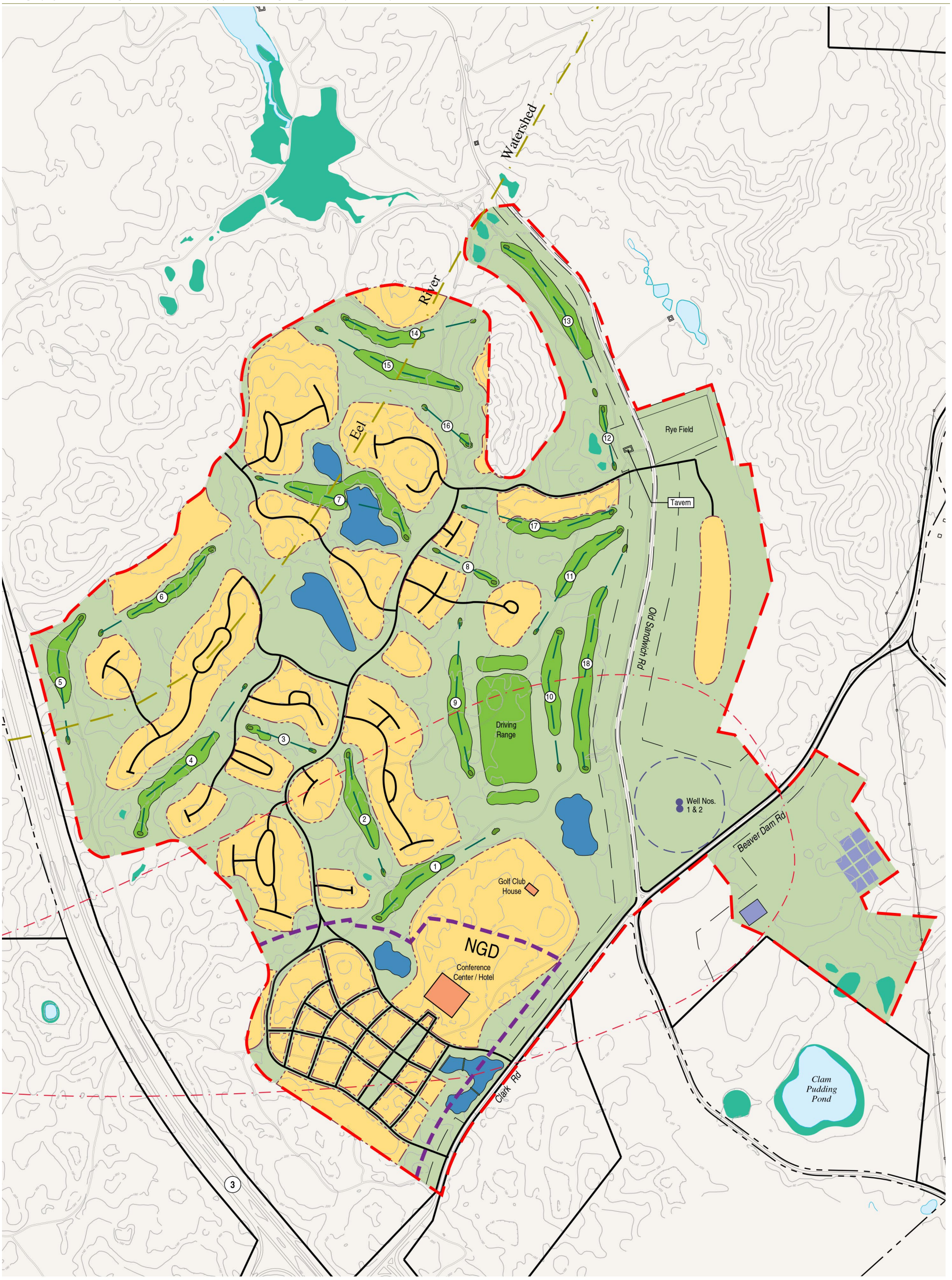
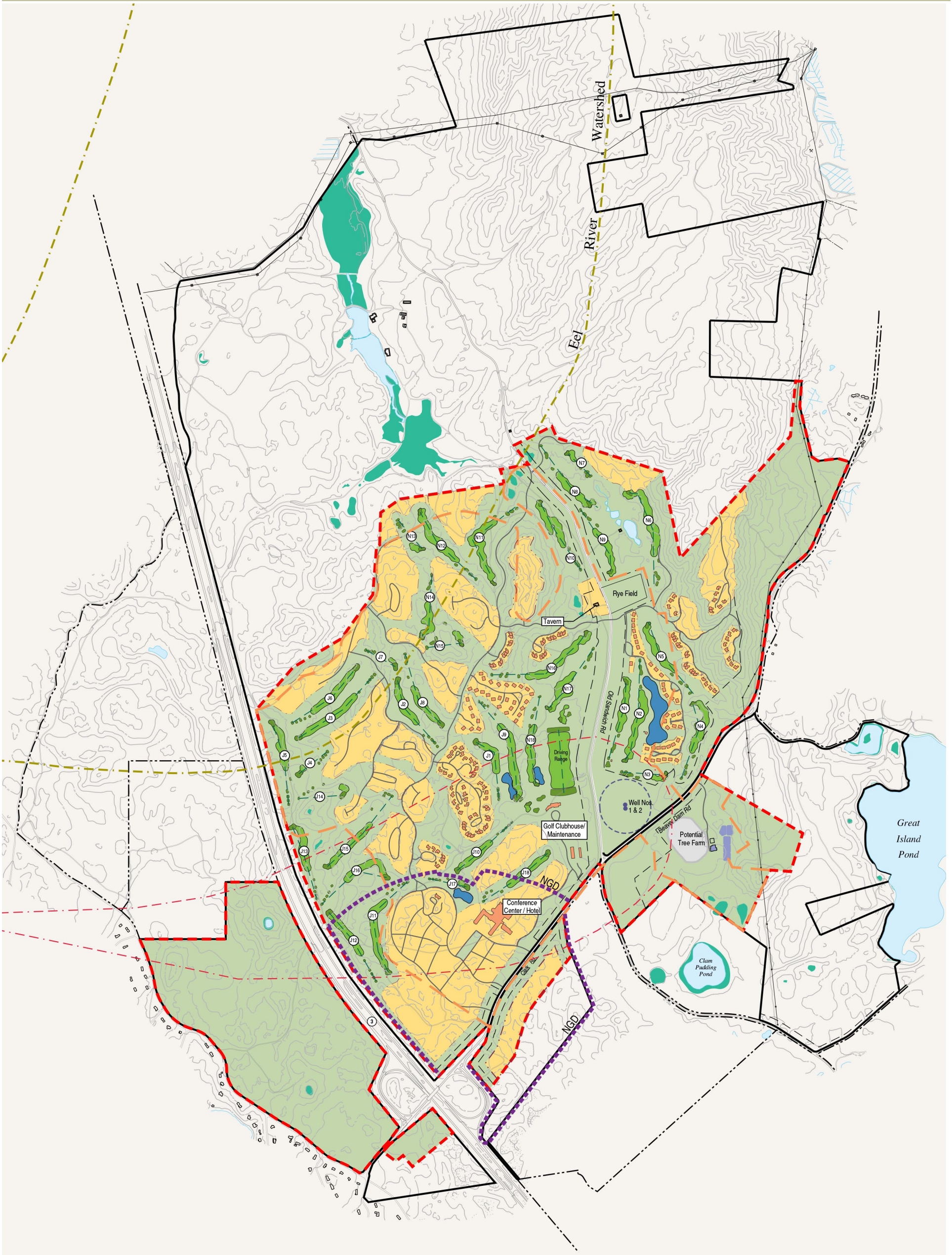


Figure 2.1

Phase I Plan



Buildable Areas

Open Space Areas

Proposed Ponds

Existing Wetland / Flood Plain

Golf Green

Limit of PRD: Phase I

Limit of PRD: Phase II

Leaching Fields for Treatment Plant

Public Water Supply & 400' Protective Radius

On-Site Water Supply Zone II

Limit of Undisturbed Open Space

Sewage Treatment Plant

NGD Limit of PRD: Phase I Neighborhood Green District

0 750 1500 Feet

Figure 2.2

Phase II Plan

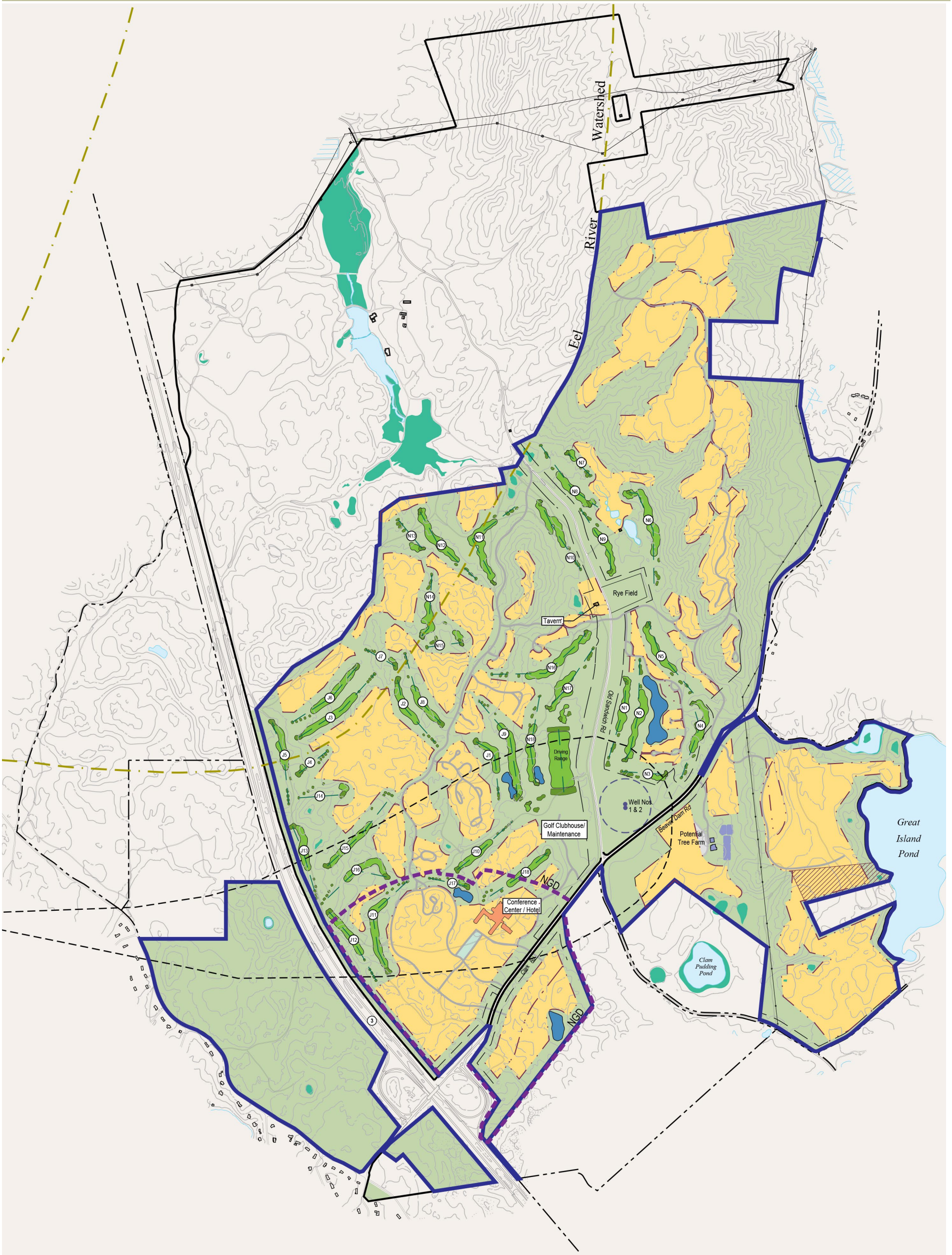


Figure 2.3

Phase I-III Plan

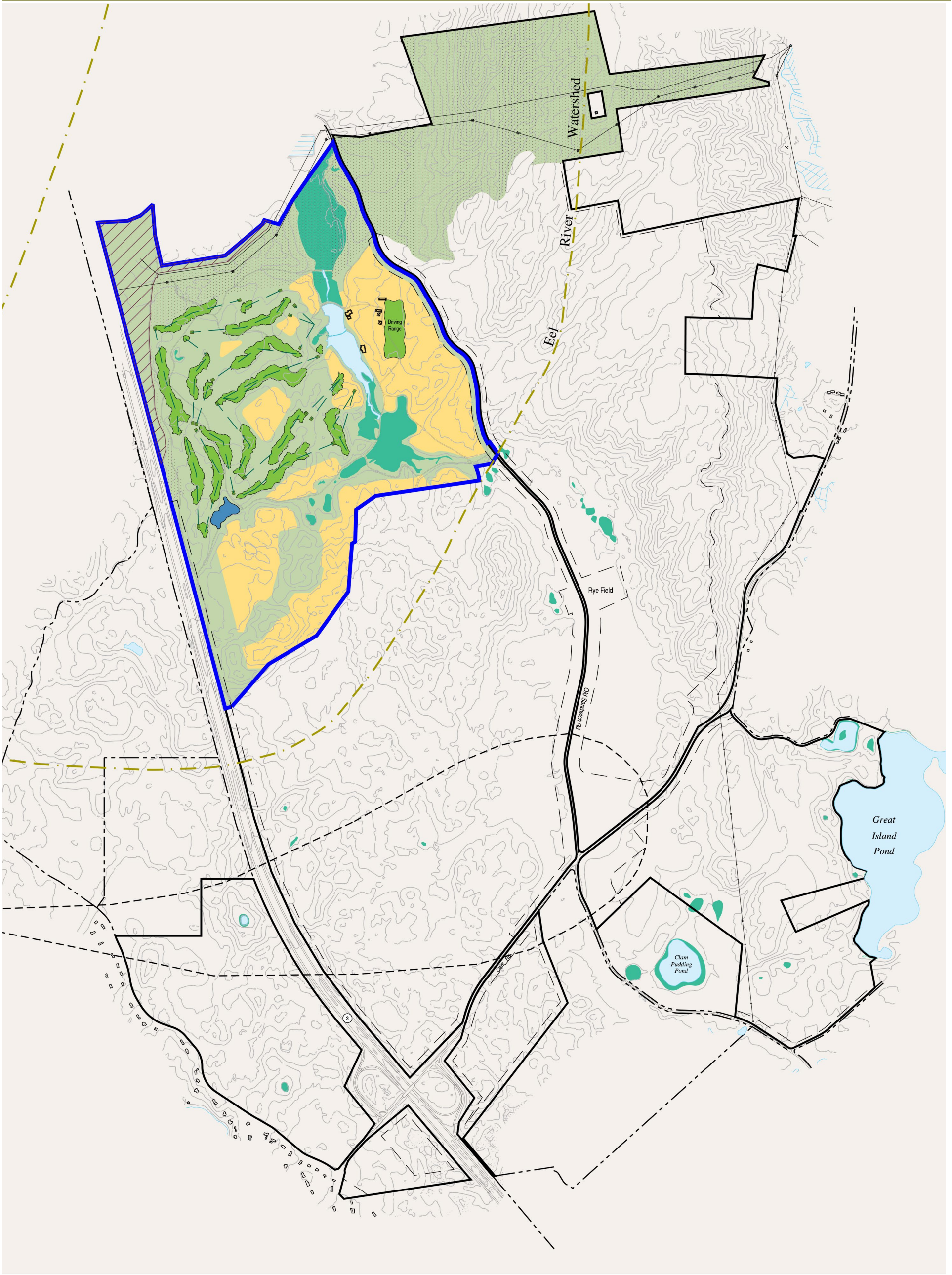
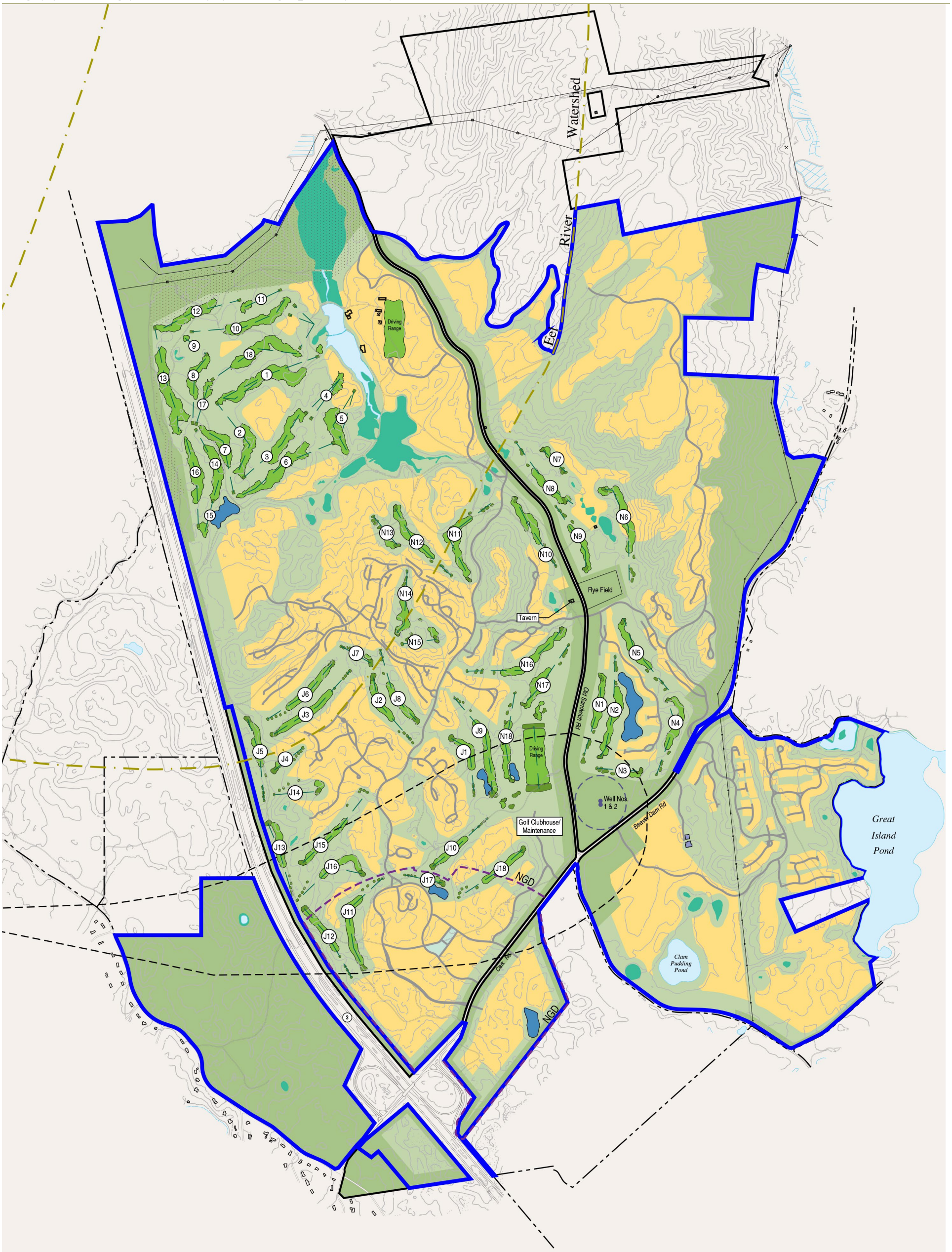


Figure 2.4

Phase IV Plan



Buildable Areas
Open Space Areas
Proposed Ponds
Existing Wetland / Flood Plain
Undisturbed Open Space
Limit of PRD through Phase IV
Roads

Leaching Fields for Treatment Plant
Public Water Supply & 400' Protective Radius
Northern Corridor Wildlife Preserve (392 Acres, Southeastern boundary to be defined)
Golf Green

Eef River Watershed Boundary
On-Site Water Supply Zone II
NGD Limit of PRD: Phase I Neighborhood Green District

0 750 1500 Feet

Figure 2.5
Phase I-V Plan

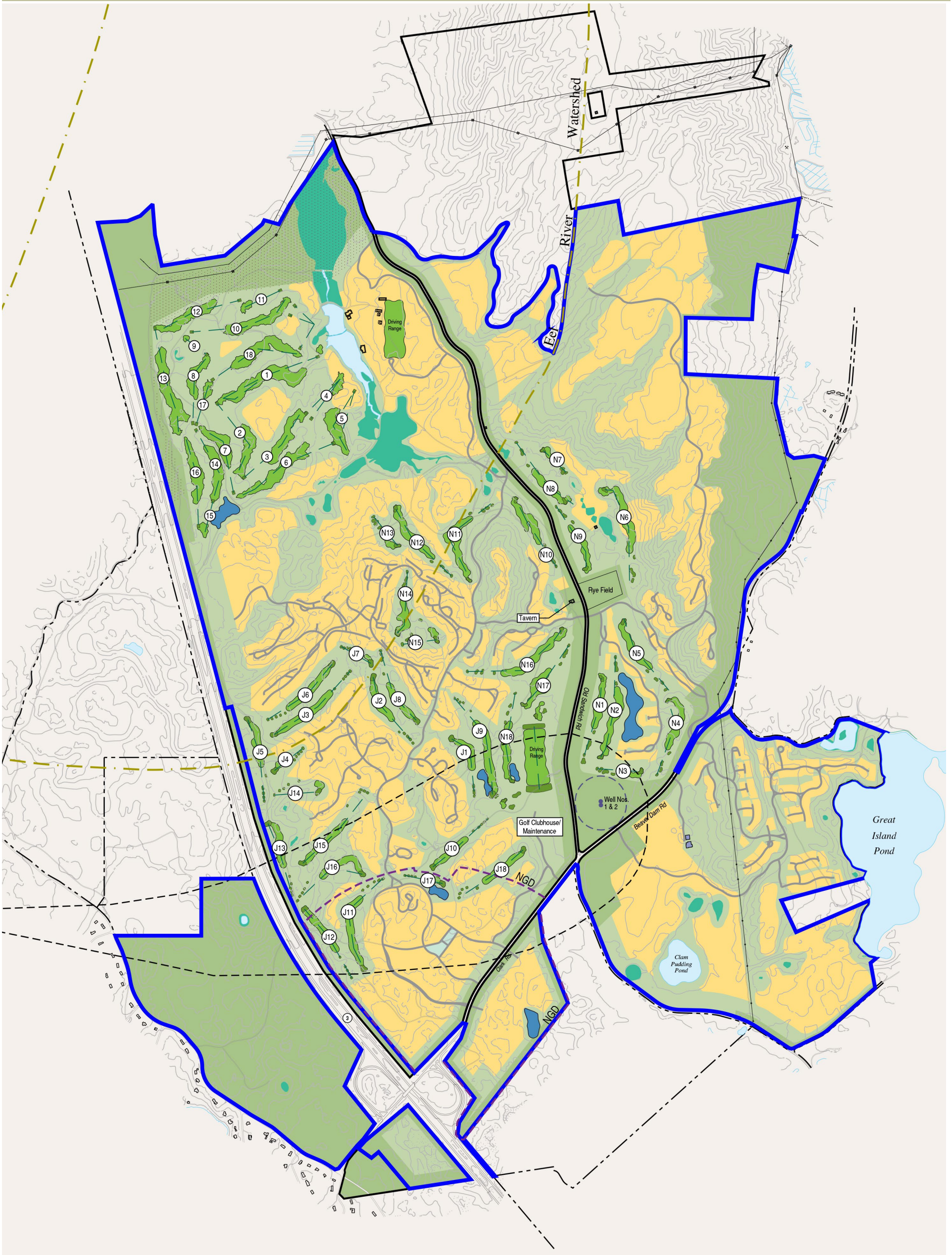


Figure 2.6
Phase VI Plan

3

Existing Environment

This chapter describes existing conditions at the site, including topography, geology and soils; surface and groundwater hydrology and quality; air quality and noise; plant and animal species and habitat; traffic, transit, pedestrian, and bicycle transportation; scenic qualities, open space, and recreational resources; historic and archaeological resources, the built environment; and rare or unique features.

3.1 Area Environment

The Pinehills is located primarily at the northeast quadrant of Exit 3, on Route 3, as it intersects Clark Road. Prior to commencing construction, the Project Site was mostly undeveloped and located in a largely residential area with some bordering agricultural and equestrian uses. See Figure 1.1 for location of the Project Site.

3.2 Topography, Geology, and Soils

The Project Site is located near the northern margin of the Coastal Plain physiographic province, which includes Cape Cod and the islands. It is comprised of three topographic districts and ranges from 60 feet to 370 feet above mean sea level. The valley region is a gently sloping outwash plain roughly centered north-south on Old Sandwich Road and ranging in width from 500 feet to nearly one-half mile. The Pinehills consists of ground moraine deposits and contains rolling highlands along the eastern boundary of the community. The hills rise more than 200 feet above the valley to 370 feet and are broad plateaus at their highest elevations. The kettles region features end moraine deposits and consists of glacial till with scattered kettle hole features. The most common soil type in The Pinehills is Carver coarse sand with slopes of up to 15 percent. Carver and Gloucester soils (8 to 35 percent slopes), peat and sanded muck are also found on the site. Soil conditions are well drained and dry.

3.3 Surface and Groundwater Hydrology and Quality

Located above the Commonwealth's second largest aquifer, the Plymouth-Carver, the abundant quantity available as a potential drinking water source is matched by its very high quality. This water serves as one of the baseflow sources of the Eel River system.

Less than three percent of the area of the Project Site consists of wetlands. There are 30 identified wetlands on the Project Site, 13 of which are vernal pools or Outstanding Resource Waters of the Commonwealth. The Pinehills is host to the Great Island, Little Island, and Clam Pudding Ponds, all deep-water ponds on the southeast border of the property. Great Island Pond meets the regulatory definition of a great pond (310 CMR 9.00), as it is larger than ten

acres. Pinehills LLC studied the groundwater hydrology of the Site in order to develop a proposal for DEP permitting of the public water supply and wastewater treatment plant.

3.4 Air Quality and Noise

Vehicular traffic is the only current source of air and noise pollution generated in The Pinehills. A mesoscale analysis was prepared in accordance with state and federal guidelines. It reports on the existing area-wide VOC and NOx emissions and models future emission levels, both with and without development of The Pinehills. The results of that analysis were reported in the "Infrastructure Plan and Phased Review Document: Phase I."

3.5 Plant and Animal Species and Habitat

The Pinehills supports several vegetation types that are common throughout southeastern Massachusetts and Cape Cod. The primary groupings of vegetation are pitch pine/scrub oak, deciduous stands, coniferous stands, riparian system, and scrub oak. Ninety-five percent of the Project Site was vegetated prior to commencing work.

Wildlife habitat has previously been evaluated through field observations over the course of many years, and at all times of the year. Previously, NHESP responded to a MESA Information Request, and reported habitat for two species: Eastern Box Turtle (*Terrapene carolina*) and Barons Buckmoth (*Hemileuca maia*). NHESP routinely updates its state-wide mapping of rare species habitat, and as of this most recent mapping, effective August 1, 2017, there are no areas of mapped habitat at the Pinehills. The most proximate area of mapped habitat is surrounding Long Island Pond (PH 635), located southeast of Beaver Dam Road.

3.6 Traffic, Transit, Pedestrian and Bicycle Transportation

Route 3, one of the state's major highways, abuts the Project Site and its Exit #3 interchange is immediately proximate to The Pinehills' commercial center (Neighborhood Green District). Eight miles to the north of Exit #3 is a commuter rail system providing easy access to downtown Boston. Commuter service via bus and van service is also available and convenient to the Project Site. Other roads immediately around the Project Site are paved and unpaved and, generally, the traffic flow is light. Old Sandwich Road, which bisects The Pinehills, is an ancient way. Approximately one-third of the section of Old Sandwich Road which traverses the Project Site is paved. Neither Old Sandwich Road nor streets in the immediate area are serviced by sidewalks or bicycle trails

3.7 Scenic Qualities, Open Space and Recreational Resources

Scenic vistas from within The Pinehills are plentiful. On a clear day, the view from The Pinehills to the east is of Cape Cod Bay and landmarks can easily be identified in each of the Cape Towns, from Provincetown to the Cape Cod Canal. To the west, elevations of the Project Site look toward Myles Standish State Forest and environs. From east of The Pinehills, the pine hills range is easily visible and creates a dramatic vertical visual draw.

There are abundant open space and recreational resources available to the public in the immediate area of The Pinehills. These include the Myles Standish State Forest, athletic fields at Forges Field, a municipal golf course as well as a privately held golf course, numerous ponds, a newly established Audubon Wildlife Sanctuary abutting the Project Site to the east, and athletic facilities at nearby schools.

3.8 Historic and Archaeological Resources

The Pinehills contains a variety of historic and archaeological resources that have been identified and evaluated through systematic study. Old Sandwich Road is an ancient way, reportedly established by Native American people of the Wampanoag Tribe and then used by EuroAmerican settlers to travel between Plymouth and Cape Cod. The Project Site also contains a Native American sacred site known as "sacrifice rock," which, while contained within the boundary of The Pinehills, is owned by the Plymouth Antiquarian Society and held for preservation purposes. The Pinehills includes a building that used to house Cornish's Tavern (known locally as the Wright Tavern), a late eighteenth-century structure on Old Sandwich Road that was used as a farm in the nineteenth century. At the time that Pinehills LLC acquired the Project Site, the building was being used as a single-family home and no longer sits on its original foundation. The Rye Field, located opposite the tavern, is a parcel of land representing an intact agricultural landscape associated with the Wright Tavern. The Robert B. Symington and William C. Symington Cranberry Bogs are another resource associated with past land use.

The Pinehills employed the Public Archaeology Laboratory, Inc., a firm with substantial expertise in surveying and evaluating historic and archeological resources, to work in The Pinehills under the direction of the Massachusetts Historical Commission (MHC). Their reconnaissance and intensive survey work suggested areas of potentially significant cultural resources within the Project Site, which have been documented in various reports to MHC. Several potentially significant archaeological sites have been studied in more detail at the site examination level. Two sites (Talcott Site and Clam Pudding) were the subject of an archaeological data recovery program conducted to mitigate adverse effects of proposed development on the site. Chapter 6 of this document provides a comprehensive up to date summary of the investigations and surveys PAL has completed on the Project Site. The Pinehills and PAL will continue to work with MHC in accordance with the Memorandum of Agreement to identify and address any significant cultural resources within the Project Site.

3.9 The Built Environment & Human Use of the Project Site & Surroundings

Historic uses of the Project Site include agriculture, forest management, residential and recreational (hunting). At the inception of the Project, three homes existed on the Project Site. Two are associated with the Talcott Estate, on the northern portion of The Pinehills. Established in the 1920's, the Talcott Estate is beautiful in architecture and landscape design. The third home was originally the Wright Tavern that opened to serve colonial travelers on route between Plymouth and Cape Cod. Dirt roads traverse the Project Site. Old Sandwich Road, an ancient way, defines the valley floor and is partly paved. The State's Department of

Environmental Management maintains a fire tower in the northeast corner of The Pinehills. Near to it, power lines over easements on the site connect neighboring Entergy (formerly Boston Edison) power plant and NStar Electric to their customer base. Much of the Project Site is forested.

The Pinehills sits within a largely residential part of Plymouth that is bisected by Route 3. Within this area are agricultural uses (mostly cranberry bogs), equestrian activity, schools, recreational and conservation lands. In the immediately surrounding area, there is only one site of environmental concern: The Town landfill. It is hydro geologically downgradient of The Pinehills and is not considered connected to The Pinehills.

Most of the housing in the area around The Pinehills was constructed in the last fifty years, as is typical of the Town of Plymouth's total housing stock. Given a fast pace of residential growth throughout the Town and the opening in 1997 of a commuter rail station 8 miles to the north of this neighborhood (and on Route 3), continued residential growth has been realized.

At the Project's inception, the Town's population was about 52,000. The average household contained 2.67 persons per household (US Census, 2000). The median household income was $39,886. Per capita income average was $15,882 (circa 1998). By 2018 the population grew to 59,331, with a median household income of approximately $87,595 and a per capita income of approximately $43,747.[1] As of March 2020, the median residential sale price for homes in Plymouth was $398,358.[2] The average sale price for new homes within The Pinehills is approximately $650,000 [3rd quarter 2020].

3.10 Rare or Unique Features

The size and topography of The Pinehills are quite unusual, particularly for New England. Developing the Site through a Master Plan helped to preserve key features and attributes. As a result of the zoning and the Master Plan Special Permit process, at the conclusion of the Project, seventy percent of The Pinehills will remain as common facilities and open space. The framework is set so that detailed land use planning will minimize development impact on natural resources, locating it away from the valley (protect historic, natural and groundwater assets) and kettle holes. Transportation infrastructure (both pedestrian and vehicular) conforms to the topography and the existing rural character. As a result, grading and runoff impacts have been minimized. The unusual combination of open space and careful construction of homes and commercial buildings has created a unique place to live and work.

[1] Source 2018 American Community Survey 5-Year Estimates https://www.census.gov/programs-surveys/acs/. Accessed 05/11/20.

[2] Zillow. https://www.zillow.com/plymouth-ma/home-values/. Accessed 05/11/20.

4

Traffic Impact Assessment

This Chapter summarizes the Traffic Impact Assessment (included in its entirety in Appendix C). It describes existing and future traffic conditions, as well as specific improvements to the transportation infrastructure that may be needed.

4.1 Introduction

On April 17, 1998, the Secretary of Environmental Affairs issued a certificate establishing a special review procedure for The Pinehills requiring that an Infrastructure Plan be prepared and, due to the phased nature of the planned development, a Phased Review Document (PRD) be prepared for each phase of the community. Each PRD must assess the impacts on the transportation infrastructure associated with the particular and cumulative development phases and follow the general format of the Infrastructure Plan traffic analysis. Each subsequent PRD is to build upon and refine the assumptions and data presented in the prior PRD(s).

This study was performed in accordance with the Massachusetts Department of Transportation's (MassDOT's) Transportation Impact Assessment (TIA) Guidelines and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports, and addresses the study requirements defined in the Massachusetts Environmental Policy Act (MEPA) Office scope for the preparation of the PRD: Phase VII for the community. The report identifies existing operating parameters on the surrounding roadway network, examines and refines the assumptions presented in the "Infrastructure Plan and Phased Review Document: Phase I" and the subsequent PRDs prepared in support of Phases II, III, IV, V and VI, and evaluates the anticipated traffic-volume increases as a result of the development of PRD: Phase VII of the community. Potential impacts on the transportation infrastructure that may be associated with PRD: Phase VII are also analyzed, with particular attention paid to the major roadways serving the site, including Route 3, Clark Road, Long Pond Road, and State Road (Route 3A), as well as the historic Old Sandwich Road corridor.

This Chapter includes discussion of specific improvements to the transportation infrastructure that may be needed. Because MassDOT and MEPA have asked for yearly monitoring of traffic in the area, actual traffic volume data for The Pinehills is and will continue to be readily available. The initial monitoring of traffic associated with The Pinehills commenced in 2003 and has continued annually since that time. The monitoring program will be the most accurate measure of the need for undertaking traffic mitigation measures. Traffic counts performed at the existing roadways serving the community as a part of the

annual traffic monitoring program have demonstrated that the actual volume of traffic generated by The Pinehills has been below the traffic volume projections that were developed following established Traffic Engineering and Transportation Planning standards. A contributing factor to the lower traffic volumes is the interrelationship of uses within The Pinehills, a guiding principle of The Pinehills Master Plan and a feature which serves to encourage trips between uses within the community (i.e., internal capture trips). Further, the interconnected pathway system within The Pinehills also facilitates connectivity of uses and encourages pedestrian and bicycle activity. As a result, it is expected that the actual traffic realized from PRD: Phase VII will also be below the traffic volume projections documented herein as a result of these community amenities.

As documented in the prior traffic assessments prepared in support of The Pinehills, actual traffic counts performed at other master planned communities, including one developed by the Green Company on Cape Cod, have evidenced internal capture rates far higher than the 25 percent assumed for PRD: Phase VII of The Pinehills, and generally show per household trips much lower than the Institute of Transportation Engineers (ITE) standard would predict, potentially resulting in a conservative (high) assessment of the impacts of the project on the transportation infrastructure.

4.2 Project Description

The project site is located on a 3,255-acre parcel of land in Plymouth, Massachusetts generally bounded by Route 3 and Long Pond Road to the west; Beaver Dam Road, the Pine Hills and Island Pond to the east; Clark Road and areas of open and wooded space to the south; and Manomet Hill, private properties, and areas of open and wooded space to the north. PRD: Phase VII of The Pinehills will consist of the development of up to 13 limited occupancy homes and 500,000 square feet (sf) of development consisting of 200 multifamily residential units, 250,000 sf of general office space and 50,000 sf of medical office space. Not all of the PRD: Phase VII commercial space represents "new" development. The PRD: Phase VII development program will reallocate 100,000 sf of previously approved retail space to the commercial uses defined above. It is anticipated that PRD: Phase VII will be substantially complete by the end of 2030.

Primary access to PRD: Phase VII of the community will be provided by the Pinehills Drive, Meeting Way and Landmark Drive located along the north side of Clark Road, and a new roadway that will be located opposite Pinehills Drive along the south side of Clark Road.

Figure 4.1 depicts the site location in relation to the local roadway network, with Figure 4.2 depicting rail facilities, sensitive receptors such as schools and parks, and roadway jurisdictions.

4.3 Existing Conditions

4.3.1 Existing Traffic Volumes

Figure 4.3 depicts the study area evaluated for PRD: Phase VII which includes twenty-five (25) intersections/ramp junctions. Traffic volumes for this study were obtained from manual turning movement counts (TMCs) and automatic traffic recorder (ATR) counts conducted in

January and February 2020. Traffic volumes during the months of January and February were found to be approximately 15.3 percent and 14.0 percent, respectively, below average-month conditions and were adjusted upward to average-month conditions. The 2020 Existing peak-hour traffic volumes are included in Appendix C, Table C-1 and depicted graphically on Figures 4.4, 4.5, and 4.6 for the weekday morning, weekday evening, and Saturday midday peak-hours, respectively.

Clark Road, east of the Route 3 northbound on/off ramps, was found to accommodate 12,580 vehicles per day (vpd) on an average weekday, with approximately 848 vehicles per hour (vph) during the weekday morning peak-hour and 1,194 vph during the weekday evening peak-hour. This section of Clark Road was found to accommodate approximately 10,455 vehicles on an average Saturday, with 1,096 vph during the Saturday midday-peak hour. Clark Road, west of the Route 3 southbound on/off ramps, was found to accommodate approximately 14,080 vehicles on an average weekday, with approximately 1,205 vph during the weekday morning peak-hour and 1,242 vph during the weekday evening peak-hour. On a Saturday, this section of Clark Road was found to accommodate approximately 10,715 vehicles, with 906 vph during the Saturday midday peak-hour.

Long Pond Road, north of Clark Road, was found to accommodate approximately 6,020 vehicles on an average weekday, with approximately 755 vph during the weekday morning peak-hour and 675 vph during the weekday evening-peak hour. On a Saturday, this section of Long Pond Road was found to accommodate approximately 4,175 vehicles, with approximately 490 vph during the Saturday midday peak-hour. Long Pond Road, south of Clark Road, was found to accommodate approximately 12,305 vehicles on an average weekday, with approximately 1,090 vph during the weekday morning peak-hour and 1,146 vph during the weekday evening peak-hour. On a Saturday, this section of Long Pond Road was found to accommodate approximately 9,705 vehicles, with 820 vph during the Saturday midday peak-hour.

State Road (Route 3A), east of Beaver Dam Road, was found to accommodate approximately 17,915 vehicles on an average weekday, with approximately 1,145 vph during the weekday morning peak-hour and 1,385 vph during the weekday evening peak-hour. On a Saturday, this section of State Road was found to accommodate approximately 15,620 vehicles, with approximately 1,244 vph during the Saturday midday-peak hour.

Old Sandwich Road, north of Clark Road, was found to accommodate approximately 225 vehicles on an average weekday, with approximately 12 vph during the weekday morning-peak hour and 18 vph during the weekday evening peak-hour. On a Saturday, this section of Old Sandwich Road was found to accommodate approximately 170 vehicles, with approximately 17 vph during the Saturday midday peak-hour.

Weekday daily and Saturday traffic volumes within the study area have generally increased over those presented in the "Phased Review Document: Phase VI", which is consistent with traffic growth trends regionally and within the town. Given that a portion of the homes and businesses that have been approved for The Pinehills are not yet occupied (2,232 homes are currently occupied; three public golf courses are open; and 487,344± sf of commercial space is open for business as of PRD: Phase VI), any increase in traffic may be attributed, in part, to

continued development in the area including The Pinehills. Construction related traffic volumes are relatively minor and will be of limited duration as the community is developed.

4.4 Future Conditions

4.4.1 No-Build Traffic Volumes

In accordance with MassDOT's Transportation Impact Assessment (TIA) Guidelines, a ten-year planning horizon was selected to be consistent with the expected year of substantial completion of PRD: Phase VII of the community. To represent future No-Build (without PRD: Phase VII) traffic-volume conditions within the study area by the 2030 design year, existing traffic volumes were adjusted to account for normal traffic growth, as well as any developments and roadway improvements anticipated to be constructed by that time. The 2030 No-Build peak-hour traffic-volumes are shown on Figures 4.7, 4.8, and 4.9.

Based on discussions with the Planning Department of the Town of Plymouth, the Massachusetts Department of Transportation (MassDOT), and the Old Colony Planning Council (OCPC), 16 projects (site-specific developments including the continue build-out of The Pinehills PRD: Phase I, II, III, IV, V and VI) were identified that may impact traffic volumes within the study area and these were included in the analysis. In order to account for normal background traffic growth, a 1.0 percent per year compounded annual background traffic growth rate was also used, in addition to the site-specific developments, based on a review of historic traffic counts at from MassDOT Continuous Count Station No. 36 located on Route 3 at River Street in Norwell. It should be noted that this procedure results in traffic-volume increases in excess of 1.0 percent at the study area intersections and was documented in the prior traffic assessments prepared for The Pinehills and confirmed with both the Town of Plymouth and the OCPC.

