Today's Speakers

- Stephen Roy, P.G., NH DES Drinking Water & Groundwater Bureau

  (603) 271-0660, stephen.roy@des.nh.gov

- Robert Tardif, P.E., NH DES Subsurface Systems Bureau

  (603) 271-2904, robert.a.tardif@des.nh.gov

- Randall Arendt, F.R.T.P.I., ASLA (Hon).

  (207) 406-4242, rgarendt@comcast.net

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

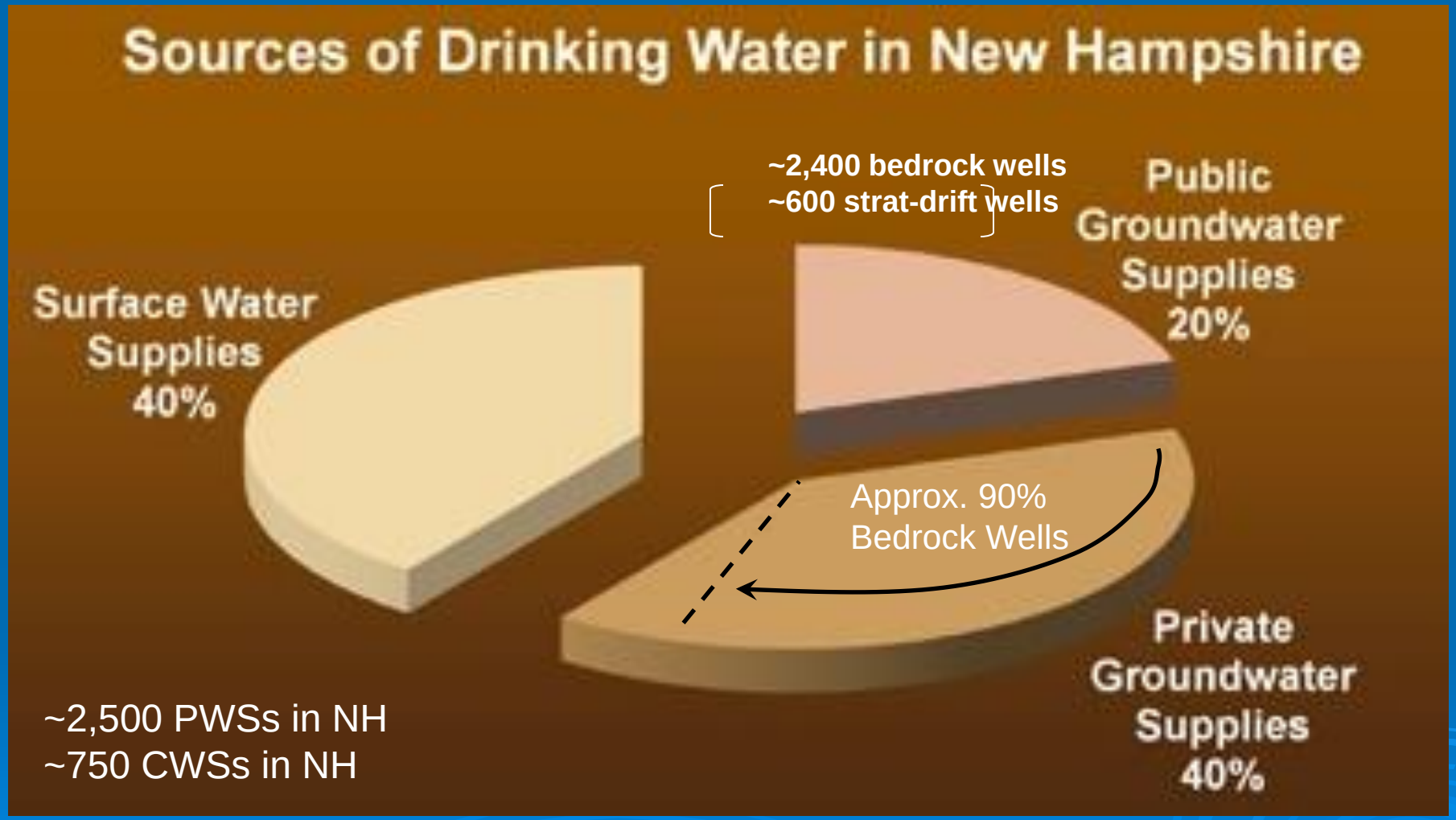
Private and Public Well Siting Standards

Stephen Roy, P.G.