The 2030 No-Build traffic volumes were developed by applying the 1.0 percent compounded annual background traffic growth rate to the 2020 Existing peak-hour traffic volumes and then adding the traffic expected to be generated by the identified site-specific developments, including traffic associated with the remaining unbuilt portions of PRD: Phases I, II, III, IV, V and VI of the community. Trips associated with the reallocation of 100,000 sf of unbuilt retail space that has been approved as a part of the prior PRD's were shifted to the commercial component of PRD: Phase VII resulting in a decrease in traffic volumes attributable to The Pinehills along the Clark Road/Beaver Dam Road corridor from the conditions documented for PRD: Phase VI.

4.4.2 PRD: Phase VII Traffic Volumes

Traffic volumes expected to be generated by the proposed PRD: Phase VII development program were determined based on statistics published by the ITE for Land Use Codes (LUCs) 260: Recreational Homes; 221: Multifamily Housing (Mid-Rise); 710: General Office Building; and 720: Medical-Dental Office Building. Figures 4.10 and 4.11 illustrate the trip-distribution pattern for the residential and commercial components of Phase VII of the community, respectively. the new external site-generated traffic volumes were assigned on

the study area roadway network as shown on Figures 4.12, 4.13, and 4.14 for the respective peak hours. A ten-year time horizon for construction of PRD: Phase VII (the 2030 Build condition) consists of the 2030 No-Build condition traffic-volumes with the anticipated full-build traffic resulting from the PRD: Phase VII development program added to them. The resulting 2030 Build peak-hour traffic-volumes are shown on Figures 4.15, 4.16, and 4.17.

At the completion of PRD: Phase VII, the project site is projected to generate an additional 4,162 new vehicle trips (2,081 entering and 2,081 exiting) on an average weekday. During the weekday morning peak-hour, the site is anticipated to generate an additional 340 new vehicle trips (254 entering and 86 exiting). During the weekday evening peak-hour, the site is projected to generate an additional 401 new vehicle trips (109 entering and 292 exiting). On a Saturday, the project site is expected to generate an additional 1,504 new vehicle trips (752 entering and 752 exiting). During the Saturday midday peak-hour, the project site is anticipated to generate an additional 288 new vehicle trips (154 entering and 154 exiting).

4.4.3 Internal Capture Trips

The Pinehills provides residences, retail establishments, recreational opportunities, and office space within a common boundary. To link land uses, an extensive internal network of rural roadways, walking and bicycle paths have been incorporated into the framework of the community. Accordingly, it is expected that a significant portion of the traffic projected to be generated by the community and PRD: Phase VII will remain internal to the site using the community roads and walking and bicycling network to travel between home, work, shopping, and recreating.

Empirical evidence presented in the "Infrastructure Plan" suggests that internal capture rates vary depending on the land uses and amenities contained within a development, as well as on the presence of internal connections between the various land uses. Studies performed at a development similar to The Pinehills revealed internal capture rates ranging from 45 to 55 percent during the weekday morning and evening peak-hours and 51 percent on a daily basis. Data gathered at a similar Green Company community in Massachusetts revealed traffic levels ranging from 78 to 99 percent below ITE traffic-volume projections during the peak-hours. However, as presented in the "Infrastructure Plan and Phased Review Document: Phase I" and consistent with the approach used in the transportation impact assessments that have been prepared in support of The Pinehills, a mean internal capture rate of 25 percent was used in the development of the traffic characteristics of PRD: Phase VII in order to provide conservative (high) traffic volumes from which to assess the impact of PRD: Phase VII.

4.4.4 Trip Distribution

As documented in the "Infrastructure Plan and Phased Review Document: Phase I", the directional distribution of generated trips to and from the community was developed based on the most current journey-to-work data for the Town of Plymouth (at the time, obtained from the 1990 U.S. Census); and existing traffic patterns. Journey-to-Work data from the 2010 U.S. Census has been incorporated into this PRD. A review of the updated journey-to-work data does not indicate any significant changes in the relative assignment of trips to the

major employment centers over those presented in the "Infrastructure Plan and Phased Review Document: Phase I" and subsequent PRDs and, therefore, the general directional distribution of generated trips to and from The Pinehills for PRD: Phase VII remains the same as presented in the previous PRDs.

4.4.5 Traffic Operations Analysis

A detailed traffic operations analysis (level-of-service, motorist delays and vehicle queuing) was performed for the study area roadways, intersections and ramp junctions for 2020 Existing, Future 2030 No-Build (with PRD: Phases I, II, III, IV, V, and VI of the community), and Future 2030 Build (with PRD: Phases I, II, III, IV, V, and VII of the community) conditions in order to assess the impacts that may be associated with the build-out of PRD: Phase VII and to evaluate improvement strategies at critical intersections. The analysis results indicate that, with implementation of the recommended improvement strategies, the majority of the study intersections will continue to function in an efficient manner during the peak hours analyzed.

4.5 Recommended Improvements

The improvements presented below are recommended for the completion of the development of PRD: Phase VII of The Pinehills and are graphically depicted on Figure 4.18.

4.5.1 PRD: Phase VII Access

4.5.1.1 Clark Road at the Site Roadways

Primary access to PRD: Phase VII of the community will be provided by the Pinehills Drive, Meeting Way and Landmark Drive located along the north side of Clark Road, and a new roadway that will be located opposite Pinehills Drive along the south side of Clark Road. It is recommended that the new roadway provide a similar cross-section to that of other primary roadways within The Pinehills and consist of a 20-foot-wide traveled-way that accommodates two-way traffic.

No geometric changes are proposed or required to the existing roadway network within The Pinehills community to support PRD: Phase VII; however, geometric improvements are recommended along Clark Road at Pinehills Drive (provide left-turn lanes on both Clark Road approaches), Meeting Way (provide an eastbound left-turn lane on Clark Road) and Landmark Drive/Mainstone Boulevard (provide left-turn lanes on both Clark Road approaches).

In addition, a review of the warrants that are specified in the Manual on Uniform Traffic Control Devices (MUTCD) for the installation of a traffic control signal indicates that the Clark Road/Pinehills Drive intersection may meet the Four-Hour Vehicular Volume traffic signal warrant (Warrant 2) under 2030 future conditions, with or without PRD: Phase VII.

4.5.2 Off-Site Improvements

4.5.2.1 Clark Road at the Route 3 Southbound Ramps

The traffic analysis performed at the intersection of Clark Road at the Route 3 southbound ramps as a part of PRD: Phase VII has shown that, independent of the build-out of PRD: Phase VII, critical movements (Route 3 southbound off-ramp left-turns) at this intersection are currently operating at or over capacity (LOS E or F, respectively) during the peak-hours under 2020 Existing conditions. As committed to as a part of The Pinehills, this intersection will continue to be monitored as a part of the Traffic Monitoring Program and, if and when warranted, appropriate mitigation measures, up to and including signalization of the intersection, will be implemented by the project proponent at the direction and discretion of MassDOT.

A review of the MUTCD Four-Hour Vehicular Volume signal warrant (Warrant 2) indicates that the installation of a traffic control signal at this intersection is not warranted under 2020 Existing conditions, and may be warranted under 2030 future conditions, with or without PRD: Phase VII. That said, the improvements that have been completed at the Clark Road/Long Pond Road intersection as a part of the Redbrook (formerly River Run) mixed-use development have resulted in an overall reduction in motorist delays and vehicle queuing at this intersection which may eliminate or delay the need to implement additional improvements at this intersection. Annual monitoring of traffic volumes at this intersection is on-going and will be used to determine the timing and scope of the improvements required at the intersection. The results of the monitoring program will be provided to MassDOT and the Town of Plymouth.

4.5.2.2 Clark Road at the Route 3 Northbound Ramps

The traffic analysis performed at the intersection of Clark Road at the Route 3 northbound ramps as a part of PRD: Phase VII has shown that, independent of the build-out of PRD: Phase VII, critical movements (Route 3 northbound off-ramp left-turns) at this intersection are currently operating over their design capacity (LOS F) during the peak-hours under 2020 Existing conditions. As committed to as a part of The Pinehills, this intersection will continue to be monitored as a part of the Traffic Monitoring Program and, if and when warranted, appropriate mitigation measures, up to and including signalization of the intersection, will be implemented by the project proponent at the direction and discretion of MassDOT.

A review of the MUTCD Four-Hour Vehicular Volume traffic signal warrant (Warrant 2) indicates that the installation of a traffic control signal at this intersection is not warranted under 2020 Existing conditions, and may be warranted under 2030 future conditions, with or without PRD: Phase VII. Annual monitoring of traffic volumes at this intersection is on-going and will be used to determine the timing and scope of the improvements required at the intersection. The results of the monitoring program will be provided to MassDOT and the Town of Plymouth.

Subsequent review by MassDOT of traffic volumes and operating conditions at this intersection in conjunction with the prior PRDs prepared in support of The Pinehills have indicated that the construction of a right-turn slip-ramp from Clark Road westbound to

Route 3 northbound may offer a more immediate benefit to traffic flow within the Route 3/Clark Road interchange. In order to advance this potential improvement, The Pinehills has committed to reserving land located in the northeast quadrant of the Route 3/Clark Road interchange for the future construction by MassDOT (or others) of a northbound slip-ramp to Route 3.

4.5.2.3 Route 3A at Beaver Dam Road and White Horse Road

Independent of PRD: Phase VII of the Pinehills, adjustments to the traffic signal timing and phasing are expected to be required by 2030 to accommodate traffic-volume increases at the Route 3A/Beaver Dam Road/White Horse Road intersection. Under 2020 Existing conditions, this intersection was shown to operate at LOS C or better during the peak periods, where an LOS "D" or better is generally defined as acceptable operating conditions. In order to assist with planning and implementation of improvements at the Route 3A/Beaver Dam Road/White Horse Road intersection, the project proponent has agreed to provide a financial contribution to the Town of Plymouth for the preliminary design of geometric and traffic signal improvements at the intersection. In addition, annual monitoring of traffic volumes and operating conditions at this intersection is on-going. Improvements to the Route3A/Beaver Dam Road/White Horse Road intersection were undertaken by others at the direction of the Town in coordination with new commercial uses that were constructed by others at the intersection.

4.5.2.4 Future Interchange Improvements (by Others)

As requested by MassDOT, The Pinehills has committed to reserving land located in the northeast quadrant of the Route 3/Clark Road interchange for the future construction by MassDOT (or others) of a northbound slip-ramp and in the southwest quadrant for both an on and off-ramp.

4.5.3 Travel Demand Management

As committed in the "Infrastructure Plan and Phased Review Document: Phase I", a Pinehills LLC staff person has been assigned to oversee all transportation-related issues within the community, including promotion of the use of Transportation Demand Management (TDM) strategies and advancement of commuter services to and within the community. As the community grows, it is envisioned that a Transportation Management Association (TMA) will be created or incorporated into the Pinehills Landowners Association, Inc., which all commercial tenants within the community will be encouraged to join.

In order to encourage the use of alternative modes of transportation within the community, public and private transit schedules and car/vanpool information is provided in a central location and has been made available to residents and employees of the community and, guests and patrons of the golf clubs. The project proponent has been and will continue to work with the Greater Attleboro Taunton Regional Transit Authority (GATRA) to expand the existing bus service to the project site, as well as potential service to downtown Plymouth and the MBTA commuter rail stations in Plymouth and Kingston. In addition, bicycle racks have been provided in the Neighborhood Green area and proximate to retail and community

service buildings within The Pinehills to encourage the use of bicycle travel to and within the community. In addition, an extensive trail system of paved and lighted walking paths has been created throughout the site, with appropriate safety signage and cross walks to encourage pedestrian travel from residential areas to the Village Green commercial district as well as for recreational uses. Through carpooling and use of private common carrier services (vans and buses) to attend off-site events, residents within The Pinehills and Pinehills LLC employees have already initiated efforts to mitigate off-site traffic impacts.

The PRD: Phase VII development has been designed to incorporate and not preclude implementation of any mitigation measures identified in the TDM analysis presented in the "Infrastructure Plan and Phased Review Document: Phase I."

4.5.4 Traffic Monitoring

As required as a part of MEPA Certificates and MassDOT Section 61 Findings issued for The Pinehills, a traffic monitoring program has been and will continue to be undertaken by the project proponent. The traffic monitoring program for The Pinehills commenced in 2003 as required in the aforementioned documents and will be used in order to document the actual (vs. projected) volume of traffic generated by the community and the associated internal capture rate. The monitoring program has been performed as directed in MassDOT's Section 61 Findings, with the results submitted to MassDOT and documented in subsequent PRDs.

4.6 Conclusion

In summary, this analysis has demonstrated that the additional traffic demands that may be associated with PRD: Phase VII can be accommodated within the confines of the existing transportation infrastructure with defined improvements along Clark Road that are consistent with those defined in the "Infrastructure Plan and Phased Review Document: Phase I", the timing and scope of which will be identified as a part of the annual traffic monitoring program for the community so as to maintain the rural character of the area. With implementation of the above recommendations, safe and efficient access will be maintained and the proposed development of PRD: Phase VII of the community can be accomplished with minimal traffic impact on the roadway system.

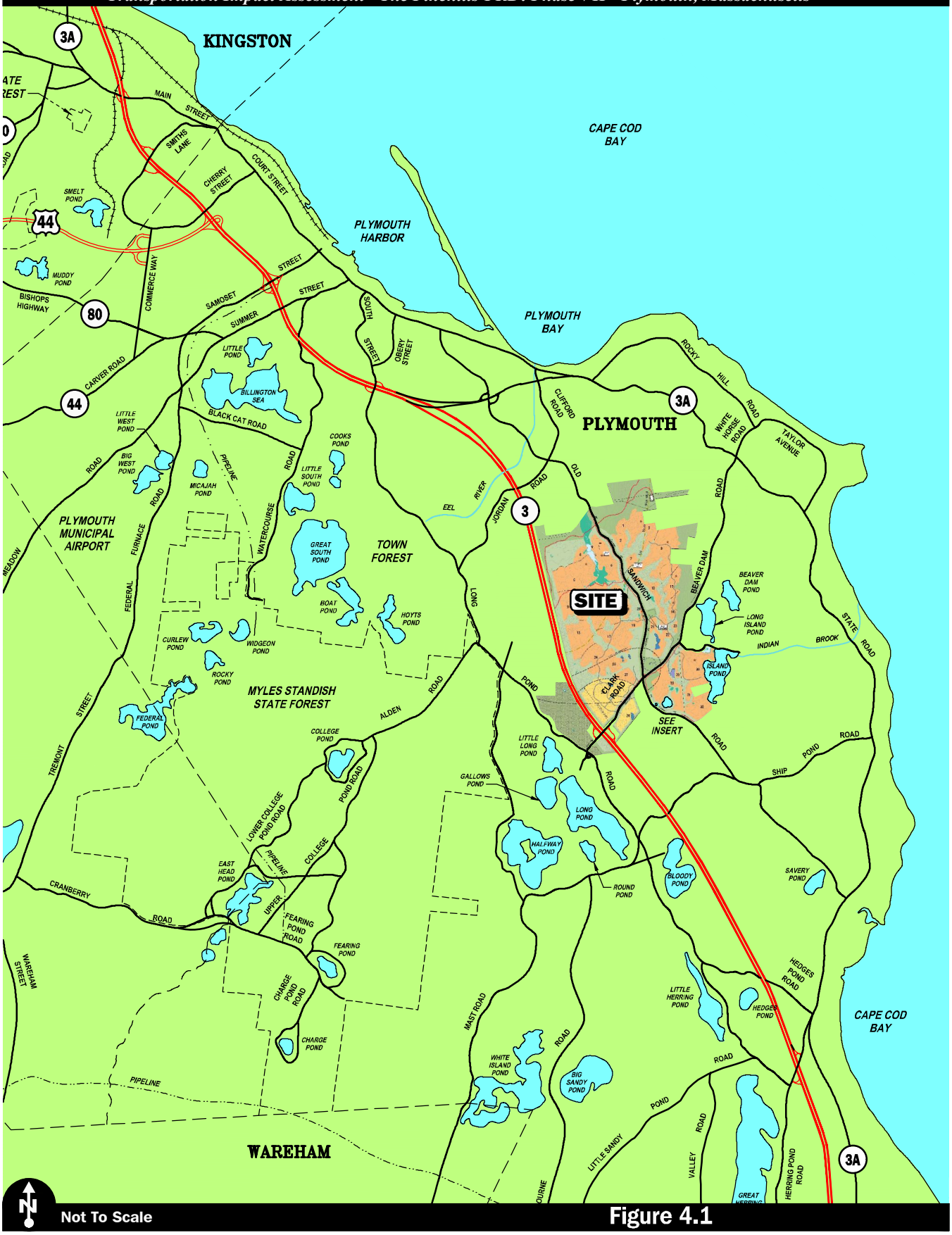


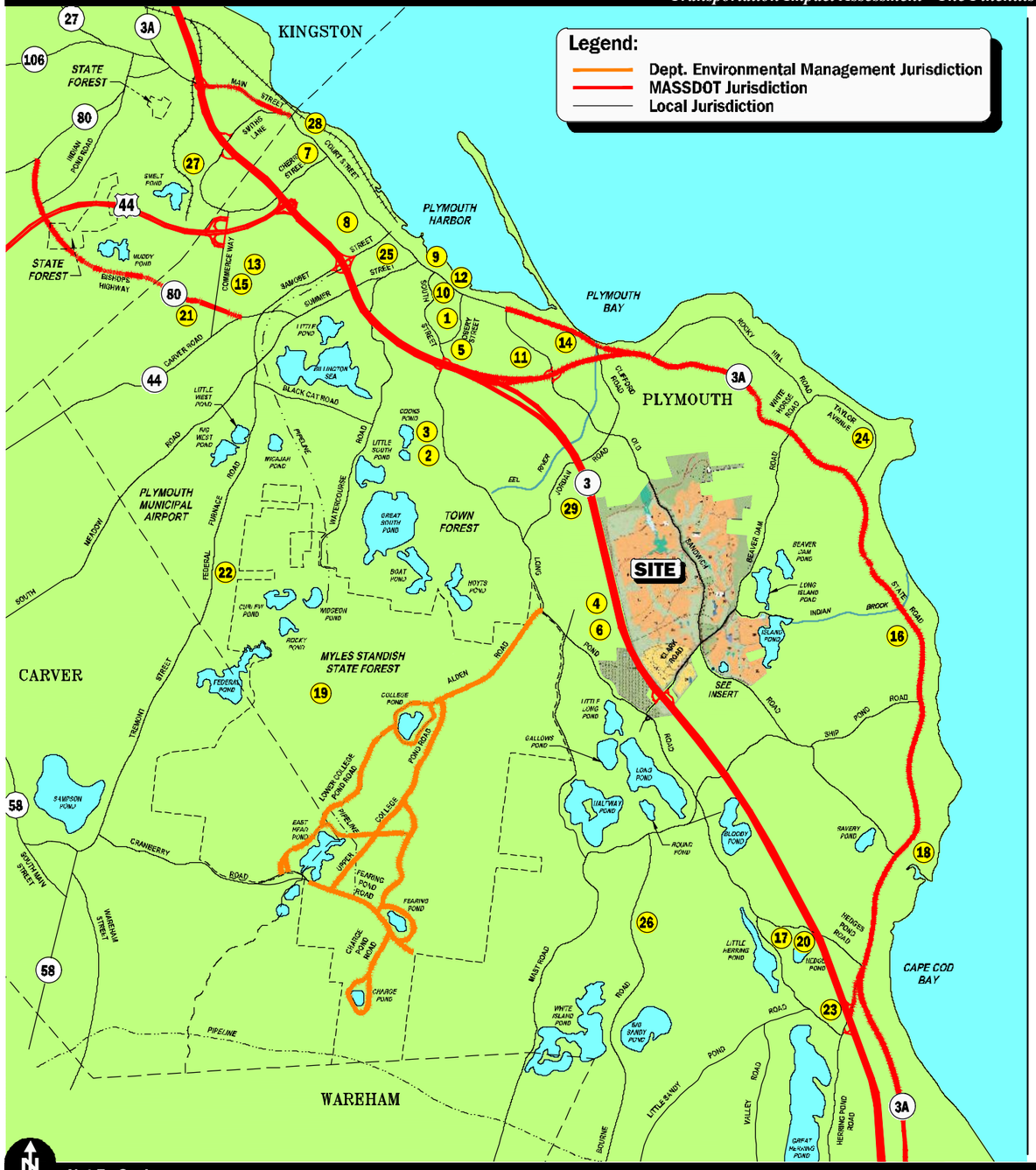
Figure 4.1

Site Location Map

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073SLM.dwg, 5/7/2020 10:55:07 AM



1 PLYMOUTH PUBLIC LIBRARY
2 PLYMOUTH COMMUNITY INTERMEDIATE SCHOOL
3 PLYMOUTH EARLY CHILDHOOD CENTER
4 PLYMOUTH INTERMEDIATE SCHOOL
5 PLYMOUTH - NORTH HIGH SCHOOL
6 PLYMOUTH - SOUTH HIGH SCHOOL
7 HEDGES ELEMENTARY SCHOOL
8 COLD SPRING ELEMENTARY SCHOOL
9 NATHANIEL MORTON ELEMENTARY SCHOOL
10 MT. PLEASANT SCHOOL
11 JORDAN HOSPITAL
12 ALTERNATIVE HIGH SCHOOL
13 RISING TIDE CHARTER PUBLIC SCHOOL
14 PLIMOTH PLANTATION MUSEUM
15 MAP ACADEMY CHARTER SCHOOL
16 INDIAN BROOK ELEMENTARY SCHOOL
17 CAMP CLARK
18 ELLISVILLE HARBOR STATE PARK
19 MYLES STANDISH STATE FOREST
20 HEDGES POND RECREATIONAL AREA PRESERVE
21 WEST ELEMENTARY SCHOOL
22 FEDERAL FURNACE ELEMENTARY SCHOOL
23 ELMER E. RAYMOND JR. MEMORIAL PARK
24 MANOMET ELEMENTARY SCHOOL
25 OAK STREET SCHOOL
26 SOUTH ELEMENTARY SCHOOL
27 OLD COLONY RAILROAD KINGSTON/ROUTE 3 STATION
28 OLD COLONY RAILROAD PLYMOUTH CENTER STATION
29 FORGES FIELD RECREATION FACILITY

Not To Scale

Figure 4.2

Rail Facilities, Sensitive Receptors and Roadway Jurisdiction Map PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073rjm.dwg, 5/7/2020 3:21:59 PM

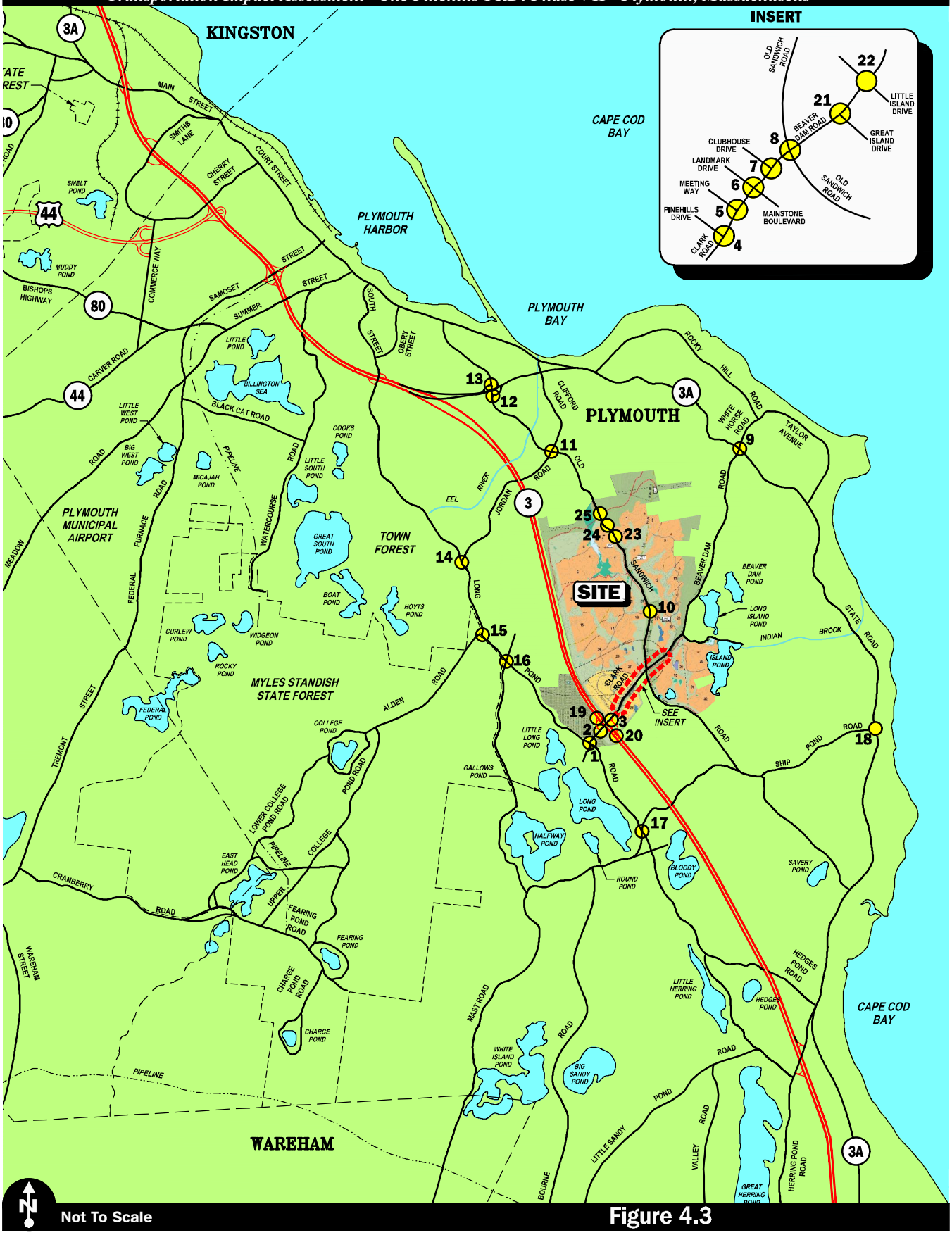


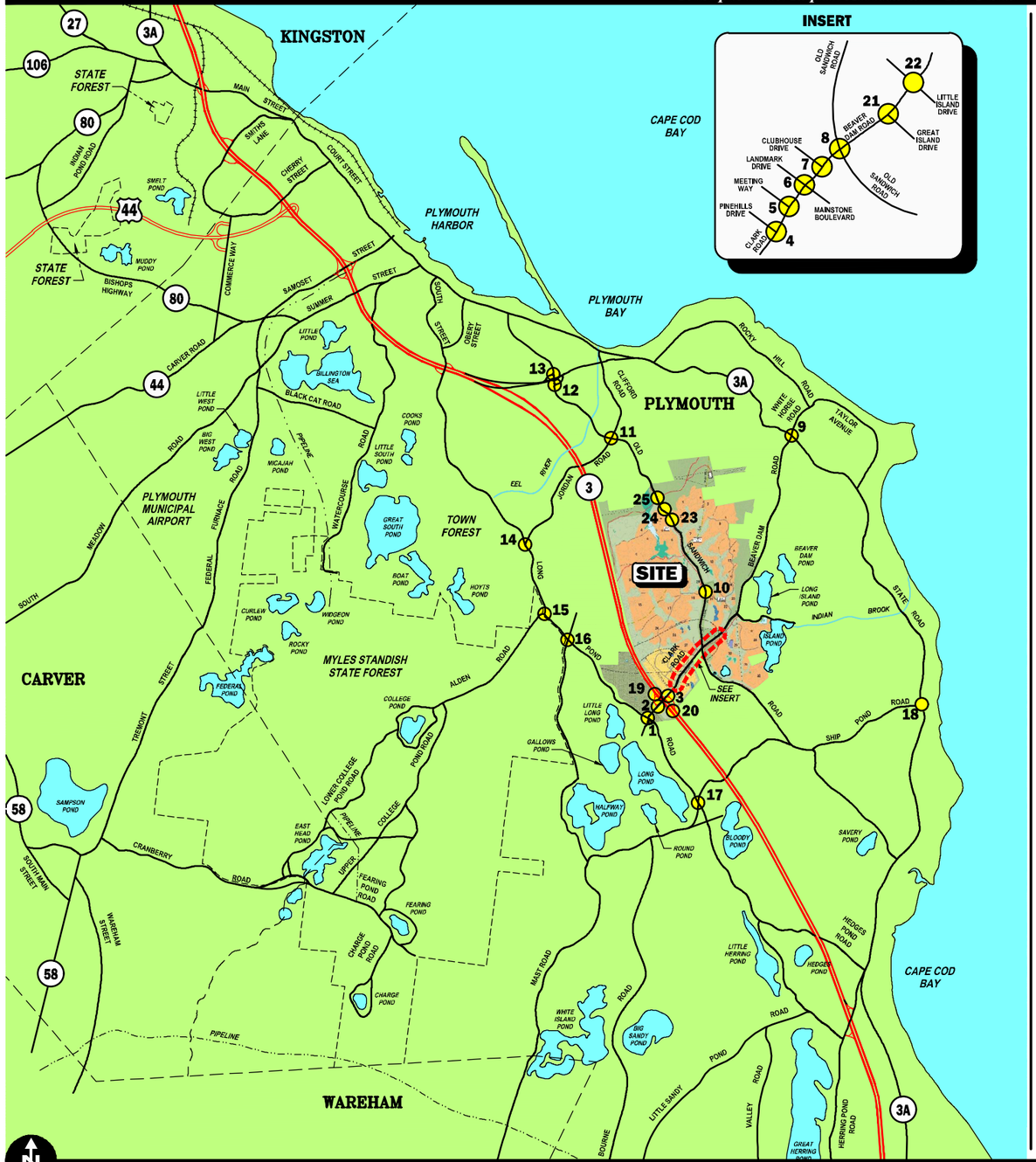
Figure 4.3

Study Area Map

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073SLM1.dwg, 5/7/2020 10:48:19 AM



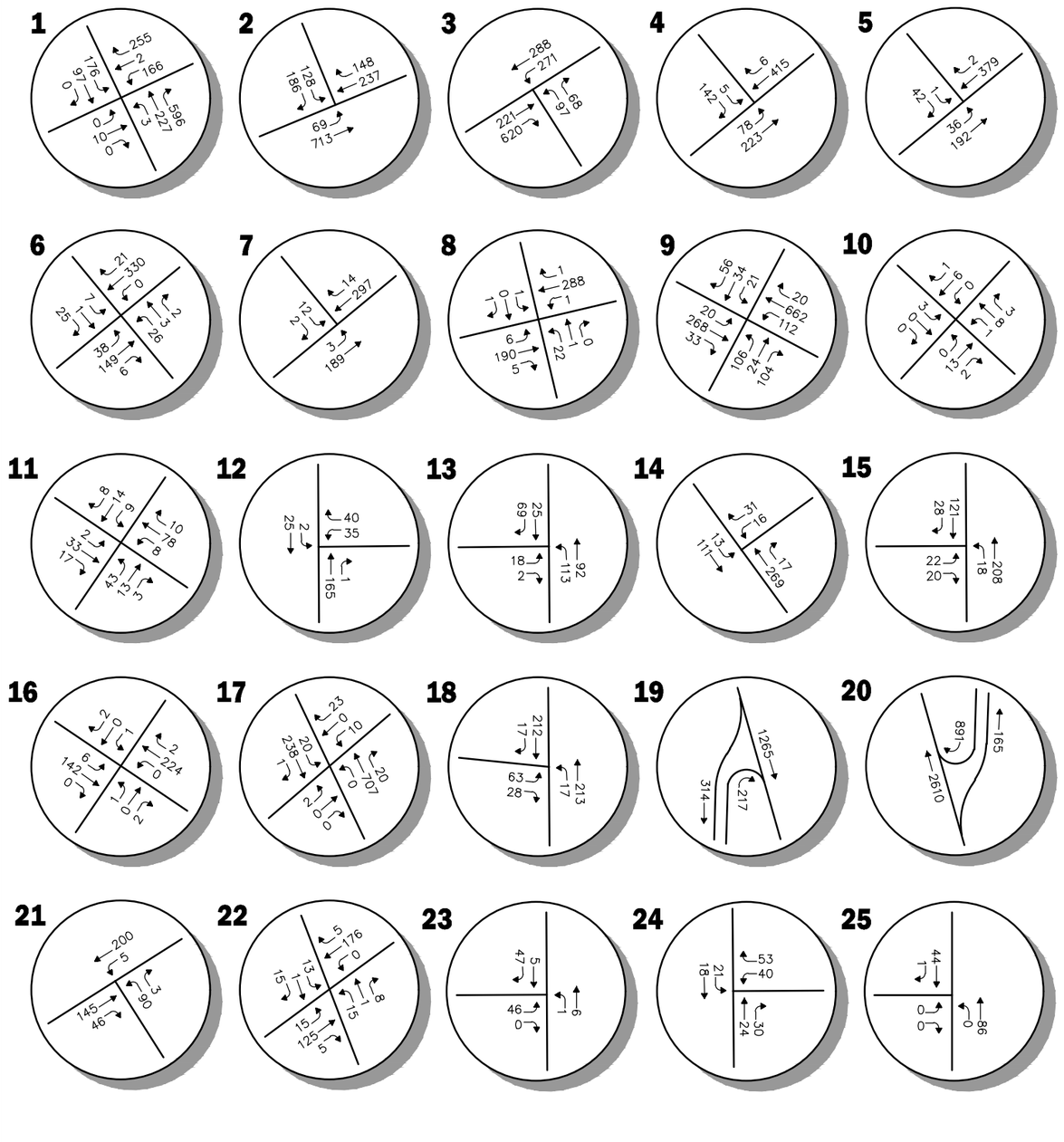


Figure 4.4

2020 Existing
Weekday Morning
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt.dwg, 5/7/2020 9:25:35 AM

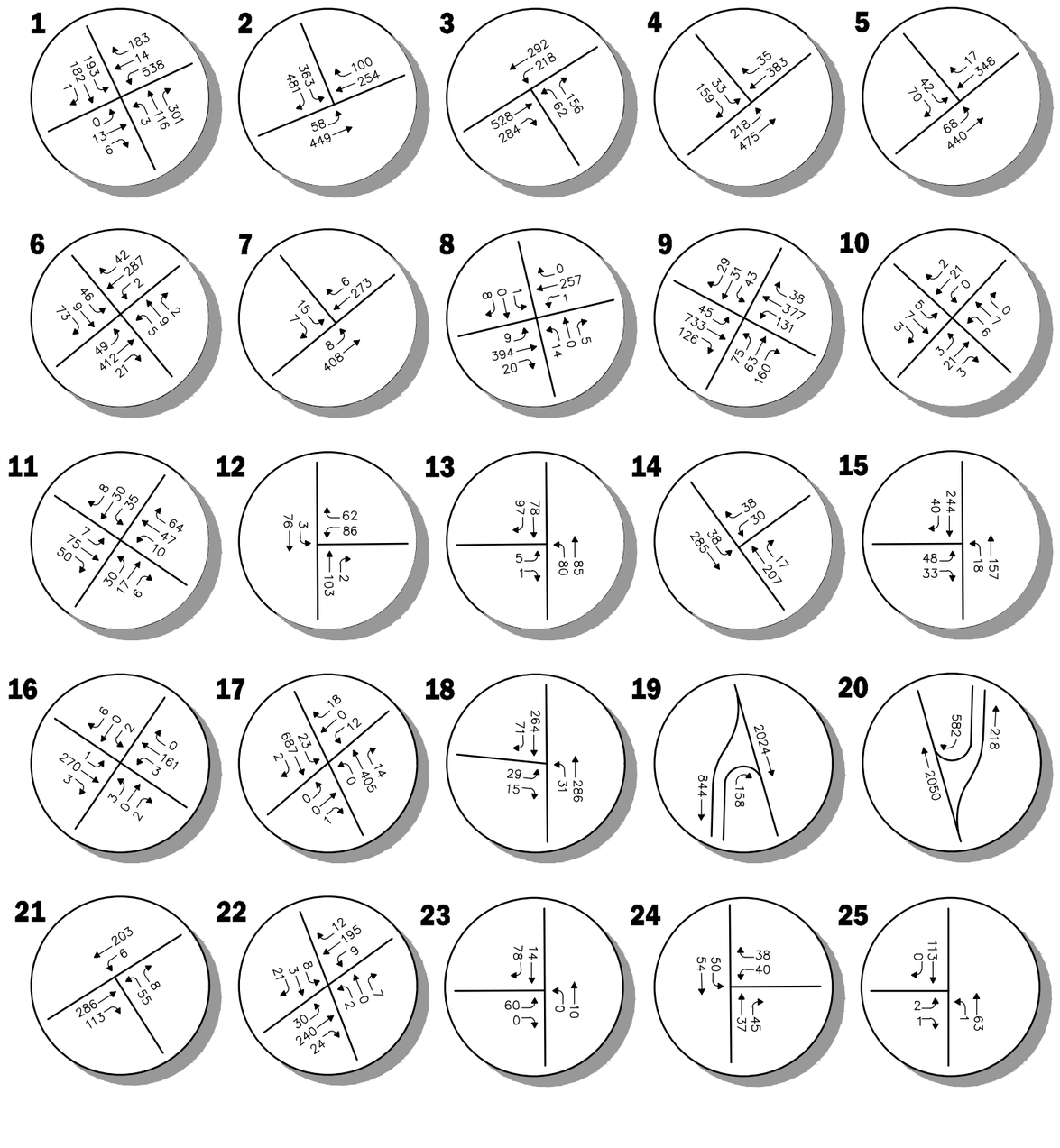


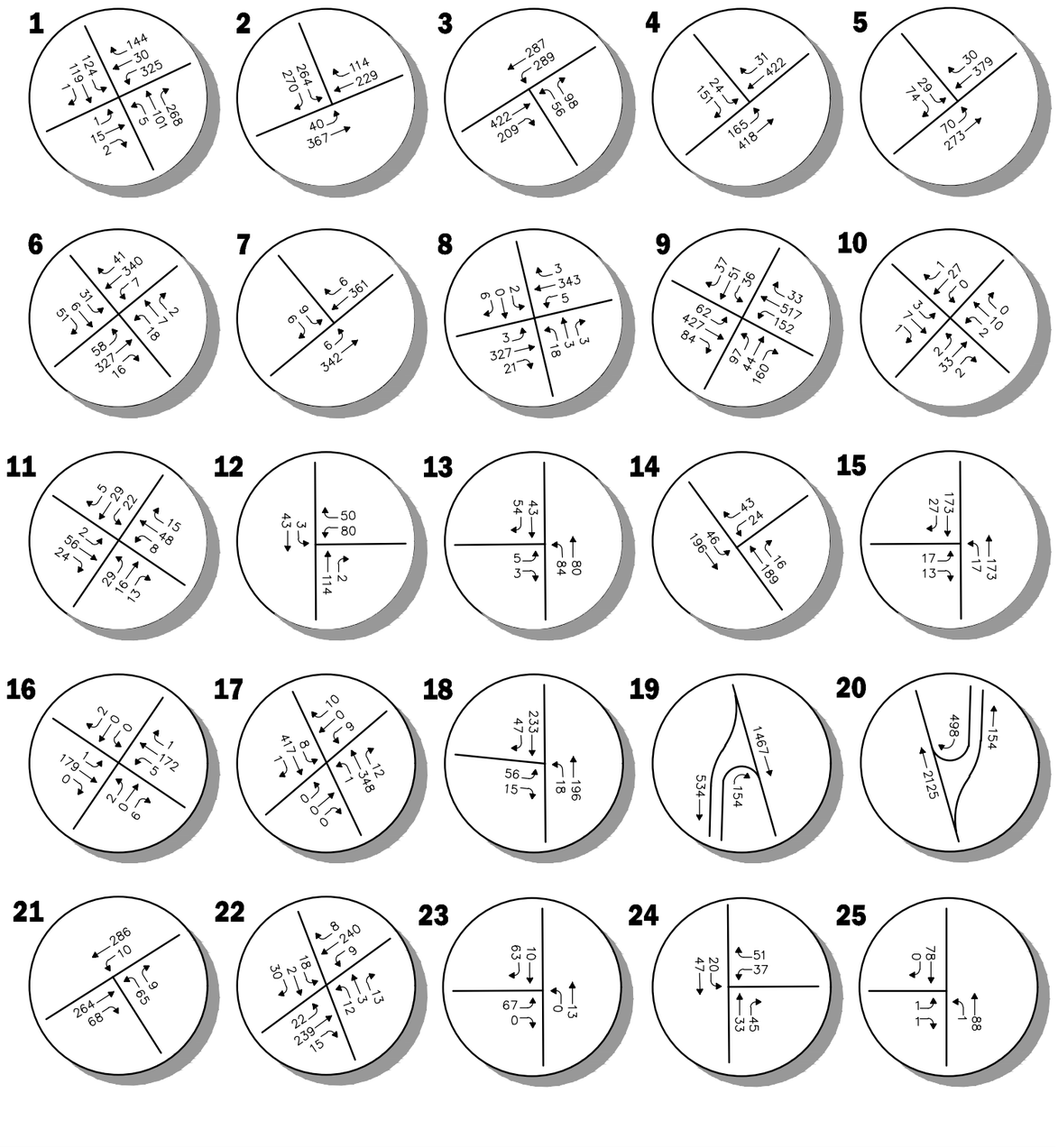
Figure 4.5

2020 Existing
Weekday Evening
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt.dwg, 5/7/2020 9:26:27 AM



Not To Scale

Figure 4.6

2020 Existing
Saturday Midday
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt.dwg, 5/7/2020 9:27:16 AM

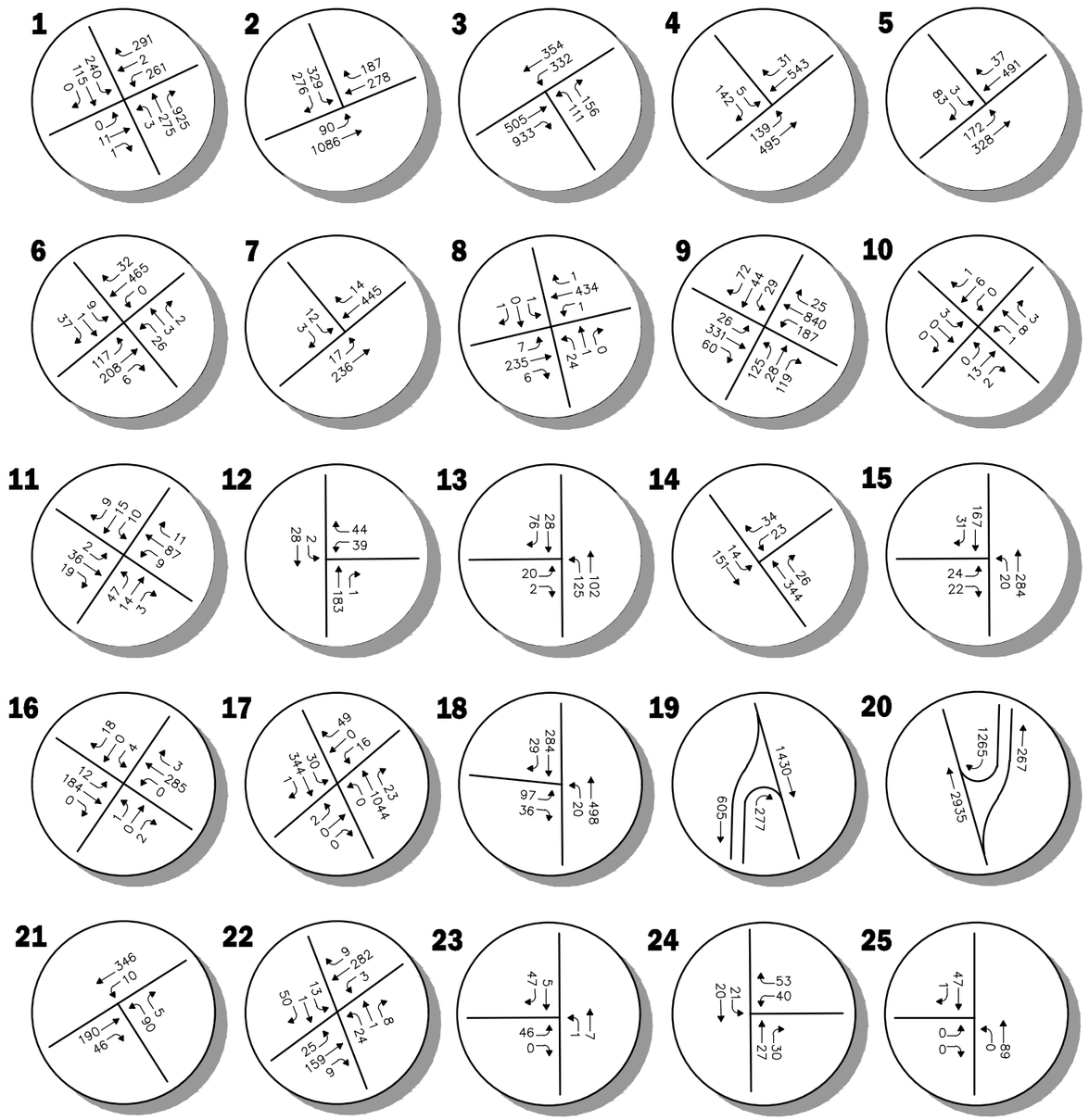


Figure 4.7

2030 No-Build
Weekday Morning
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:54:36 AM

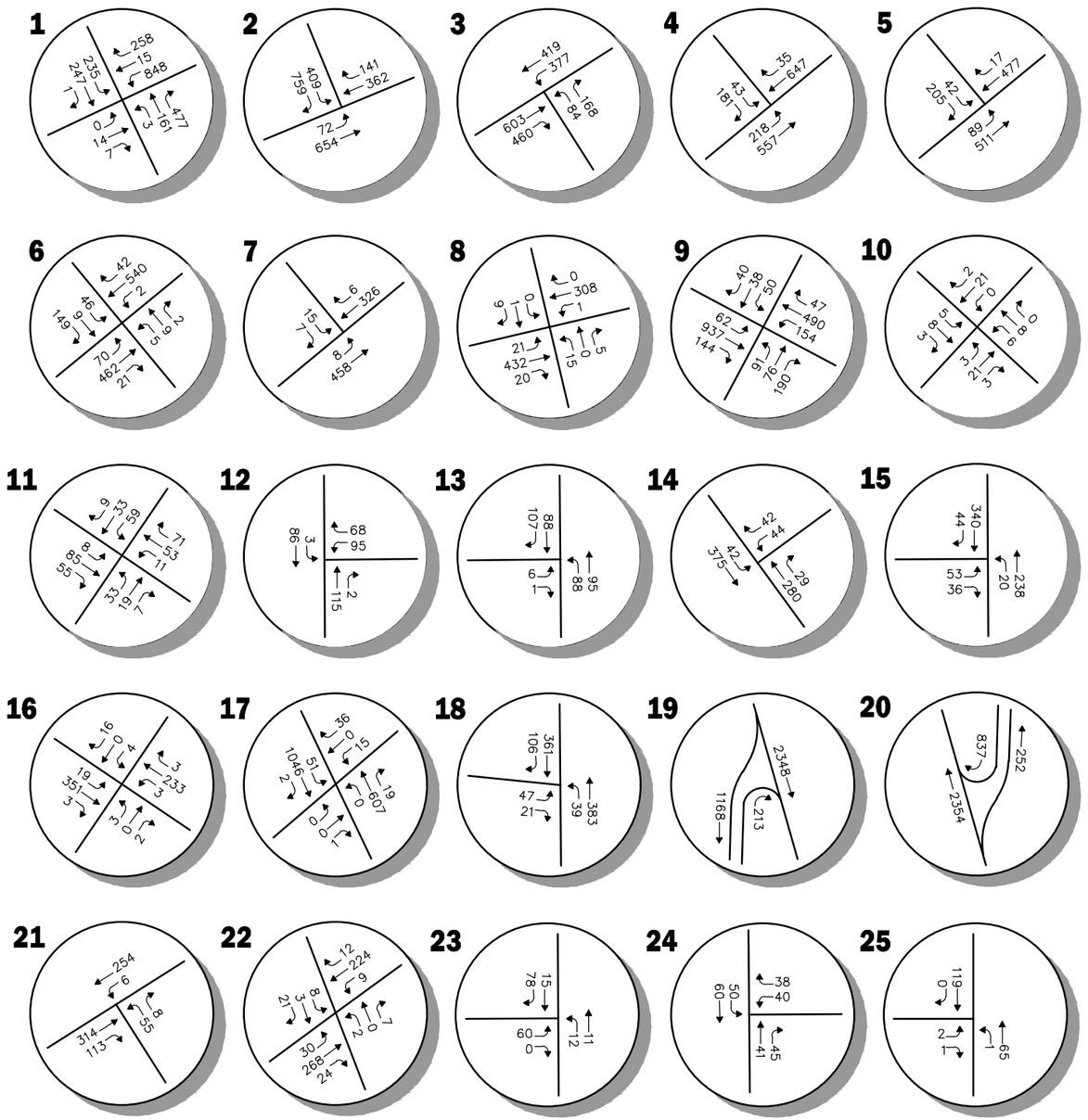


Figure 4.8

2030 No-Build
Weekday Evening
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:55:10 AM

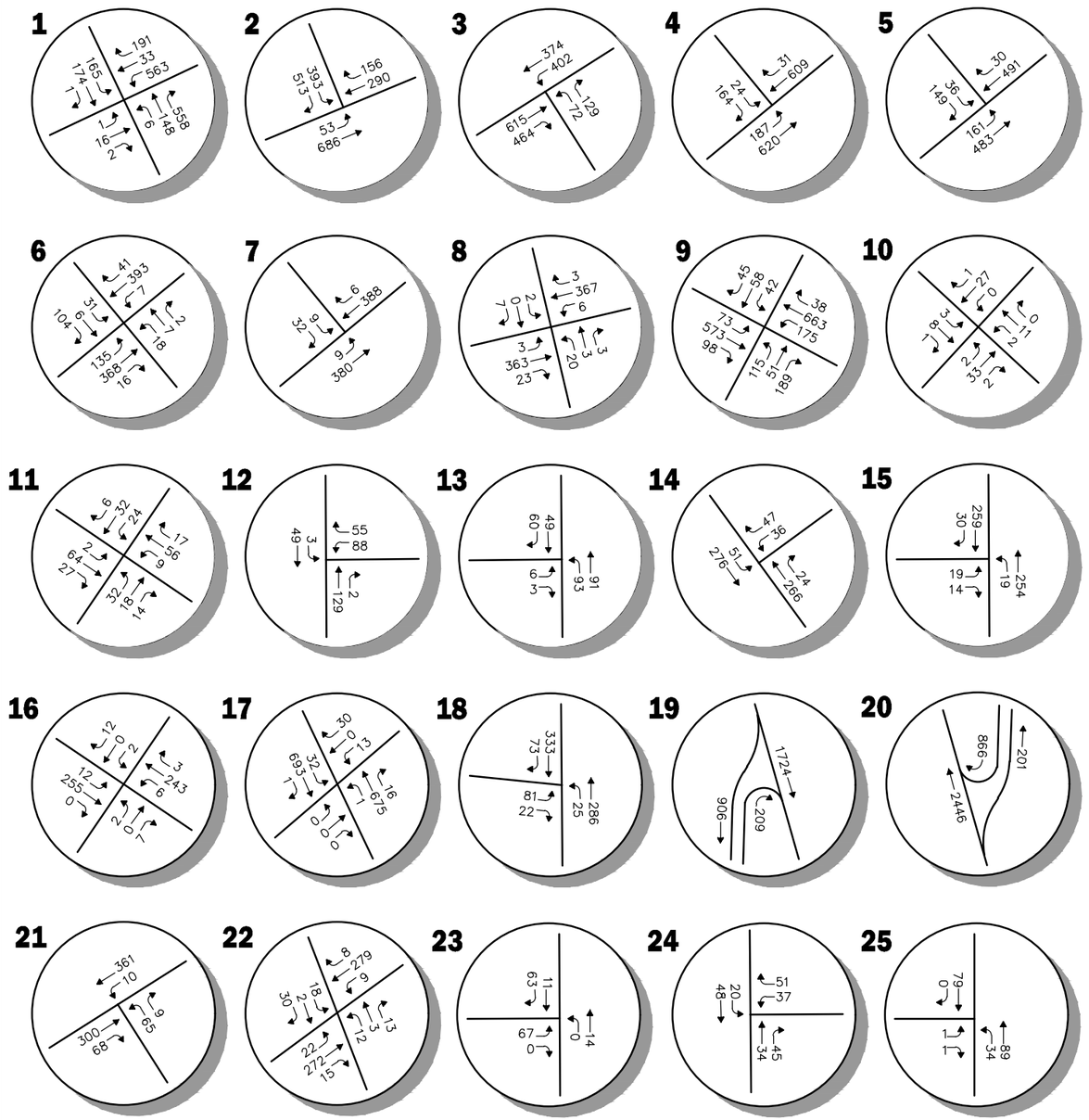


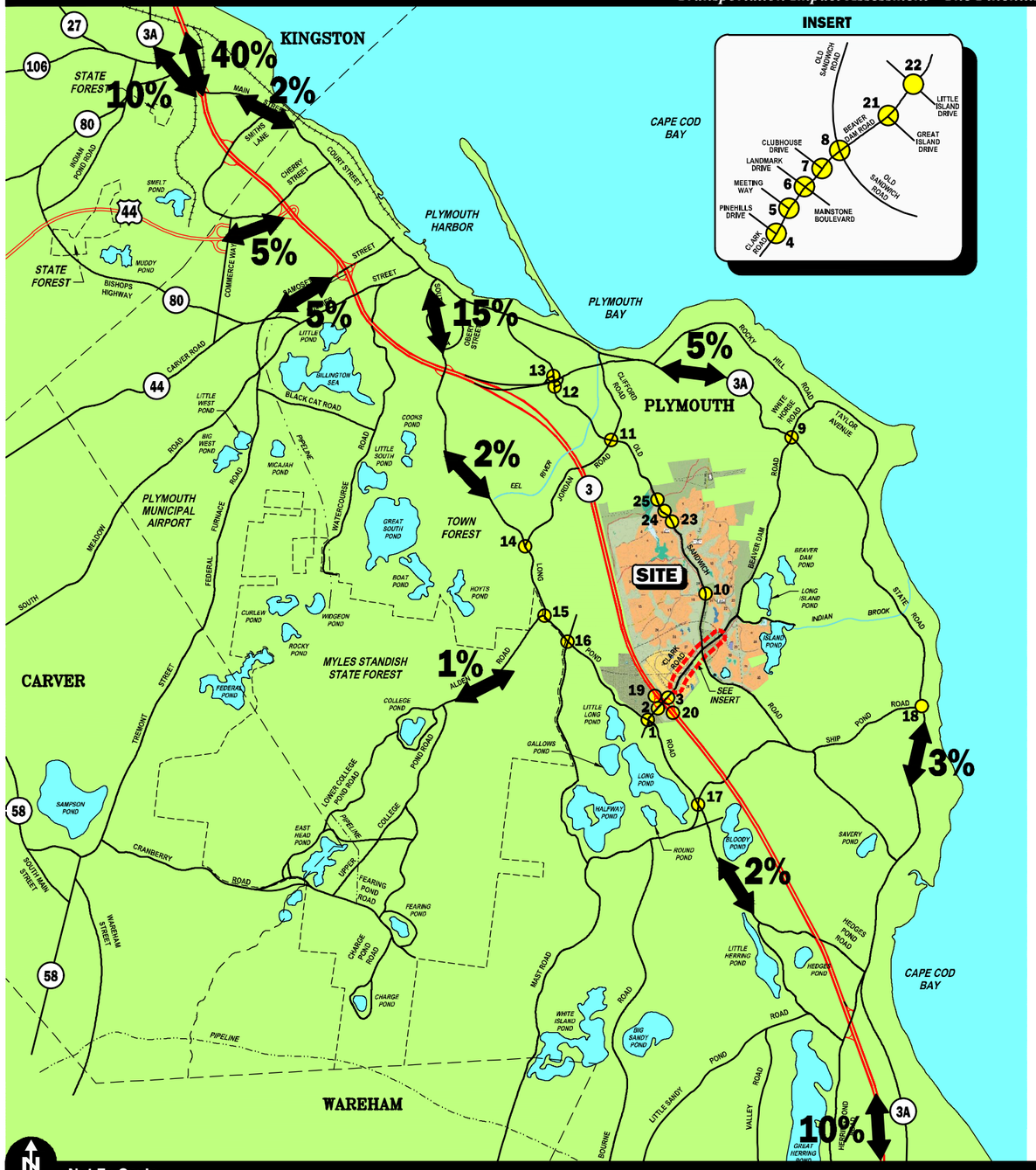
Figure 4.9

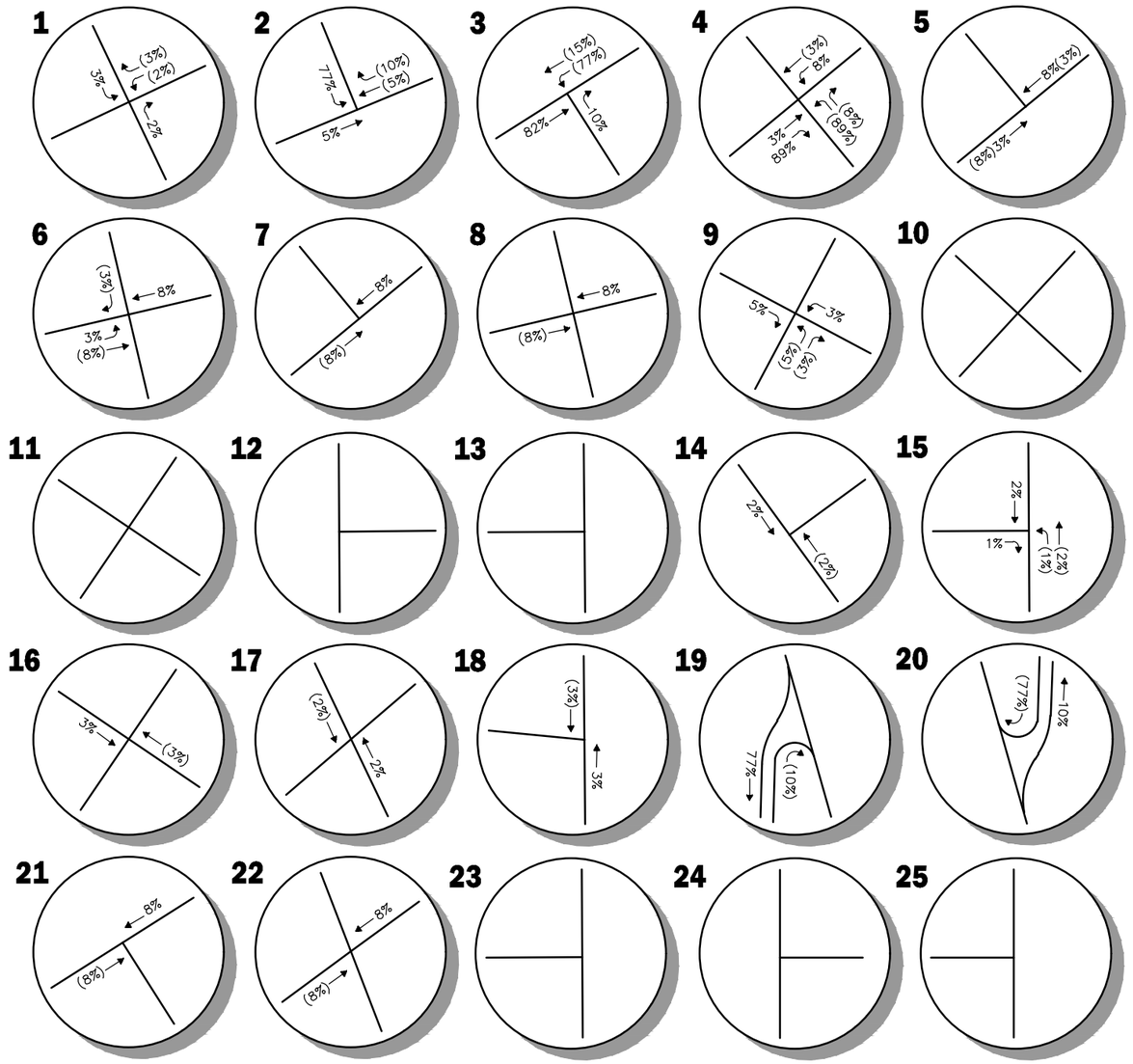
2030 No-Build
Saturday Midday
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:55:48 AM





Legend:

XX	Entering Trips
(XX)	Exiting Trips

Not To Scale

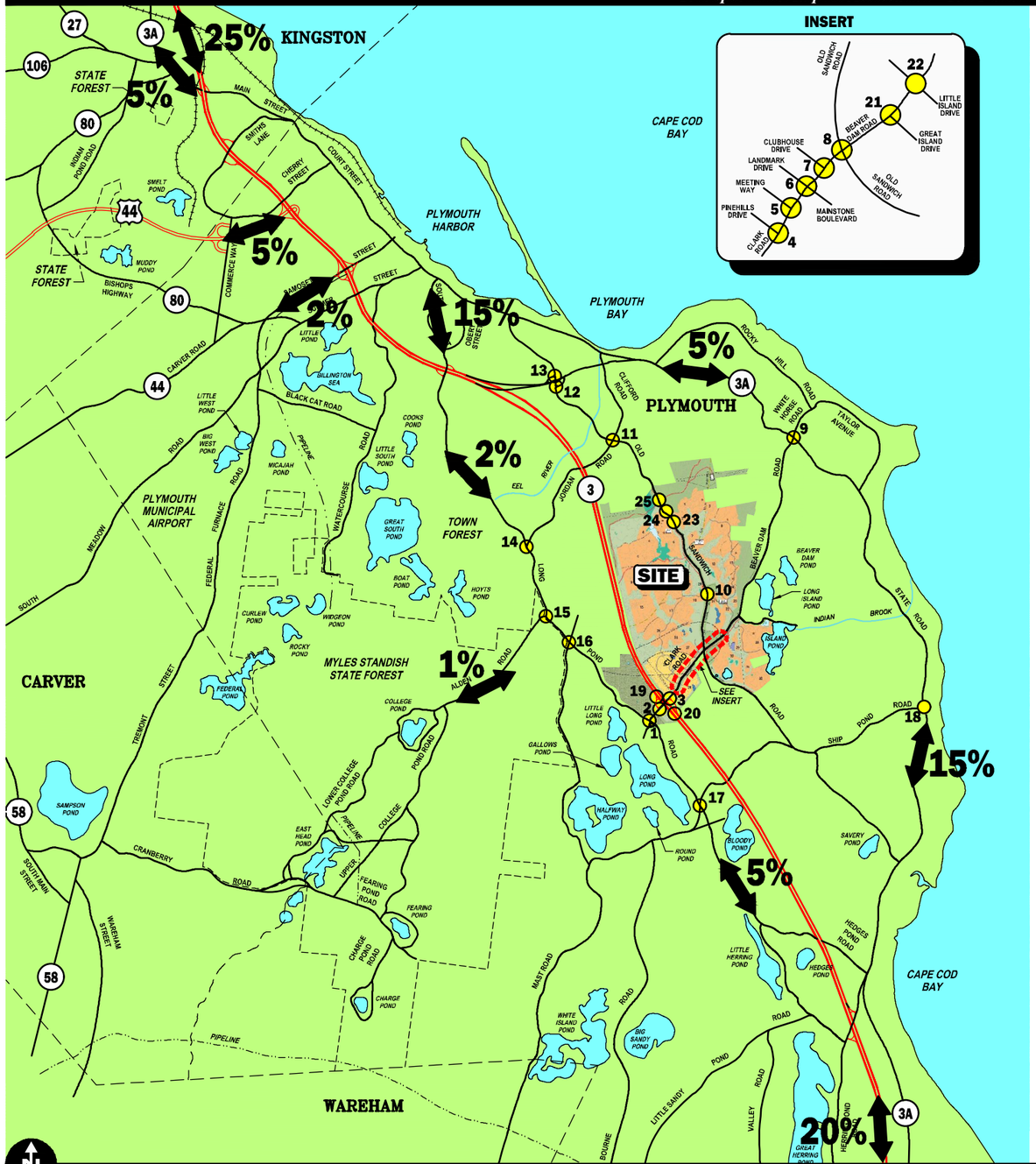
Figure 4.10

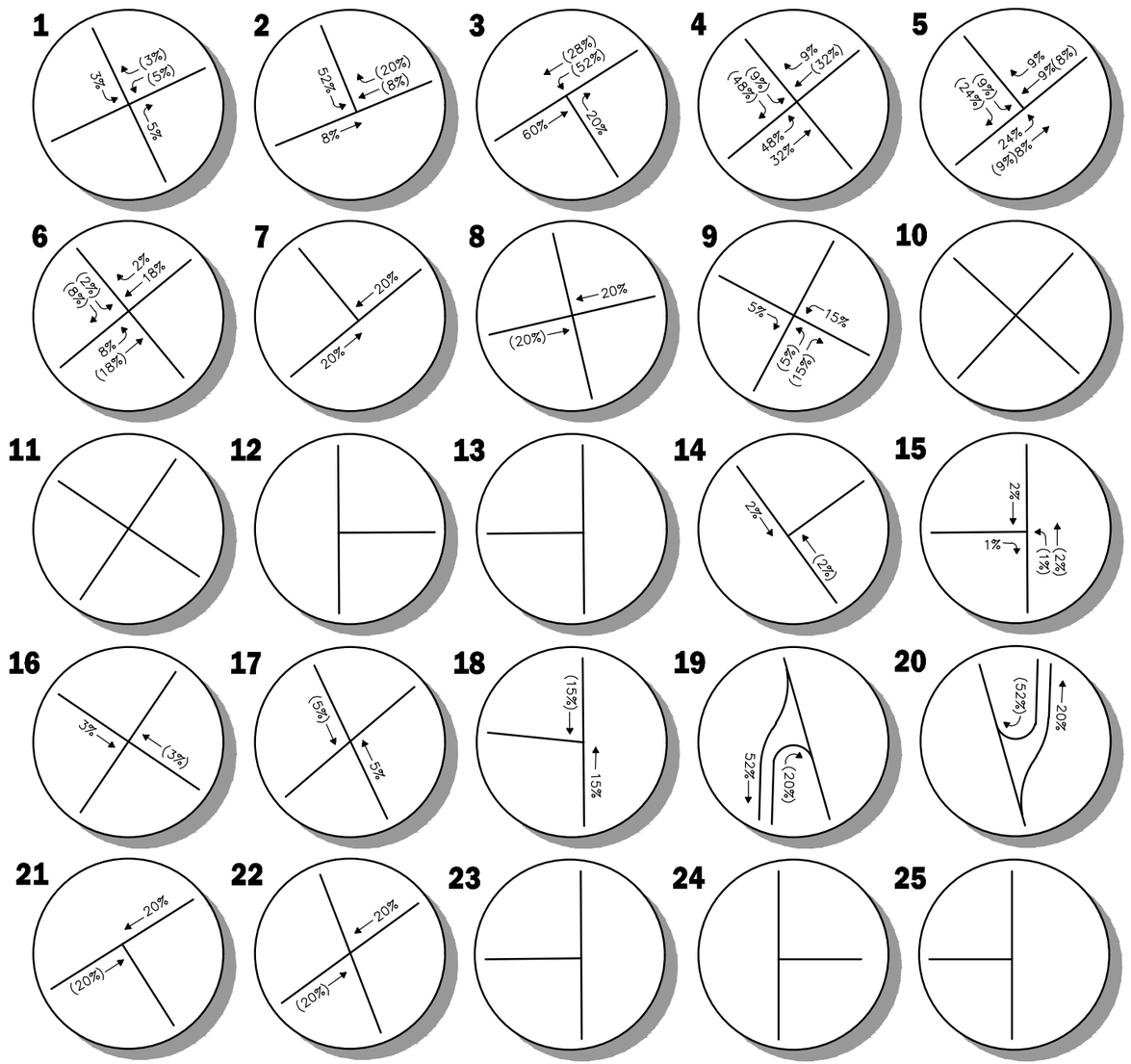
Trip Distribution Map
Residential Component
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAI. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:56:26 AM





Legend:

XX Entering Trips

(XX) Exiting Trips

Not To Scale

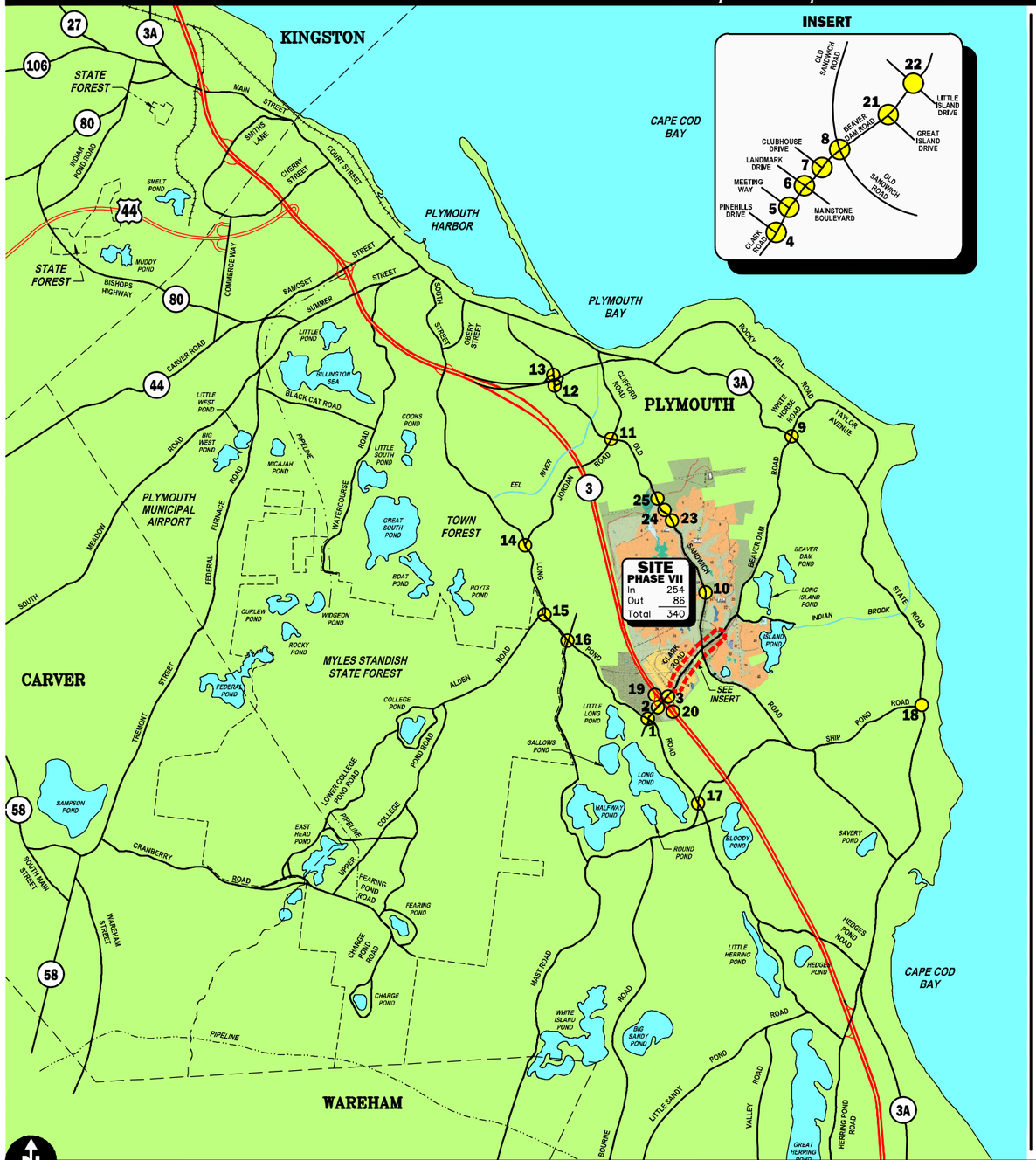
Figure 4.11

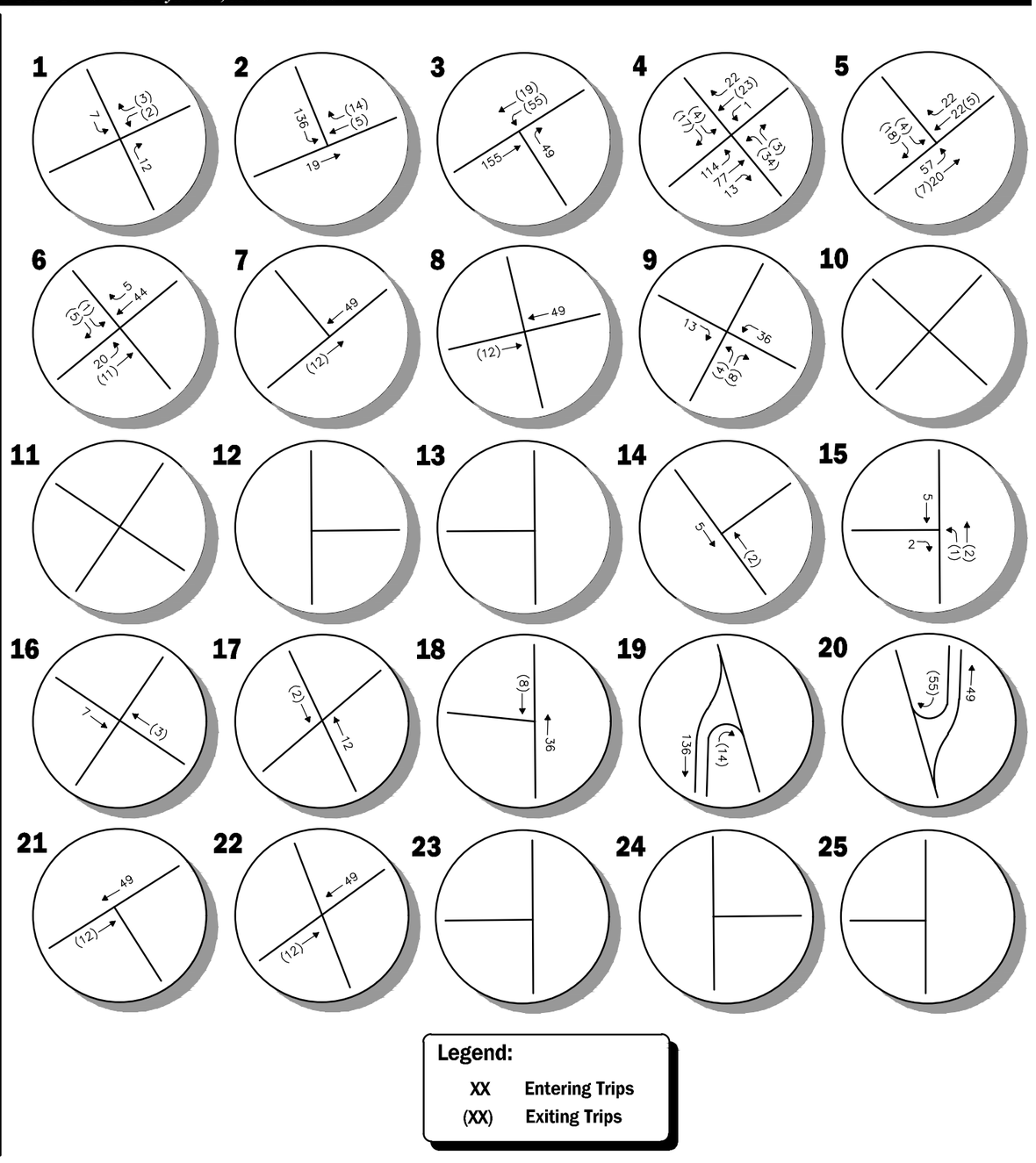
Trip Distribution Map
Commercial Component
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAI. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:58:18 AM





Legend:

XX	Entering Trips
(XX)	Exiting Trips

Not To Scale

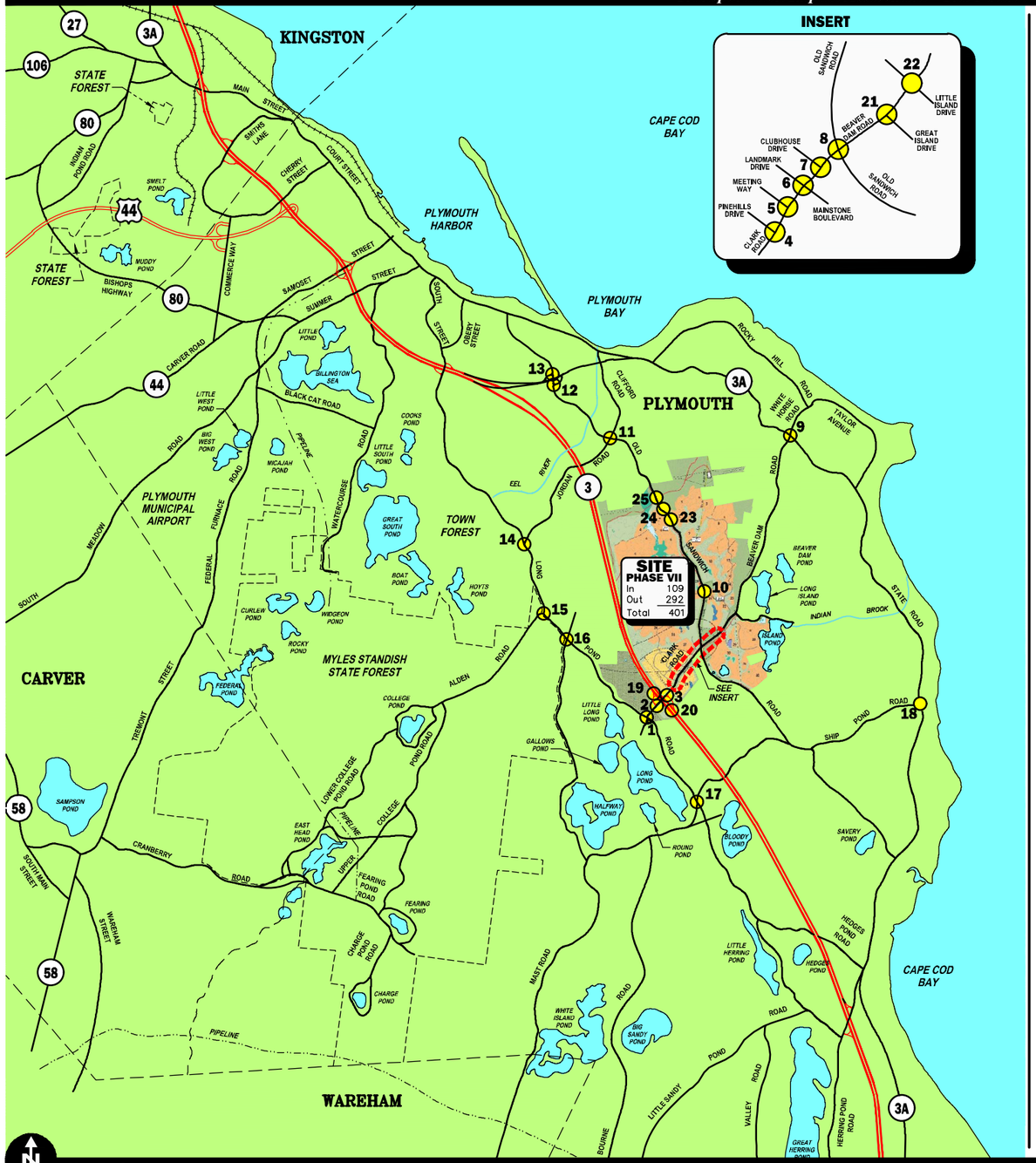
Figure 4.12

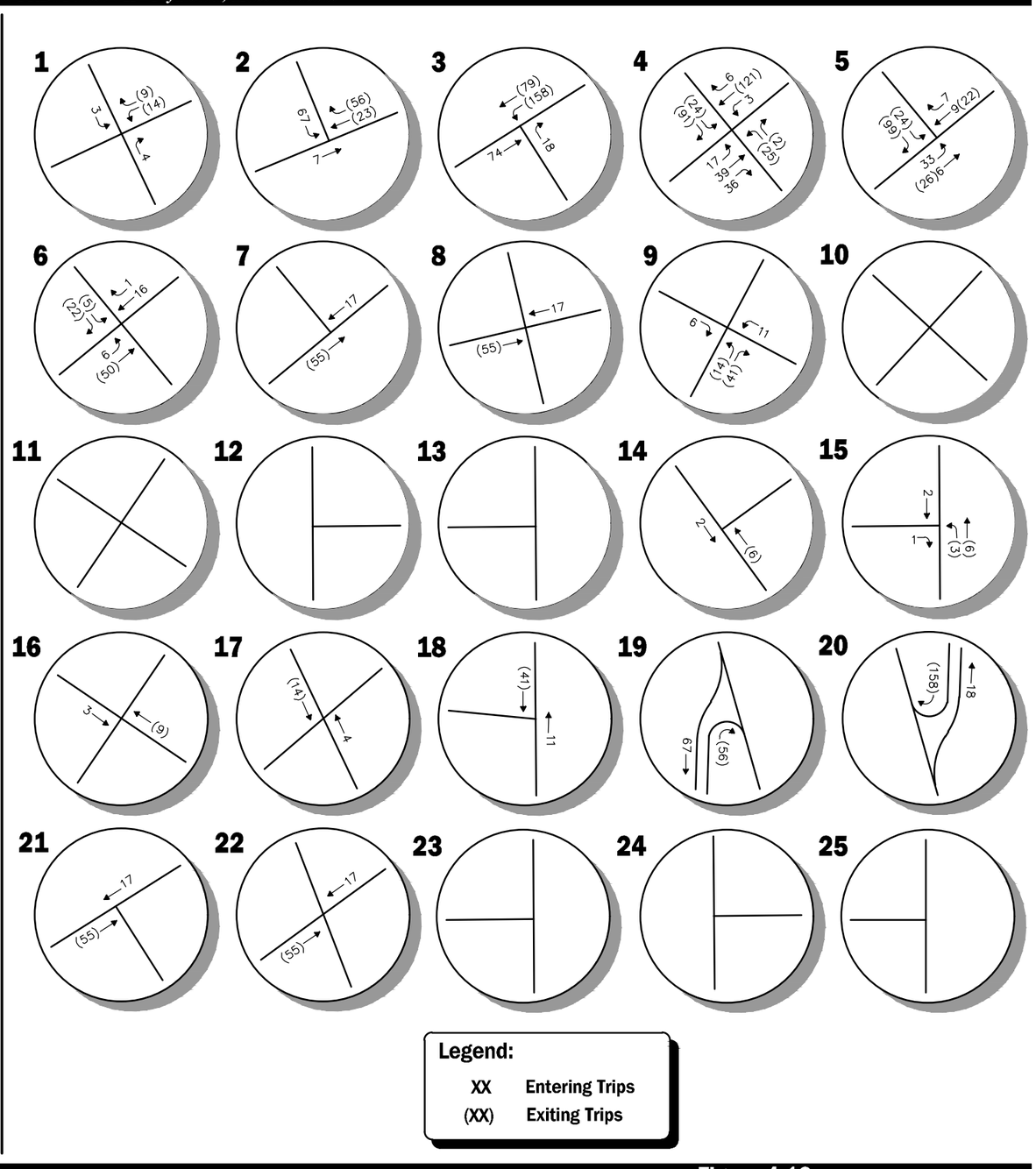
Project Generated
Weekday Morning
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAI. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 10:44:41 AM





Legend:

XX	Entering Trips
(XX)	Exiting Trips

Not To Scale

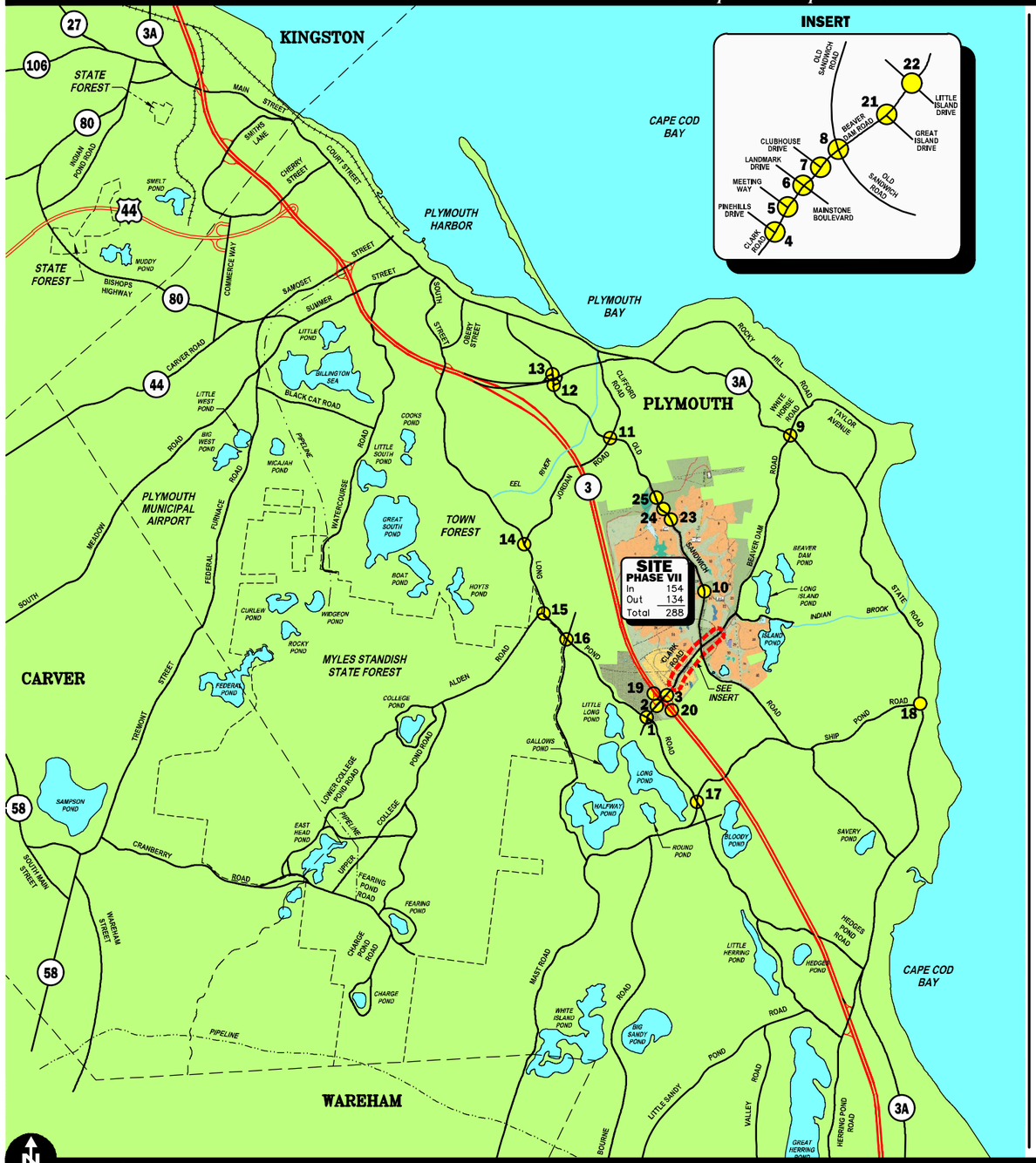
Figure 4.13

Project Generated
Weekday Evening
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAI. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:25:25 AM



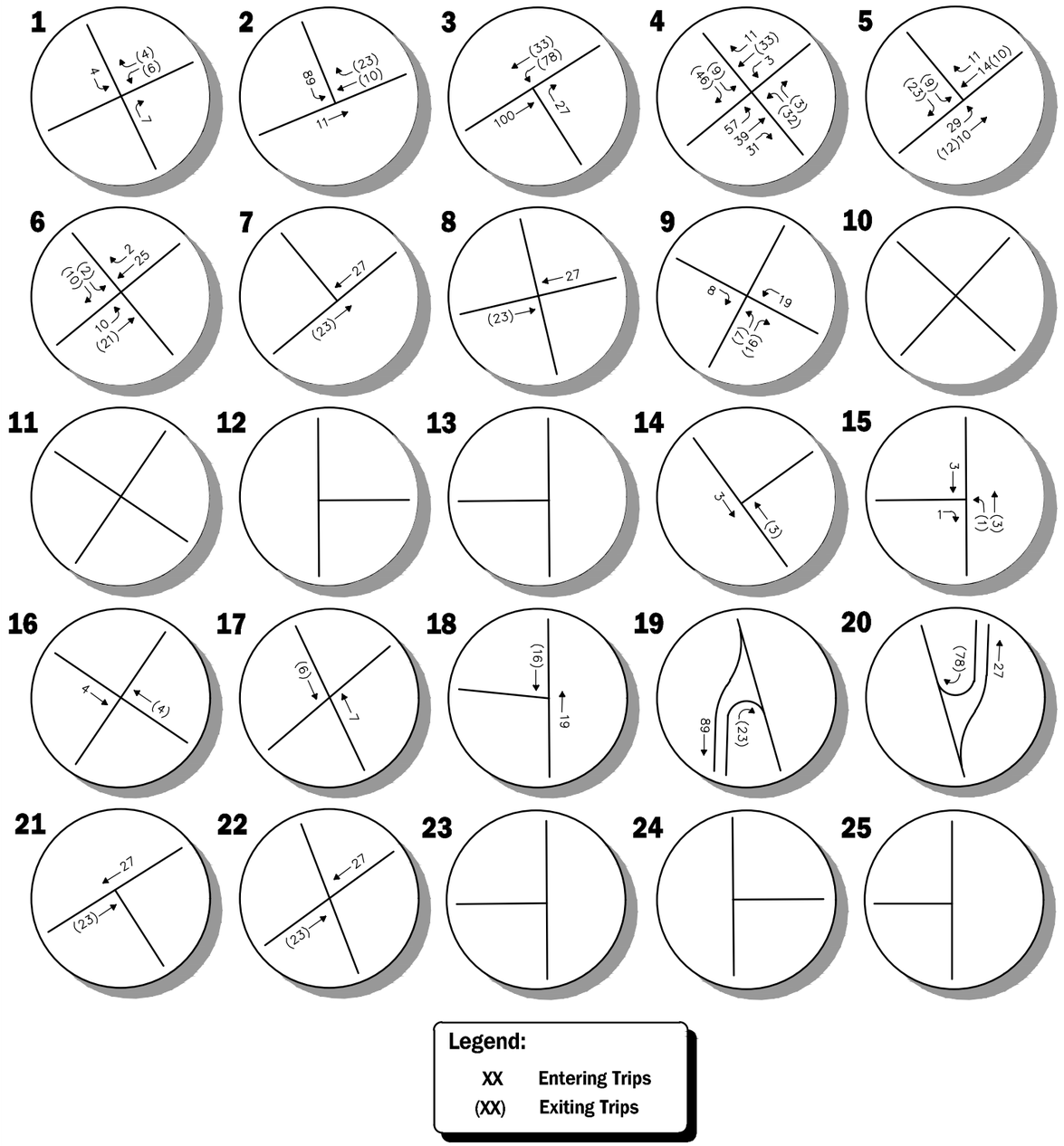


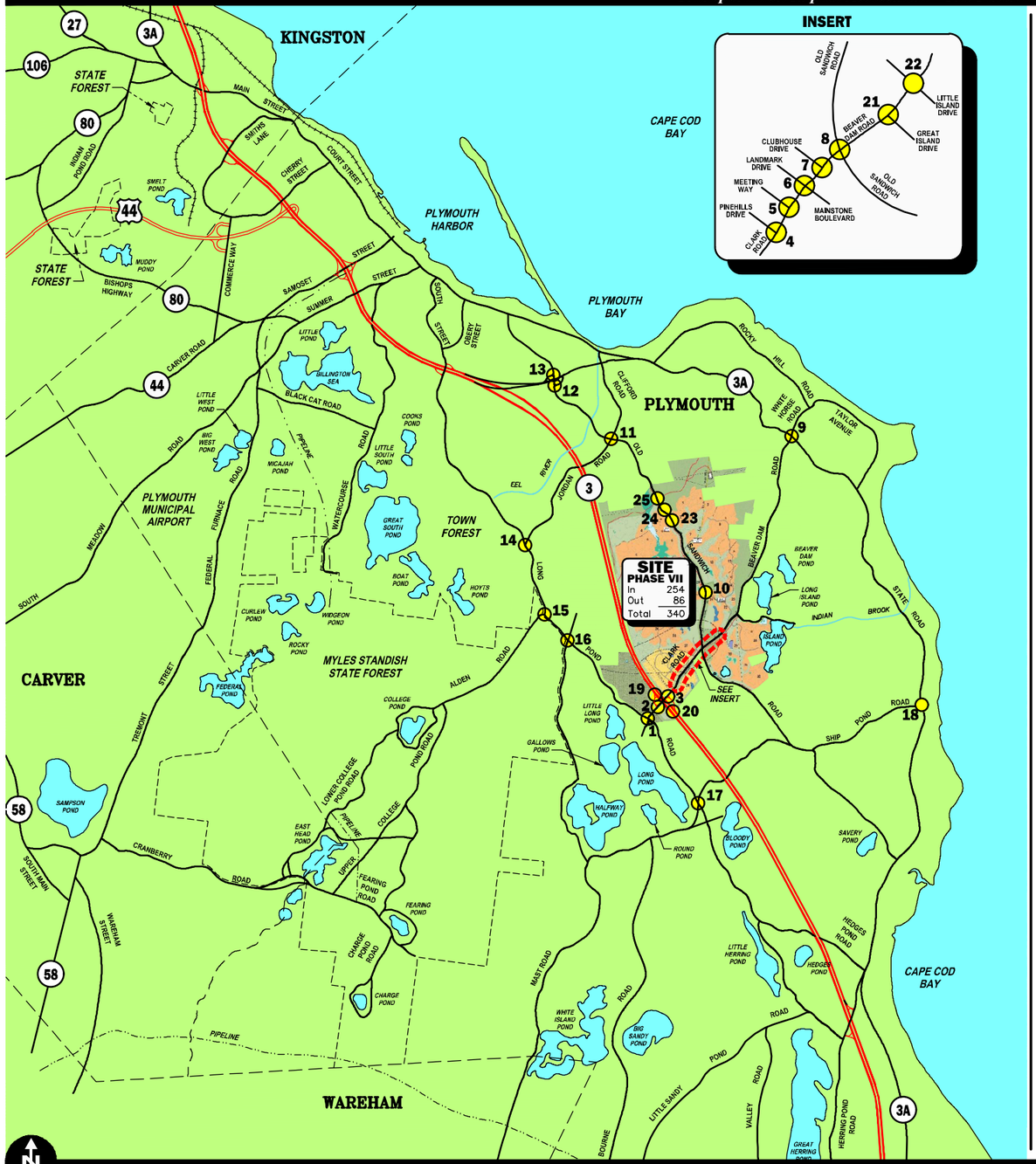
Figure 4.14

Project Generated
Saturday Midday
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAI. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:27:04 AM



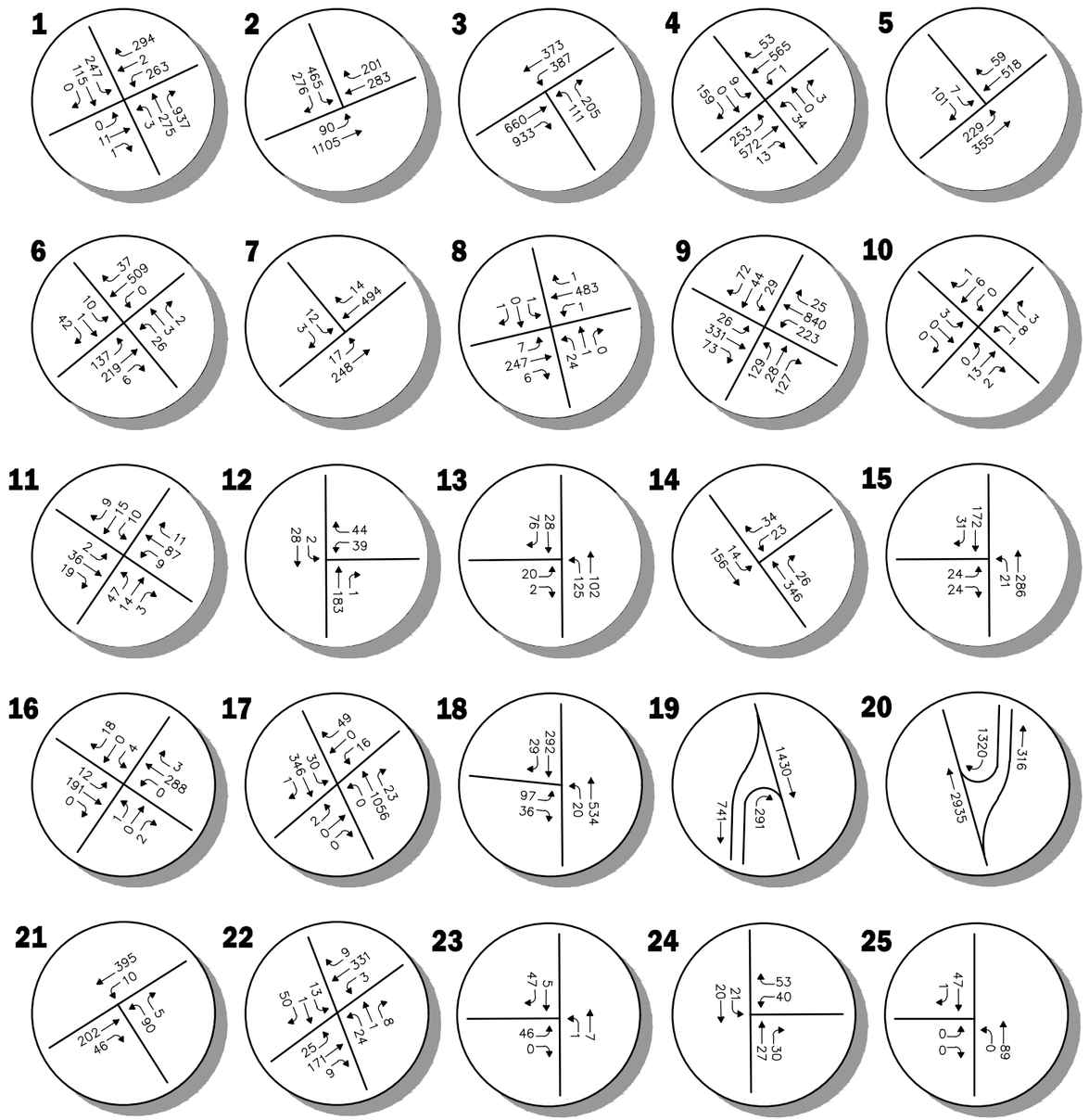


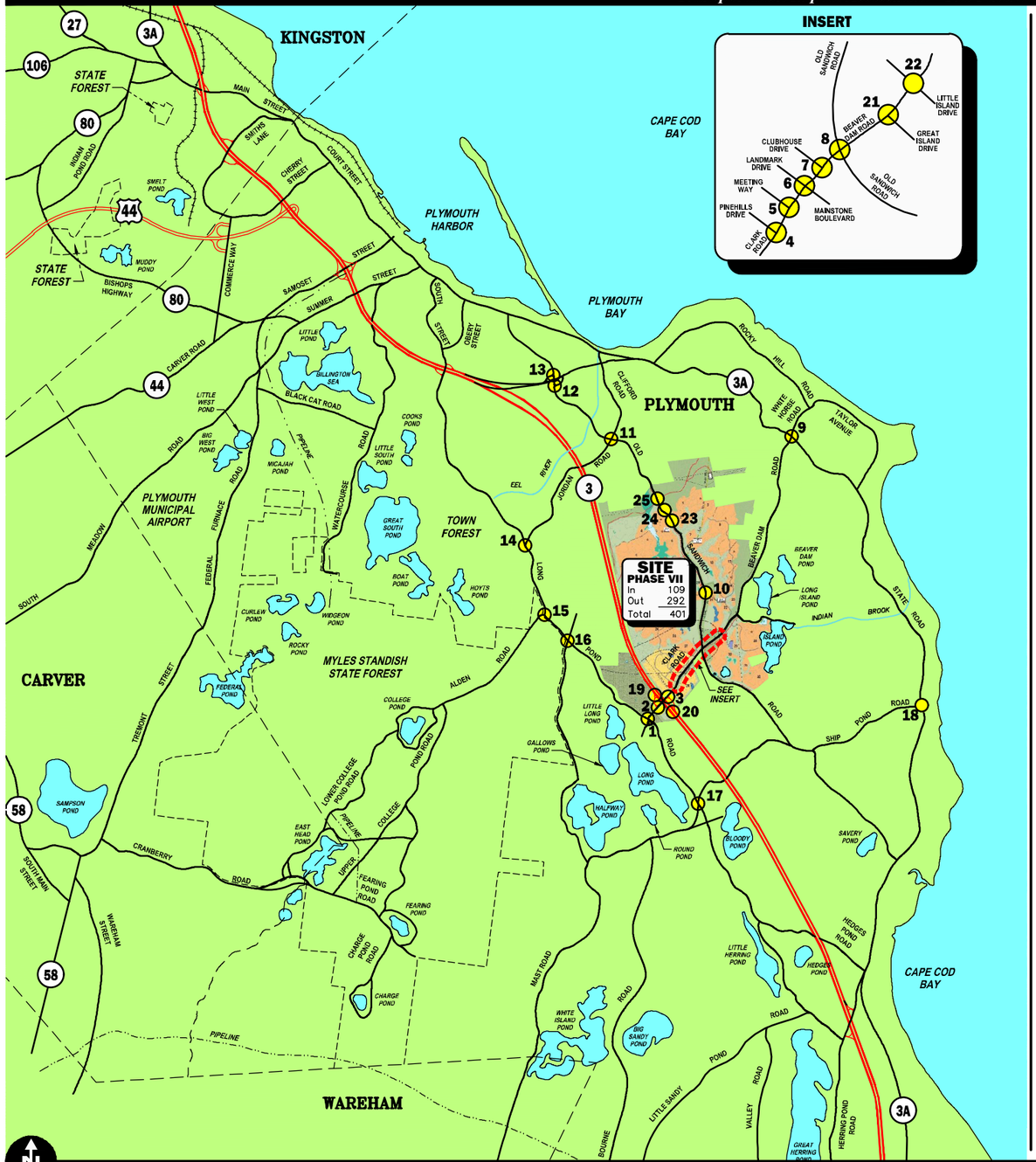
Figure 4.15

2030 Build
Weekday Morning
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 10:49:26 AM



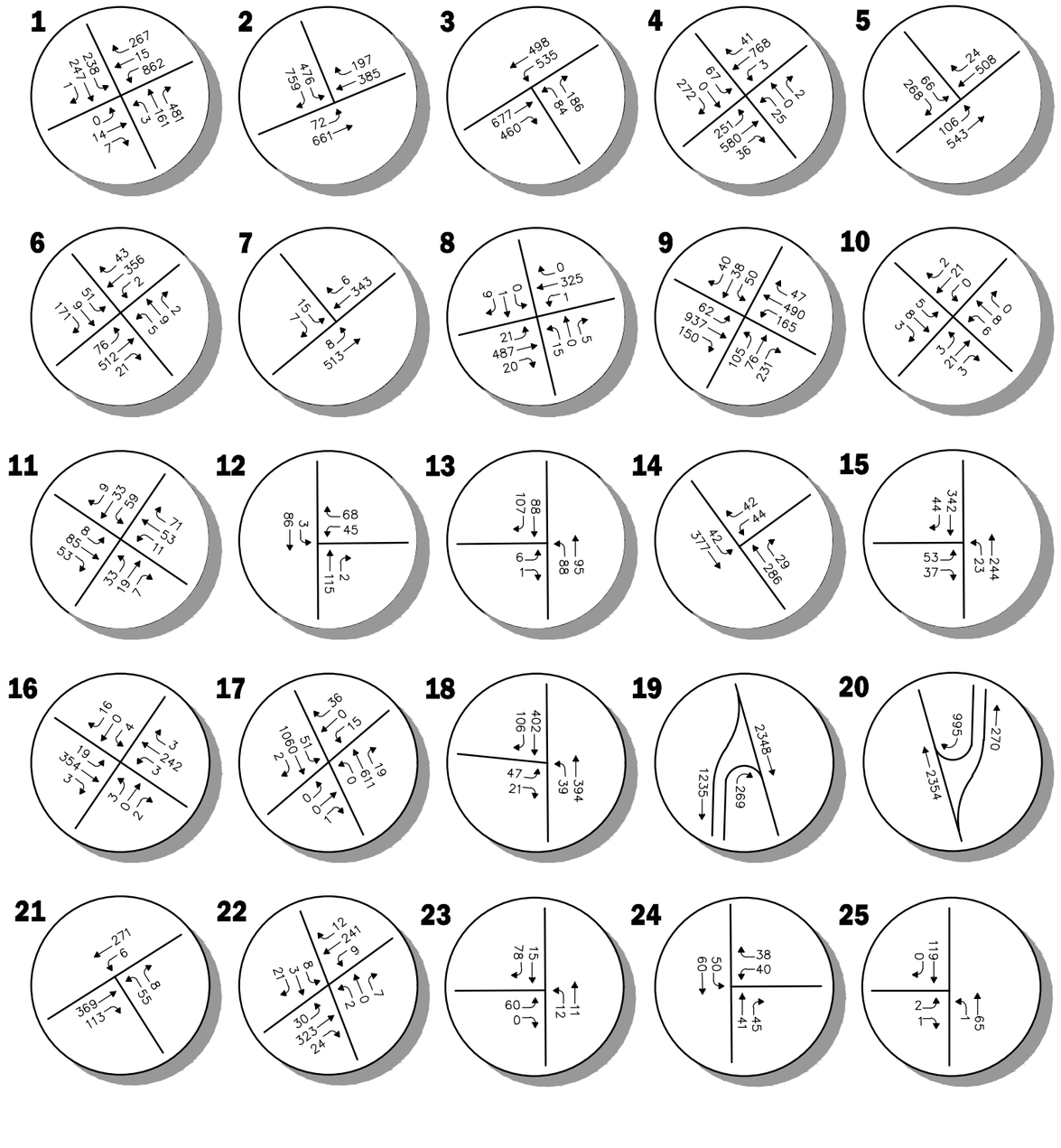


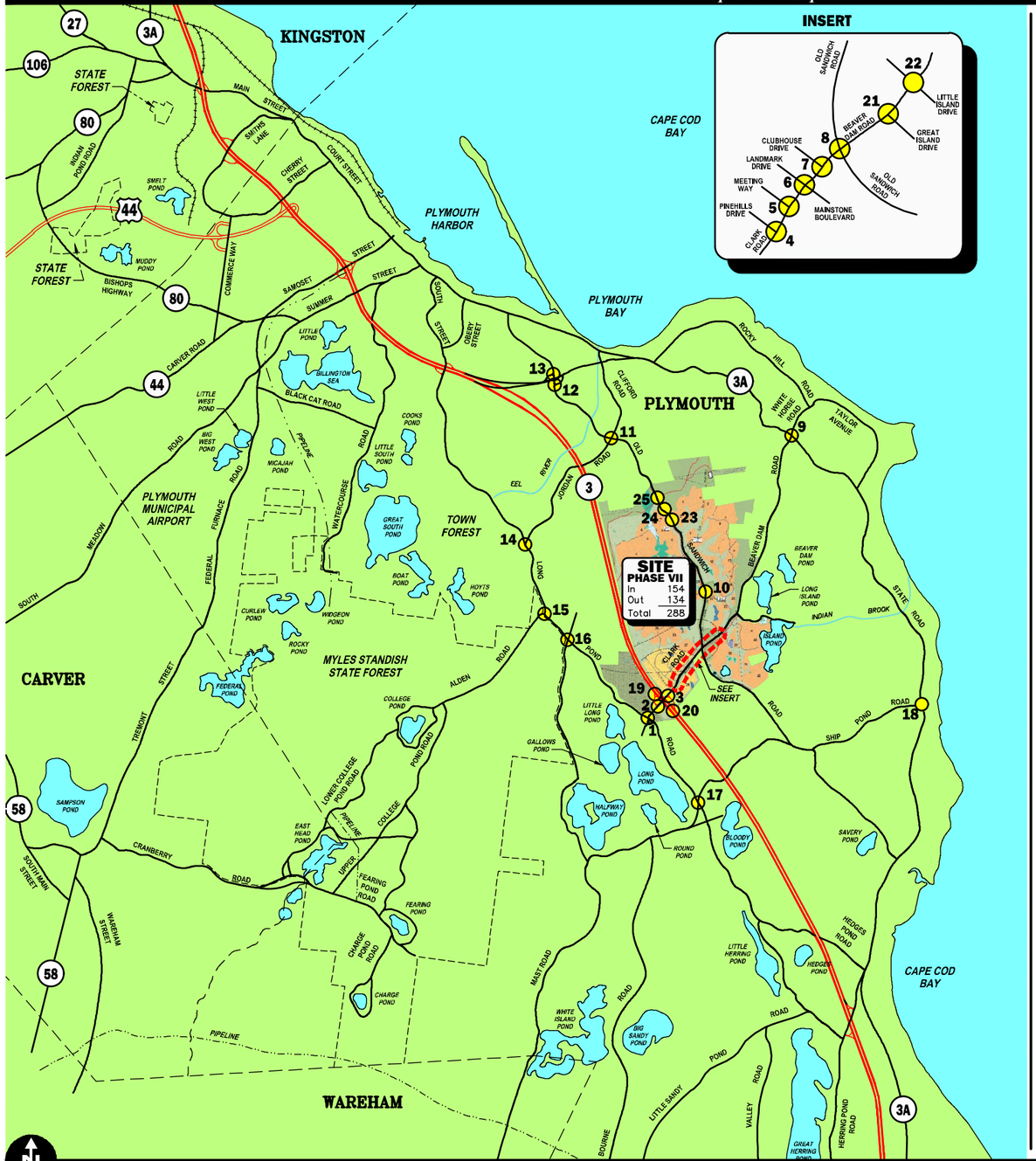
Figure 4.16

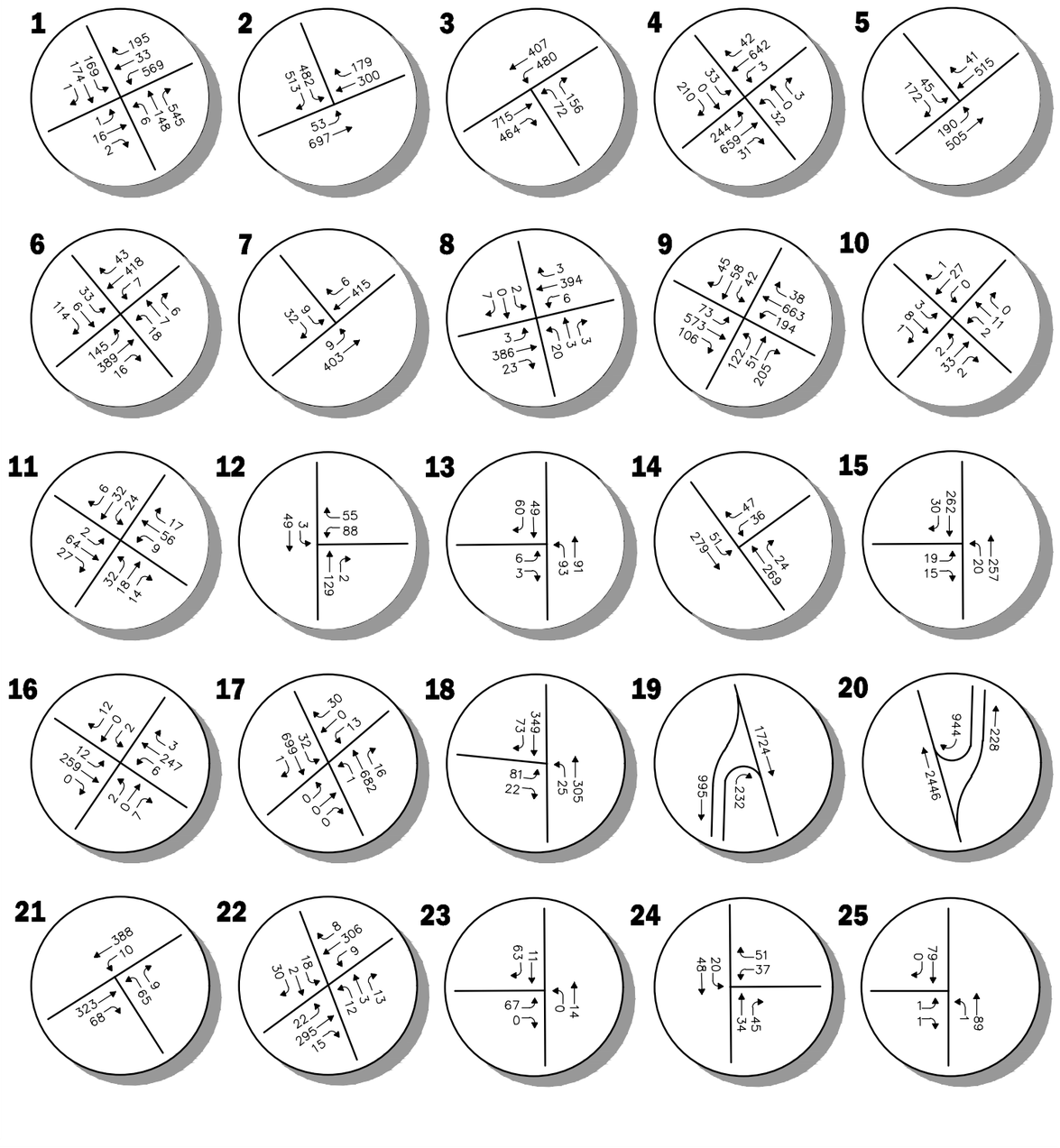
2030 Build
Weekday Evening
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:51:23 AM





Not To Scale

Figure 4.17

2030 Build
Saturday Midday
Peak Hour Traffic Volumes
PRD: Phase VII

Vanasse & Associates inc

Copyright © 2020 by VAi. All Rights Reserved.

R:\2073\Phase 7\2073nt4.dwg, 5/7/2020 9:52:47 AM

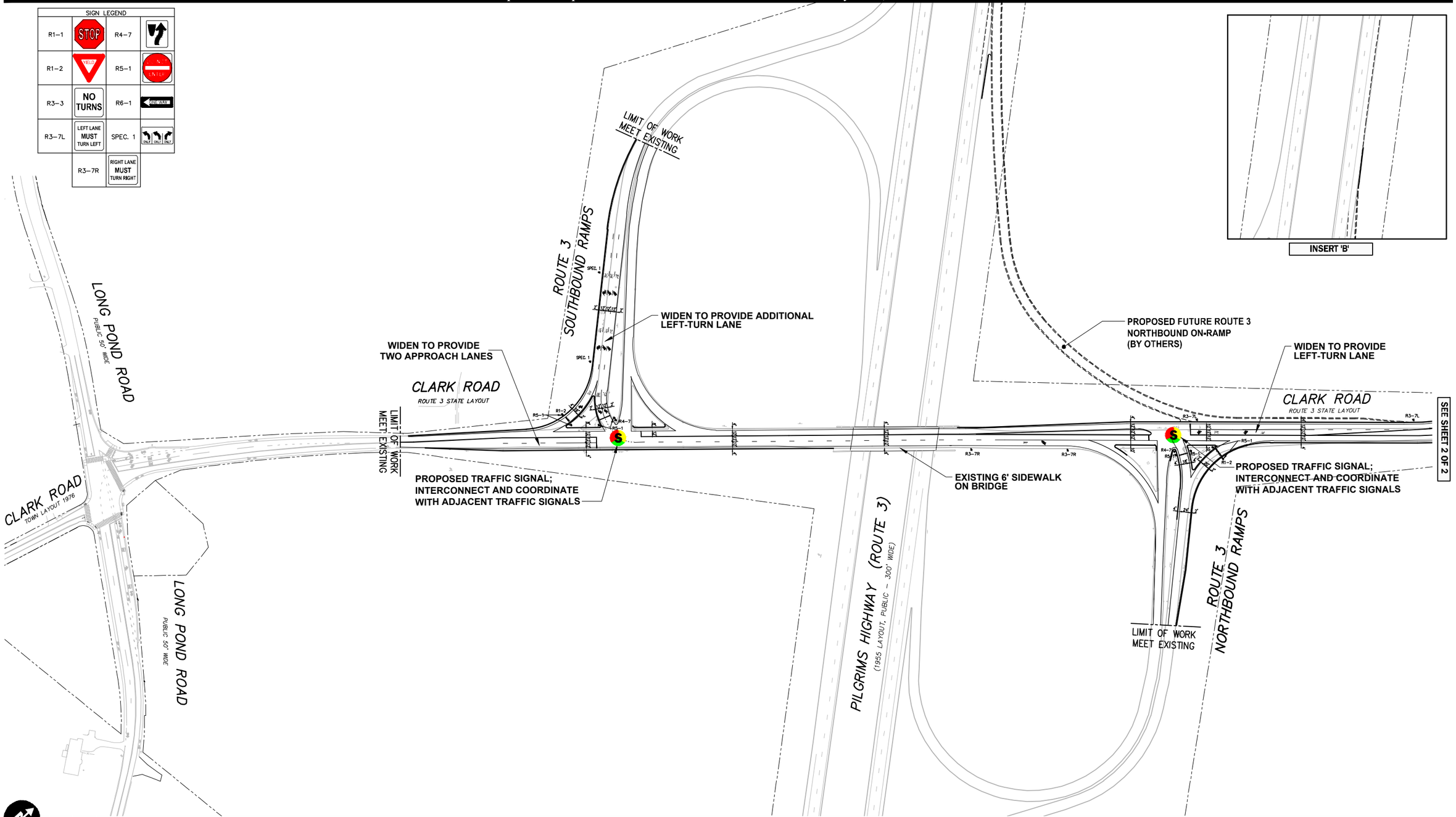


Figure 4-18

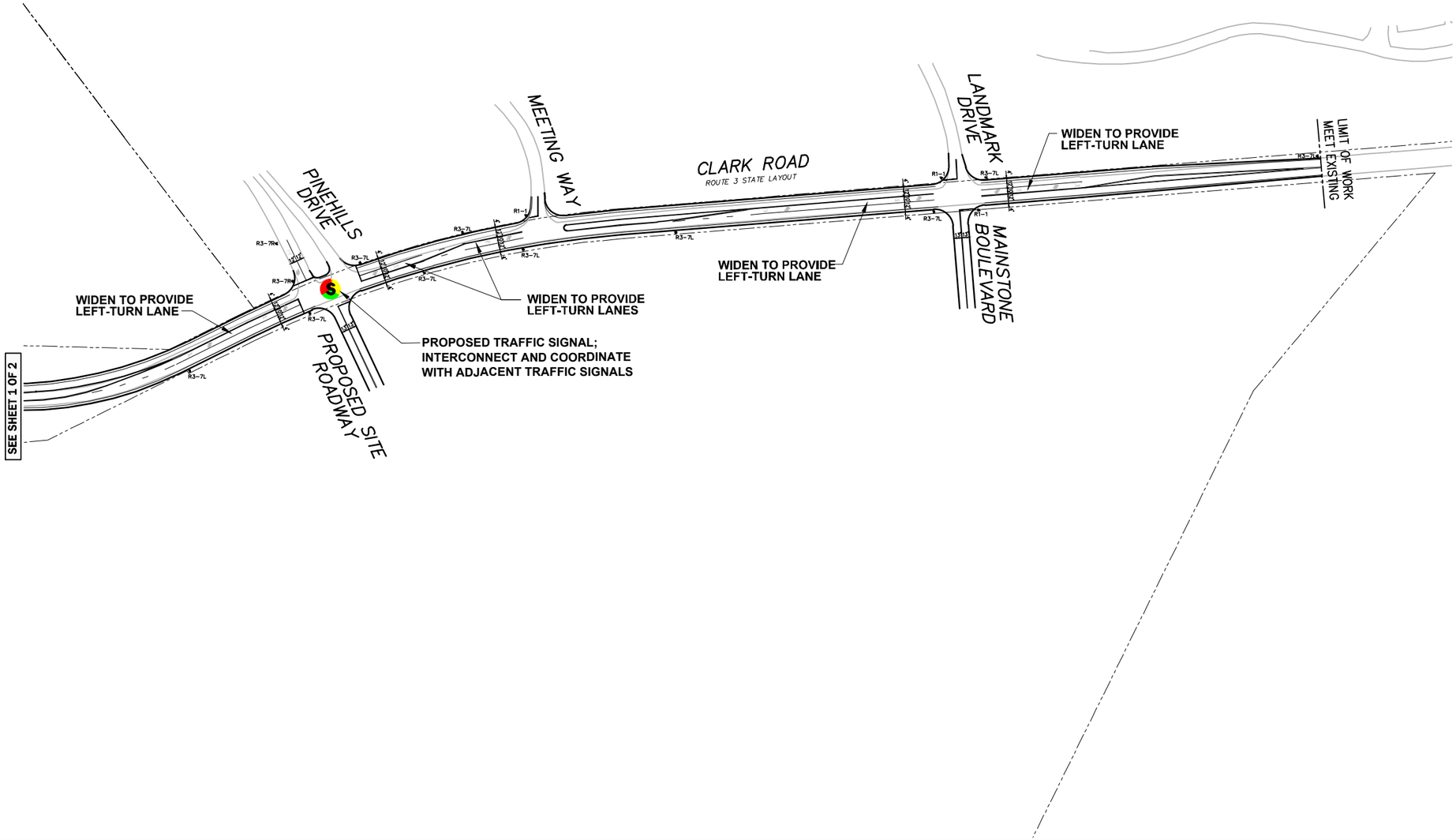
Conceptual Improvement Plan
Clark Road
Sheet 1 of 2

Vanasse & Associates inc

Copyright © 2020 by VAI. All Rights Reserved.

R:\2073\Phase 7\2073cn2mw_081814.dwg, 5/4/2020 10:20:44 AM

SIGN LEGEND			
R1-1	STOP	R3-7L	LEFT LANE MUST TURN LEFT
R1-2	YIELD	R4-7	
R3-3	NO TURNS	R5-1	DO NOT ENTER
R3-7R	RIGHT LANE MUST TURN RIGHT	R6-1	ONE WAY
	SPEC. 1		ONLY ONLY ONLY



0 100 200 Scale in Feet

Figure 4-18

Conceptual Improvement Plan
Clark Road
Sheet 2 of 2

Vanasse & Associates inc

Copyright © 2020 by VAI. All Rights Reserved.

R:\2073\Phase 7\2073cn2mw_081814.dwg, 5/7/2020 11:09:27 AM

5

Water Resources

This chapter provides updated information on the Pinehills' water supply and wastewater activities.

5.1 Water Supply

The water supply and distribution plans for The Pinehills, described in previous PRD submittals, include a pumping station with three production wells, a 2 million-gallon storage tank and reservoir, and a water distribution system. Each phase of the detailed water system design is based upon criteria set forth in the "Pinehills Water Master Plan," approved on February 7, 2000 by the Massachusetts Department of Environmental Protection (DEP)

Construction of the public water supply pumping station for The Pinehills, known as the Pinehills Water Company Pumping Station, was completed in July of 2000. DEP issued its approval to operate during October 2000, at which point the station began providing water for water main testing and golf course irrigation. On January 2, 2001 the Pinehills Water Company became a public water supplier in accordance with the Massachusetts Drinking Water Regulations, 310 CMR 22.02.

The Pinehills Water Company contracts out the operation of the pumping station and its distribution system. Based on the use of chemical treatment at the pumping station and the projected population to be served in The Pinehills, the Pinehills Water Company is required by DEP to utilize a water system operator with a Class-1 treatment license for operation of the Pinehills Water Company Pumping Station and a Class-2 distribution license for operation of the distribution system.

The Pinehills Water Company Pumping Station consists of three gravel-packed wells each equipped with its own vertical turbine pump and variable-frequency pump control. Two pumps have a rated capacity of 1,460 gallons per minutes (gpm) each, and the third pump has a rated capacity of 400 gpm. The pumping station also consists of two 12,000-gallon hydropneumatic storage tanks to maintain the system pressure. The hydropneumatics storage tanks have not been used since the new 2 million gallons pre-stressed concrete water storage tank, which went into service in October of 2006. At the same time, a booster pump station was built next to the water storage tank and started its operation on June 2014.

Groundwater pumped by the Pinehills Water Company Pumping Station has a pH between 5.5 and 6.0, and the pH is adjusted to between 7.2 and 7.4 using sodium hydroxide. This is the only routine treatment provided at the pumping station. A chlorination feed system is available, if needed, for temporary disinfection. The pumping station also includes a standby generator to provide emergency power during a power outage, ensuring that drinking water is available at all times.

To offset the operation and maintenance cost of water system, water revenues are recovered through a water rate structure charged to residential and commercial consumers. The water rate structure was approved by the Massachusetts Department of Telecommunications and Energy (currently known as the Massachusetts Department of Public Utilities). The water rate has not been adjusted since it was first approved in January 2002.

5.1.1 Water Demand

The proposed water demands for PRD: Phase VII will be generated primarily by 13 homes, multi-family apartments and 300,000 square feet of general commercial & offices. The Water Master Plan used 2,817 homes for the original flow estimation. This estimate was adjusted as land was added to the Pinehills over time to account for the addition of one home per acre of newly purchased land. The current permitted daily average withdrawal from the three Pinehills Water Company wells at buildout is 0.46 million gallons per day (MGD), and the total annual withdrawal volume is 167.9 million gallons per year (MGY) under the Water Management Act (WMA). The volume of withdrawal has not been changed since 2000. This withdrawal does not include withdrawals for golf course irrigation. A dedicated golf course irrigation supply and distribution system for the existing Rees Jones and Nicklaus courses has been constructed and is operated under a separate WMA permit. The OS Golf Club, the third private golf club at the Pinehills, has obtained a separate WMA permit for its irrigation water. Pinehills has obtained a separate WMA permit to provide irrigation for common areas maintained by the various landowners' associations and related neighborhood associations. Potable water demands for PRD: Phase I through VII are listed in Table 5.1. This PRD is the final application for the Project and the water demands will be the same as the buildout.