NHDES, Drinking Water and Groundwater Bureau

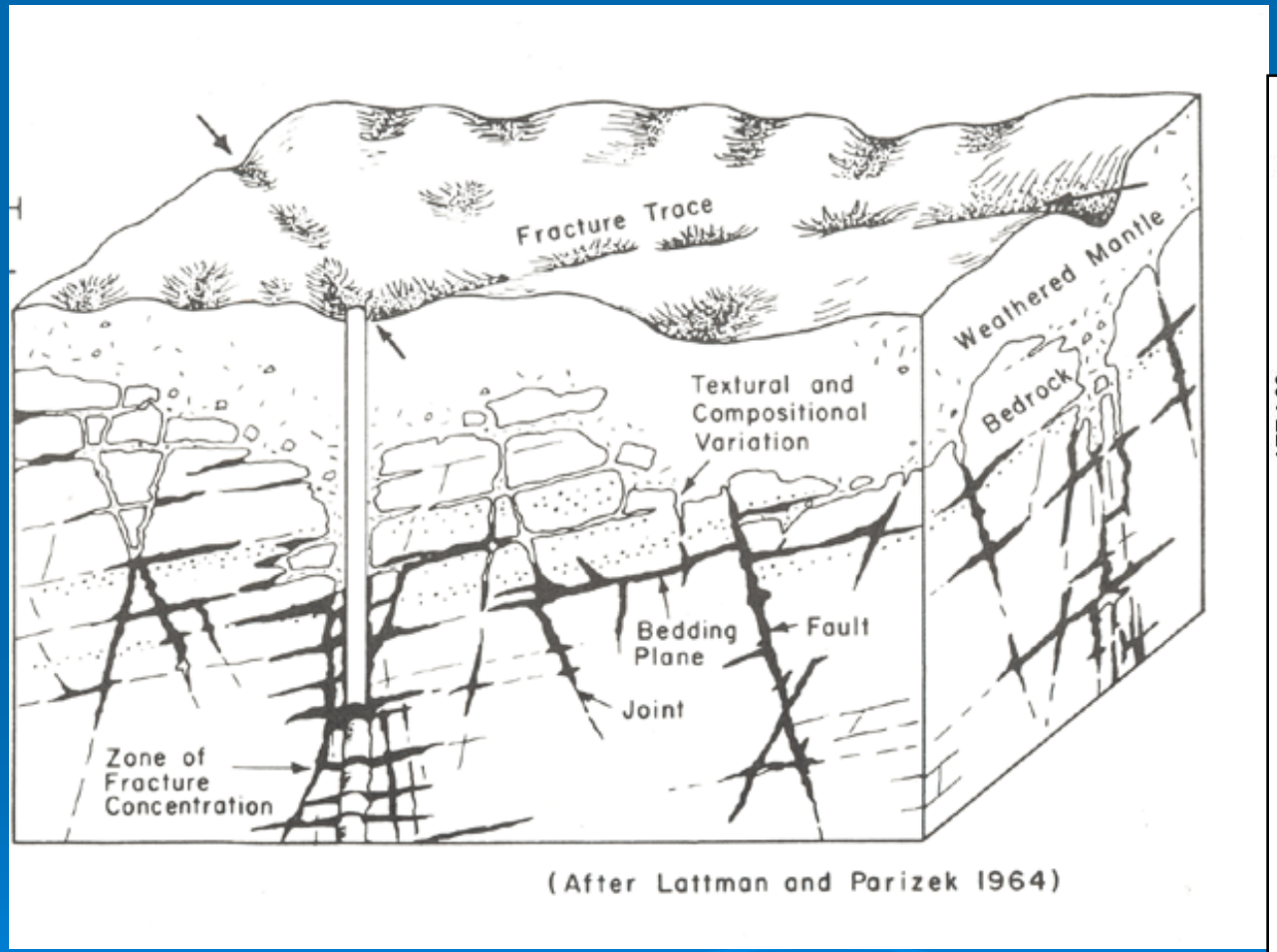
Stephen.Roy@des.nh.gov

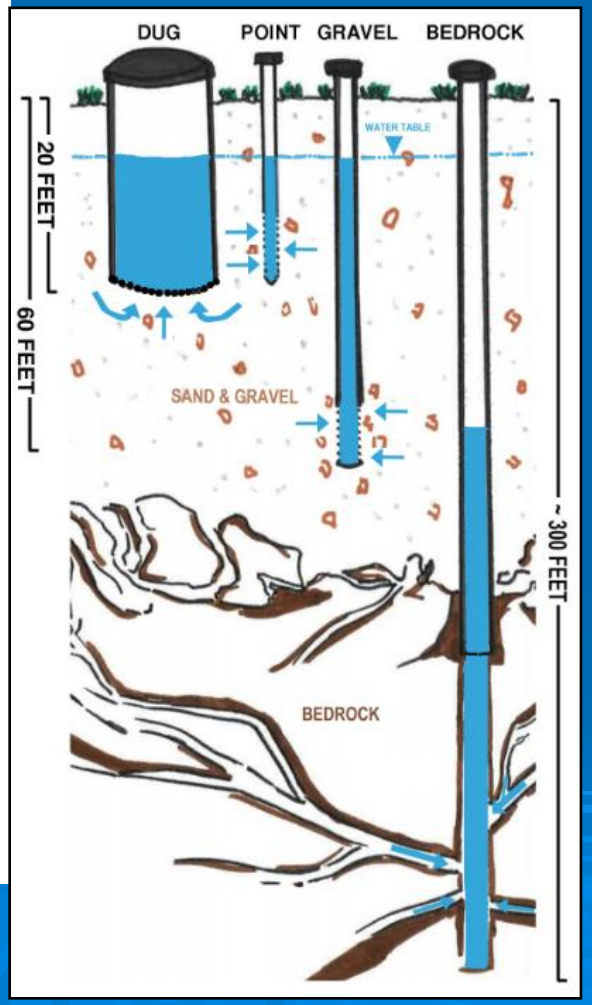
Where Does NH get its Drinking Water?