Table 5.1 Projected Potable Water Demand through PRD: Phase VII

	Average Daily Demand (gpd)	Maximum Daily Demand (gpd)
Phases I to VI		
Hotel and Spa, plus 800,000 square feet of commercial/retail/office	94,000	226,000
3,052 residential dwellings	397,000	992,000
Others	80,000	200,000
Subtotal	571,000	1,418,000
Phase VII		
13 residential dwellings	2,000	4,000
General office (300,000 sf)	10,000	23,000
Multi-family apartments	23,000	59,000
Others	40,000	100,000
Subtotal	75,000	186,000
Phases I to VII Total	**646,000**	**1,604,000**

(1) The population projection is based on 2 persons per dwelling.

(2) The average daily per capita water demand is projected to be 65 gallons per person per day.

(3) For residential uses, Maximum Daily Demand is projected to be a factor of 2.5 times Average Daily Demand. The total residential dwellings through and including PRD: Phase VI include 2,152 limited occupancy homes and 920 planned retirement homes.
(4) For commercial uses, Maximum Daily Demand is projected to be a factor of 2.3 times Average Daily Demand.
(5) Others includes municipal use, recreation amenities, irrigation, construction water and unaccounted-to-water.
(6) In this RPD document, both Average Day Demand and Maximum Day Demand are used. However, NPC form o only used the average day demand.

5.1.2 Future Water Supply

The Pinehills has applied for the additional withdrawal from the existing primary pumps at the pump station. The pump test was conducted in November 2019 and the pump test result was approved by DEP in May 2020. A water management act application for additional withdrawal of 69.45 million gallons per year was submitted in July 2020. The final approval is expected in November 2020. The final water withdrawal will be 237.35 million gallons per year or 0.65 million gallons per day as average day demand and a maximum daily demand of 1.604 million gallons per day.

5.1.3 Water Distribution System

The complete water distribution system will consist of approximately 41 miles of water mains ranging in size from 2 inches to 16 inches in diameter. The water system constructed to date includes the Pinehills Water Pumping Station, a booster pump station and a 2 million gallons pre-stressed concrete tank, 15,721 feet of 16-inch water main, 60,143 feet of 12-inch water main, 123,764 feet of 8-inch water main, 13,888 feet of 6-inch water main, and 3,554 feet of 4-inch or smaller water main, as shown in Figure 5.1.

The complete water system has been hydraulically modeled for the effectively watermains sizes in the distribution system. Criteria for conceptual design of the watermains were based upon the "Pinehills Water Master Plan" (November 16, 1999). In accordance with the approval conditions of the Water Master Plan, as-built plans of watermain construction have been submitted once each year to the DEP to verify consistency with the Master Plan. Submittals of as-built plans occurred in February of the following year.

5.1.4 Golf Course Irrigation Water

Irrigation water for the existing Rees Jones and Nicklaus golf courses is provided by an existing set of irrigation/interceptor wells operating under their own WMA permit (Permit #9P4-4-21-239.04). The four interceptor wells were installed downgradient of the Pinehills Private Sewer Treatment Facility's disposal beds. The wells were located to intercept groundwater that would eventually load nutrients, particularly phosphorus, to Great Island Pond. The water withdrawn from the wells is conveyed to the irrigation pond through dedicated irrigation mains. There, the water is stored before being used to irrigate the existing Rees Jones and Nicklaus golf courses located in the southern half of the community.

Construction of the interceptor wells was completed near the end of 2000, and operation began on May 24, 2001. The wells are subject to a WMA permit obtained exclusively for these four withdrawal points. The wells are operated between April 15th and October 31st.

This permit allows an annual withdrawal of 81.71 million gallons per year. In 2019, the wells produced 56.84 MG with an average pumping rate of 0.266 MGD.

Irrigation water for the OS Golf Course is provided by a separate well approved through Water Management Act Permit #9P4-4-21-239.09. The single irrigation well installed for the OS Golf Course is permitted to operate from mid-April to mid-November and withdraw up to 31 million gallons. The permitted peak day threshold is 490,000 gallons per day. In 2019, the well produced 12.03 MG with an average pumping rate of 0.06 MGD.

5.1.5 Common Area Irrigation Water

Irrigation water to the common areas in the Pinehills community is provided by separate irrigation wells through Water Management Act Permit # 9P4-4-21-239.11, approved in February 2008 with a total withdrawal volume of 54.91 MGY. A total of Twenty-one (21) irrigation wells have been installed and total withdrawal was 42.71 MGY in 2019.

5.2 Wastewater

Pinehills LLC undertook extensive analysis of site conditions, regulatory standards, and operational performance records in developing the wastewater management plan for The Pinehills. The primary goal of these analyses was to avoid or minimize impact on sensitive receptors, such as surface water bodies or groundwater, particularly that which might impact a public water supply. Another important goal was the design of a wastewater management plan that will minimize inter-basin transfer as The Pinehills is located within two watersheds.

The wastewater from The Pinehills community at buildout will be treated by a wastewater treatment plant complex, with disposal beds located at more than one location throughout the community. A limited number of homes may be served by on-site septic systems. These homes will be in locations where it would be difficult and expensive to provide the community wastewater treatment services.

This wastewater management plan has not changed since the filing of the PRD: Phase III report in February 2001.

5.2.1 Status of the Wastewater Treatment Plant

On March 2, 2000, DEP issued a Groundwater Discharge Permit (Permit #0-680) authorizing the Pinehills LLC to proceed with the construction of a wastewater treatment plant including disposal beds and interceptor wells. In addition, the Permit also specified monitoring requirements. The Permit was appealed, and a final revised Permit was issued in January 2001. The permit was renewed in March 2008 (Permit #1-680).

The construction of the wastewater treatment plant, disposal beds, and interceptor wells was completed in April 2001. A clear water test, witnessed by DEP staff, was conducted successfully on May 7, 2001. The approval letter by DEP was received on May 11, 2001. Between May of 2001 and July of 2003, the wastewater treatment plant was inactive. A minimum flow of 7,500 gallons per day (gpd) is necessary to sustain the operation of the wastewater treatment plant. Since July of 2003, the wastewater treatment plant has been in operation.

The plant was expanded in 2006 (Phase II) to an average daily capacity of 300,000 gpd and a maximum day capacity of 660,000 gpd. The disposal capacity was increased to 660,000 gpd at disposal beds next to the plant and subsurface disposal area at Rye Field at the intersection of Old Sandwich Road and Old Tavern Trail. DEP was involved in the clear water test and authorized the use of the expanded facilities.

The plant was expanded again in 2019 (Phase III) to an average daily capacity of 450,000 gpd and a maximum day capacity of 900,000 gpd. The disposal capacity remains at 660,000 gpd. Currently, the average wastewater flow is approximately 270,000 gpd. DEP approved the operation of Phase III on May of 2019. The current GWDP permit is #680-1M. An application for renewal of the permit is currently pending with MassDEP.

5.2.2 Projected Wastewater Demand

The development program for PRD: Phase VII includes up to 13 limited occupancy dwellings, 178 multi-family apartments, and 300,000 sf of commercial space. All of these developments will be served by the wastewater treatment plant. The wastewater flow for these facilities under PRD: Phase VII (the buildout condition) is listed in Table 5.2.

Table 5.2 Wastewater Flows Through PRD: Phase VII

				Daily Flow (gpd)	
Development Use	**Quantity**	**Units**	**Flow/unit, gpd**	**Average**	**Maximum**
PRD I to VI					
Residential					
Age-Deed-Restricted Dwellings	920	dwellings	150		138,000
Expected occupancy per home	2	persons	55	101,200	
Limited Occupancy Dwellings	2132	dwellings	330		703,560
Expected occupancy per home	2	persons	55	234,520	
		Residential Subtotal (sewered only):		**335,720**	**841,560**
Commercial - Specific Flows					
Golf Clubhouse (10,000 sf)					
Showers	60	locker	20	530	1,200
Pro Shop (400 sf)	0.4	1,000 sq ft	50	10	20
Restaurant	100	seat	35	1,530	3,500
Maintenance Facility	4	1,000 sq ft	60	110	240
OS Golf Club					
Suites (with bathroom)	6	units	105	280	630
Lounge	20	seats	40	350	800
Restaurant	50	seats	35	770	1,750
OS Golf Club					
Pro Shop (400 sf)	0.4	1,000 sq. ft.	50	10	20
Locker Room	350	lockers	20	3,050	7,000

Development Use	Quantity	Units	Flow/unit, gpd	Daily Flow (gpd) Average	Maximum
Grill Room	40	seats	35	610	1,400
OS Golf Club					
Golf Maintenance Facility	2	1,000 sq. ft.	60	60	120
Mirbeau Inn and Spa					
Spa facility	43	1,000 sq. ft.	50	940	2,150
Spa active	26	seats	100	1,140	2,600
Rooms	90	units	110	4,310	9,900
Laundry	10	units	400	1,740	4,000
Office	16.4	1,000 sq. ft.	75	540	1,230
Wine Bar	62	seats	40	1,080	2,480
Dining Room	96	seats	35	1,470	3,360
			Specific Commercial Subtotal:	**18,530**	**42,400**
Commercial - General Flows					
General Commercial & Office (450,000 sf)	450	1,000 sq ft	75	14,680	33,750
Retail (200,000 sf)	200	1,000 sq ft	50	4,350	10,000
Multifamily Apartments & others	492	units			
	863	persons	55	23,733	47,465
			Commercial Subtotal:	**42,763**	**91,215**
			Total Phases I to VI:	**397,013**	**975,175**
PRD VII					
Residential					
Limited Occupancy Dwellings	13	dwellings	330		4,290
Expected occupancy per home	2	persons	55	1,430	
			Total PRD VII Residential:	**1,430**	**4,290**
Commercial					
General Commercial & Office (300,000 sf)	300	1,000 sq ft	75	9,790	22,500
Multifamily Apartment	178	unit	330		58,740
	351	persons	55	25,540	
			Total PRD VII Commercial:	**35,330**	**81,240**
			Total PRD VII:	**36,760**	**85,530**
PRD I-VII					
			Total Residential PRD I to VII:	**337,150**	**845,850**
			Total Commercial PRD I to VII:	**96,623**	**214,855**
			Total PRD I to VII:	**433,773**	**1,060,705**

5.2.3 PRD: Phase VII Compliance with Nutrient Loading Standards

The development of nitrogen and phosphorus loading controls were incorporated into the Permit and apply to different areas of The Pinehills community. For the purposes of PRD: Phase VII development, some limited residential development is proposed within the 200-foot phosphorus management buffer that surrounds the Eel River system. Any disturbance of this buffer area will be subject to the development standards set forth in the Permit Section I.A.2(a).

Nitrogen loading calculations are performed as part of the PRD process to compare anticipated nitrogen loading impacts with the standards set forth in the Groundwater Discharge Permit (the Permit) for The Pinehills community. Under the original Permit, these standards reflected the level of development across the site, in three individual sectors, and in the Zone 2 contributing area to the public water supply. These sectors were established in the preliminary planning phases of the community with the assumption that significant portions of the developed areas might be serviced by on-site septic systems.

Since these early planning phases, development trends and future planning have demonstrated that the vast majority of the community will dispose of its wastewater through the centralized wastewater treatment facility. These land use trends suggest that compliance with several of these previous nitrogen loading standards are not necessary as the downgradient property wells will effectively monitor subsurface nitrogen concentrations for much of the site. Accordingly, the 2008 Permit renewal limited compliance with nitrogen loading standards to the Eel River Watershed (previously known as "Sector 1") and the on-site Zone 2 (Figure 5.2). Table 5.3 summarizes the nitrogen loading standards associated with these two areas.

Table 5.3 Summary of Existing Nitrogen Loading Standards

	Existing Standard (lbs/yr)
Eel River Watershed	7,416
PWS Zone 2	10,670

5.2.4 Sources of Nitrogen

5.2.4.1 Septic System Effluent

Each residence using an on-site septic system is assumed to generate an average daily flow of 134 gallons per day, and the effluent will have a nitrogen loading concentration of 35 mg/L. The rate of flow is based on an average occupancy rate of 2.4 people per house and a flow rate of 55 gallons per person. The most recent occupancy records for The Pinehills suggests this assumed rate is higher than actual conditions; however, this rate was used in developing many of the original standards and therefore remains in the current analyses as a conservative estimate. The 35 mg/L nitrogen concentration is consistent with that used in the DEP nitrogen loading model (Horsley & Witten, 1996). Loading calculations are included in Appendix D. With the exception of the community visitor center (The Summerhouse), there are no residential properties or commercial properties using on-site septic systems.

5.2.4.2 Fertilization of Golf Course Areas

Areas of golf turf within The Pinehills include three 18-hole courses that lie in all nitrogen loading sectors. The acreage for these courses was calculated from digital mapping for existing courses and from architect design drawings where digital data were not available. Fertilization rates for tees, greens, fairways and roughs were taken from the "Fertilizer Management Plan, The Pinehills Golf Club" (Horsley & Witten, 2000) or from personal communication with golf course management staff (Table 5.4).

Table 5.4 Long-Term Fertilization Rates Applied to Golf Course Turf within the Nitrogen Loading Analyses

Turf Category	Nicklaus and Rees-Jones Course (lbs per 1,000 square feet)	OS Golf Club (lbs per 1,000 square feet)
Tees	4	2
Greens	3	3
Fairways	3	3
Roughs	1	0

A leaching rate of 15 percent was applied to all golf course fertilization as required by the Permit to determine the actual amount of nitrogen that travels to groundwater. This leaching rate is based on data from the Bayberry Hills Golf Course in Yarmouth, Massachusetts, where the leaching rate directly below the greens is 14 percent (Nash, 1998). As such, it represents a conservative leaching rate when applied to all turf categories, since greens are more heavily fertilized than the majority of managed turf on a given course. The rate of 15 percent is also supported by previous studies of Cape Cod golf courses (Cohen et al., 1990).

5.2.4.3 Fertilization and Runoff within Residential Areas

Nitrogen loading from residential development will include loading from lawn fertilizer and runoff from impervious surfaces that recharges to groundwater. Residential areas within The Pinehills are assumed to have 2,000 square feet of managed lawn, 500 square feet of driveway, and 1,500 square feet of roof area per home. These assumptions are consistent with those detailed in the Groundwater Discharge Permit for The Pinehills community. Fertilization of residential lawns is assumed at a rate of 3.5 pounds of nitrogen per 1,000 square feet of lawn, with a corresponding leaching rate of 25 percent. The resulting load of nitrogen from each lawn within The Pinehills is therefore assumed to be 1.75 pounds per year. Runoff from rooftops and driveways is assumed to contain a nitrogen concentration of 1.5 mg/L and will recharge at a rate of 24 inches per year. These loading assumptions relative to impervious surfaces are also consistent with those found in the Permit.

5.2.4.4 Fertilization and Runoff Associated with Roadway Areas

Roadway development within The Pinehills community constitutes a source of nitrogen for two reasons. First, as with impervious areas from residential development, runoff from roadways is assumed to contain 1.5 mg/L of nitrogen (derived from road debris and waste), which will recharge at a rate of 24 inches per year. Second, the following nitrogen loading

analyses assume a 10-foot wide landscaped shoulder on each side of developed roadway. These shoulder areas are assumed to be fertilized at the same rate as residential lawns (3.5 pounds per 1,000 square feet) with the same leaching rate (25 percent). Areas of roadway for the Phase VII development were adapted from ArcGIS information associated with the most recent Annual Report submitted as part of the Permit requirements.

5.2.4.5 Effluent from the Sewage Treatment Facility

The Pinehills Sewage Treatment Facility is located outside both the Eel River Watershed and the PSW Zone 2. This effluent was therefore not included in any nitrogen loading calculations.

5.2.4.6 Recharge from Natural Areas

The final source of nitrogen loading to be considered in the model is the background loading from natural areas. Any undeveloped areas within the property boundary were assumed to recharge 24 inches of precipitation per year at an assumed nitrogen concentration of 0.05 mg/L.

5.2.5 Results of Nitrogen Loading Analyses

Nitrogen loading analyses were performed for the Eel River Watershed and the PWS Zone 2 as described above. At this time, the proposed PRD VII development activity includes 13 planned retirement homes. The exact location of these homes has yet to be determined and may vary slightly based on physical constraints or market conditions. Therefore, to produce conservative analyses for the Eel River Watershed and the Zone 2, preliminary development envelopes were used to estimate the potential impacts from these homes. It should be noted that these areas were treated independently for the purposes of nitrogen loading, and the estimate of the number of homes was pushed to its highest anticipated level in each area. As a result, the total number of homes modeled is actually higher than the proposed 13 units when added together. In the Zone 2 area, the highest anticipated number of homes is 1 and, in the Eel River Watershed, the highest number of anticipated homes is 81.

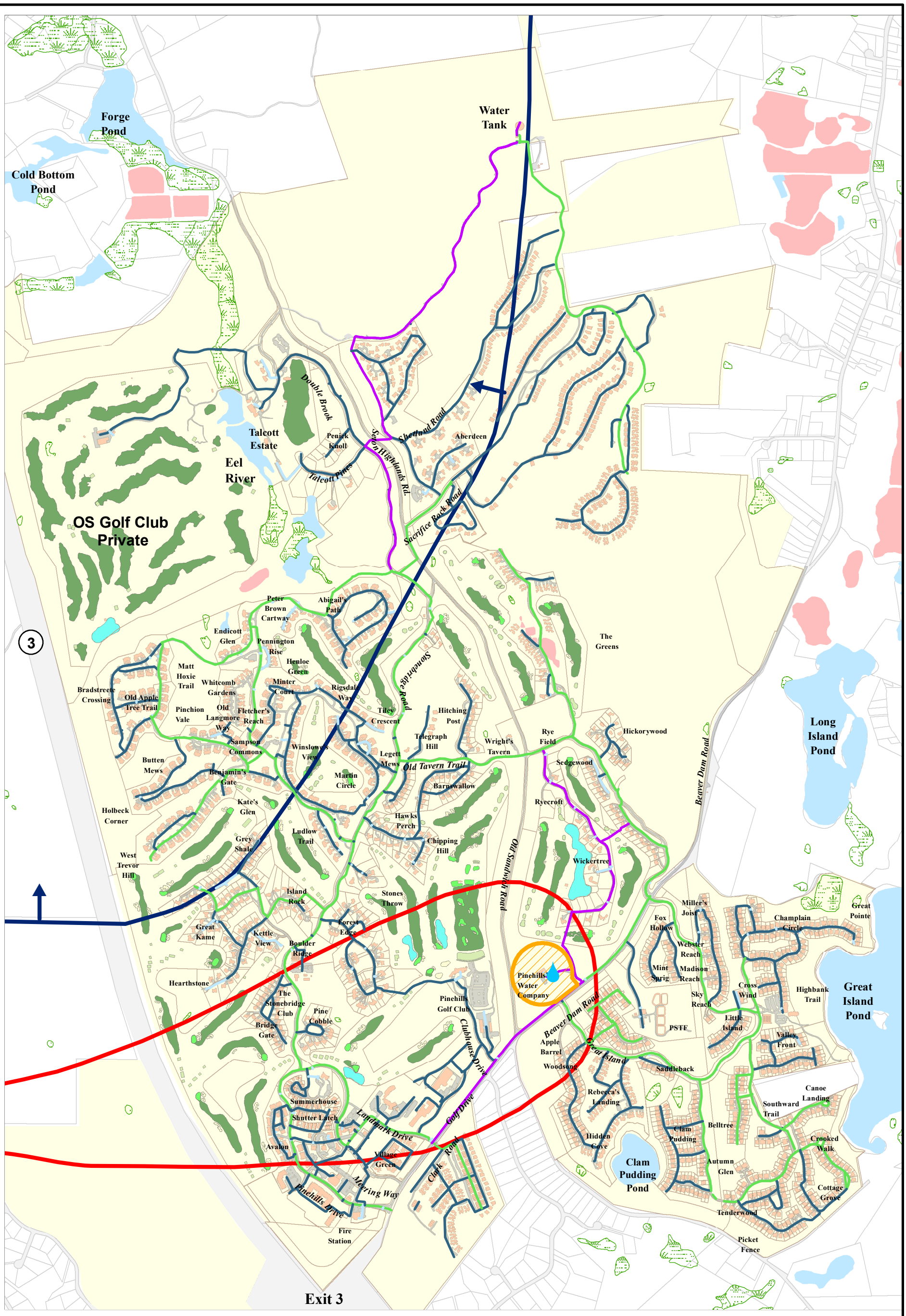
To estimate the nitrogen loading from this increase in the number of residential units, the 2013 nitrogen loading estimates developed as part of the most recent Permit Annual Report were used as a base. These include the highest potential levels of future development that the Pinehills can reasonably predict. The homes proposed under PRD VII were then used to adjust these Annual Report projections and other adjustments were made to areas of impervious cover, golf turf fertilization rates, and other model inputs as necessary. As a significantly conservative approach, 10% of the homes projected in the Eel River Watershed are assumed to be serviced by on-site septic systems. The actual number of homes using septic systems will be much lower based on the preferred approach of connecting new homes to the PSTF.

Table 5.5 provides a summary of the PRD VI nitrogen loading analyses for the Eel River Watershed and the PWS Zone 2.

Table 5.5 Summary of PRD VII Nitrogen Loading Analyses

Eel River Watershed		PWS Zone 2	
Permit Standard	**Calculated N- Load**	**Permit Standard**	**Calculated N- Load**
7,416	7,054	10,670	2,973

The results of the nitrogen loading analyses show that the PRD VII development program would yield numbers for nitrogen loading that are well beneath the limits set in the Permit.



Legend

- Buildings
- Roadway / Parking
- Golf Course
- Wetlands
- Open Water
- Streams
- Eel River Watershed
- Zone I
- Zone II
- Pinehills Water Company
- 6" Water Line
- 8" Water Line
- 12" Water Line
- 16" Water Line

*Note: Based on construction through December 2019

N

Feet

1,250

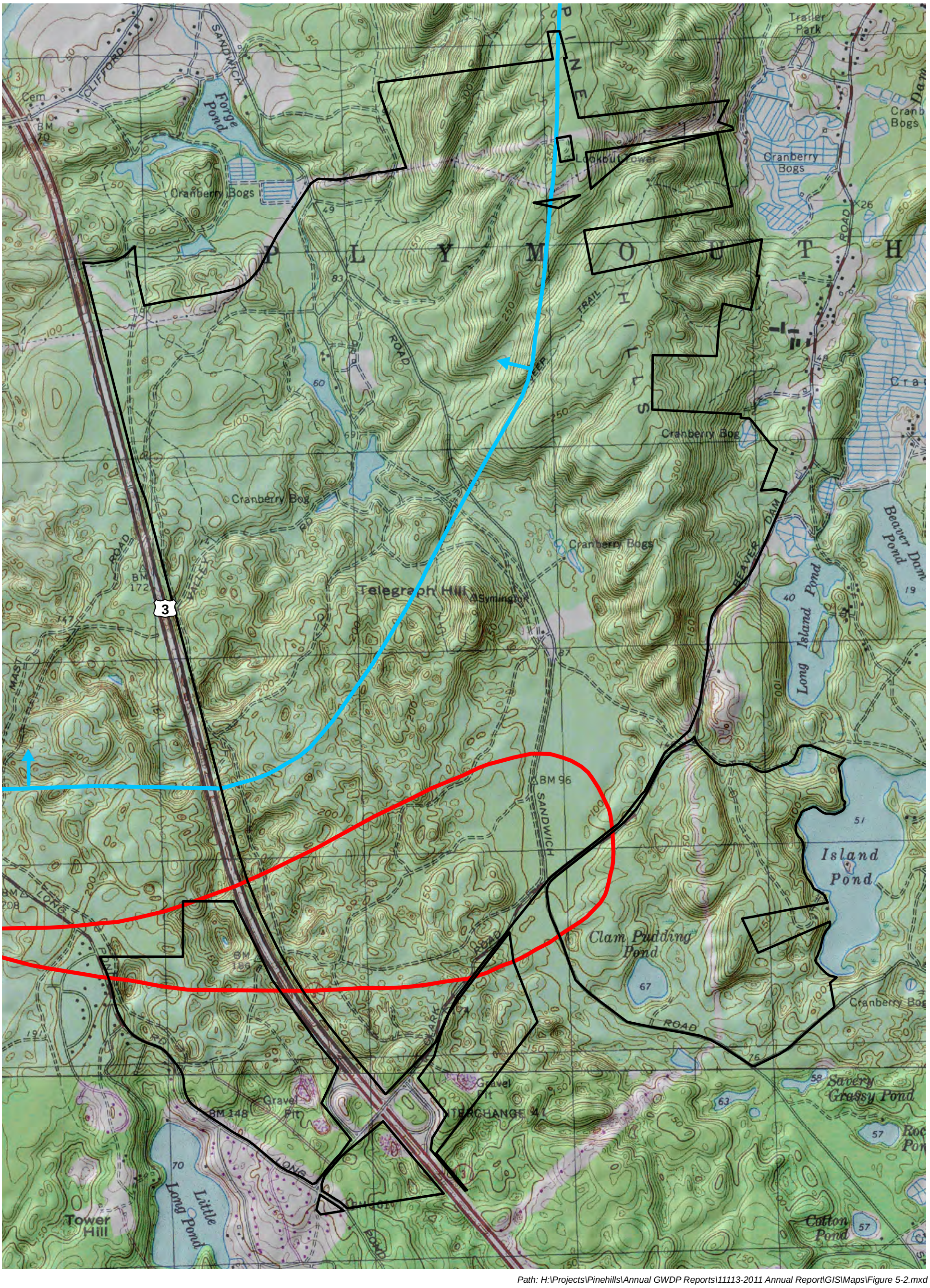
Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

Record Plan for The Pinehills Water System Plymouth, MA

Date: 6/8/2020 - erk

Figure 5.1

Path: H:\Projects\Pinehills\Master_GIS\Maps\PH-Water-System-2020.mxd



Path: H:\Projects\Pinehills\Annual GWDP Reports\11113-2011 Annual Report\GIS\Maps\Figure 5-2.mxd

Legend

- Pinehills Property Boundary
- DEP Wellhead Protection Areas (Zone II)
- Eel River Watershed

N

1,500 Feet

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

Fig 5.2 Zone II and Eel River Watershed

Date: 6/8/2020 - ec

Figure 5.2

6

Historical and Archaeological Resources

This chapter summarizes the results of the proponent's ongoing consultation with the Massachusetts Historical Commission including a summary of historical documentation of the Main House of the Talcott Estate and review of architectural improvements, repairs and rehabilitation to this historic structure which occurred since the filing of PRD: Phase VI in September of 2013.

6.1 Ongoing Consultation with Massachusetts Historical Commission

In the Certificate on the "Infrastructure Plan & Phase Review Document: Phase I" for The Pinehills, dated December 8, 1998, the Secretary acknowledged the proponent's efforts in consultation with the Massachusetts Historical Commission (MHC) to develop a Memorandum of Agreement (MOA) for the site. As described in greater detail below, the proponent and MHC agreed upon the terms and conditions of the MOA, which the parties executed in September of 2003. The MOA has served as a guide for studies of historic and archaeological resources within the development areas of each of the various PRD: Phases. A copy of the executed MOA is included in Appendix E.

In its comment letter on the "Infrastructure Plan & Phase Review Document: Phase I", MHC requested additional information about the project, including proposed development in the area of the Talcott Estate (aka Symington – Talcott Estate) and the proximity of the golf course to the Cornish/Wright Tavern. As planning for development within the Symington – Talcott Estate and other sections of the Pinehills progressed, the proponent has supplied the information requested by the MHC . The Proponent will provide MHC with additional information as plans for future phases of the project develop.

Based on its review of the ENF/Master Plan filing and the information supplied by the proponent, MHC identified the scope of cultural resources studies for The Pinehills as a whole in a letter to MEPA dated April 10, 1998. The MHC requested a reconnaissance level archaeological survey of the entire 3,037-acre site and further investigation at the intensive survey and site examination level as needed to identify and evaluate archaeological resources. The MHC also requested Cultural Resources Management Plans (CRMPs) for certain above ground historic resources. The "Infrastructure Plan & Phase Review Document: Phase I" summarized the results of the reconnaissance survey and intensive surveys for "Infrastructure Plan & Phased Review Document: Phase I" of The Pinehills.

After the publication of the "Infrastructure Plan & Phased Review Document: Phase I" in October 1998, the proponent and MHC continued to consult on survey work and to refine the MOA. Given the size, complexity, and phasing of The Pinehills, the agreed upon MOA outlines a process to eliminate, minimize, or mitigate adverse impacts to any significant

historic and archaeological resources consistent with written guidance material of the Advisory Council on Historic Preservation. The agreed upon MOA reflects the phasing plan for The Pinehills and outlines the process the proponent will follow to determine whether there are archaeological resources to protect and how to document such resources.

The proponent revised previous drafts of the MOA in response to several sets of comments from MHC. The MOA, which is now fully executed, includes a refined phasing plan and a cultural resources management program specifically targeted to cultural resources identified in the "Infrastructure Plan & Phased Review Document: Phase I". Under the cultural resources management program, the proponent will serve as the "caretaker" of the Cornish/Wright Tavern to prevent deterioration of the building. MHC will review any proposed changes to the Tavern for consistency with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings. Under the cultural resources management program, the proponent will preserve buffer zones along the unpaved portion of Old Sandwich Road and maintain them as described in a forest management plan for The Pinehills filed with the Department of Environmental Protection. The proponent agreed to have intensive archaeological surveys conducted by PAL within path routes and other crossings within the buffer strip area prior to utility installations.

The "Phased Review Document: Phase II" of the Pinehills published in July 1999 contained a summary of the intensive archaeological surveys completed in the PRD: Phase II development area. The proponent continued to consult with MHC during the MEPA comment period and thereafter during the construction of PRD: Phase II. In response to comments by the MHC on the Phased Review Document: Phase II, the report by PAL on intensive archaeological surveys within the Phase II development and remainder of the Pinehills project area was submitted to MHC for review. The proponent has continued to consult with MHC and conduct further archaeological surveys at the intensive and site examination levels, if necessary, on a phase by phase basis, as build out of The Pinehills moves forward.

The "Phased Review Document: Phase III" of the Pinehills published in February 2001 contained a summary of the intensive archaeological surveys completed in the PRD: Phase II development area. Some of this intensive survey work also included property within the PRD: Phase IV development area. The proponent continued consultation with MHC throughout the MEPA comments period and during construction under PRD: Phase III. The report prepared by PAL on intensive archaeological survey within the PRD: Phase III development area was submitted to MHC for review.

Reports prepared by PAL on intensive surveys within other sections of The Pinehills such as the "northern outparcel", Rye Field and Cornish/Wright Tavern, Symington – Talcott Estate and Clam Pudding Pond area have also been submitted to MHC for review and comment.

The Phased Review Document: Phase IV published in July 2002 also contained descriptions of the intensive archaeological surveys completed in the PRD Phase II, III and IV development areas. Some of this prior intensive survey study included one of the parcels (84 acres east of Old Sandwich Road) in the PRD: Phase V development area.

Since publication of the Phased Review Development: Phase IV document, the proponent has entered into consultation with the MHC to carry out site examination studies of archaeological and historic resources within the PRD: Phase IV area and Symington – Talcott Estate. Other consultation with MHC has involved archaeological data recovery and archival level documentation to mitigate adverse effects of proposed development (Old Sandwich Golf Club) on archaeological resources and historic structures within the Symington-Talcott Estate. A Memorandum of Agreement (MOA) between Pinehills, LLC, MHC and Massachusetts Department of Environmental Protection was developed specifically for this data recovery program and archival documentation.

The Phased Review Development: Phase V document contained descriptions of the archaeological investigations conducted within the Clam Pudding Pond section of the Pinehills. These investigations included an intensive survey, site examination and data recovery program. Technical reports on these studies were submitted to MHC for review and accepted.

An intensive survey within the PRD: Phase VI parcel identified six small sites or loci of pre-contact Native American cultural material designated as Pine Hill Lookout Locus 1-6. These sites were found in the three buildable areas within the project area. Five sites (Pine Hill Lookout Loci 2-6) contained non-diagnostic pieces of quartz, quartzite and argillite chipping debris. Pine Hill Lookout Locus 1 consisted of an isolated Small Stemmed projectile point that indicates activity at this location took place in the Late to Terminal Archaic period, about 4500 -2500 years ago). While these sites (Pine Hill Lookout Locus 1-6) provided some new information about pre-contact Native American settlement patterns in the Manomet and Pine Hills section of Plymouth, they were not considered to represent potentially significant cultural resources, due to low information content. No further archaeological investigation of the Pinehills PRD VI development area was recommended.

6.2 Intensive Archaeological Survey of The Pinehills

In July and August 1999, PAL conducted intensive archaeological surveys of The Pinehills in several stages. The first stage was an intensive survey of the northwest sections of The Pinehills project area that had not been studied at that level in previous investigations. This northwest portion of the project area was within the former PRD: Phase IV development area. Part of this northwest portion of the project area east of Old Sandwich Road will also be within the PRD: Phase V development area

The second stage consisted of an intensive survey of the portion of the PRD: Phase III development area in the southeast section of the Pinehills project area near Great Island Pond. In March and July 2000, proposed crossings within the buffer zone along the Old Sandwich Road corridor were also subjected to intensive archaeological survey. The "northern out parcel" a thirteen-acre tract located adjacent to Great Island Pond in the southeastern portion of PRD: Phase III development area was investigated with an intensive survey in December 2000.

An intensive survey within a section of the buffer zone along Old Sandwich Road containing the Rye Field and the Cornish/Wright Tavern was completed in December 2001. This survey

investigated the proposed location of wastewater treatment beds within the Rye Field and utility lines to serve the Cornish/Wright Tavern and the Nicklaus Golf Course.

In 2002, an intensive archaeological survey and historic structures inventory of the Symington - Talcott Estate was completed by PAL. This survey investigated the entire 36-acre estate parcel including the proposed location of the Old Sandwich Golf Club. Historic structures and landscape features forming the estate were documented as part of this study.

The following section summarizes the methodology and the results of the reconnaissance archaeological survey that served as the basis for the intensive archaeological surveys of the PRD: Phase III and IV areas and the Symington – Talcott Estate. The results of archaeological sensitivity assessments forming the basis for intensive archaeological surveys within the PRD: Phase V and VI areas are also discussed.

6.2.1 Sensitivity Assessment

Sections in the northwest portion of the Pinehills not previously studied at the intensive survey level, portions of the Pinehills PRD III area and Old Sandwich Road corridor buffer zone were categorized as either moderately or highly sensitive for archaeological resources. The intensive surveys were conducted within these zones of high and moderate sensitivity. The "northern out parcel" and Symington – Talcott Estate were not part of the reconnaissance survey conducted in 1998. However, both areas were considered to have moderate and high archaeological sensitivity based on their similarity to the surrounding areas. Much of the Symington – Talcott estate was ranked as having high and moderate archaeological sensitivity due to its proximity to the Eel River and the Old Sandwich Road corridor. The intensive surveys of the "northern outparcel" and Symington – Talcott Estate were conducted within zones of high and moderate sensitivity.

The reconnaissance survey of the Pinehills project area conducted by PAL in 1998 identified zones of Native American and Euro-American archaeological sensitivity for the Pinehills development area. The Clam Pudding Pond parcel forming part of the PRD: Phase V area was not included in this initial reconnaissance survey since it had not been scheduled for future development at that time.

Given the documented presence elsewhere within The Pinehills development area of pre-contact Native American sites adjacent to the Old Sandwich Road corridor, all areas falling within 30m of the east alignment of Sandwich Road near Clam Pudding Pond were considered to have high sensitivity to contain Native American archaeological resources. Outside of this corridor, environmental attributes were the primary factors in assessing pre-contact Native American archaeological sensitivity. All areas of well-drained, level, elevated terrain, particularly those areas proximate to Clam Pudding Pond were also considered to have high pre-contact Native American archaeological sensitivity

Areas falling within 30 meters (m) of three historic roadways were considered to have high sensitivity to contain post-contact period archaeological resources. Adjacent areas within the southern and eastern portions of the Clam Pudding Pond parcel, coincident with the cleared agricultural tract depicted in an 1830 (Bourne) map of Plymouth were considered to have moderate post-contact period archaeological sensitivity. Sections of the parcel located more

than 30 m away from the historic roadways and outside of the nineteenth-century agricultural tract, forming much of the parcel north and west of Clam Pudding Pond, were considered to have low sensitivity for containing post-contact period archaeological resources.

A large portion of the PRD: Phase VI parcel was investigated as part of the previous reconnaissance survey completed by PAL in 1998 and found to have low archaeological sensitivity. One section of the PRD: Phase VI parcel contains two lots (Lots 6A, 7A) with residential buildable areas that were not part of the reconnaissance survey. Sections of these parcels on the elevated crest of Pine Hill contained environmental conditions (level to slightly sloping topography, sandy soils, proximity to wetlands/cranberry bogs) frequently associated with pre-contact Native American archaeological sites. The upper slopes and crest of Pine Hill within the two parcels was not a focus of historic settlement activity due to its distance from the Old Sandwich Road corridor and had low probability to contain cellar holes or foundations from abandoned houses or farmsteads.

6.2.2 Native American Cultural Resources

Prior intensive surveys have shown that the northwest portion of The Pinehills project area forming the PRD: Phase IV area and the Old Sandwich Road buffer zone with minimal previous disturbances or alteration contained Native American archaeological sites. The Eel River was a local core area of prehistoric settlement and it is possible that locations within The Pinehills were used by Native Americans for various purposes. The Eel River may have served as a corridor for Native Americans moving between the coastal zone and interior areas during seasonal changes in settlement. The PRD: Phase III area near Great Island Pond, including the "northern out parcel" also had zones of high and moderate sensitivity that were found to contain prehistoric Native American sites. Old Sandwich Road may follow a Native American trail and it was possible that there were prehistoric sites in close proximity to this route. Due to its location between the Eel River headwaters and Old Sandwich Road corridor, the Symington – Talcott Estate contained zones of high and moderate sensitivity for ancient Native American archaeological sites.

Categories of potential Native American archaeological sites ranged from moderate to large areas in close proximity to wetlands and bogs that might have been used for base camps or much smaller temporary camps and activity areas. Sites were likely to be located near wetlands and open ponds. Several known prehistoric sites are clustered around Forge Pond just north of The Pinehills. The elevated ridge terrain west of Great Island Pond and the crest of Pine Hill would be conducive to smaller sites, such as temporary camps. Other small sites were likely to be located in and around the kettle holes associated with glacial outwash deposits which may have contained water. Previous surveys within the Old Sandwich Road corridor had also identified small prehistoric period sites in close proximity to this road which followed a Native American trail route.

6.2.3 Euro-American Cultural Resources

The MHC has identified the following historic/modern period sites in The Pinehills: Cornish/Wright Tavern and its associated Rye Field; the Symington - Talcott Estate, an early twentieth century rural estate and farm complex.

In addition to these previously known historic/modern period above ground cultural resources, the Pinehills contains the archaeological remains of other farmsteads or house sites. Near the intersection of Old Sandwich and Savery Roads was a small portion of the former site of Thrasherville, a late-eighteenth to mid-nineteenth century rural hamlet. The Clam Pudding Pond Farmstead Site was an example of archaeological remains of a historic dwelling along the corridor formed by Old Sandwich Road and in proximity to Clam Pudding Pond.

The Cornish/Wright Tavern and Thrasherville are discussed in detail in Chapter 9 of the "Infrastructure Plan & Phased Review Document: Phase I" and addressed in the MOA and the cultural resources management plan. The historic resources (standing structures and landscape features) within the Symington – Talcott Estate have been inventoried and evaluated during an intensive survey of this part of The Pinehills development.

6.3 PRD: Phase III Intensive Survey

PAL performed an intensive archaeological survey within previously unstudied areas and the PRD: Phase III area during July and August 1999 under permit no. 1722 issued by MHC and the State Archaeologist as amended. The areas not covered by previous intensive survey were in the northwestern portion of The Pinehills project area near the headwaters of the Eel River. This section of The Pinehills formed a majority of the PRD: Phase IV development area. The 84-acre parcel east of Old Sandwich Road forming part of the PRD: Phase V development area was included in the 1999 intensive survey.

The other portion of the PRD: Phase III development area subjected to intensive archaeological survey was located west of Great Island Pond and north of Old Sandwich and Savery Roads. PAL carried out subsurface testing within zones of high and moderate sensitivity in these two areas.

Subsurface testing in the northwestern portion of the project area identified four prehistoric sites (Pine Road, Triple P, Pine Hills Loci 5 and 6) in close proximity to the Eel River headwaters. The Pine Road Site is a moderate to large area containing evidence of Native American occupation during several time periods. Artifacts found on this site included a diagnostic Early Woodland (ca 2500 - 1600 years ago) period projectile point and other chipped stone tools. The Triple P Site yielded projectile points diagnostic of the Late/Terminal Archaic (ca 4500 - 3000 years ago) and Late Woodland (ca 1000 - 500 years ago) periods. The Pine Hills Locus 5 and Pine Hills Locus 6 Sites were small, low density find spots of prehistoric cultural material (chipping debris). Their temporal/cultural affiliation is unknown.

Two prehistoric sites, Pine Hills Locus 7 and Pine Hills Locus 8, were found in the southeast section of the PRD: Phase III area west of Great Island Pond. These sites contained small deposits of chipping debris and their temporal/cultural affiliation is unknown.

Intensive survey near the intersection of Old Sandwich and Savery Roads identified three historic period sites associated with the nineteenth century to early modern period settlement of Thrasherville. The R. Thrasher House, Thrasherville I and II Sites contained deposits of cultural material including ceramic sherds, bottle glass and structural debris (brick, window glass, nails) associated with occupation from the early nineteenth to twentieth century. The R Thrasher House appears to have been built after about 1830 and may have

been the birthplace of William Douglas, governor of Massachusetts in 1905. The Thrasherville I and II Sites appear to be the locations of a small house and outbuilding, possibly a barn.

Intensive survey of proposed crossings and paths within the buffer zone along Old Sandwich Road was conducted in May and July 2000. This survey work was conducted under MHC permit no. 1722 as amended. Two small find spots of prehistoric cultural material, Pine Hills Locus 9 and Pine Hills Locus 10 were found in the buffer zone. Pine Hills Locus 9 contained a single Late/Terminal Archaic (ca 4500 -3000 years ago) period projectile point. Pine Hills Locus 10 consisted of several pieces of chipping debris. Subsurface testing in crossings and paths within the buffer zone also yielded historic/modern period cultural material (redware, stoneware, whiteware) of eighteenth and nineteenth century manufacture. These ceramic sherds appear to be low density scatter of domestic refuse discarded as "field trash" when the area was in active agricultural use. There was no evidence that this material is associated with a specific former farmstead or house site.

The intensive survey within the "northern out parcel" in December 2001 was conducted under MHC permit no. 1722, as amended. This survey identified a single small find spot of prehistoric cultural material (chipping debris) designated as Pine Hills Locus 11. In addition, three small cottages located on the western shore of Great Island Pond were designated the Great Island Pond Cottage 1, 2 and 3 sites.

The intensive survey of the Rye Field and proposed utility lines near the Cornish/Wright Tavern completed in December 2001 under MHC permit no. 2094 resulted in the identification of a single find spot of prehistoric cultural material. This find spot was designated Pine Hills Locus 12 and contained only low-density chipping debris. Historic/modern period cultural material (ceramic sherds, bottle glass, structural materials) in low density scatters were found in the Rye Field and near the Cornish/Wright Tavern. The historic materials found in the Rye Field and near the tavern most likely represent domestic and cultural debris discarded as "field trash" when this area was under active agricultural land use from the eighteenth century to the early modern period. Some of the material from the proposed utility lines adjacent to the tavern could also be debris generated by relocations of the Cornish/Wright Tavern to its present site in 1935.

6.4 PRD: Phase IV Intensive Survey

The PRD: Phase IV development area was located in the northwest portion of The Pinehills bounded to the north by the northern property boundary, to the west by Old Sandwich Road and to the east by Route 3. The area includes the Symington – Talcott Estate, a +/- 36-acre tract which was under a life estate to Mr. and Mrs. John Talcott who reside on the property in the original estate home. Because it was under a life estate, Pinehills LLC did not include the tract in the prior intensive archaeological survey of the northwest portion of the project area previously conducted by PAL. Consistent with the MOA, Pinehills engaged PAL to undertake an intensive archaeological survey and historic structures inventory of the Symington -Talcott estate, including the estate home and all of the outbuildings.

The intensive survey and structures inventory of the Symington –Talcott Estate was conducted by PAL under MHC permit no. 2094. A total of 19 resources were identified during the historic structures inventory including standing structures within the property and features of the estate landscape (Talcott Pond, dam, causeway and bridge, garden/grotto). All architectural resources within the estate were documented with photographs and recorded on an MHC Area Inventory Form. One historic/modern period archaeological site designated the Symington – Talcott Estate Outbuilding Site, was found during the intensive survey. Two ancient Native American archaeological sites designated The Pinehills Locus 13 and Talcott Sites were also found. The Pinehills Locus 13 Site was a small findspot of cultural material (quartz chipping debris). The Talcott Site yielded a broken Late Woodland period (ca 1000 to 500 years ago) projectile point, quartz and rhyolite chipping debris and evidence of a hearth/firepit feature.

6.5 PRD: Phase IV Site Examination

In the fall of 2002, PAL conducted archaeological site examinations on the Pine Road and Triple P Sites under MHC permit no. 2202. These sites were located in close proximity to proposed sewer main and roadway improvements associated with PRD: Phase IV development. The site examinations provided information regarding the size, content, internal composition, age, and condition of the Pine Road and Triple P sites sufficient to evaluate their significance and potential for listing in the National and State Register of Historic Places. The Pine Road Site occupies a site area estimated to measure 8,136 square miles in extent at the headwaters of the Eel River. It contains numerous small concentrations of cultural material such as rhyolite and quartz chipping debris and chipped stone tools. These concentrations are the product of numerous episodes of chipped-stone tool maintenance and/or manufacture. The combined assemblage of temporally diagnostic Native American artifact types recovered from the Pine Road Site includes seven projectile points, indicating occupation of the site during the Late/Transitional Archaic periods (ca. 5000–2500 B.P.) and into the Early Woodland Period (ca. 3600–1600 B.P.).

The Triple P Site is situated near the headwaters of the Eel River. Native American cultural materials were recovered within a site area estimated to measure 3,078 square miles in extent. It contains small concentrations of cultural material that appear to mark locations where brief episodes of chipped-stone tool maintenance and/or manufacture took place. This activity focused on making bifaces (including projectile points) primarily from quartz. The assemblage of temporally diagnostic Native American artifact types recovered from the Triple P Site consists of projectile point types and ceramic sherds indicating occupation of the site during the Late/Transitional Archaic periods (ca. 5000–2500 B.P.) and into the Early Woodland (ca. 2500–1600 B.P.) and Late Woodland periods (ca. 1000–450 B.P.).

The archaeological site examination of the Talcott Site was carried out by PAL in April 2003 under MHC permit 2235. The site examination fieldwork determined the boundaries of the Talcott Site and collected information sufficient to evaluate its significance and potential for listing in the National Register of Historic Places. The site examination established that the Talcott Site covered an area of 852 square miles. Based on the results of subsurface testing, the Talcott Site had good integrity, with minimal evidence of prior disturbance. Native

American cultural materials consisting of chipped-stone tools and chipping debris (rhyolite, quartz, hornfels, quartzite) from their manufacture and/or maintenance were recovered. Chipped-stone tool fragments included projectile points from the Late to Terminal Archaic period (ca 4000 - 3200 years ago) and Late Woodland period (ca 1000 – 500 years ago, unifacial and bifacial tool blade fragments. A circular fire pit was radiocarbon dated to about 1,450 to 1,660 years ago (Late Woodland or Contact period).

6.6 PRD: Phase IV Data Recovery and Historic Structure Documentation

PAL conducted an archaeological data recovery program at the Talcott Site in the fall of 2003 under MHC permit no 2596. The site was located on a knoll overlooking the headwaters of the Eel River within the proposed location of a clubhouse for the Old Sandwich Golf Club. The Old Sandwich Golf Club is located within the former Symington-Talcott Estate. The research design developed for the data recovery program contained a set of research contexts or problems relating to: 1) depositional processes and internal complexity of sites in the interior of Plymouth County and the Eel River basin, 2) cobble-based lithic technologies in the terminal moraine zone of Plymouth County, and 3) late prehistoric and Contact period settlement in the interior of the Plymouth Harbor core area. The lithic assemblage recovered from the site included Late to Terminal Archaic, Early and Late Woodland Period projectile points, bifacial tools and chipping debris of rhyolite, hornfels, quartzite and argillite. Lithic workshop loci on the site contained evidence for making Late Woodland Period Levanna projectile points from cobble-derived quartz, rhyolite, and chalcedony-like rock brought there from beach and glacial outwash sources. Specialized analyses carried out on cultural materials and samples collected from the site included radiocarbon dating of charcoal samples and petrographic analysis of lithic materials.

Intensive Late Woodland activity at the Talcott Site probably occurred in at least two separate episodes as suggested by the results of radiocarbon dating of features. The first use would have been about 1,140 to 1,130 years ago (AD 770 to 1010, AD 770 to 1020) followed by occupation around 750 years ago (AD 1180 to 1310, AD 1370 to 1380). The 18 features found within the Talcott Site were pits with varying forms including cylindrical straight sided, hemispherical, basin shaped and conical morphologies. The pits could have been used for storage of food or other materials and then served as places to dispose of inorganic (chipping debris) and organic refuse (bone, plant remains) created by various activities such as stone toolmaking, processing of food, or other raw materials. Final episodes of activity in the Contact period were indicated by overlapping ranges of calibrated radiocarbon dates of AD 1420 to 1640, AD 1450 to 1660 and AD 1490 to 1680 from charcoal in two cylindrical pits and one hemispherical bowl-shaped pit.

Planned development for the Old Sandwich Golf Club required the demolition of three standing structures (barn, outbuildings) and the relocation and restoration of another building (caretaker's cottage) within the Symington-Talcott Estate. A carriage house and garage were restored in their original location. Mitigation of adverse effects of proposed development on the three structures to be demolished and the relocated caretaker's cottage was achieved through archival level historical and photographic documentation. This work was conducted

under the terms of a Memorandum of Agreement (MOA) between Pinehills, LLC, MHC and Massachusetts Department of Environmental Protection developed specifically for an archaeological data recovery program (Talcott Site) and this archival documentation.

6.7 PRD: Phase V Intensive Survey

Consistent with the MOA, Pinehills engaged PAL to undertake an intensive archaeological survey of the remaining portion of the PRD: Phase V development area near Clam Pudding Pond, an area that was not previously surveyed by PAL. This part of the Pinehills development area consisted of an approximately 72 -acre parcel which encompasses Clam Pudding Pond on the east side of Old Sandwich Road between Beaver Dam and Savery roads.

Plans for proposed residential development included house lots and roadways placed in two areas to the east, west, and north of Clam Pudding Pond. Designated buffer zones that will remain undeveloped were placed around Clam Pudding Pond, wetlands, and the Old Sandwich Road corridor. The intensive survey of the Clam Pudding Pond section of the Pinehills provided compliance with the MOA developed for this project. Fieldwork for the intensive survey was conducted in October 2004 under permit number 2690 issued by the MHC.

Archival research indicated that the Clam Pudding Pond parcel had the potential to contain both pre-contact Native American and post-contact period archaeological sites given the presence of the pond, wetlands, and historic roadways. This parcel was in close proximity to the historic location of Thrasherville, a small rural settlement occupied from the late eighteenth century to early modern period.

The Pinehills Locus 14 Site was identified following the recovery of three pieces of quartz, rhyolite and hornfels chipping debris from test pits. The Pinehills Locus 15 Site was identified from a bifacial tool blade of quartz, that may have been a preform for a projectile point, found in a test pit. The Pinehills Locus 14 and 15 sites appeared to be small temporary pre-contact Native American camps located in proximity to a Native American trail route that is now represented by the abandoned eastern alignment of Sandwich Road. The eastern alignment of Sandwich Road within the Clam Pudding pond parcel is a historic road corridor that likely follows the route of an older Native American trail. The western alignment of Sandwich Road was in use from the early nineteenth century to the 1960s. Both alignments formed part of a locally important transportation corridor within eastern Plymouth County from the seventeenth to early nineteenth century.

The Clam Pudding Pond Farmstead was located in close proximity to the abandoned eastern alignment of Sandwich Road and the eastern end of Clam Pudding Pond. The artifact assemblage recovered from test pits placed near an open cellar hole included structural and domestic debris including ceramic sherds (creamware, transfer printed pearlware, whiteware, yellow ware) indicating the farmstead was occupied from the early to late nineteenth century, probably from about 1830 to 1890. Additional features identified near the cellar hole were an approximately 6-x-4-m depression, a small depression possibly marking a filled privy or well, and an L-shaped ditch-and-berm feature measuring approximately 30-m along each leg.

Occupants of the house may have been members of the Thrasher or Savery families. These families owned other properties in the hamlet of Thrasherville (PLY-HA-32), located at the

intersection of Old Sandwich and Savery roads. The Clam Pudding Pond Farmstead was an undocumented historic period house and property likely associated with Thrasherville not shown on nineteenth-century maps of Plymouth. It was likely within an area of cleared land or fields extending from Thrasherville to Clam Pudding Pond indicated on an 1830 map of Plymouth. The William S. Leland Summer Home was the site of a late-nineteenth-century cottage located near the southern shoreline of Clam Pudding Pond. It was destroyed in the forest fire of 1900 and evidence of this event was found during the intensive survey.

6.8 PRD: Phase V Site Examination

In May 2005, MHC reviewed the results of the intensive survey done by PAL and concurred with a recommendation that the Clam Pudding Pond Farmstead Site was an important cultural resource with potential to contain significant information about rural life and agriculture in nineteenth-century Plymouth. The MHC also concurred with the recommendation that if this site could not be avoided, then an archaeological site examination should be conducted for the Clam Pudding Pond Farmstead Site.

In July 2005, PAL completed an archaeological site examination of the Clam Pudding Pond Farmstead Site under permit number 2765 issued by the MHC. Subsurface sampling during site examination fieldwork determined the boundaries of the Clam Pudding Pond Farmstead Site and collected information sufficient to evaluate its significance and potential for listing in the National Register of Historic Places. The site examination established that the site contained two distinct activity areas: a concentration of domestic refuse such as bottle glass and ceramic sherds on an embankment above Sandwich Road and a second activity area likely related to demolition of the farmhouse that included a concentration of iron items, brick fragments, and other artifacts identified during a metal detector survey.

Features on the site included remnants of an intact fieldstone masonry foundation and a large "L" shaped earth berm and ditch feature possibly marking the limits of a distinct farmyard. This farmyard contained an abandoned, collapsed well shaft or outbuilding foundation filled with fieldstone and brick demolition rubble as well as artifacts. A pre-contact period Native American component dating to the Terminal Archaic to Early Woodland Period about 3000 to 2500 years ago yielded 56 pieces of chipping debris and four chipped-stone tools. While activities associated with the construction, occupation, and abandonment of the farmstead altered most of this Native American component, some portions of it remained intact.

6.9 PRD: Phase V Data Recovery Program

In May and June 2006, PAL completed an archaeological data recovery program on the Clam Pudding Pond Farmstead Site, within the Pinehills development in Plymouth, Massachusetts. The data recovery program collected categories of information that contributed to a more detailed reconstruction of rural settlement/land use in Plymouth, the Old Sandwich Road corridor, configuration of buildings and activity areas in the site and occupation span of the Clam Pudding Pond Farmstead Site. The recovered information was of significant value for

addressing the two research contexts and sets of hypotheses about late-eighteenth- to mid-nineteenth-century farmsteads in the rural interior of Plymouth County.

Although later use of the site for a farmstead and related modifications (cellar hole, outbuilding, midden/dump) altered it, the pre-contact period component of the site contributed new information about Native American settlement in the area surrounding the Eel River headwaters and interior freshwater ponds. This oldest element of the site was created by sporadic use for temporary camps over at least 7,000 years during the Archaic and Woodland periods. The older, abandoned roadway next to the farmstead site may have been the same trail route used by Native Americans, given its orientation to the eastern and northern shorelines of Clam Pudding Pond.

A re-worked channel flake that may be an isolated Paleo-Indian tool could place the earliest use of the site at about 11,000 to 9000 years ago. A Neville point found on the site is one of only a few Middle Archaic Period tools found within the Pinehills by recent archeological investigations. This area seems to have seen little activity about 7500 to 6000 years ago in comparison to more intensively occupied zones near major wetlands and ponds in southern Plymouth County. Other projectile points such as the Small Stemmed points of quartz were likely left on the site sometime between about 4500 and 2500 years ago in the Late to Terminal Archaic Period. Most of the rhyolite, quartz and quartzite chipping left in deposits in the floor of the swale and knoll could be from episodes of toolmaking during this general time span when the Pinehills and upper Eel River watershed was most intensively used by Native American groups. The earlier site examination on the Clam Pudding Pond Farmstead yielded an Early Woodland Period Meadowood point about 2500 years old and a lanceolate point of probable Middle Woodland (ca. 1600 to 1000 years ago) age. A brief use of the site in the Late Woodland Period around 1000 years ago was indicated by a quartz preform to make a Levanna point.

6.10 PRD: Phase VI Intensive Survey

In November 2012 PAL completed an intensive (locational archaeological survey within the Pinehills PRD VI project area. The approximately 69.4-acre project area is within the larger Pinehills development and contains three buildable areas where future development could take place on the crest and northeast slopes of the Pine Hills. Archival research indicated that the PRD VI development area did not contain any known pre-contact Native American archaeological sites but was in proximity to a small cluster of documented sites along the headwaters of the Eel River drainage.

The project area had the potential to contain evidence of Native American occupation ranging from find spots of isolated chipped stone tools (projectile points, bifacial tool blades, etc.) or pieces of chipping debris to small deposits of cultural material (stone tools, chipping debris, burnt rock fragments) centered around features (hearth/firepit, refuse pit etc.). The most likely archaeological resources were expected to be Late/Terminal Archaic period (ca 4000 to 2500 years ago) sites since they usually have the widest distribution in various environmental settings. The project area was peripheral to historic settlement activity due to its distance from the Old Sandwich Road corridor where most agricultural land use and residential settlement took place. There was some potential for stone walls, cart paths

and small, isolated deposits of household refuse (brick, nails, ceramics, bottle glass, animal bone, etc.) near cart paths or in former pastures or farmland. The only modern period modifications in and near the PRD VI project area were a fire tower, several unpaved gravel access roads leading to the crest of Pine Hill and a Boston Edison power line easement.

A walkover survey determined that the eastern portion of the project area contained a steeply sloping hillside with low sensitivity for both pre-contact Native American and post contact Euro-American archaeological resources. The three buildable areas were found to contain level to slightly sloping terrain on the crest of two knolls and in a broad swale that was sensitive for pre-contact Native American archaeological sites. Some large granite boulders were also potential locations for small pre-contact Native American sites or windbreaks. The three buildable areas were less sensitive for post-contact to modern period cultural resources.

Six small sites or loci of pre-contact Native American cultural material designated as Pine Hill Lookout Locus 1-6 were identified in the three buildable areas within the project area. These sites all appear to mark small, temporary camps and consisted of small, low density deposits of cultural materials. Five sites (Pine Hill Lookout Loci 2-6) contained only non-diagnostic pieces of quartz, quartzite and argillite chipping debris. Pine Hill Lookout Locus 1 consisted of an isolated Small Stemmed projectile point that indicates activity at this location took place in the Late to Terminal Archaic period, about 4500 -2500 years ago).

6.11 PRD: Phase VII

No additional activities are required for the Phase VII project.

6.12 Findings and Recommendations

6.12.1 PRD: Phase III Sites

Based on prior reconnaissance survey work, PAL determined that portions of the PRD: Phase III area and northwestern portion of The Pinehills project area not previously surveyed at the intensive level were either moderately or highly sensitive for cultural resources. During an intensive archaeological survey of the PRD: Phase III area, PAL found a number of prehistoric Native American sites. Four prehistoric sites were found near the Eel River headwaters. Two prehistoric sites were identified in the southeast section of the PRD: Phase III area near Great Island Pond. Two other prehistoric sites were found in the buffer zone along Old Sandwich Road.

6.12.1.1 Eel River Headwaters Sites

The Pine Road and Triple P Sites near the Eel River headwaters contained evidence of occupation during the Late/Terminal Archaic, Early Woodland and Late Woodland periods and were considered to be potentially significant based on the results of an intensive survey. Pine Hills Locus 5, 6, 7, 8, 9 and 10 were not considered to be potentially significant cultural resources due to their low information content.

Intensive survey in the southeast section of the PRD: Phase III area also identified three historic/modern period archaeological sites (R. Thrasher House, Thrasherville I, II Sites) near the intersection of Old Sandwich and Savery Roads. These sites were considered to be potentially significant due to their association with the former settlement of Thrasherville.

6.12.1.2 Great Island Pond Sites

Within the "northern out parcel" an intensive survey identified Pine Hills Locus 11. This small find spot of prehistoric cultural material was not considered to be potentially significant due to the low informational content. The Great Island Pond Cottage 3 Site was in poor condition and not considered to be potentially significant. Pine Hills Locus 12, the small find spot of prehistoric cultural material found within the Rye Field was not considered to be potentially significant given its low information content.

6.12.1.3 Old Sandwich Road Buffer Sites

PAL recommended that, if possible, any proposed development avoid the Pine Road, Triple P, R. Thrasher House and Thrasherville I and II Sites. The R. Thrasher House, Thrasherville I and II Sites are within a buffer zone along Old Sandwich Road. If avoidance of these prehistoric and historic/modern period sites is not possible it was recommended that they be subjected to further archaeological investigation at the site examination level.

PAL has documented the results of the intensive archaeological survey of the northwest section of The Pinehills project area, PRD: Phase III area and crossings within the Old Sandwich Road buffer zone in a technical report submitted to the MHC for review. The results of the intensive surveys of the "northern out parcel," the Rye Field and the utility corridor near the Cornish/Wright Tavern have been documented in two technical reports submitted to the Massachusetts Historic Commission for review.

6.12.2 PRD: Phase IV Sites

An intensive survey within the Symington – Talcott Estate in 2002 identified one historic/modern period resource (Talcott Estate Outbuilding) and one ancient Native American Site (Pinehills Locus 13) that were not considered to be potentially significant. The results of intensive survey and site examination studies of the more important Pine Road and Triple P sites in the PRD: Phase IV development area and the Talcott Site within the Symington-Talcott Estate has been documented in several technical reports submitted to the MHC . The historic structures inventory of the Symington-Talcott Estate has also been presented in one of these technical reports. The 19 historic buildings and landscape features within the estate were considered to be potentially significant as a complex.

6.12.2.1 Pine Road and Triple P Sites

From the results of site examination studies, the Pine Road and Triple P sites were both considered to be potentially significant and eligible for listing in the National and State Registers of Historic Places. It was recommended that proposed development activities avoid the Pine Road and Triple P sites. It was also recommended that protective measures be taken to protect the Pine Road and Triple P sites during any proposed construction activities.

6.12.2.2 The Talcott Site

Based on the results of both intensive survey and site examination studies the Talcott Site was considered to be potentially significant. Evaluation of this resource through the site examination resulted in a determination that the Talcott Site was a significant cultural resource eligible for listing in the National and State Registers of Historic Places. It was recommended that proposed development of the Old Sandwich Golf club house avoid the Talcott Site. Since avoidance was not feasible, a data recovery program was developed to mitigate the adverse effect of proposed development.

The classes of archaeological information recovered from the Talcott Site during the data recovery program were used to assess research contexts, interpret the site and compare it to others at the local (Eel and eastern Taunton River drainages), subregional (southeastern Massachusetts) and regional (southeastern New England) scales. The categories of information collected in the data recovery program were considered sufficient to address the research contexts or problems posed for this investigation and mitigate the adverse effects of proposed construction on the Talcott Site. As a result, it was recommended that construction of the proposed clubhouse facility for the Old Sandwich Golf Club proceed as planned.

In 2013, control of the Talcott Estate which had been occupied by Mr. Talcott under the terms of a life estate and served as his residence until his death fully transferred to OS Golf Club LLC. At the time of the transfer, no final decision had been made concerning its future use or reuse as part of the Old Sandwich Golf Club with the alternative future uses including remaining a single family residence or being rehabilitated for use as a lodge associated with the operation of golf course.

The rehabilitation of the Main House for reuse as Talcott Lodge constituted an adverse effect on historic property. The MOA executed by MHC and Pinehills outlines the measures required to mitigate the project impacts. Following the termination of the life estate, the historic documentation of the Main House was prepared by PAL in accordance with one of the stipulations of the MOA, which requires that affected buildings be recorded to state standards for photographic and written documentation of historic properties before alteration. The rehabilitation of the Main House for reuse as Talcott Lodge required the alteration of the Main House to accommodate its reuse and occupancy as guest lodging for use by members of Old Sandwich Golf Club. A historical documentation of the Main House was undertaken in 2013 and submitted by PAL to MHC in April of 2014 (Historical Documentation Symington-Talcott Estate House, Plymouth, Massachusetts April 2014 prepared by Virginia Adams, et. al., Public Archeological Laboratory). The Main House was constructed as a two-story, nine-bay-by-three-bay, Craftsman-style residence in 1928, part of a large estate and hunting preserve. PAL concluded that the property possesses significance for its association with early estate development and recreation in Plymouth.

In January of 2016 Pinehills engaged in consultation with MHC, in accordance with the MOA, concerning scope and requirement for exterior alterations, repairs and rehabilitation to the Main House in order to in order to permit the occupancy and reuse of the Symington/Talcott Estate by the Old Sandwich Golf Club as a lodge and guest house for members of the club ("Talcott Lodge"). The terms of the MOA further provided that any exterior alterations to the historic property would be consistent with the recommended approaches to rehabilitation

set forth in the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitation Historic Buildings. Further, MHC would be entitled to review and approve plans and specifications for any such exterior alterations.

Following review and consultation with MHC in accordance with the MOA, the rehabilitation, repairs and exterior alterations to the Main House for reuse as Talcott Lodge were completed including the replacement of the windows, roof and siding and penetration of roof and side elevations for improvements to ventilation and plumbing systems and connection of the building to the public water supply and private sewerage collection and treatment system serving The Pinehills.

6.12.2.3 Clam Pudding Pond Site

An intensive archaeological survey within the Clam Pudding Pond parcel resulted in the identification of two loci of pre-contact Native American activity, designated the Pinehills Locus 14 Site and the Pinehills Locus 15 Site, and two nineteenth-century domestic sites, designated the Clam Pudding Pond Farmstead Site and the William S. Leland Summer Home Site. In addition, two abandoned alignments of Sandwich Road were documented within the project area. The older of the two roadways passes Clam Pudding Pond on its eastern side, while the more recent alignment passes the pond on its western side. Both were situated to the east and north of the present-day alignment of Old Sandwich Road where it passes by the pond.

Given their low information content and uncertain temporal/cultural affiliation, the Pinehills Locus 14 and 15 sites were not considered to be potentially significant cultural resources. The William S. Leland Summer Home Site was not considered to be a potentially significant cultural resource because of its limited information content. No further archaeological investigations were recommended for the Pinehills Locus 14 and 15 and William S. Leland sites. It was recommended that any future development within the Clam Pudding Pond parcel avoid the eastern and western alignments of Sandwich Road and the Clam Pudding Pond Farmstead Site. The Clam Pudding Pond Farmstead was considered to be a potentially significant cultural resource given its association with the rural settlement of Thrasherville.

It was recommended that if the Clam Pudding Pond Farmstead Site could not be avoided, then it should be studied further at the site examination level to evaluate its significance and potential eligibility for listing on the National and State Registers of Historic Places.

Based on the results of a site examination, the Clam Pudding Pond Farmstead Site represented a well preserved early- to mid-nineteenth-century rural farmstead associated with the rural hamlet of Thrasherville, which was probably built and occupied from about 1820 to 1860 and then abandoned. The Clam Pudding Pond Farmstead had the potential to yield information about past activity at this site, its former owner/occupants, and how Sandwich Road was used in the early to mid-nineteenth century. The Clam Pudding Pond Farmstead Site was considered to be potentially significant and eligible for listing in the National Register of Historic Places. PAL recommended that proposed residential development within the Clam Pudding Pond parcel avoid this site. If avoidance was not possible, then a data recovery plan should be developed to mitigate the adverse effects of this development on the Clam Pudding Pond Farmstead Site.

The classes of archaeological information recovered from the Clam Pudding Pond Farmstead Site during the data recovery program were used to assess research contexts, interpret the site and compare it to others at the local (Eel and eastern Taunton River drainages), subregional (southeastern Massachusetts) and regional (southeastern New England) scales. Analysis and interpretation of artifacts and features was carried out within the framework of two research contexts and sets of hypotheses. The results of this analysis contributed to current knowledge about pre-contact Native American settlement through time in an interior pond setting near the Pine Hills. Analysis of post-contact Euro-American artifacts and features yielded information about late-eighteenth- to mid-nineteenth-century farmsteads in the rural interior of Plymouth County, where there has been little archaeological study of this kind of site. The total body of archaeological information recovered from the Clam Pudding Pond Farmstead Site during data recovery investigations was sufficient to address the research questions outlined in the research design. Following fieldwork and preliminary analysis, PAL submitted a completion memorandum to The Pinehills and MHC. It was recommended that the data recovery program had collected sufficient information to mitigate the adverse effects of proposed construction on the Clam Pudding Pond Farmstead Site and that the site be cleared so that construction of the proposed residential development could proceed. Following review of the completion memorandum, the MHC and state archaeologist concurred with this recommendation and The Pinehills secured clearance to proceed with the project as planned.

6.12.2.4 Pine Hill Lookout Sites

An intensive survey within the PRD: Phase VI parcel identified six small sites or loci of pre-contact Native American cultural material designated as Pine Hill Lookout Locus 1-6. These sites were found in the three buildable areas within the project area. Five sites (Pine Hill Lookout Loci 2-6) contained non-diagnostic pieces of quartz, quartzite and argillite chipping debris. Pine Hill Lookout Locus 1 consisted of an isolated Small Stemmed projectile point that indicates activity at this location took place in the Late to Terminal Archaic period, about 4500 -2500 years ago). While these sites (Pine Hill Lookout Locus 1-6) provided some new information about pre-contact Native American settlement patterns in the Manomet and Pine Hills section of Plymouth, they were not considered to represent potentially significant cultural resources, due to low information content. No further archaeological investigation of the Pinehills PRD VI development area was recommended.

6.13 Mitigation

A Memorandum of Agreement (MOA) is an appropriate and customary mechanism to assure that significant cultural resources affected by a proposal are identified, reviewed, and mitigated properly. As described above, the Proponent and MHC have agreed upon the terms and conditions of a MOA intended to facilitate the development of any mitigation plans that may be necessary in connection with The Pinehills. The agreed upon MOA requires consultation with MHC about ways to mitigate any potentially adverse effects of The Pinehills. Furthermore, as part of the MOA, the proponent has prepared a cultural resources management program (Appendix E) for various resources at the Project Site.

This Page Intentionally Blank

7

Wetlands

This chapter describes site conditions located on the Project Site and describes the potential indirect impacts associated with the development. Measures designed to minimize any such impacts and the stormwater management program for The Pinehills are also described in this chapter. The Pinehills is designed to protect water quality in full compliance with DEP's Stormwater Policy and standards.

7.1 Project Area Wetlands

As identified in the ENF and Master Plan, wetland resources at the site were initially identified through the examination of published surveys[1], review of earlier studies[2], and interpretation of aerial photographs. Wetland characteristics and limits were further investigated during a series of field inspections conducted between 1997 and 2001. During that time, a total of thirty wetlands have been identified on the site. In early 2004, the Clam Pudding Pond Parcel was investigated for the presence of wetland resources as reported in the 5th Notice of Project Change. Two wetlands (identified as Wetland EE and Wetland FF) were delineated, bringing the most up-to-date total of identified wetland systems to thirty-two. The location of each wetland is shown on Figure 7.1. As all development associated with Phase VII will be located in areas previously identified for development, no new wetlands resource areas will be impacted in Phase VII.

Table 7.1 presents all currently known wetland resources on the site and the document in which they were described (with the exception of Wetlands J and K which occur on a lot that has been deeded to the Town of Plymouth).

Table 7.1 Documented Wetland Resources

MEPA Document	Wetlands Described
PRD I	C, D, F, G, H, I, Q, S, T
PRD II	C, D, E, I, Q
PRD III	M, N, O, P, U, V
PRD IV	A, B, X, Y ,Z, AA, BB, CC, DD, L, R, W
PRD V	EE, FF
PRD VI	None Present
PRD VII	None Present

[1] U.S. Fish and Wildlife Service, 1992. *National Wetland Inventory Map of the Manomet Quadrangle, MA.*

[2] BSC Engineering, 1982. *Pine Hills Site Analysis and Resource Evaluation, Executive Summary and Technical Memoranda.*

7.2 Potential Wetland Impacts

PRD: Phase VII will not result in any direct impacts to jurisdictional wetland resource areas. Due to the distance of any known wetland resources from the project site, it is highly unlikely that any short- or long-term impacts (such as erosion, sedimentation, damage to vegetation, etc.) will occur during the construction of the project.

A description of the proposed activities and potential impacts associated with each stage of the proposed work are described below. Measures to mitigate for the potential impacts are described in the Proposed Mitigation Measures section of this chapter.

7.3 Proposed Mitigation Measures

The Pinehills has been designed to minimize or avoid direct impacts (i.e., clearing, filling, and excavating) to wetland resources by establishing an appropriate undisturbed buffer of natural vegetation between the limit of work and the edge of wetlands. The proposed development associated with PRD: Phase VII will be located to minimize or avoid entirely work within the 100-foot buffer zone and will meet all applicable performance standards. An erosion and sediment control program will minimize any potential temporary impacts to the wetlands during the construction. The program will incorporate BMPs specified in the guidelines developed by the DEP and the United States Environmental Protection Agency (EPA), and will comply with the requirements of the NPDES General Permit for Storm Water Discharges from Construction Activities, as applicable. Measures may include the installation of temporary erosion and sedimentation controls and construction sequencing. Areas of exposed soil will be kept to a minimum, and a permanent vegetative cover will be established on final graded areas as soon as practicable.

7.4 Stormwater Management

The stormwater management program for The Pinehills includes site wide water quality controls to protect surface water and groundwater resources, and site-specific quantity controls designed for each development area. Generally, runoff will be collected in shallow swales and directed toward naturally occurring depressions or dry wells for infiltration, or toward manmade ponds, which will maintain water quality by settling suspended solids, and will supplement irrigation supply. Road runoff will not be directed toward wetland resource areas. Swales will be grass-lined except in areas where higher velocities require channel linings such as rip-rap, geotextile, or other reinforcement as necessary to prevent scouring.

The Master Plan for The Pinehills, the standards established by the Massachusetts Department of Environmental Protection (DEP) and Office of Coastal Zone Management, and the Plymouth DPW "Guide for the Design of Storm Drainage Facilities" serve as the foundation for the stormwater management plan and selection of the most effective best management practices for short- and long-term protection of water resources.

The program, as further described, has been designed to manage stormwater under full-build conditions.

7.4.1.1 DEP's Stormwater Performance Standards

When proposed work occurs within jurisdiction of the Massachusetts Wetlands Protection Act, the DEP/CZM Stormwater Management Policy requires that new development projects conform to nine performance standards. The stormwater management system for the Project Site has been designed to meet or exceed each of these standards, when required and as described below.

1. *No new stormwater conveyances may discharge untreated stormwater directly to, or cause erosion in wetlands or waters of the Commonwealth.*

   This standard will be fully met. If any, stormwater runoff generated from impervious surfaces discharges to wetlands, it will be treated.

2. *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

   This standard will be fully met for runoff leaving the site. Internally, this standard will be evaluated and met where development occurs within surface watersheds to wetlands.

3. *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site should approximate the annual recharge from the pre-development site conditions based on soil types.*

   The majority of site runoff will be infiltrated. This standard will be fully met.

4. *For new development, stormwater management systems must be designed to remove 80 percent of the average annual load (post development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when:*

   - *suitable non-structural practices for source control and pollution prevention are implemented;*
   - *stormwater management best management practices (BMPs) are sized to capture the prescribed runoff volume; and*
   - *stormwater management BMPs are maintained as designed.*

   This standard will be fully met by implementing BMPs. Runoff from impervious surfaces will not be discharged into wetland resources.

5. *Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMPs (listed in guidelines). The use of infiltration practices without pretreatment is prohibited.*

   This standard will be fully met. For the PRD: Phase VI, there are no proposed land uses that generate higher potential pollutant loads.

6. *Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas (listed in guidelines). Critical areas are Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, cold water fisheries, and recharge areas for public water supplies.*

This standard is not applicable due to the lack of any critical areas within the PRD: Phase VI subject area.

7. *Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practical to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.*

   This standard is not applicable, as the project is not a redevelopment.

8. *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

   A complete erosion and sedimentation control plan will be formulated for each building phase and will be implemented prior to land disturbance activities and throughout construction. Measures to prevent erosion and contain sediment will likely include the installation of erosion control barriers at the downgradient limit of work, installation of stabilized construction exits, construction of sedimentation basins (if required) and protecting the inlets of new catch basins.

9. *All stormwater management systems must have an operation and maintenance plan to ensure that systems function as designed.*

   An Operation and Maintenance Plan will be developed and supplied to the Pinehills Landowners Association for implementation.

The following sections describe in greater detail how applicable stormwater performance standards will be met.

7.4.1.2 Stormwater Quantity

Consistent with previous development scenarios on the site, stormwater will continue to be naturally infiltrated. Generally, surface water will be directed to upland depressions for natural infiltration, or to man-made ponds for irrigation purposes. The final design of the stormwater management system for this portion of the site will maintain the current hydrology of the area and mimic existing hydrological conditions.

7.4.1.3 Stormwater Quality

The goal of the stormwater quality program is to protect the wetland areas that exist on site, the man-made water features, and the groundwater. Because the majority of runoff will be infiltrated, the project easily complies with the 80 percent standard for the removal of total suspended solids. Structural and non-structural water quality control measures are described below.

Non-Structural Methods

Site Layout

The site will continue to maintain large tracts of natural vegetation in open space areas and buffers for adjacent wetlands. The community design will continue to respect and use the irregular topography by dividing runoff into small drainage areas that will be conveyed to naturally occurring depressions minimizing the potential of large concentrated flows, and eliminate the need for constructed detention basins.

Source Control

The preservation of naturally vegetated areas as part of the proposed development will continue to minimize the necessity for maintenance and the use of fertilizer or pesticides. Salt concentrations from roadway areas during the winter months will be minimized by using low salt concentrations (5%-6%) in the sand/salt mixture.

Pavement Sweeping Program

While certain types of street sweepers are not effective for the removal of fine particulates and pollutants associated with them, most are quite effective for the removal of large quantities of sand, grit, litter and assorted inorganic and organic debris. Larger materials may clog conveyance systems, reduce the efficiency and longevity of treatment systems, and ultimately result in more maintenance downstream. The removal of contaminants directly from paved surfaces before contact with stormwater is a valuable method for reducing pollutant loading in stormwater. Street sweeping, particularly during the early spring months, has been identified in the Site Operations and Maintenance Plan and is the responsibility of The Pinehills landowners' association and/or a sub association.

Permanent Structural Methods

Water Quality Swales

Water will continue to be conveyed to naturally occurring depressions via grass-lined water quality swales. Any new swales will be designed as dry-swales and/or biofilter-swales that will serve to filter particulates, promote infiltration, and enhance nutrient uptake. Energy dissipation for concentrated flow - particularly at the point of discharge - will be accomplished by rip-rap lined spreaders that will reduce velocities, promote sheet flow, and guard against scouring.

Catch Basins

Any new catch basins that may be required will be equipped with sumps (minimum of 4 feet) and hooded outlets, as warranted, to trap debris, sediments and floating contaminants, which are the largest constituents of urban runoff. The catch basins will be inspected annually and cleaned as necessary. This practice, in combination with minimal use of sand and street sweeping, will comprise a multi-level source control approach to minimize sand/sediments and litter concentrations.

Stormwater Detention / Water Quality Basin

Man-made ponds have been designed to act as water quality basins. The ponds will continue to provide water quality treatment through settling of the total suspended solids and associated pollutants (heavy metals, petroleum hydrocarbons). The presence of vegetation in the basins assists in the bio-assimilation of nutrients from the runoff. Sediment forebays will provide additional settling area for any sediments in runoff not removed by street sweeping efforts, catch basin sumps, or grass-lined swales.

Infiltration Systems

Infiltration systems constructed of crushed stone with perforated distribution piping will continue to be used in constrained low points if overland outlets are not feasible. Water quality benefits will rely on the extensive natural filtration capacity of the underlying soils.

Structural Practices – Maintenance Program

The following maintenance program was previously proposed to ensure the effectiveness of the structural controls:

- Inspect the detention/water quality basins annually in the spring for cracking or erosion of side slope embankments, and accumulated sediment. Necessary sediment removal, earth repair and/or reseeding shall be performed immediately upon identification;
- Inspect and clean all catch basins annually (at a minimum) to remove accumulated sand, sediment, and floatable product;
- Routinely pick up and remove litter from parking areas and along the roads in addition to pavement sweeping;
- Routinely inspect commercial trash container locations for spillage. Clean, as necessary; and
- Monitor the water level in the drainage manholes just upstream of the infiltration systems after rainfall events to verify that the systems are functioning as designed.

7.5 Required Wetland Permits

Table 7.2 below lists the Notices of Intent filed with the Plymouth Conservation Commission under the Wetlands Protection Act for projects within the Project Site. It includes the DEP file number, the date of issuance of each Order of Conditions (OOC), and a summary of impacts to jurisdictional wetland resource areas.

Table 7.2 Previous Notice of Intent Filings

DEP File No.	Project Name	OOC Date	Wetland Resource Impacts
057-1884	Old Sandwich Road	03/21/03	Buffer
057-1943	Old Sandwich Road	09/18/03	Buffer
057-2090	Canoe Landing	09/14/05	Buffer
057-2269	Old Sandwich Road	06/20/07	Buffer

DEP File No.	Project Name	OOC Date	Wetland Resource Impacts
057-2607	The Greens	N/A	Buffer
057-2408	66 Five Lanterns	03/17/09	Buffer
057-2409	Rebecca's Landing Dock Installation	03/17/09	Bank (5 lf); LUWW (150 sf)
057-2486	Hidden Cove	06/02/10	Bank (32 lf); LUWW (25 sf)
057-2607	The Greens	N/A	Buffer
057-2811	Old Sandwich Golf Club Talcott Lodge Utility Upgrades	01/27/16	Buffer
057-3006	Old Sandwich Golf Club	04/17/19	Buffer
057-3053	The Pinehills Pond Amenity Area Project	01/29/20	Buffer

If any regulated wetland resources will be impacted by the development associated with PRD VII, the Proponent will file with the Conservation Commission in compliance with the Massachusetts Wetlands Protection Act (M.G.L., c. 131, §40) and the Plymouth Wetlands Protection Bylaw (Article 27).

The discharge of treated stormwater will have no long-term impacts on the off-site protected wetland resource areas and will comply with the requirements of DEP's Stormwater Policy.