From: The New Hampshire Water Resources Primer, 2008

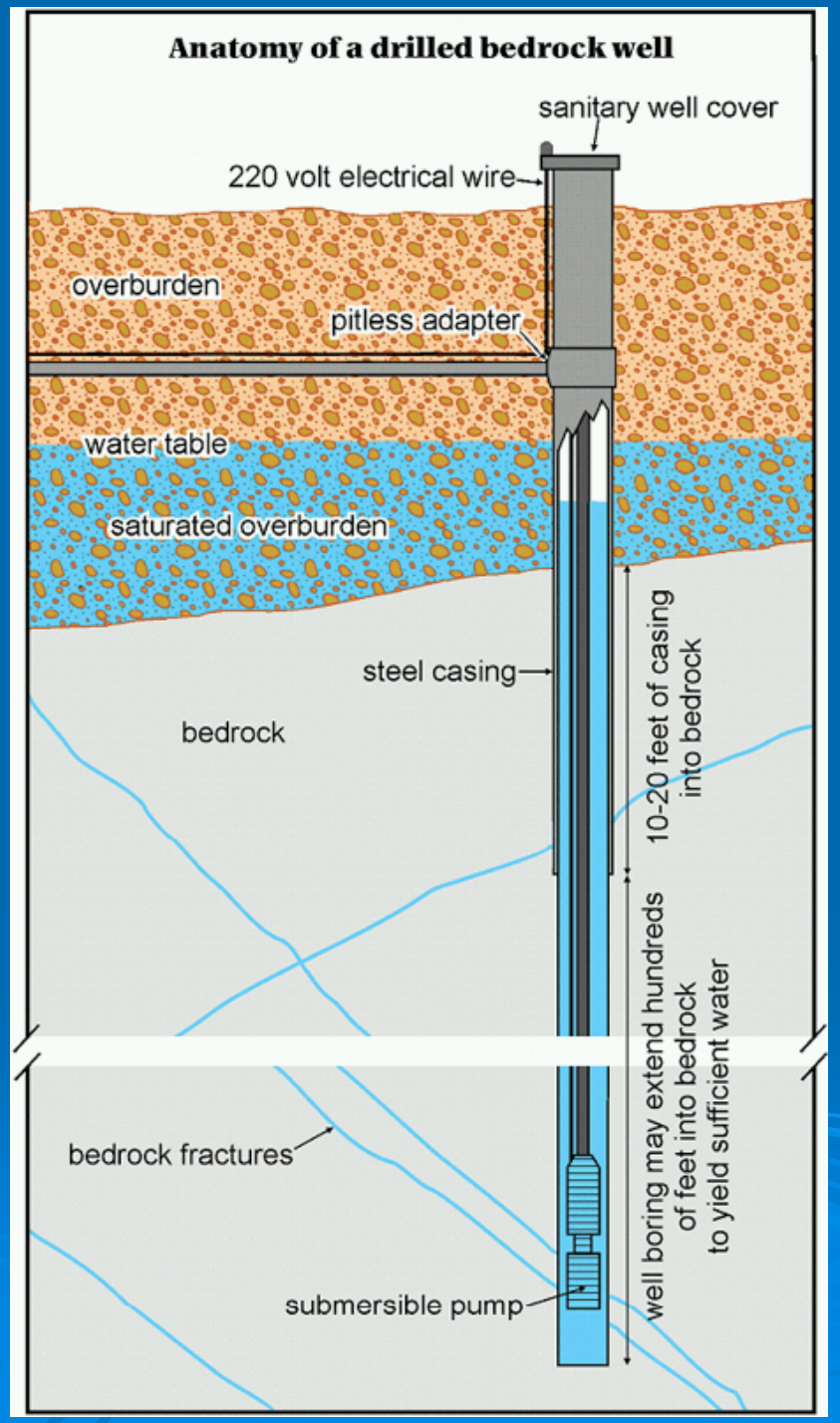
Private Wells in NH





Bedrock Water Supply Well Basics:

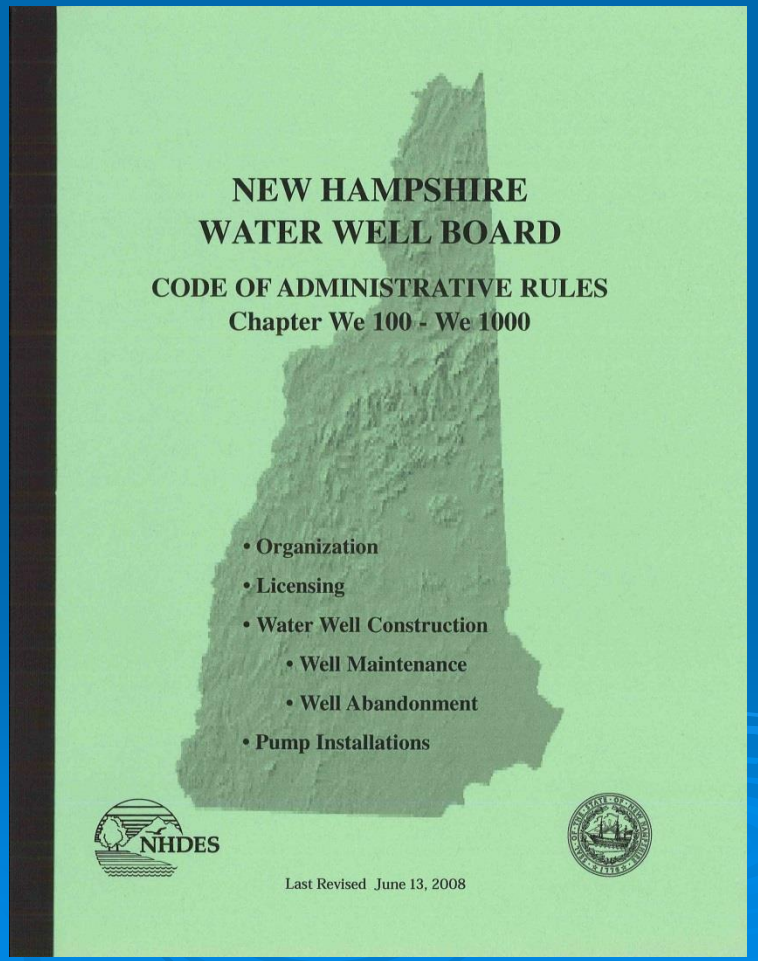
- Casing installed into competent rock
- Option to grout between casing and ground
- Water flow through fractures
- Submersible pumps