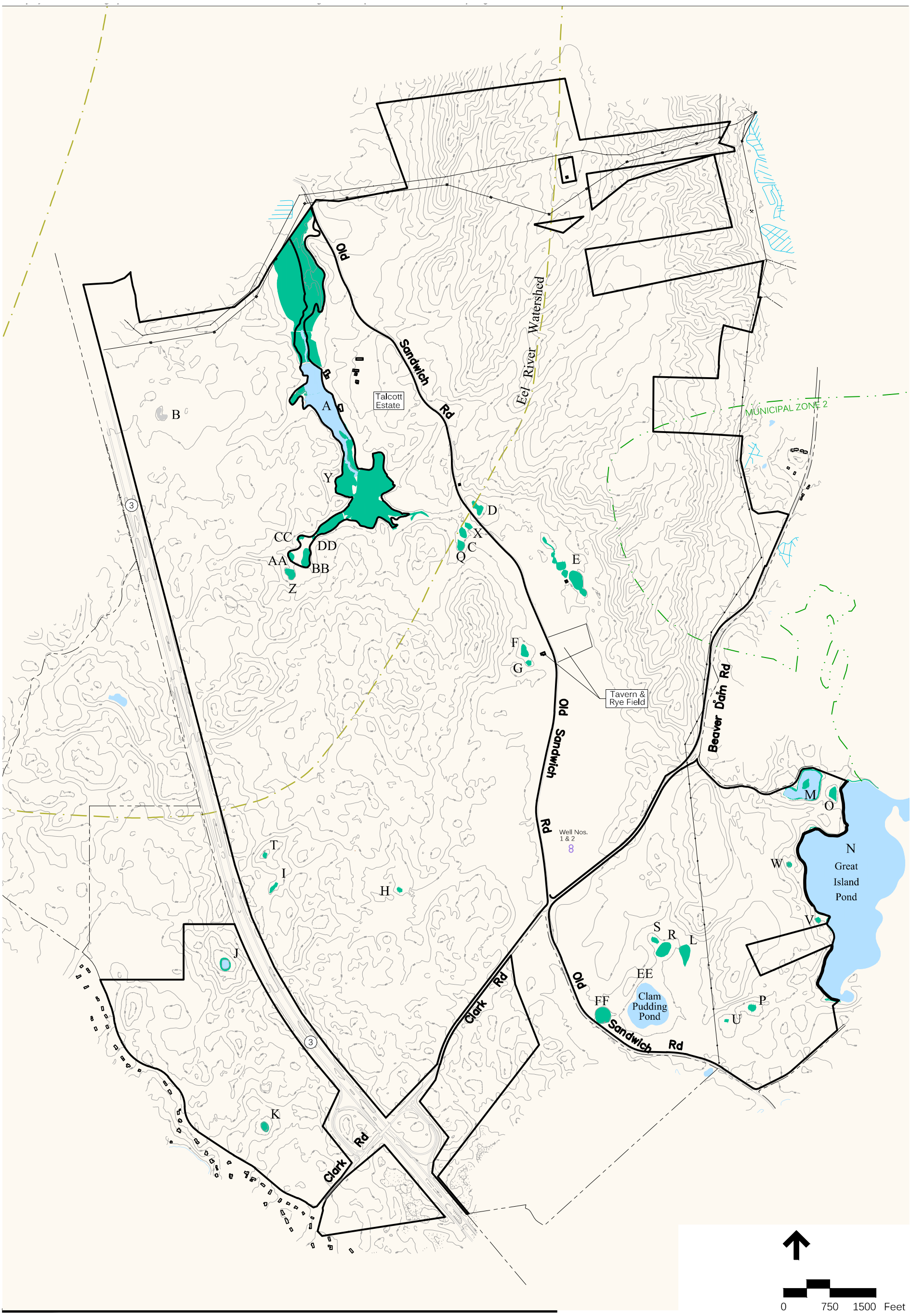
The proposed work within PRD: Phase VII will not result in the discharge of fill to any wetland, and therefore will not require Water Quality Certification (Section 401 Permit) from the DEP or a Section 404 Permit from the United States Army Corps of Engineers.

7.6 Summary

The Pinehills Project is designed to avoid direct impacts, such as filling, excavating, or clearing, to wetlands and will maintain protective buffers of naturally occurring vegetation between the work limits and resource area boundaries. Potential indirect impacts to off-site wetland resources, primarily associated with stormwater discharge, will be mitigated through site layout and treatment. As described above, potential short-term impacts, construction-related impacts and long-term impacts to the wetlands will be minimized through mitigation measures including erosion control, stormwater management, and other Best Management Practices (BMPs). Wetland impacts during the construction of The Pinehills will be prevented through the establishment of a comprehensive erosion and sedimentation control program.

The surface and groundwater quality of the wetlands will be maintained through the installation of a stormwater management program that fully complies with the DEP/CZM standards and the utilization of other BMPs. Structural and non-structural stormwater management methods will be implemented to assure that The Pinehills will comply with DEP's stormwater performance standards for protection of wetlands, groundwater, and downstream properties. Potential long-term stormwater-related impacts will be minimized or avoided altogether by primarily utilizing infiltration-related BMPs suited to the

community's unique topography and soils composition. Man-made ponds will provide water quality benefits in addition to their irrigation and aesthetic functions.



Existing Wetland

Existing Open Water

100 Year Flood Plain (Bordering Land Subject to Flooding)

vhb

Figure 7.1

Wetland Resource Areas

8

Wildlife Habitat

This chapter addresses wildlife issues related to The Pinehills, summarizing the results of previous wildlife habitat investigations conducted at the site as well as updating information related to PRD: Phase VI. It includes a discussion of habitat preservation measures incorporated in The Pinehills Master Plan and preservation measures added to the design following the issuance of that document.

8.1 Overview

As discussed in The Pinehills Master Plan and updated herein, wildlife evaluation through review of relevant studies and initial and follow-up onsite investigations found that:

- The site supports a variety of vegetation cover types typical of those found throughout southeastern Massachusetts and Cape Cod;
- Oak forest and pitch pine/oak closed canopy forest vegetation dominates the site, and provides habitat for a wide range of wildlife species;
- Designations in the Massachusetts Natural Heritage Atlas have changed throughout the development of the Pinehills. The current designations are provided in the August 2017 Atlas (See Figure 8.1).
- Based on the 2008 Atlas there are two areas of Priority Habitat of Rare Species (PH 777 and PH 988) and two areas of Estimated Habitat of Rare Wildlife (EH 201 and EH 832) that extend onto a portion of The Pinehills property. Two areas (PH 988 and EH 832) are located along the shoreline of Great Island Pond, in an area that has already been reviewed through the MEPA process. The remaining two areas (PH 777 and EH 201) are located in the northwest corner of the Pinehills and along the power line easement that bisects the northern portion of the site, within the PRD VI area.
- Noteworthy wildlife habitat identified at the site includes seventeen certified vernal pools and a riparian wetland system associated with the headwaters of the Eel River.

Despite the Pinehills no longer being mapped as Eastern Box Turtle habitat, Pinehills LLC will comply with the requirements of MESA for development within this area as agreed upon during PRD VI.

The following sections discuss general wildlife habitat protection measures and measures to protect vernal pools and the rare species habitat in the northern portion of The Pinehills.

8.2 General Wildlife Habitat

Protection of wildlife habitat at The Pinehills site incorporates the protection and preservation of large areas of undisturbed forested land, protection of wetlands and riparian corridors, protection of vernal pools, and protection of potentially important lepidopteran habitat.

The site Master Plan includes preservation of an approximately 392-acre area ("Northern Corridor Wildlife Preserve") in the northern portion of the site that is contiguous with adjacent open land currently owned by Entergy (formerly Boston Edison). This area contains forested hills and ravines, a portion of a glacial outwash plain, a portion of the Eel River wetland system, and an open power line cut. Also included in the Master Plan is the preservation of the Land," a 207-acre parcel west of Route 3. This parcel includes two certified vernal pools and kettle depressions that have the potential to support state-listed pine barrens lepidoptera. The Master Plan also preserves the slopes extending from the summit of The Pinehills easterly toward Beaver Dam Road.

Preservation of these large contiguous areas, containing substantial diversity of community types, will ensure that the site continues to provide habitat for a wide range of common and uncommon vertebrates and invertebrates. Existing powerline cuts and more open pitch pine areas provide habitat for early-successional species of dry habitats, such as prairie warbler and whip-poor-will.

The large preserved areas and the preservation of natural vegetation interspersed with the residential and golf development will maintain all types of habitat currently found on the site and will maintain migration corridors between these habitat areas. The preservation of buffers on each side of Old Sandwich Road and along Clark Road described in the Master Plan also provides wildlife corridors.

8.3 Vernal Pools

Consistent with previous commitments made by The Pinehills, seventeen vernal pools have been certified by the Massachusetts Natural Heritage and Endangered Species Program (NHESP). These submissions include all known areas within the Pinehills that may provide vernal pool habitat (Table 8.1). Should any additional areas of vernal pool habitat be identified, they will also be evaluated and documented. Appropriate documentation will then be forwarded to NHESP to request certification.

Vernal pools are defined as isolated depressions that hold water for at least two continuous months during spring and early summer, become dry (partially or completely) later in the year and lack fish populations. They provide important breeding habitat for certain amphibian and invertebrate species, as well as habitat for other wildlife species. The amphibian species that rely on vernal pools for breeding habitat, particularly wood frogs (*Rana sylvatica*) and mole salamanders (*Ambystoma maculata* and related species), are adapted to rapid larval development and metamorphosis in ephemeral pools and live in forested uplands as adults.

Table 8.1 Certified Vernal Pools

Wetland ID	Date Certified by NHESP	NHESP Designation
E	9-19-1994	656
H	12-1-1999	1942
I	12-1-1999	1943
W	6-14-2002	2900
R	6-14-2002	2899
P	6-14-2002	2898
O	6-14-2002	2897
B	6-14-2002	2892
C	6-14-2002	2893
F	6-14-2002	2894
J	6-14-2002	2895
K	6-14-2002	2896
Z	6-12-2005	3628
AA-north	6-12-2005	3629
AA-south	6-12-2005	3630
BB	6-12-2005	3631
FF	6-12-2005	3632

Vernal Pools J and K occur on parcels of land that have previously been deeded to the Town of Plymouth and are no longer under the control of Pinehills.
Source: VHB, Inc.

All vernal pool habitat areas on the site will have a minimum 100-foot undisturbed buffer maintained surrounding each area. Larger buffer areas will be created where feasible depending on other site factors. Please note that no known vernal pools are located within the PRD VI area.

8.4 Rare Species Habitat

The Pinehills LLC began discussions with the NHESP in 2006 regarding rare species habitat in the northern portion of the Pinehills. Originally, these conversations began based on the rare species habitat mapping published in the October 2006 Natural Heritage Atlas that included a larger area of rare species habitat in the northern portion of the Pinehills. NHESP routinely updates its state-wide mapping of rare species habitat, and as of this most recent mapping, effective August 1, 2017, there are no areas of mapped habitat at the Pinehills. The most proximate area of mapped habitat is surrounding Long Island Pond (PH 635), located southeast of Beaver Dam Road (Figure 8.1).

Responding to a MESA Information Request in 2008, NHESP reported habitat for two Massachusetts Species of Special Concern: Eastern Box Turtle (*Terrapene carolina)* and Barons Buckmoth (*Hemileuca maia*). A subsequent inquiry to NHESP added to the list of species documented at this site the whip-poor-will (*Caprimulgus vociferus*), a Species of Special Concern that was added to the NHESP list in 2011. As with the Eastern Box Turtle and the Barons Buckmoth, the whip-poor-will is no longer listed for the Pinehills property.

The discussions between the Pinehills LLC and NHESP for rare species over the years have involved two issues:

1. The permitting of proposed development that is located within the mapped habitat; and
2. Voluntary measures proposed by the Pinehills LLC to improve box turtle habitat in areas outside of the mapped habitat.

During the PRD VI stage of development, which included 2.56 acres of development land within the then-mapped NHESP habitat areas, Pinehills LLC submitted a Request for MESA Project Review as required by the regulations, and worked with NHESP staff to design this portion of the project according to the MESA regulations. NHESP approved the PRD VI area work was approved as proposed with the following conditions:

- At least 1.5 acres of land are preserved as open space for each acre of land disturbed. The project exceeds that requirement by providing 48 acres of open space land for each acre disturbed, well above the ratio requested by NHESP. Please note this is over and above the other permanently protected and open space areas throughout the Pinehills community;
- A Conservation Restriction be placed on the approximately 9-acre former gravel pit property on the eastern border of the Pinehills along Beaver Dam Road. The sandy gravel pit provides excellent turtle nesting habitat; and
- Three turtle crossings be provided at NHESP-approved locations beneath Long Ridge Road as part of the PRD VI development.

A June 14, 2017 letter from NHESP confirming Pinehills LLC's offer of these voluntary measures is provided in Appendix F.

Despite the fact that Pinehills is no longer listed as Eastern Box Turtle habitat, Pinehills LLC has continued to coordinate with NHESP in the design of development within the mapped habitat area and with regards to the voluntary mitigation measures proposed by Pinehills LLC. To date:

- The protected open space requirement has been exceeded.
- The open space covenant and restriction requirement for the approximately 11.2-acre former gravel pit property is in process and expected to be recorded in 2020.
- Construction of an extension of Long Ridge Road which began in fall of 2020 and will continue through spring of 2021, will include the construction of two NHESP-approved turtle crossing locations.

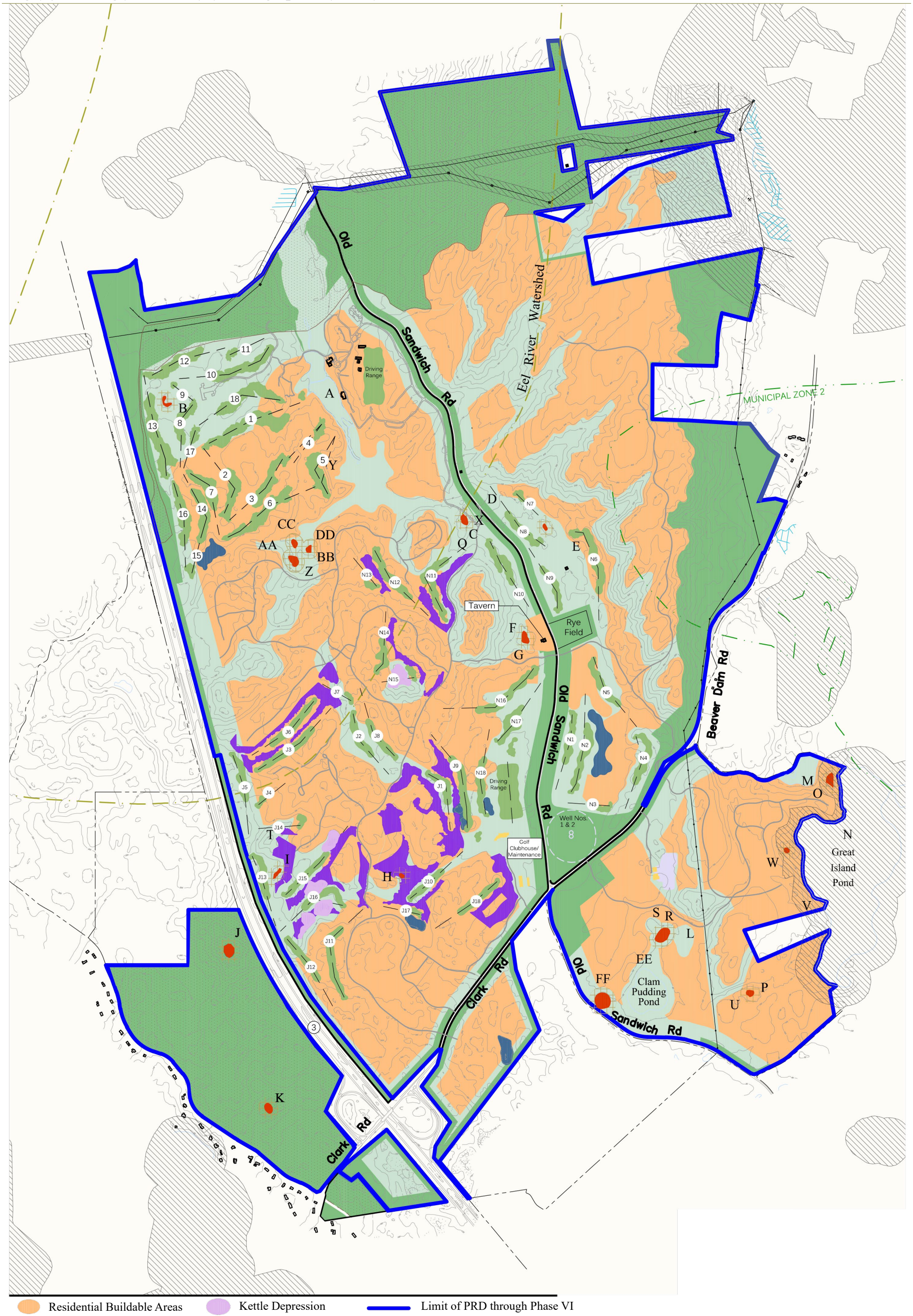


Figure 8.1
Illustrative Habitat

9

Summary of Mitigation

This chapter summarizes the measures designed to avoid and/or mitigate Project-related impacts on traffic, air quality, aquifer recharge, water quality, historical and archaeological resources, wetlands and wildlife. Each mitigation measure, the phase in which the measure was anticipated to be completed, the responsible party, and status for each measure is provided in tabular form.

9.1 Mitigation Measure Summary Table

Table 9.1 below summarizes the mitigation measures described in the sections below, including the document in which the commitment was made, the party responsible for implementation, the implementation schedule, and the status of the mitigation commitment.

Table 9.1 Mitigation Summary

Mitigation Commitment	PRD/NPC Document	Responsible Party	Schedule	Status
Traffic				
Old Sandwich Road Bypass	IP; PRD: Phases I, II	Pinehills LLC	Phase Build Out	Original Bypass road completed (Stonebridge Road);
Clark Road Improvements - Site entrance	IP; PRD: Phase I	Pinehills LLC	Phase Build Out	Not yet warranted based on monitoring, preliminary design on-going.
Clark Road/Southbound Ramps - signalization	PRD: Phase II	Pinehills LLC	If necessary, per project impacts	Not yet warranted based on monitoring
Clark Road/Southbound Ramps - geometric improvements & signalization	PRD: Phases III, IV, V, VI, VII	Pinehills LLC	If necessary, per project impacts	Not yet warranted based on monitoring
Clark Road/Northbound Ramp- geometric improvements & signalization	PRD: Phases III, IV, V, VI	Pinehills LLC	If necessary, per project impacts	Not yet warranted based on monitoring
Route 3A at Beaver Dam Road and White Horse Road - Traffic Signal Timing Adjustment Study & Implementation	PRD: Phases III, IV, V, VI, VII	Pinehills LLC	By 2030	Funded. Task completed by others at direction of Town of Plymouth

Mitigation Commitment	PRD/NPC Document	Responsible Party	Schedule	Status
Clark Road at Long Pond Road: Traffic Signal Warrant Analysis	PRD: Phases III, IV, V	Pinehills LLC	At completion of Phase I or 2003	Completed by others at direction of Town of Plymouth
Old Sandwich Road/Jordan Road/Clifford Road - Sign and pavement marking improvements	PRD: Phase VI	Pinehills LLC	On-going	Safety improvements undertaken by Town of Plymouth
Geometric improvements along Clark Road at Pinehills Drive, Meeting Way, and Landmark Drive/Mainstone Boulevard	PRD: Phase VII	Pinehills LLC	On-going	Under preliminary design but not yet warranted based on monitoring.
Reserve Land at NE & SW quadrants of Route 3/Clark Road for future improvements	Phase VII	MassDOT/others	Improvements TBD	Land has been reserved
Annual Traffic Monitoring	PRD: Phases IV, V, VI, VII		At completion of Phase I or 2003	Completed annually since 2003
Air Quality				
Pedestrian Trails / Bicycle Accommodations	IP; PRD: Phases I, II, III, IV, V, VI	Pinehills LLC	Phase Build Out	On-going – undertaken within each Phase
Telecommunications Premiums	IP; PRD: Phases I, II, III, IV, V, VI	Pinehills LLC	Phase Build Out	Ongoing – community web site and wi-fi
Transportation Demand Management Program	IP; PRD: Phases I, II, III, IV, V, VI, VII	Pinehills LLC	Start 1999	Ongoing since 1999
Aquifer Recharge				
Drainage System Premiums for infiltration	IP; PRD: Phases I, II	Pinehills LLC	Phase Build Out	On-going – design and construction within each Phase
Offsets current WMA permitted withdrawals	NA	Pinehills LLC	Phase Build Out	Complete
Offsets buildout WMA permitted withdrawals	NPC IX	Pinehills LLC	Phase Build Out	To be completed in 2020; Permit application and review pending with MassDEP
Water Quality				
Eel River Monitoring	IP; PRD: Phase I	Pinehills LLC	Start 1998	On-going
Integrated Pest Management (1 course)	IP; PRD: Phases I, II, III, IV, V, VI	Golf Course Operator	Start 2000	On-going
Capture Wells	IP; PRD: Phase I	Pinehills LLC	Phase Build Out	**Installation complete. On-going**

Mitigation Commitment	PRD/NPC Document	Responsible Party	Schedule	Status
				monitoring per permit
Water Quality Monitoring	PRD: Phases II, III, IV, V, VI	Pinehills LLC	On-going	On-going per permit
Limit of 250 On-site Septic Systems within the Eel River Watershed Area	PRD: Phase III, IV, V, VI	Pinehills LLC	On-going	No septic systems installed or anticipated by Proponent. Pre-existing septic system removed and connected to community sewer system
Sewering of Entire Site	PRD: Phase III, IV, V, VI	Pinehills LLC	On-going	On-going, completed with each phase
Wastewater Disposal Outside Eel River Watershed	PRD: Phase III, IV, V, VI	Pinehills LLC	On-going	Completed
Historical and Archeological				
Reconnaissance Survey	IP, PRD: Phase I	Pinehills LLC	Complete Phase I	Complete
Intensive Surveys, Documentation	IP; PRD: Phases I, III, IV, V, VI	Pinehills LLC	Complete Phase I, Phase III	Complete
Memorandum of Agreement	IP; PRD: Phases I, II	Pinehills LLC	Draft Phase I; Complete Phase II	Executed. Consultation with MHC as required
MOA Buffers	IP; PRD: Phases I, II, III, IV, V	Pinehills LLC	Phase Build Out	On-going and complete with each phase
Wetlands and Wildlife				
Habitat Preservation/Enhancement	IP; PRD: Phases I, II, III, IV, V, VI	Pinehills LLC	Phase Build Out	On-going and complete with each phase
New Water Bodies	IP; PRD: Phases I, II, III, IV, V	Pinehills LLC	Phase Build Out	Complete with golf course construction
Incorporation of Turtle crossings	PRD: Phase VI	Pinehills LLC	Phase Build Out	To be completed in 2020 - 2021
Conservation Restriction on 9-acre former Gravel Pit	PRD: Phase VI NPC VIII	Pinehills LLC	Phase Build Out	Revised to include 11.21 acres; To be completed in 2020

9.2 Traffic Mitigation and Improvements

The traffic mitigation measures described below are intended to serve as the basis for MassDOT's Section 61 Findings. This section also describes major transportation improvements that are components of the Project. The Pinehills is a mixed-use development of residential,

recreational and commercial land uses joined by an internal network of roads and trails that provide convenient access between land uses for pedestrians and bicyclists. This configuration is anticipated to result in approximately 35 percent of trips being captured internally within the community. Additionally, construction of the Old Sandwich Road Bypass is expected to divert 95 percent of the Pinehills traffic from Old Sandwich Road. However, traffic generation associated with the Pinehills will have an impact on the surrounding road network. The project proponent is committed to the development and implementation of a comprehensive traffic mitigation program that is designed to minimize the Project's impacts on the surrounding roadway infrastructure, while balancing the desire to maintain the rural character of the environment encompassing The Pinehills.

9.2.1 Full-Build Out

The traffic-related mitigation commitments for full build-out include:

- A new road (Bypass Road) to function as a more convenient alternate route to the unpaved portion of Old Sandwich Road. The Bypass Road will be constructed as part of the community at an estimated cost of $3,000,000. No homes utilize the Bypass Road for frontage, it merely replaces Old Sandwich Road as a way to distribute traffic. This alternate roadway will redirect site and local traffic protecting Old Sandwich Road as a site resource and providing safer, more convenient access within and through the community. The Bypass Road will originate at Clark Road in the Neighborhood Green District and will direct traffic northeast, tying into the paved portion of Old Sandwich Road in the northern part of the site;
- Clark Road will be improved to provide turning lanes into the community at both the easterly and westerly site driveways to maintain uninterrupted through traffic movement. Traffic signals, if warranted, will be constructed for traffic control and safety considerations;
- Exclusive turning lane(s) will be added, and signal control will be improved at the intersection of Beaver Dam Road and White Horse Road. Under the existing condition this intersection experiences capacity problems. Pine Hills LLC will work with the town of Plymouth on mitigation improvements at this intersection;
- The Route 3 interchange will be reconfigured to provide exclusive left turn and right turn lanes for each ramp to Clark Road. Exclusive turn lanes for ramp access will be provided on Clark Road at the easterly and westerly ramp approaches. Traffic signalization will be provided at ramp intersections if conditions warrant;
- Exclusive turn lanes will be added on the approaches to the community intersection of Clark Road and Long Pond Road. Under the existing condition this intersection experiences capacity problems. Pine Hills LLC will work with the town of Plymouth on mitigation improvements at this intersection;
- A Transportation Demand Management (TDM) plan will be implemented. It is anticipated that the TDM will include ridesharing programs, flexible work schedules, shuttle bus service, and traffic calming techniques; and
- A traffic monitoring program.

9.2.2 PRD: Phases I-VI

Phase I

The Pinehills mitigation commitments relating to the PRD: Phase 1 include:

- Construct the first portion of the Bypass Road which will ultimately provide a move convenient and alternate route to the unpaved portion of Old Sandwich Road. This roadway will provide access to the entirety of the PRD: Phase I building areas;
- Improve Clark Road in the vicinity of the easterly site driveway (Old Sandwich Road bypass road) to provide an exclusive left turn lane, if necessary, on the eastbound approach in the year 2002;
- Clark Road will be widened westerly of the site drive to accommodate a shared right turn through lane; and
- A "Transportation Coordinator" position will be staffed and an initial TDM plan for the community will be formulated. The coordinator will distribute promotional material to employees, disseminate availability of carpool and vanpool programs, and assess the viability of a shuttle service for residents of and persons employed within the Pinehills.

Phase II

The need for The Pinehills mitigation commitments associated with PRD: Phase II will be measured by ongoing traffic analysis, as committed to as part of the MEPA process for this project. Geometric improvements to Clark Road at the site driveways, proposed as part of the PRD: Phase I mitigation, will support PRD: Phase II program. The PRD: Phase II improvements include:

- Construction of the second portion of the Bypass Road which will ultimately provide a move convenient and alternate route to the unpaved portion of Old Sandwich Road. This roadway will provide access to the entirety of the PRD: Phase II building areas. Total cost of the Bypass Road is estimated at $3,000,000;
- At the build-out of PRD: Phase II, the operation of Clark Road at the Southbound Route 3 ramps will be evaluated to assess project related impacts and intersection performance. If warranted by project impacts, appropriate mitigation measures, including signalization of the intersection will be implemented by the project proponent at the direction and discretion of MassDOT;
- Adjustments to the traffic signal timing at the intersection of Route 3A and Beaver Dam Road and White Horse Road are expected to be required by 2004 with or without the PRD: Phase II. At the completion of PRD: Phase II or by the end of 2004 the project proponent will evaluate the signal operation and recommend adjustments to be implemented by MassDOT; and
- The Transportation Demand Management (TDM) program commenced as part of the PRD: Phase I mitigation will be continued as part of the PRD: Phase II mitigation. This will include staffing of the Transportation Coordinator position to oversee TDM implementation.

Phase III

The PRD: Phase III traffic mitigation commitments include:

- The four site driveways proposed as a part of PRD: Phase III of the community will be a minimum of 22 feet in width accommodating one entering and one exiting travel lane and will be placed under STOP-sign control with illumination provided. Any signing and landscaping proposed adjacent to the site driveways will be designed and maintained so as to maintain appropriate sight distance from the site driveways;
- As committed to as part of the PRD: Phase II development program, the intersection of Clark Road at the Route 3 southbound ramps will be monitored as a part of the PRD process and, if and when warranted, appropriate mitigation measures, up to and including signalization of the intersection, will be implemented by the project proponent at the direction and discretion of MassDOT. Monitoring of the intersection will begin at the completion of the Phase I development program or by 2003. The results of the monitoring program, including a Traffic Signal Warrants Analysis (TSWA), will be provided to MassDOT and the Town of Plymouth;
- The intersection of Clark Road at the Route 3 northbound ramps will be monitored as a part of the PRD process and, if and when warranted, appropriate mitigation measures, up to and including signalization of the intersection, will be implemented by the project proponent at the direction and discretion of MassDOT. Monitoring of the intersection will begin at the completion of the Phase I development program or by 2003. The results of the monitoring program, including a Traffic Signal Warrants Analysis (TSWA), will be provided to MassDOT and the Town of Plymouth;
- Adjustments to the traffic signal timing at the intersection of Route 3A and Beaver Dam Road and White Horse Road are expected to be required by 2006 with or without PRD: Phase III. At the completion of PRD: Phase III or by the end of 2006 the project proponent will evaluate the signal operation and recommend adjustments to be implemented by MassDOT;
- Traffic operations at the intersection of Clark Road at Long Pond Road were shown to be somewhat constrained (LOS F) during both the weekday morning and evening peak hours under 2001 Existing conditions, independent of PRD: Phase III. This intersection will be monitored as a part of the traffic monitoring program required by MassDOT for the community. A detailed TSWA will be performed including a 12-hour manual turning movement count. The TSWA will be prepared at the completion of the Phase I development program or by 2003 and will be submitted to MassDOT and the Town of Plymouth;
- As requested by MassDOT, the project proponent will reserve the land located in the northeast and southwest quadrants of the Route 3/Clark Road interchange for future improvements to the interchange by others;
- The Transportation Demand Management (TDM) program commenced as part of the PRD: Phase I and II mitigation will be continued as part of the PRD: Phase III mitigation. This will include staffing of the Transportation Coordinator position to oversee TDM implementation. In addition, the project proponent will work with the Plymouth and Brockton Street Railway Company to provide bus service to the project site, as well as

potential service to downtown Plymouth and the MBTA commuter rail stations in Plymouth and Kingston; and

› As required as a part of MEPA Certificates and Section 61 Findings issued for the "Infrastructure Plan and Phased Review Document: Phase I", a traffic monitoring program will be undertaken by the project proponent at the completion of the Phase I development program or by 2003 in order to document the traffic generated by The Pinehills and the internal capture rate. The monitoring program will be performed as directed in MassDOT's Section 61 Findings, with the results submitted to MassDOT and documented in the subsequent PRDs.

Phase IV

Geometric improvements to Clark Road at the three site driveways proposed as part of PRD: Phase I are not anticipated to be required in order to support the PRD: Phase IV development program. As documented in Chapter 4 of this Phased Review Document, the PRD: Phase IV traffic mitigation commitments and Site improvements include:

› One new internal driveway proposed as a part of PRD: Phase IV of the community, that will intersect the west side of the northern end of Stonebridge Road, will be a minimum of 22 feet in width accommodating one entering and one exiting travel lane, and will be placed under STOP-sign control;

› Additional access to PRD: Phase IV of the community will be provided by way of three driveways constructed along the north side of Clark Road, between Old Sandwich Road and Route 3, and the two driveways that intersect the ease and west sides of Old Sandwich Road, south of the Cornish/Wright Tavern, as well as the new driveway to be constructed as party of PRD Phase III along the north side of Beaver Dam Road;

› It is recommended that all of the driveways be a minimum of 22 feet in width accommodating one entering and one exiting travel lane, and that vehicles exiting the driveways be placed under STOP-sign control, with illumination provided. No geometric changes are proposed to the PRD: Phase I, II and III site driveways as part of PRD: Phase IV. It is recommended that the PRD: Phase I, II and III site driveways remain under STOP-sign control, with illumination provided. Any signing and landscaping adjacent to the site driveways should be designed to maintain sight distances to and from the driveways;

› A review of traffic operations under anticipated 2007 No-Build and Build conditions indicates that, as the community is developed, the addition of turn lanes may be desirable at the intersections of Clark Road at Pinehills Drive and Clark Road at Meeting Way in order to efficiently accommodate turning movements entering and exiting the community. The need for the addition of turn lanes will be reviewed as a part of the annual traffic monitoring program for the community. The project proponent will modify the community driveway intersections with Clark Road to add turning lanes when warranted by the actual volume of traffic utilizing the driveways or when operating conditions indicate the need for such improvements. The results of the monitoring program will be provided to MassDOT and the Town of Plymouth and will include an operational analysis at the community driveways;

- As committed to as part of the PRD: Phase II and Phase III development program, the Clark Road/Route 3 interchange will be monitored as a part of the PRD process and, if and when warranted, appropriate mitigation measures, up to and including signalization of the intersection, will be implemented by the project proponent at the direction and discretion of MassDOT. Monitoring of the intersection will begin at the completion of the Phase I development program or by 2003. The results of the monitoring program, including a Traffic Signal Warrants Analysis (TSWA), will be provided to MassDOT and the Town of Plymouth;
- Independent of the buildout of PRD: Phase IV development area, adjustments to the traffic signal timing and minor geometric changes at the intersection of Route 3A and Beaver Dam Road and White Horse Road are expected to be required by 2007. Traffic volumes and operating conditions at this intersection will be monitored on a yearly basis beginning in 2003. In conjunction with this monitoring, the project proponent will evaluate the signal operation and recommend geometric improvements and adjustments for approval by MassDOT and to be implemented by MassDOT. The project proponent has committed to the Town of Plymouth to fund the preliminary design of geometric and traffic signal improvements at this intersection;
- Traffic operations at the intersection of Clark Road at Long Pond Road will be monitored as a part of the traffic monitoring program required by MassDOT for the community. A detailed TSWA will be performed including a 12-hour manual turning movement count. The TSWA will be prepared at the completion of the Phase I development program or by 2003 and will be submitted to MassDOT and the Town of Plymouth;
- As requested by MassDOT, the project proponent will reserve the land located in the northeast and southwest quadrants of the Route 3/Clark Road interchange for future improvements to the interchange by others;
- The Transportation Demand Management (TDM) program commenced as part of the PRD: Phase I, II and III mitigation will be continued as part of the PRD: Phase IV mitigation. This will include staffing of the Transportation Coordinator position to oversee TDM implementation. In addition, the project proponent will work with the Plymouth and Brockton Street Railway Company to provide bus service to the project site, as well as potential service to downtown Plymouth and the MBTA commuter rail stations in Plymouth and Kingston. The PRD: Phase IV development has been designed to incorporate and not preclude implementation of any mitigation measures identified in the TDM analysis presented in the Infrastructure Plan and Phase Review Document: PRD I; and
- As required as a part of MEPA Certificates and Section 61 Findings issued for the "Infrastructure Plan and Phased Review Documents: PRD I, II and III", a traffic monitoring program will be undertaken by the project proponent at the completion of the Phase I development program or by 2003 in order to document the traffic generated by The Pinehills and the internal capture rate. The monitoring program will be performed as directed in MassDOT's Section 61 Findings, with the results submitted to MassDOT and documented in the subsequent PRDs.

Phase V

PRD: Phase V traffic mitigation commitments include:

- Two new roadways will be constructed as a part of PRD: Phase V that will intersect the east side of Old Sandwich Road, north of Old Tavern Trail, one of which will align opposite the Talcott Estate driveway (now known as "Doublebrook" road). The roadways will be a minimum of 22 feet in width, accommodating one entering and one exiting travel lane, and will be placed under STOP-sign control;
- Additional access to PRD: Phase V of the community will be provided by way of six of the thirteen roadways constructed (or to be constructed) as part of PRD: Phases I, II, III and IV, three of which intersect Clark Road along the north side, east of Route 3 (Pinehills Drive, Meeting Way, and Landmark Drive); two roadways that intersect the north and south side of Beaver Dam Road, east of Old Sandwich Road (Great Island and Little Island); and one roadway that intersects the west side of Old Sandwich Road, south of the Wright Tavern (Old Tavern Trail);
- It is recommended that all of the driveways be a minimum of 22 feet in width accommodating one entering and one exiting travel lane, and that vehicles exiting the driveways be placed under STOP-sign control. No geometric changes are proposed to the PRD: Phases I, II, III and IV site driveways as part of PRD: Phase V. It is recommended that the PRD: Phase I, II, III and IV site driveways remain under STOP-sign control. Any signing and landscaping adjacent to the site driveways should be designed to maintain sight distances to and from the driveways;
- A review of traffic operations under anticipated 2009 No-Build and Build conditions indicates that, as the community is developed, the addition of turn lanes may be desirable at the intersections of Clark Road and Pinehills Drive and Clark Road at Meeting Way in order to efficiently accommodate turning movements entering and exiting the community. At this time, operating conditions at the site roadways and relative traffic volumes do not indicate that the addition of turn lanes is necessary. The need for the addition of turn lanes will be reviewed as a part of the annual traffic monitoring program for the community. The project proponent will modify the community roadway intersections with Clark Road to add turning lanes when warranted by the actual volume of traffic using the roadways or when operating conditions indicate the need for such improvements. The results of the monitoring program will be provided to MassDOT and the Town of Plymouth and will include an operational analysis at the community roadways;
- As committed to as part of the PRD: Phase II and Phase III development program, the Clark Road/Route 3 interchange will be monitored as a part of the PRD process and, if and when warranted, appropriate mitigation measures, up to and including signalization of the intersection, will be implemented by the project proponent at the direction and discretion of MassDOT. Monitoring of the intersection began in 2003. Annual monitoring of traffic volumes at this intersection is on-going and includes the completion of a TSWA. The results of the monitoring program will be provided to MassDOT and the Town of Plymouth and will be documented in subsequent PRDs;
- Independent of the buildout of PRD: Phase V development area, adjustments to the traffic signal timing and minor geometric changes at the intersection of Route 3A and Beaver Dam Road and White Horse Road are expected to be required by 2007. Traffic volumes and operating conditions at this intersection will be monitored on a yearly basis beginning in 2003. In conjunction with this monitoring, the project proponent will

evaluate the signal operation and recommend geometric improvements and adjustments for approval by MassDOT and to be implemented by MassDOT. The project proponent has funded the preliminary design of geometric and traffic signal improvements at this intersection, as requested by the Town of Plymouth;

- Traffic operations at the intersection of Clark Road at Long Pond Road will be monitored as a part of the traffic monitoring program required by MassDOT for the community. The detailed TSWA will be prepared at the completion of the Phase I development program or as a part of the 2005 traffic monitoring program and will be submitted to MassDOT and the Town of Plymouth;
- As requested by MassDOT, the project proponent will reserve the land located in the northeast and southwest quadrants of the Route 3/Clark Road interchange for future improvements to the interchange by others;
- The Transportation Demand Management (TDM) program commenced as part of the PRD: Phase I, II, III and IV mitigation will be continued as part of the PRD: Phase V mitigation. This will include staffing of the Transportation Coordinator position to oversee TDM implementation. In addition, the project proponent will work with regional transportation authority (GATRA) to provide service to the project site, as well as potential service to downtown Plymouth and the MBTA commuter rail stations in Plymouth and Kingston. Limited GATRA services has been provided to the project site since approximately 2015. The project proponent will continue to work with other transportation providers (such as the Plymouth and Brockton Street Railway Company) to develop and promote service to the project site, The PRD: Phase V development has been designed to incorporate and not preclude implementation of any mitigation measures identified in the TDM analysis presented in the Infrastructure Plan and Phase Review Document: PRD I. Through carpooling and use of private common carrier services (vans and buses) to attend off site events, residents within The Pinehills and Pinehills LLC employees have already initiated efforts to mitigate off-site traffic impacts. In addition, five residents live and work within the Pinehills community; and
- As required as a part of MEPA Certificates and Section 61 Findings issued for the "Infrastructure Plan and Phased Review Documents: PRD I, II, III and IV," a traffic monitoring program is being undertaken by the project proponent in order to document the traffic generated by The Pinehills and the internal capture rate. The monitoring program will be performed as directed in MassDOT's Section 61 Findings, with the results submitted to MassDOT and documented in the subsequent PRDs.

Phase VI

The PRD: Phase VI traffic mitigation commitments include:

- Access to PRD: Phase VI of the community will be provided by an extension of Long Ridge Road located on the north side of Clark Road/Beaver Dam Road and/or the extension of Sacrifice Rock Road located on the east side of Old Sandwich Road;
- It is recommended that the extensions of these roadways provide a similar cross–section to that of the originating roadway and be a minimum of 20 feet in width, accommodating two-way traffic. No geometric changes are proposed at this time to the existing

community roadway network as these roadways and their intersections with Clark Road, Beaver Dam Road and Long Ridge Road continue to accommodate existing and projected future traffic (including PRD: Phase VI) in a safe and efficient manner;

- As committed to as a part of the IP and the prior PRDs prepared in support of the project, the Clark Road/Route 3 interchange will be monitored as a part of the PRD process and, if and when warranted, appropriate mitigation measures, up to and including signalization of the intersection, will be implemented by the project proponent at the direction and discretion of MassDOT. Monitoring of the intersection began in 2003. Annual monitoring of traffic volumes at this intersection is on-going and includes the completion of a TSWA. The results of the monitoring program will be provided to MassDOT and the Town of Plymouth and will be documented in subsequent PRDs. In addition, the project proponent has committed to transferring the land located in the northeast quadrant of the interchange for the future construction by MassDOT (or others) of a right-turn slip-ramp between Clark Road westbound and Route 3 northbound;
- The intersection of Old Sandwich Road at Jordan Road and Clifford Road is under all-way STOP-sign control and was found to exceed the average crash rate of 0.60 for unsignalized intersections as defined by MassDOT for the MassDOT Highway Division District in which the intersection is located (District 5). In an effort to reduce the frequency of occurrence of motor vehicle crashes at this intersection, the following improvements are recommended independent of PRD: Phase VI and will be implemented by the project proponent subject to receipt of all necessary rights, permits and approvals:
  1. Install stop sign ahead warning signs (W3-1) on all four approaches to the intersection;
  2. Replace/upgrade signs and pavement markings at and approaching the intersection, including the STOP-signs and STOP-lines;
  3. Trim and maintain trees and vegetation at the intersection in order to improve sight lines; and
  4. Consider posting an advisory speed sign (25 mph) in advance of the intersection in conjunction with the installation of intersection ahead (graphic symbol) warning signs.
- Independent of the buildout of PRD: Phase VI development area, adjustments to the traffic signal timing and minor geometric changes at the intersection of Route 3A and Beaver Dam Road and White Horse Road are expected to be required by 2017. Traffic volumes and operating conditions at this intersection have been monitored on a periodic basis since 1999. In conjunction with this monitoring, the project proponent will evaluate the signal operation and recommend geometric improvements and adjustments for approval by MassDOT and to be implemented by MassDOT. The project proponent has funded the preliminary design of geometric and traffic signal improvements at this intersection, as requested by the Town of Plymouth;
- As part of the Plymouth South High School expansion project, two alternative improvement plans were evaluated by the Town for the intersection of Long Pond Road at Clark Road: 1) the installation of a traffic control signal; and 2) the reconstruction and realignment of the intersection to function as a modern roundabout. Alternative 2, the construction of a modern roundabout, was selected by the Town as the preferred improvement for the

intersection to be completed in conjunction with the expansion of the Plymouth South High School. As a part of the River Run mixed-use development, the River Run project proponent has committed to the design and construction of a modern roundabout at the intersection of Long Pond Road at Clark Road. With this improvement, overall operating conditions at the intersection were shown to improve to a LOS B or better during the peak hours under 2017 No-Build and Build conditions. In order to facilitate this much needed improvement, the project proponent has agreed to reserve land situated in the southeast corner of the intersection to allow for the roundabout construction;

- As requested by MassDOT, the project proponent will reserve the land located in the northeast and southwest quadrants of the Route 3/Clark Road interchange for future improvements to the interchange by others;
- The Transportation Demand Management (TDM) program commenced as part of the PRD: Phase I, II, III, IV and V mitigation will be continued as part of the PRD: Phase VI mitigation. This will include staffing of the Transportation Coordinator position to oversee TDM implementation. As the community grows, it is envisioned that a Transportation Management Association (TMA) will be created, which all commercial tenants within the community will be encouraged to join.