NH Water Well Construction Standards

NH State Water Well Board

- Driller and Pump Installer Licensing Authority
- Establishes well construction and pump installation and materials standards
- Establishes well siting standards
- Well Completion Reports
- Consumer Protection



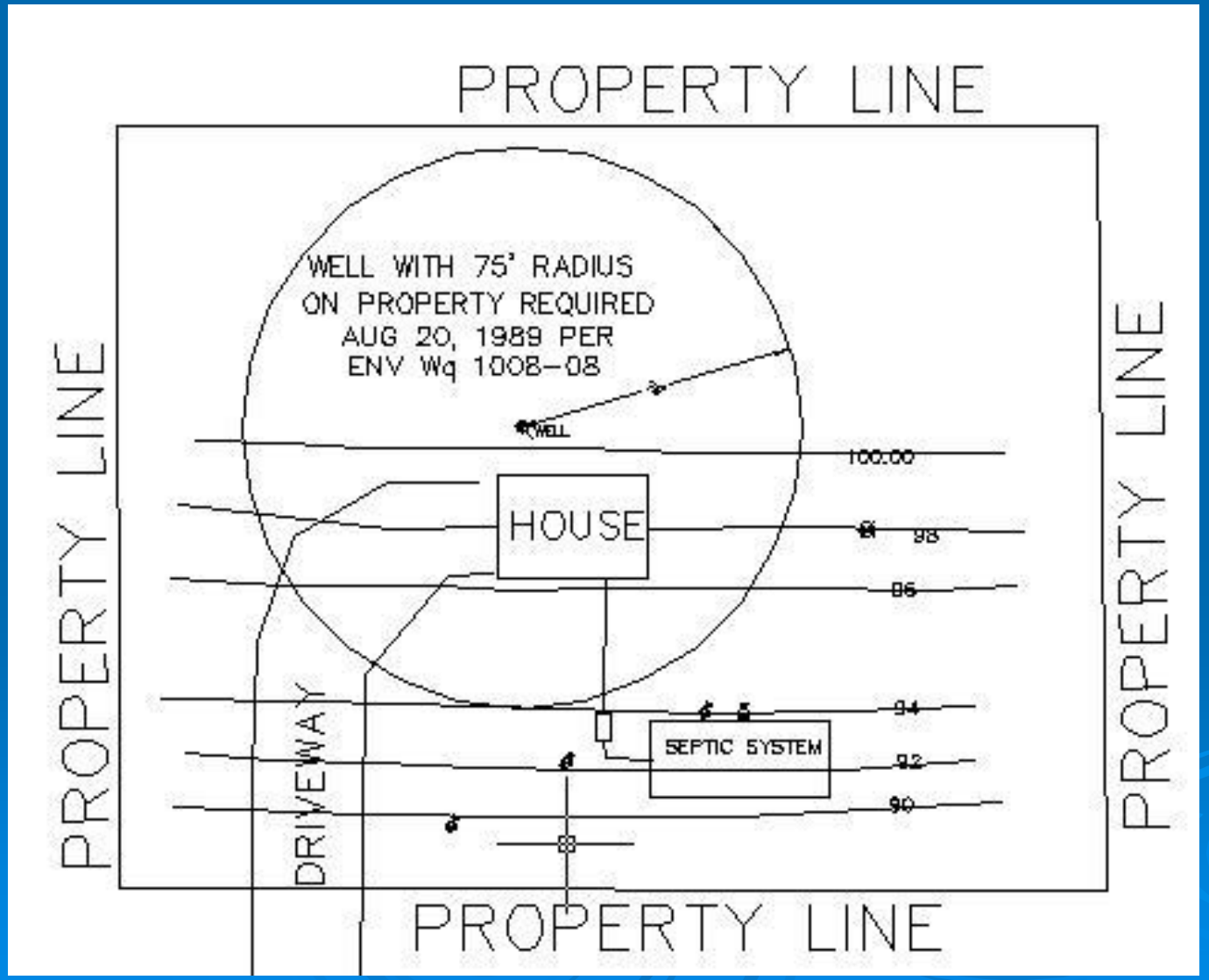
Private Well Setbacks

- Well Siting needs to align with SSB approval
- Frequent site feature conflicts
- Small lots, steep slopes, surface water, etc.
- Reductions are ***conditionally*** allowed

RESIDENTIAL DRINKING WATER WELL LOCATION SETBACKS	
Entity	**Setback (feet)**
Effluent Disposal Area (leach field/bed)	75[1]
Septic Tank	75[2]
Property Boundary	75
Livestock Pen	75 (100 for dug wells)
Automobile Salvage Yard	75
Underground Storage Tanks (containing gasoline fuel)	250
Storage of Regulated Substance (except gasoline fuel)	75
Solid Waste Disposal Site	75
Bulk Storage of Material (ex. fertilizer, manure, salt)	75
Stump Dump	75[3]
State Highway Right-of-Way	50[4]
Sewer Component	50[5]
Surface Water / Swamp	50[6]
Public Road Surface	75[7]
Other Sources of Contamination	75

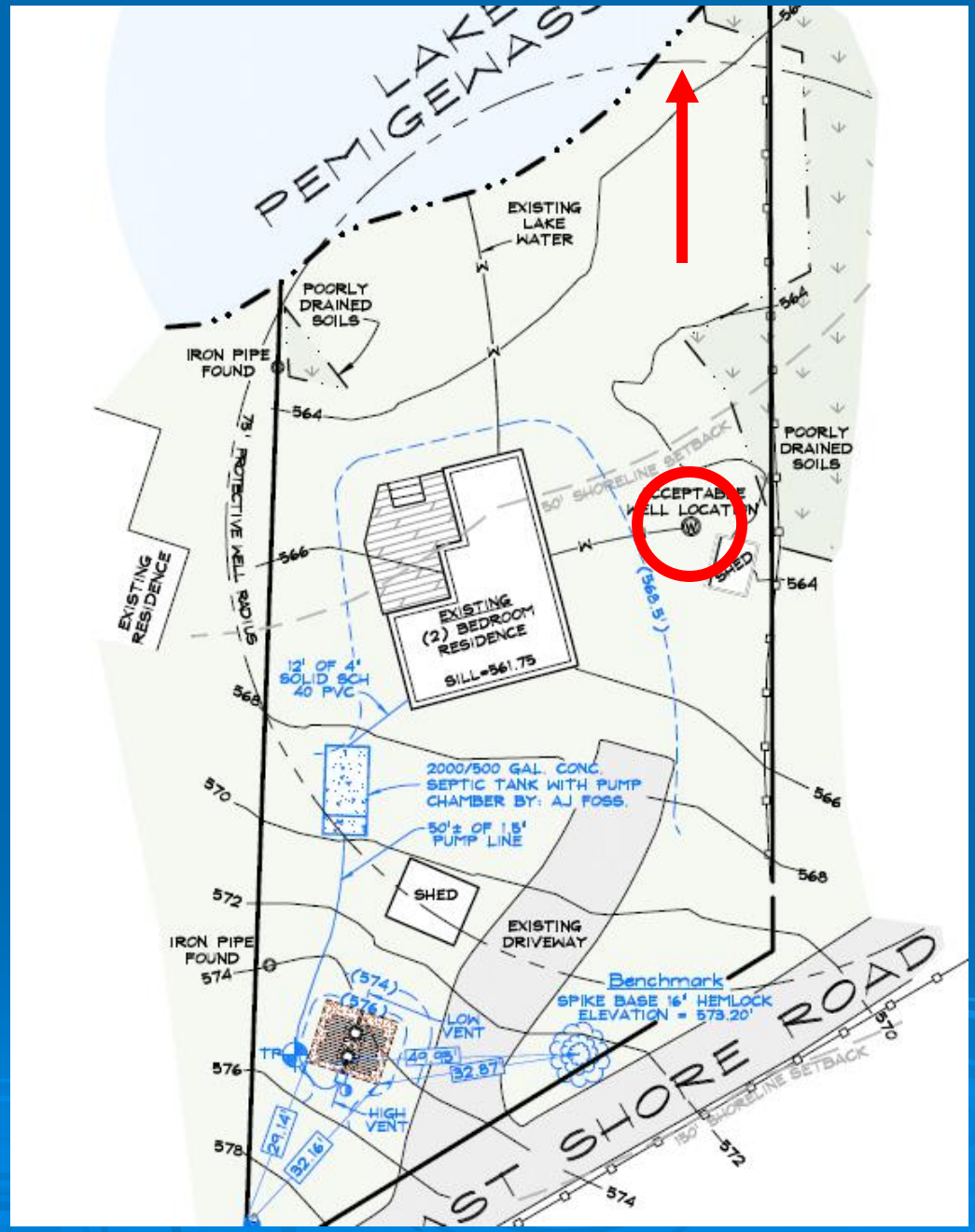
Protective Well Radius

RSA 485-A:30-b

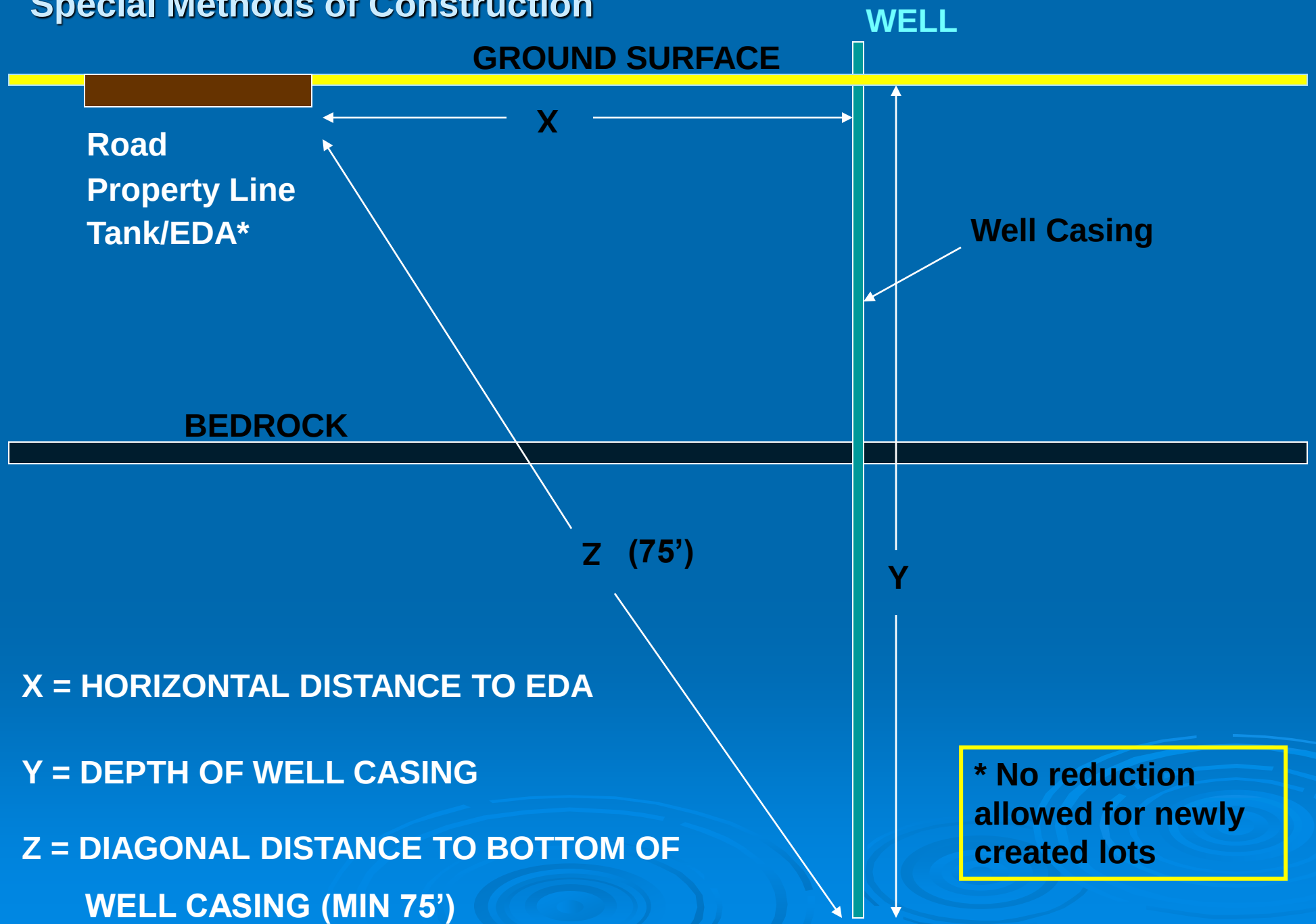


Non-conforming locations

- Driller, SSB designer and owner consult when well cannot be located per site plan to choose alternate location
- Approved plan requires amendment
- Special methods of construction required
- Requires setback reduction form



Special Methods of Construction



X = HORIZONTAL DISTANCE TO EDA