  In order to encourage the use of alternative modes of transportation within the community, transit schedules and car/vanpool information is provided in a central location and has been made available to residents of the community, conference center guests and patrons of the golf clubs. The project proponent has been and will continue to work with the Plymouth and Brockton Street Railway Company and the Greater Attleboro Taunton Regional Transit Authority (GATRA) to expand the existing bus service to the project site, as well as potential service to downtown Plymouth and the MBTA commuter rail stations in Plymouth and Kingston. In addition, bicycle racks have been provided in the Neighborhood Green area and proximate to retail and community service buildings within The Pinehills to encourage the use of bicycle travel to and within the community. Through carpooling and use of private common carrier services (vans and buses) to attend off-site events, residents within The Pinehills and Pinehills LLC employees have already initiated efforts to mitigate off-site traffic impacts;

  The PRD: Phase VI development has been designed to incorporate and not preclude implementation of any mitigation measures identified in the TDM analysis presented in the "Infrastructure Plan and Phased Review Document: Phase I"; and
- As required as a part of MEPA Certificates and MassDOT Section 61 Findings issued for The Pinehills, a traffic monitoring program has been and will continue to be undertaken by the project proponent. The traffic monitoring program for The Pinehills commenced in 2003 as required in the aforementioned documents and will be used in order to document the actual (vs. projected) volume of traffic generated by the community and the associated internal capture rate. The monitoring program has been performed as directed in MassDOT's Section 61 Findings, with the results submitted to MassDOT and documented in subsequent PRDs. This PRD includes traffic counts performed at the existing roadways serving the community in 2012.

9.2.3 PRD: Phase VII

The PRD: Phase VII traffic mitigation commitments include:

- Primary access to PRD: Phase VII of the community will be provided by the Pinehills Drive, Meeting Way and Landmark Drive located along the north side of Clark Road, and a new roadway that will be located opposite Pinehills Drive along the south side of Clark Road. It is recommended that the new roadway provide a similar cross-section to that of other primary roadways within The Pinehills and consist of a 20-foot-wide traveled-way that accommodates two-way traffic. No geometric changes are proposed or required to the existing roadway network within The Pinehills community to support PRD: Phase VII; however, geometric improvements are recommended along Clark Road at Pinehills Drive (provide left-turn lanes on both Clark Road approaches), Meeting Way (provide an eastbound left-turn lane on Clark Road) and Landmark Drive/Mainstone Boulevard (provide left-turn lanes on both Clark Road approaches);
- As committed to as a part of the IP and the prior PRDs prepared in support of the project, the Clark Road/Route 3 interchange will be monitored as a part of the PRD process and, if and when warranted, appropriate mitigation measures, up to and including signalization of the intersections, will be implemented by the project proponent at the direction and discretion of MassDOT. Monitoring of the intersection began in 2003. Annual monitoring of traffic volumes at this intersection is on-going and includes the completion of a TSWA. The results of the monitoring program will be provided to MassDOT and the Town of Plymouth and will be documented in subsequent PRDs. In addition, the project proponent has committed to transferring the land located in the northeast quadrant of the interchange for the future construction by MassDOT (or others) of a right-turn slip-ramp between Clark Road westbound and Route 3 northbound. It has been noted that the improvements that have been completed at the Clark Road/Long Pond Road intersection as a part of the Redbrook (formerly River Run) mixed-use development have resulted in an overall reduction in motorist delays and vehicle queuing at this intersection which may eliminate or delay the need to implement additional improvements at this intersection;
- Independent of PRD: Phase VII of the Pinehills, adjustments to the traffic signal timing and phasing are expected to be required by 2030 to accommodate traffic-volume increases at the Route 3A/Beaver Dam Road/White Horse Road intersection. The project proponent has agreed to provide a financial contribution to the Town of Plymouth for the preliminary design of geometric and traffic signal improvements at the intersection. In addition, annual monitoring of traffic volumes and operating conditions at this intersection is on-going;
- As requested by MassDOT, the project proponent will reserve the land located in the northeast and southwest quadrants of the Route 3/Clark Road interchange for future improvements to the interchange by others;
- The Transportation Demand Management (TDM) program commenced as part of the PRD: Phase I, II, III, IV, V and VI mitigation will be continued as part of the PRD: Phase VII mitigation. This will include staffing of the Transportation Coordinator position to oversee TDM implementation. As the community grows, it is envisioned that a Transportation

Management Association (TMA) will be created, which all commercial tenants within the community will be encouraged to join.

In order to encourage the use of alternative modes of transportation within the community, transit schedules and car/vanpool information is provided in a central location and has been made available to residents of the community, conference center guests and patrons of the golf clubs. The project proponent has been and will continue to work with the Plymouth and Brockton Street Railway Company and the Greater Attleboro Taunton Regional Transit Authority (GATRA) to expand the existing bus service to the project site, as well as potential service to downtown Plymouth and the MBTA commuter rail stations in Plymouth and Kingston. In addition, bicycle racks have been provided in the Neighborhood Green area and proximate to retail and community service buildings within The Pinehills to encourage the use of bicycle travel to and within the community. Through carpooling and use of private common carrier services (vans and buses) to attend off-site events, residents within The Pinehills and Pinehills LLC employees have already initiated efforts to mitigate off-site traffic impacts. The PRD: Phase VII development has been designed to incorporate and not preclude implementation of any mitigation measures identified in the TDM analysis presented in the "Infrastructure Plan and Phased Review Document: Phase I"; and

- As required as a part of MEPA Certificates and MassDOT Section 61 Findings issued for The Pinehills, a traffic monitoring program has been and will continue to be undertaken by the project proponent. The traffic monitoring program for The Pinehills commenced in 2003 as required in the aforementioned documents and will be used in order to document the actual (vs. projected) volume of traffic generated by the community and the associated internal capture rate. The monitoring program has been performed as directed in MassDOT's Section 61 Findings, with the results submitted to MassDOT and documented in subsequent PRDs. This PRD includes traffic counts performed at the existing roadways serving the community in 2020.

9.3 Air Quality Mitigation

Air quality impacts result primarily from increased traffic and its effect on traffic mobility. Traffic related air quality impacts can be reduced through reductions in traffic volume and traffic congestion, so air quality mitigation is closely tied to traffic mitigation.

9.3.1 Full Build-Out

The air quality-related mitigation commitments for full build-out include:

- Construct roadway improvements along Clark Road, improving the Route 3 interchange, and selected intersection improvements as previously described under Traffic Mitigation;
- Implement a portion of the TDM program as described above under traffic mitigation;
- Provide a network of pedestrian trails throughout the community which link the residential areas, commercial development and various points of interest together; and

› Promote telecommunications throughout the community in anticipation of growth in, and further acceptance of, telecommuting and other work-at-home programs as well as the possibility of a community intranet.

9.3.2 PRD: Phases I-VI

Phase I

The Pinehills mitigation commitments relating to the PRD: Phase 1 include:

› Construct pedestrian paths throughout the PRD: Phase I development area;

› Install bicycle parking areas in the Neighborhood Green District;

› Analyze the viability of computer network communications within the Pinehills in order to offset the rate of single occupancy vehicle trips; and

› Complete development of initial TDM plan and implement relevant first phase elements described above under traffic mitigation.

Phase II

The Pinehills mitigation commitments relating to the PRD: Phase II include:

› Construct pedestrian and bicycle paths throughout the PRD: Phase II development area;

› Implement planned-for analysis (Infrastructure Plan & Phased Review Document: Phase I) of the viability of computer network communications, including a community intranet, within the Pinehills in order to offset the rate of single occupancy vehicle trips; and

› Implement relevant elements of the TDM plan.

Phase III

The Pinehills mitigation commitments relating to the PRD: Phase III include:

› Construct pedestrian and bicycle paths throughout the PRD: Phase III development area;

› Implement planned-for analysis (Infrastructure Plan & Phased Review Document: Phase I) of the viability of computer network communications, including a community intranet, within The Pinehills Community in order to offset the rate of single occupancy vehicle trips; and

› Implement relevant elements of the TDM plan.

Phase IV

The Pinehills mitigation commitments relating to the PRD: Phase IV include:

› Construct pedestrian and bicycle paths throughout the PRD: Phase IV development area;

› Implement planned-for analysis (Infrastructure Plan & Phased Review Document: Phase I) of the viability of computer network communications, including a community intranet, within The Pinehills Community in order to offset the rate of single occupancy vehicle trips; and

› Implement relevant elements of the TDM plan.

Phase V

The Pinehills mitigation commitments relating to the PRD: Phase V include:

› Construct pedestrian and bicycle paths throughout the PRD: Phase V development area;

› Implement planned-for analysis (Infrastructure Plan & Phased Review Document: Phase I) of the viability of computer network communications, including a community intranet, within The Pinehills Community in order to offset the rate of single occupancy vehicle trips. A community intranet system is operational and was launched in September 2003; and

› Implement relevant elements of the TDM plan.

Phase VI

The Pinehills mitigation commitments relating to the PRD: Phase VI include:

› Construct pedestrian and bicycle paths throughout the PRD: Phase V development area;

› Implement planned-for analysis (Infrastructure Plan & Phased Review Document: Phase I) of the viability of computer network communications, including a community intranet, within The Pinehills Community in order to offset the rate of single occupancy vehicle trips. A community intranet system is operational and was launched in September 2003; and

› Implement relevant elements of the TDM plan.

9.3.3 PRD: Phase VII

The Pinehills mitigation commitments relating to the PRD: Phase VII include:

› Implement relevant elements of the TDM plan.

9.4 Aquifer Recharge Mitigation

The Pinehills lies over the Plymouth-Carver Aquifer and falls within two watersheds with respect to surface water features. Groundwater recharged beneath the northern section of the Pinehills flows north towards the Eel River and ultimately out to Plymouth Harbor, while groundwater from beneath the remainder of the Pinehills flows east to Cape Cod Bay, either directly or through Beaver Dam Brook. A design goal for the Pinehills is to maintain the hydrologic balance of the aquifer and of both watersheds. Changes in the water balance can result from pumping drinking or irrigation water, discharging treated effluent from the wastewater treatment plant, and infiltrating stormwater.

Wastewater generated from nearly all of the Pinehills is treated at the Pinehills Private Sewage Treatment Facility (PSTF) to maximize water quality protection. PSTF effluent is discharged at two locations in the Pinehills to better disperse recharge within the aquifer. Both PSTF discharge locations are located less than a mile from the wells from which the water was originally withdrawn. One of the PSTF discharge locations is directly upgradient from the Pinehills Golf Club irrigation wells so that nutrient-enriched groundwater from the

PSTF can be captured and re-used for golf course irrigation water reducing the Club's fertilization requirements.

Irrigation of common area landscaping is accomplished with 25 separate irrigation wells dispersed throughout the Pinehills. The use of so many different wells keeps the withdrawal sources close to where the irrigation water is used and disperses the withdrawal impacts over a larger area than would more centralized irrigation withdrawals.

Further, as part of the state's new Water Management Act (WMA) regulations enacted in 2015, the Pinehills, like all WMA permit holders in the state, was required to offset all of its permitted withdrawals above 2005 baseline conditions. Since the Pinehills was minimally developed in 2005, this mitigation offset covered a majority of the water volume allowed by permit for the public water supply (PWS) wells, for irrigation of all three golf courses, and for common area irrigation. These offsets were achieved by a combination of direct offsets (e.g. wastewater and stormwater infiltration), and by indirect habitat and conservation measures (e.g. permanent conservation of land as open space, enacting water conservation requirements into the Pinehills regulating bylaws, and making monetary contributions to habitat restoration projects). During the 2015 WMA renewal process Pinehills received state WMA approval for both the existing permitted withdrawal volumes, and for the additional PWS withdrawal volume requested and approved from MEPA as part of Notice of Project Change IX.

The minor changes resulting from the water withdrawal and effluent discharge are compensated by infiltration of stormwater runoff across the property. Infiltrating stormwater increases the volume of water recharging the aquifer as 90 percent of precipitation falling on impervious areas becomes recharge. In comparison, the recharge rate for undeveloped or landscaped areas is only 50 percent. Stormwater infiltration mitigates against any changes in the water balance in each watershed, maintaining or increasing the amount of water that recharges the aquifer systems and the Eel River.

9.5 Water Quality Mitigation

The quality of potable water, surface water, and groundwater can potentially be impacted by wastewater system design, pest and vegetation management programs, and stormwater runoff from impervious surfaces. The Project was designed specifically to avoid negative water quality impacts through the comprehensive mitigation program described below.

9.5.1 Full Build-Out

The water quality-related mitigation commitments for full build-out include:

- Design wastewater and water supply systems in tandem to ensure complete separation of the Zone I and II areas from the treatment plant impact area:
  - Discharge treated effluent from the PSTF outside of the Zone II to minimize the nutrient inputs in areas that could impact the public water supply wells serving The Pinehills.
- Develop an Integrated Pest Management Plan (IPM) to guide the maintenance of the golf course turfgrass within the Zone II and across the property, minimizing fertilizer and pesticide use:

- Select pesticides used on the turf to limit migration through the soil layer and into the groundwater.

› Mitigate impacts on water quality by installing capture (a.k.a. interceptor) wells downgradient of the primary PSTF disposal beds to limit the movement of phosphorus and nitrogen to Island Pond:
  - Use these wells to irrigate the two Pinehills Golf Club golf courses and remove approximately 60% of the nutrients discharged from the wastewater treatment plant before they can migrate towards Great Island Pond.

› Place significant restrictions on any development within 200 feet of the Eel River, such that Pinehills LLC must prove that proposed activities will not be a source of phosphorus to the river;

› Use the Pinehills Master Plan, DEP's Performance Standards and Guidelines for Stormwater Management and the Plymouth DPW Guide for the Design of Storm Drainage Facilities as the foundation for the stormwater management plan:
  - Select the most effective best management practices for short-term and long-term protection of water resources: Non-structural methods include the site layout, source control, and pavement sweeping, while permanent structural methods include water quality swales, catch basins, stormwater detention/water quality basins, and infiltration systems.

› Establish a water quality and biological monitoring program as required under the Groundwater Discharge Permit issued for the site:
  - Monitor at locations downgradient of the property boundaries and the wastewater disposal facilities, and within Great Island Pond and the Eel River system.
  - Provide the results of this monitoring to the Department of Environmental Protection and the Eel River Watershed Association on an annual basis and make them available for review by the general public.

9.5.2 PRD: Phases I-VI

Phase II

An extensive monitoring program was begun to characterize the background conditions in the two watersheds within which the Site is located. This activity is helpful not only to the Pine Hills LLC in planning its future uses, but also helps the Town of Plymouth to plan for potential impact of its wastewater treatment plant and associated nutrient monitoring and management programs. Once background conditions were established, modified monitoring programs were undertaken, and are currently ongoing.

Phases III & IV

In Phase III, the locations of the public supply well and the wastewater treatment facility were selected to prevent a connection between the two. Three additional mitigation measures were specifically included in the PRD Phase III proposal that are associated with wastewater disposal:

- Pinehills LLC agreed, as part of the revised Groundwater Discharge Permit, to a limit of 250 septic systems within the Eel River Watershed. While up to approximately 900 homes may be built within the watershed, only 250 can use on-site systems with the remainder being connected to the centralized wastewater system. This reduces the potential nitrogen loading within the Eel River watershed from 16,725 lbs N/yr to 7,416 lbs N/yr; a 56% reduction from what was allowed under the original Groundwater Discharge Permit;
- Pinehills LLC also agreed to provide centralized wastewater treatment for as much of the community as is feasible. At buildout, over 90% of the residences within The Pinehills will be sewered. This additional wastewater treatment reduces the nitrogen loading to groundwater across the property by more than 30%; and
- Pinehills LLC agreed to site any additional wastewater disposal facilities outside the Eel River Watershed. This prevents the discharge of additional nutrients in an area that might affect the Eel River, and also minimizes the transfer of water from the southern portion of the property to the Eel River Watershed. Siting the disposal facilities in the southern portion of the property improves the hydrologic balance in this watershed as water withdrawn by the public supply well is discharged back into the same watershed (but outside of the Zone II area).

Phase V

Mitigation measures described for Phase IV were continued in Phase V. In Phase V, the Proponent drafted an application for Permit renewal, as the existing Groundwater Discharge Permit was set to expire in the spring of 2005. Pinehills consulted with the Eel River Watershed Association prior to the submission of the Permit renewal to DEP.

Phase VI

The Pinehills mitigation commitments relating to the PRD: Phase VI include:

- Pinehills LLC agreed, under the 2008 renewal of the Groundwater Discharge Permit, to further limit the number of septic systems within the Eel River Watershed, reducing the number from 250 to 25. While up to approximately 900 homes may be built within the watershed, only 25 can use on-site systems with the remainder being connected to the centralized wastewater system. This reduces the potential nitrogen loading within the Eel River watershed from 16,725 lbs N/yr to 6,559 lbs N/yr; a 61% reduction from what was allowed under the original Groundwater Discharge Permit. Pinehills anticipates that most, if not all, of the homes included in PRD: Phase VI will be serviced by the Pinehills PSTF; and
- Pinehills LLC also agreed to provide centralized wastewater treatment for as much of the community as is feasible. It is anticipated that at least 95% of the residences within The Pinehills will now be sewered. This additional wastewater treatment reduces the nitrogen loading to groundwater across the property by more than 30%.

9.5.3 PRD: Phase VII

No new water quality mitigation measures are included in Phase VII, as water quality commitments to build out were already maximized in prior PRD phases.

9.6 Historical and Archaeological Impact Avoidance and/or Mitigation

The Pinehills has been designed to preserve historic resources within the Site, including the unpaved portion of Old Sandwich Road, Cornish's Tavern, Sacrifice Rock, and Talcott Estate. The Proponent has worked with the Massachusetts Historical Commission (MHC) to achieve compliance with state standards to preserve historical and archeological resources and to avoid and/or mitigate adverse impacts to such resources as described below.

9.6.1 Full Build-Out

The historic and archaeological resources-related mitigation commitments for full build-out include:

- Perform a reconnaissance archaeological survey as per state and federal standards in advance of submission of each PRD to MEPA;
- Perform an intensive archaeological survey of each phase of the project as per state and federal standards in advance of detailed land use planning for that phase (and in advance of relevant MEPA submissions for same);
- Execute a Memorandum of Agreement (MOA) with Massachusetts Historical Commission to address identification and evaluation of historic and archeological resources which may be affected by the project, as well as potential effects of this project on historic resources;
- Maintain open space and buffer zone areas as provided in the MOA;
- Document landscapes, road layouts, and past and present land within the project's area of potential effect, including Old Sandwich Road, Cornish's Tavern (known locally as Wright Tavern) and the Talcott Estate; and
- Establish the Bypass Road to protect the unpaved portion of Old Sandwich Road.

9.6.2 PRD: Phases I-VI

Phase I

The Pinehills impact avoidance and/or mitigation commitments relating to the PRD: Phase 1 include:

- Perform a reconnaissance archaeological survey as per state and federal standards in advance of submission of PRD: Phase 1 to MEPA;
- Perform an intensive archaeological survey of PRD: Phases 1 of the project as per state and federal standards;
- Execute a Memorandum of Agreement with Massachusetts Historical Commission to address identification and evaluation of historic and archeological resources which may be affected by the project, as well as potential effects of this project on historic resources;
- Maintain open space and buffer zone areas as provided in the MOA;

- Document landscapes, road layouts, and past and present land within the PRD: Phase I area of potential effect, including Old Sandwich Road and Cornish's Tavern; and
- Establish the first portion of the Bypass Road to protect the unpaved portion of Old Sandwich Road.

Phase II

The Pinehills impact avoidance and/or mitigation commitments relating to the PRD: Phase II include:

- Perform a reconnaissance archaeological survey as per state and federal standards in advance of submission of PRD: Phase III to MEPA;
- Perform an intensive archaeological survey of PRD: Phase II of the project as per state and federal standards;
- Implement the Memorandum of Agreement with Massachusetts Historical Commission to address identification and evaluation of historic and archeological resources which may be affected by the project, as well as potential effects of this project on historic resources. This includes maintaining open space and buffer zone areas as provided for in the MOA and documenting landscapes, road layouts, and past and present land uses within the PRD: Phase II area;
- Establish the second portion of the Bypass Road to protect the unpaved portion of Old Sandwich Road; and
- Maintain the Cornish Tavern, as directed in the MOA with MHC.

Phase III

The Pinehills impact avoidance and/or mitigation commitments relating to the PRD: Phase III include:

- Perform an intensive archaeological survey within those portions of PRD: Phase III of the project identified as possessing moderate or high archaeological sensitivity, to identify any potentially significant archaeological resources, as per state and federal standards;
- Consult with MHC on the results of intensive surveys to evaluate any properties identified and determine if any further archaeological site examination work is necessary. If any resources affected by the project are determined through evaluation to be significant and eligible for listing in the National Register of Historic Places, consult with MHC to determine whether any adverse effects can be prudently or feasibly avoided, minimized or mitigated. If significant archaeological resources requiring mitigation are identified within project impact areas, Pinehills LLC will prepare an archaeological data recovery plan and research design in consultation with MHC; and
- Continue to implement the Memorandum of Agreement with Massachusetts Historical Commission to address identification and evaluation of historic and archeological resources which may be affected by the project, as well as potential effects of this project on historic resources. This includes maintaining open space and buffer zone as are provided for in the MOA and documenting landscapes, road layouts, and past and present land uses within the PRD: Phase III area.

Phase IV

The Pinehills impact avoidance and/or mitigation commitments relating to the PRD: Phase IV include:

- Perform an intensive archaeological survey within those portions of PRD: Phase IV of the project identified as possessing moderate or high archaeological sensitivity, to identify any potentially significant archaeological resources, as per state and federal standards;
- Perform an historic structures assessment of the Talcott estate home and outbuildings, as per state and federal standards;
- Consult with MHC on the results of intensive survey and historic structures assessment to evaluate any properties identified and determine if any further archaeological site examination work or assessment is necessary. If any resources affected by the project are determined through evaluation to be significant and eligible for listing in the National Register of Historic Places, consult with MHC to determine whether any adverse effects can be prudently or feasibly avoided, minimized or mitigated. If significant archaeological resources requiring mitigation are identified within project impact areas, Pinehills LLC will prepare an archaeological data recovery plan and research design in consultation with MHC;
- Continue to implement the Memorandum of Agreement with Massachusetts Historical Commission to address identification and evaluation of historic and archeological resources which may be affected by the project, as well as potential effects of this project on historic resources. This includes maintaining open space and buffer zone as are provided for in the MOA and documenting landscapes, road layouts, and past and present land uses within the PRD: Phase IV area; and
- Maintain the Cornish/Wright Tavern and Rye Field, as directed in the MOA with MHC and cultural resources management plan.

Phase V

The Pinehills impact avoidance and/or mitigation commitments relating to the PRD: Phase V include:

- Perform an intensive archaeological survey within those portions of PRD: Phase V of the project identified as possessing moderate or high archaeological sensitivity, to identify any potentially significant archaeological resources, as per state and federal standards;
- Consult with MHC on the results of intensive survey and historic structures assessment to evaluate any properties identified and determine if any further archaeological site examination work or assessment is necessary. If any resources affected by the project are determined through evaluation to be significant and eligible for listing in the National Register of Historic Places, consult with MHC to determine whether any adverse effects can be prudently or feasibly avoided, minimized or mitigated. If significant archaeological resources requiring mitigation are identified within project impact areas, Pinehills LLC will prepare an archaeological data recovery plan and research design in consultation with MHC. If necessary, a specific Memorandum of Agreement will be developed in consultation with MHC for any data recovery program required to mitigate adverse effects on a significant archaeological or historic resource;

- Continue to implement the Memorandum of Agreement with Massachusetts Historical Commission to address identification and evaluation of historic and archeological resources which may be affected by the project, as well as potential effects of this project on historic resources. This includes maintaining open space and buffer zone as are provided for in the MOA and documenting landscapes, road layouts, and past and present land uses within the PRD: Phase V area; and
- Maintain the Cornish/Wright Tavern and Rye Field, as directed in the MOA with MHC and cultural resources management plan. Ensure that MHC is afforded the opportunity to review and comment on any changes to preliminary designs and also the opportunity to review and comment on proposed future projects at the Symington – Talcott Estate, including future work at the Talcott Estate Home; as directed in the MOA with MHC for this historic resource.

Phase VI

The Pinehills impact avoidance and/or mitigation commitments relating to the PRD: Phase VI include:

- In November 2012 PAL completed an intensive locational archaeological survey within the Pinehills PRD VI project area to identify any potentially significant archaeological resources, as per state and federal standards;
- PAL, on behalf of Pinehills, consulted with MHC on the results of intensive survey to evaluate any properties identified and determine if any further archaeological site examination work or assessment is necessary. MHC concurred with PAL's conclusion that no significant archaeological or historic resources were identified and there no additional survey would be required;
- Pinehills continued to implement the Memorandum of Agreement with Massachusetts Historical Commission to address identification and evaluation of historic and archeological resources which may be affected by the project, as well as potential effects of this project on historic resources. This includes maintaining open space and buffer zone as are provided for in the MOA; and
- Maintained the Cornish/Wright Tavern and Rye Field, as directed in the MOA with MHC and cultural resources management plan. Ensure that MHC is afforded the opportunity to review and comment on any changes to preliminary designs and also the opportunity to review and comment on proposed future projects at the Symington – Talcott Estate, including future work at the Talcott Estate Home; as directed in the MOA with MHC for this historic resource.

9.6.3 PRD: Phase VII

As necessary, the Proponent will continue to implement the Memorandum of Agreement with Massachusetts Historical Commission to address identification and evaluation of historic and archeological resources which may be affected by the project, as well as potential effects of this project on historic resources. This includes maintaining open space and buffer zone as are provided for in the MOA.

9.7 Wetlands and Wildlife Impact Avoidance and/or Mitigation

The Pinehills is designed to avoid direct impacts to wetland resources and wildlife habitat, such as filling, excavating, or clearing wetland resource areas. The Project maintains protective buffers of naturally occurring vegetation between the work limits and resource areas, and includes additional mitigation measures such as erosion control, stormwater management, and other Best Management Practices (BMPs). The Site design includes a minimum of two thousand acres as open space, the majority of which will be in a natural condition, to preserve and enhance existing conditions.

9.7.1 Full Build-Out

The wetlands and wildlife-related mitigation commitments for full build-out include:

- Design land uses with goal of avoiding construction within wetlands and water body buffer area;
- Maintain at least 2,279 acres as open space including a 392 acre wildlife preserve at northern edge of The Pinehills maintained according to an accepted Forest Management Plan (Chapter 61) and the transfer to the Town of Plymouth of the "reserved land" portion of The Pinehills for local stewardship and buffers to property lines and existing public roads;
- Ensure the existence of a network of patches to provide for lepidopteran colonization, as agreed to by the Natural Heritage and Endangered Species Program, to enable inhabitation of said species in The Pinehills;
- Restrict pesticide and herbicide use through implementation of an IPM program;
- Prohibit hunting; and
- Introduce new, manmade surface water bodies to the Community.

With the adoption of Alternative #4 via the September 1998 revised zoning, total on-site open space will increase from 2,000 to 2,125 acres and further restrict municipal use of the "reserved land "west of Route 3.

9.7.2 PRD: Phases I-VI

Phase I

The Pinehills impact avoidance and mitigation commitments relating to the PRD: Phase 1 include:

- Design land uses with goal of avoiding construction within wetlands and water body buffer areas, to the extent feasible;
- Restrict pesticide and herbicide use through implementation of an IPM program;
- Prohibit hunting;
- Maintain at least 70% of the Site (541 acres) as open space;
- Establish a network of lepidopteran habitats, as proposed to by the Natural Heritage and Endangered Species Program, to enable inhabitation of said species in the Pinehills; and

› Introduce five new manmade surface water bodies to the Community.

Phase II

In addition to the impact avoidance and mitigation commitments relating to Phase I, Phase II measures include:

› Establish upland corridors to enhance species protection associated with vernal pools;
› Maintain at least 70% of the Site (2,126 acres) as open space, including large contiguous areas containing substantial diversity of community types. These include a 350-acre wildlife preserve at northern edge of the Pinehills maintained according to an accepted Forest Management Plan (Chapter 61), transfer to the Town of Plymouth the 207 contiguous acres of "reserved land" portion of the Pinehills for local stewardship, and buffers to property lines and existing public roads;
› Remove existing fences that may work to block wildlife corridor activity within the site;
› Ensure that stormwater runoff from all phases does not impact wetlands;
› Institute and maintain an erosion and sediment control program to minimize construction related impacts to wetlands;
› Maintain Old Sandwich Road as an unpaved roadway to preserve potential migration of animals between Vernal Pools E, C and F-G complex;
› Ensure the existence of a network of patches that range in size and are critically proximate to each other to provide for lepidopteran colonization in The Pinehills;
› Restrict golf-associated pesticide and herbicide use, particularly during breeding migration, through on-going implementation of the IPM program approved by the Town of Plymouth and the Department of Environmental Protection;
› Ensure that golf associated runoff from greens and tees are directed away from vernal pools;
› Prohibit hunting; and
› Introduce three new manmade surface water bodies to the site.

Phase III

In addition to the impact avoidance and mitigation commitments relating to previous phases, Phase III measures include:

› Introduce one additional new manmade surface water body to the site.

Phase IV

In addition to the impact avoidance and mitigation commitments relating to previous phases, Phase IV measures include:

› Establish appropriate undisturbed buffers of natural vegetation between the limit of work and the edge of wetlands; and
› Introduce one additional new manmade surface water body to the site.

Phase V

As a result of the construction of the private golf course as reviewed under PRD: Phase IV, approximately 1,050 square feet of Bordering Vegetated Wetlands were altered for upgrades to an existing walking trail. These impacts were permitted under the Massachusetts Wetlands protection Act and the U.S. Clean Water Act (Section 401 and 404). As part of the permitting, wetland mitigation was required. The approved mitigation plan included the planting of approximately 500 linear feet of Bank of a constructed irrigation pond (part of the golf course development).

In addition, at the request of the Town of Plymouth, Pinehills agreed to place the northern nature preserve under a permanent conservation restriction, beginning with the portion of the nature preserve located to the west of Old Sandwich Road, the boundary for which was established under PRD: Phase IV.

In addition to the impact avoidance and mitigation commitments relating to previous phases, Phase V measures include:

- Maintain at least 70% of the Site (2270 acres) as open space and common facilities, including large contiguous areas containing substantial diversity of community types. These include an approximately 392-acre wildlife preserve at northern edge of The Pinehills community maintained according to an accepted Forest Management Plan (Chapter 61) and placement of the preserve under a permanent conservation restriction; the transfer to the Town of Plymouth in 2001 of the 207 contiguous acres of "reserved land" portion of The Pinehills community for local stewardship under a conservation restriction preserving the land for public recreational uses, and the creation and maintenance of buffers to property lines and existing public roads;
- Design golf and homes to minimize interaction with wetland areas; and
- Introduce one additional new manmade surface water body to the site.

Phase VI

Designations in the Massachusetts Natural Heritage Atlas have changed throughout the development of the Pinehills. The designations provided in the October 1, 2008 Natural Heritage Atlas (active at the time of the PRD VI submittal) designated two areas of mapped Priority Habitat of Rare Species (PH)/ Estimated Habitat of Rare Wildlife (EH) within The Pinehills property totaling 125.9 acres. PH 988 and EH 832 were located along the shoreline of Great Island Pond, in an area that had already been reviewed through the MEPA process. Areas PH 777 and EH 201 were located in the northwest corner of the Pinehills and along the power line easement that bisects the northern portion of the site, within the PRD VI area. These areas were listed as habitat for two Species of Special Concern: Eastern Box Turtle and Whip-poor-will. While the revised 2008 Natural Heritage Map effectively reduced the amount of land at The Pinehills that falls within designated rare species habitat, in PRD VI Pinehills LLC committed to upholding all previously proposed and implemented mitigation measures as summarized above.

PRD VI included 2.56 acres of land within the mapped habitat where development is proposed. Pinehills LLC and NHESP have been in discussions since approximately 2006 regarding the

future permitting for development that is located within mapped habitat. Pinehills LLC submitted a Request for MESA Project Review as required and continued to work with NHESP to design the PRD VI portion of the project in accordance with MESA regulations. In addition, the Pinehills LLC agreed to implement voluntary measures to maintain and improve the habitat values of open space areas east of Old Sandwich Road, which have already completed the MEPA review process and/or are outside of the mapped habitat, but within similar vegetation communities, and are likely to have similar habitat values.

Voluntary measures agreed to be implemented in PRD-Phase VI include:

- Continue to preserve 70 percent of the Project Site as designated open space and natural habitat;
- Construct three turtle crossings/travel corridors designed as open culverts beneath the main road that will extend across the ridge of the Pine Hills (Figure 8.1) to promote safe movement of turtles through this portion of the site; and
- Collaborate with NHESP on the future use of the sand and gravel pit located along Beaver Dam Road in order to maximize the habitat value for box turtles.

As part of Notice of Project Change VIII, Pinehills LLC agreed with NHESP on a mitigation plan that includes placing a permanent conservation restriction on approximately 9 acres of the gravel pit parcel No development will occur within this area, and, additionally, none of the homes added to the Pinehills community through NPC VIII may be built within mapped Priority Habitat.

9.7.3 PRD: Phase VII

NHESP routinely updates its state-wide mapping of rare species habitat, and as of this most recent mapping, effective August 1, 2017, there are no areas of mapped habitat at the Pinehills. The most proximate area of mapped habitat is surrounding Long Island Pond (PH 635), located southeast of Beaver Dam Road (Figure 8.1). Despite the property no longer being mapped by NHESP, Pinehills LLC continues to abide by the following conditions agreed to during PRD VI:

- Preserve at least 1.5 acres of land as open space for each acre of land disturbed.
  - The project exceeds that requirement by providing 48 acres of open space land for each acre disturbed, well above the ratio requested by NHESP. Please note this is over and above the other permanently protected and open space areas throughout the Pinehills community.
- Place an Open Space Covenant and Restriction for conservation of habitat on the approximately 11.21-acre former gravel pit property on the eastern border of the Pinehills along Beaver Dam Road. The sandy gravel pit provides excellent turtle nesting habitat. In addition, the Proponent will implement a habitat enhancement program for the area in consultation in consultation with and approved by NHESP.
  - The covenant and restriction is in process and expected to be recorded in 2020.
- Provide two turtle crossings at NHESP-approved locations beneath Long Ridge Road as part of the PRD VI development (Figure 8.1).

- Construction of the extension of Long Ridge Road which began in fall of 2020 and will continue through spring of 2021, will include the construction of two NHESP-approved turtle crossing locations.

10

Response to Comments

This chapter presents comments received on The Pinehills 9th Notice of Project Change and provides responses to each. The following comment letters were received by MEPA during the NPC public comment period:

- The Division of Fisheries and Wildlife
- MassDEP Southeast Regional Office

10.1 The Division of Fisheries and Wildlife

Comment 1.01
Any changes to the proposed project or any additional work beyond that shown on the site plans may require an additional filing with the Division pursuant to the MESA. This project may be subject to further review if no physical work is commenced within five years from the date of issuance of this determination, or if there is a change to the project.

Response

No work beyond that shown on the initial site plans is anticipated. All work related to PRD VII will be conducted in areas previously studied and reviewed.

10.2 MassDEP Southeast Regional Office

Comment 2.01
Two permits will need to be obtained from the Massachusetts Department of Environmental Protection (MassDEP) to approve the increased withdrawal volume. A new Water Management Act (WMA) permit will be needed to authorize the additional withdrawal. And a New Source Approval (NSA) permit will also be needed for the increased withdrawal, and to approve an updated Zone II wellhead protection area delineation. In support of these permit applications, a new pumping test of the supply wells will be conducted to confirm that they are capable of supplying the proposed water volume.

Response

Following consultation with the MassDEP, the Proponent submitted a pumping test proposal (BRP WS17) which was approved by MassDEP on October 11, 2019. A five-day pumping test was performed in December 2019 and a permit application (BRP WS19) was submitted on February 26, 2020 for approval of the pumping test for an increase in the allowable water withdrawal from Production Well #1 (4239055-02G) and Production Well #2 (4239055-01G). By a letter dated May 14, 2020 (Transmittal No. X285598), MassDEP approved the Pumping Test/Source Final Report increasing the approved withdrawal rate for the combined

withdrawals from the production wells to 1,132 GPM. Approval was provided with the understanding that the Proponent is filing an application for a new Water Management Act Permit for the increased withdrawal and that no increase in pumping will occur until such time as the new WMA Permit is issued. An application for a new WMA Permit was submitted to MassDEP by the Proponent on July 16, 2020 (20-WM03-0003-APP). The public comment period is complete, and the permit is under review by MassDEP. We anticipate issuance of the permit in 2020.

Comment 2.02
The NPC states that future flows will reach 413,192 gpd within the next decade. The increase in water withdrawal will change the Zone II slightly. The existing and future Zone II's do not intersect the WWTF's disposal areas.

Response

Work associated with Phase VII is not anticipated to significantly impact water withdrawal or the ZONE II areas.

Comment 2.03
Pinehills is requesting an increase to the permitted annual average withdrawal volume from 167.90 mgy to 237.35 mgy (an increase of 69.45 mgy or 0.19 mgd). The Pinehills is also seeking an increase in the permitted maximum daily withdrawal volume from their sources from I .40 mgd to I .69 mgd. These withdrawal increases require a new WMA permit.

Response

See response to Comment 2.01 above.

Comment 2.04
DCR's results confirmed Pinehills' own projections. Therefore, the WNF is not expected to affect the requested withdrawal volume in Pinehills' new WMA permit application.

Response

Noted. No response required.

Comment 2.05
Pinehills is required to re-delineate the Zone II of its PWS wells and obtain MassDEP's approval of the proposed increase to the maximum daily withdrawal volume. A pumping test will be required.

Response

See response to Comment 2.01 above.

Comment 2.06
The Project Proponent is advised that if oil and/or hazardous material are identified during the implementation of this Project, notification pursuant to the Massachusetts Contingency Plan (310 CMR 40.0000) must be made to MassDEP, if necessary. A Licensed Site Professional (LSP) should be retained to determine if notification is required and, if need be, to render

appropriate opinions. The LSP may evaluate whether risk reduction measures are necessary if contamination is present. The BWSC may be contacted for guidance if questions arise regarding cleanup.

Response

The Proponent will comply with the protocol above, if warranted.

Comment 2.07
MassDEP requests that all non-road diesel equipment rated 50 horsepower or greater meet EPA's Tier 4 emission limits, which are the most stringent emission standards currently available for off-road engines. If a piece of equipment is not available in the Tier 4 configuration, then the Proponent should use construction equipment that has been retrofitted with appropriate emissions reduction equipment.

Response

The Proponent will comply with the EPA's Tier 4 emission limits during construction.

Comment 2.08
The Proponent should maintain a list of the engines, their emission tiers, and, if applicable, the best available control technology installed on each piece of equipment on file for Departmental review.

Response

This information will be tracked as required.

Comment 2.09
MassDEP reminds the Proponent that unnecessary idling (i.e., in excess of five minutes), with limited exception, is not permitted during the construction and operations phase of the Project (310 CMR 7.11).

Response

Construction will comply with 310 CMR 7.11.

Comment 2.10
In addition, to ensure compliance with this regulation once the Project is occupied, MassDEP requests that the Proponent install permanent signs limiting idling to five minutes or less on-site.

Response

The requested signage will be installed.

Comment 2.11
A spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and post-construction activities should be presented to workers at the site and enforced. The plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases.

Response

The Proponent will comply.

Comment 2.12
In accordance with 301 CMRI 11.07(6)(k), this chapter should also include separate updated draft Section 61 Findings for each State agency that will issue permits for the Project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Response

A summary of mitigation commitments is included in Chapter 9.

Appendix A – Certificates of the Secretary of Energy and Environmental Affairs

- Environmental Notification Form/Special Review Procedure, April 17, 1998
- 1st Notice of Project Change, September 25, 1998
- Phased Review Document: Phase I/Infrastructure Plan, December 8, 1998
- Phased Review Document: Phase II, September 16, 1999
- 2nd Notice of Project Change/Phased Review Document: Phase III, April 6, 2001
- 3rd Notice of Project Change, June 22, 2001
- 4th Notice of Project Change/ Phased Review Document: Phase IV, August 30, 2002
- 5th Notice of Project Change, April 23, 2004
- Phased Review Document: Phase V, October 15, 2004
- 6th Notice of Project Change, August 9, 2006
- 7th Notice of Project Change, April 6, 2007
- Phased Review Document: Phase VI, September 27, 2013
- 8th Notice of Project Change, July 11, 2014
- 9th Notice of Project Change, September 20, 2019