Y = DEPTH OF WELL CASING

Z = DIAGONAL DISTANCE TO BOTTOM OF WELL CASING (MIN 75')

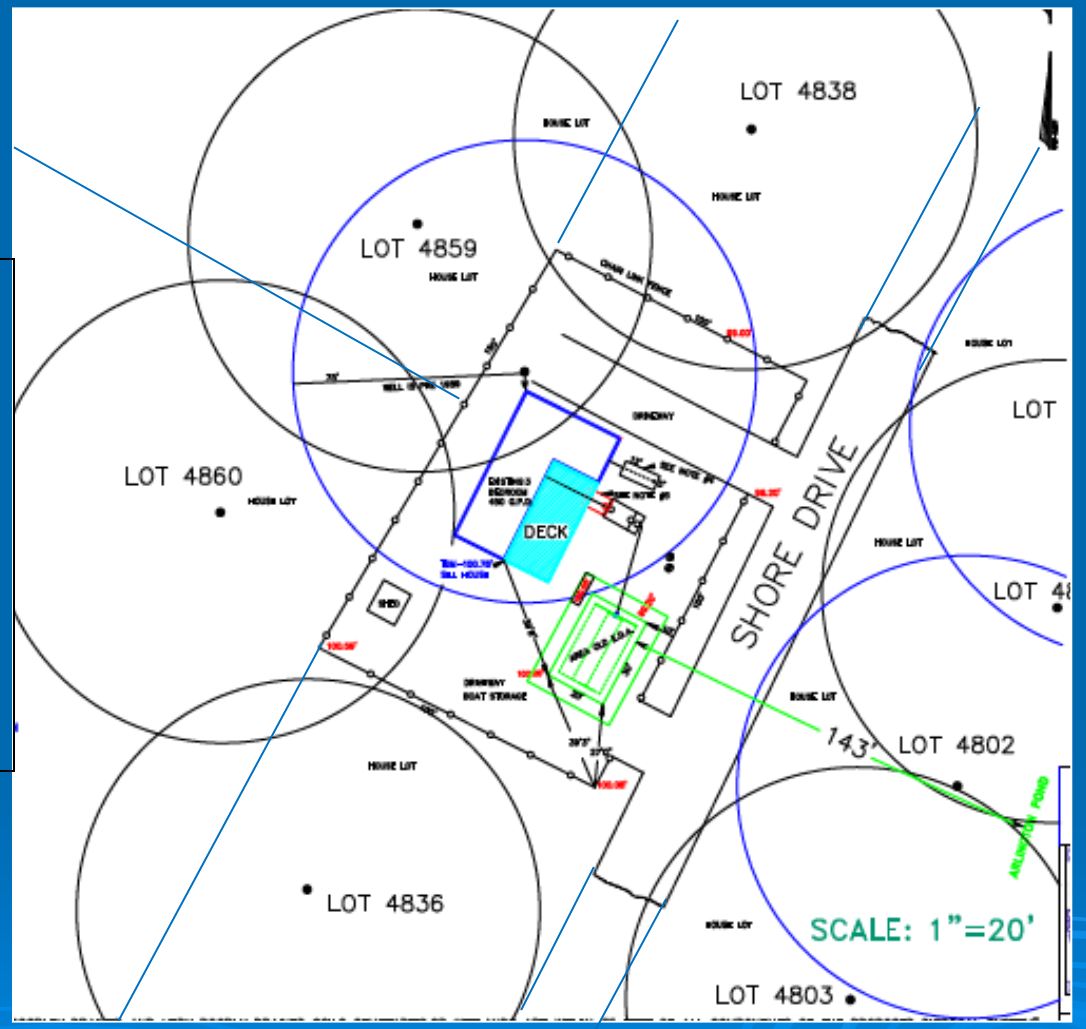
* No reduction allowed for newly created lots

Table 602-1
Horizontal Setbacks and Minimum Casing Length

Horizontal Setback [Ft]	Required Minimum Casing Length [Ft]
75 or greater	20
70 to 74	27
65 to 69	37
60 to 64	45
55 to 59	51
50 to 54	56
45 to 49	60
40 to 44	63
35 to 39	66
30 to 34	69
25 to 29	71

Overlapping Well Radii

- Allowed but not encouraged
- Identified on SSB application
- Requires standard release form



Private Well Testing

- No State Requirements
- Suggestion only
- State support for some (VOCs – PFAS)
- Treatment Guidance

Contaminants and Testing Frequency

	Testing Frequency
Standard Analysis Arsenic Bacteria Chloride Copper Fluoride Hardness Iron Lead Manganese Nitrate/Nitrite pH Sodium Uranium	Every 3 to 5 years (except for bacteria and nitrate, which are recommended yearly)
Radiological Analysis Radon Uranium Analytical Gross Alpha	Every 3 to 5 years
PFAS	Every 3 to 5 years
VOCs	Every 3 to 5 years

The NHDES Be *Well* Informed Guide

PROTECT YOUR FAMILY'S HEALTH AND HOME

INFORMATION AND GUIDANCE FOR TREATING YOUR WELL WATER

Routine Water Analysis

		Units			Units
Arsenic (As)		mg/L	Lead (Pb)		mg/L
Chloride (Cl)		mg/L	Lead, Stagnant (Pb)		mg/L
Copper (Cu)		mg/L	Manganese (Mn)		mg/L
Copper, Stagnant (Cu)		mg/L	Nitrate-N		mg/L
Fluoride (F)		mg/L	Nitrite-N		mg/L
Hardness as CaCO3		mg/L	pH		units
Iron (Fe)		mg/L	Sodium (Na)		mg/L

https://www4.des.state.nh.us/DWITool/

Community Wells in NH

Community Water System **(CWS): A public water system that supplies water to the same population (25 or more people or 15 or more service connections) year-round.**

- **Requirements for Community Water Systems are established by both the state and federal Safe Drinking Water Act**
- **CWS Source and Design Requirements established by:**

- **Env-Dw 302/305 : *Large/Small Production Wells for Small Community Water Systems***
- **Env-Dw 404/405 : *Design Standards for Large/Small Public Water Systems***

Small Community Water System = population less than 1,000
Large Community Water System = population greater than 1,000

Community Well location and protective radius criteria

Well location and Sanitary Protective Area (SPA) radii must be:

- On land that's fully owned or controlled (via easement) by the CWS owner, no overlap onto abutting property unless cons. land
- Fully maintained in its natural state with no changes other than well
- Have no structures other than water supply related
- Receive no discharge from drainage features for stormwater or runoff
- Have no utilities other than those needed for well and water system

Radius of SPA based on the required production volume per the size of CWS

Example:

-15 X 3 BR homes: 45 BR

-150 gpd per BR = 6,750 gpd (design flow)

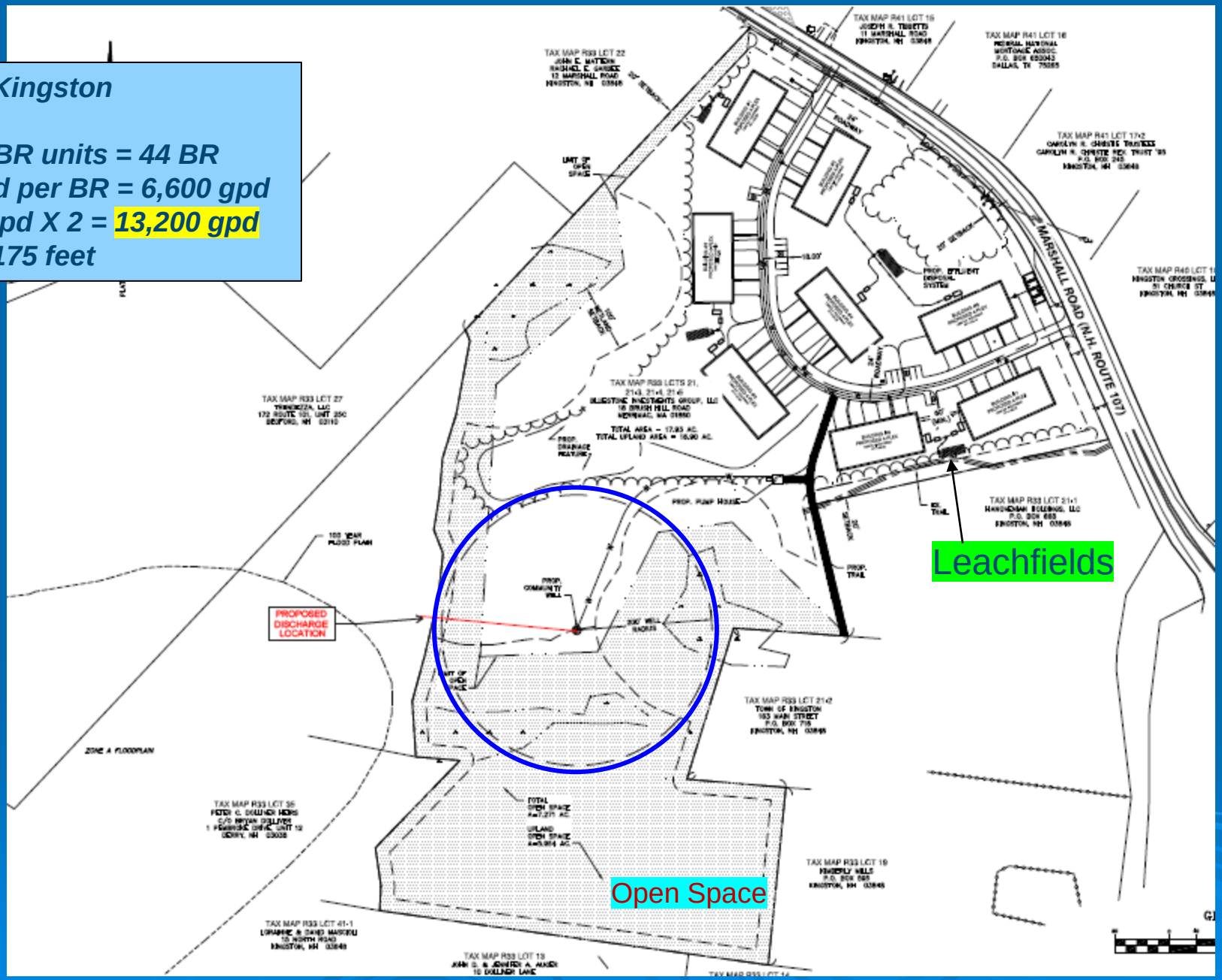
-6,750 gpd X 2 = 13,500 gpd (production volume)

Table 302-1 Sanitary Protective Area Radii

Permitted Production Volume (gallons in a 24-hour period)	Radius (feet)
less than 14,400	150
14,401 to 28,800	175
28,801 to 57,599	200
57,600 to 86,400	250
86,401 to 115,200	300
115,201 to 144,000	350
greater than 144,000	400

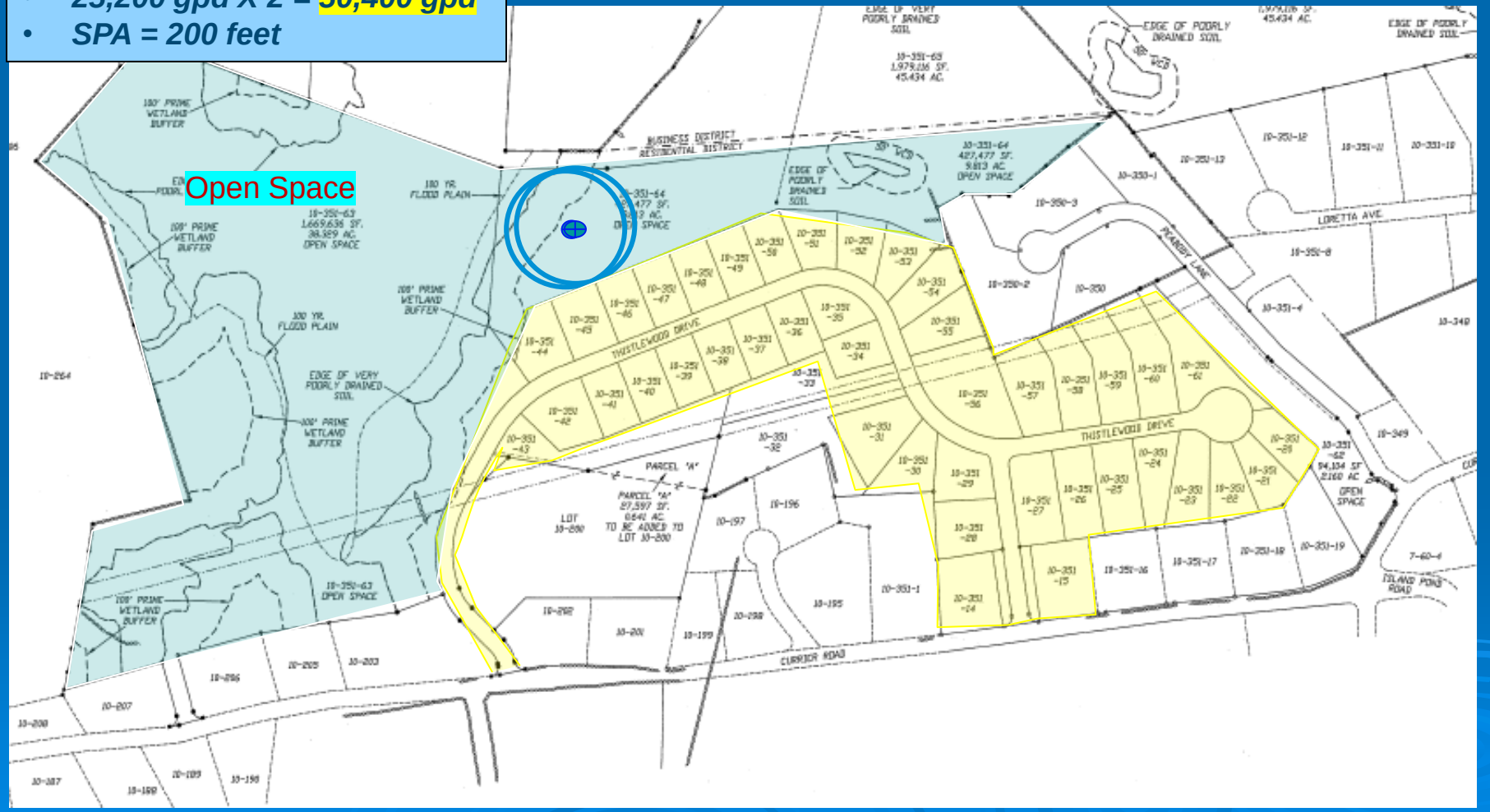
Example: Kingston

- *22 X 2 BR units = 44 BR*
- *150 gpd per BR = 6,600 gpd*
- *6,600 gpd X 2 = 13,200 gpd*
- *SPA = 175 feet*



Example: Pelham

- ***42 X 4 BR units = 168 BR***
- ***150 gpd per BR = 25,200 gpd***
- ***25,200 gpd X 2 = 50,400 gpd***
- ***SPA = 200 feet***



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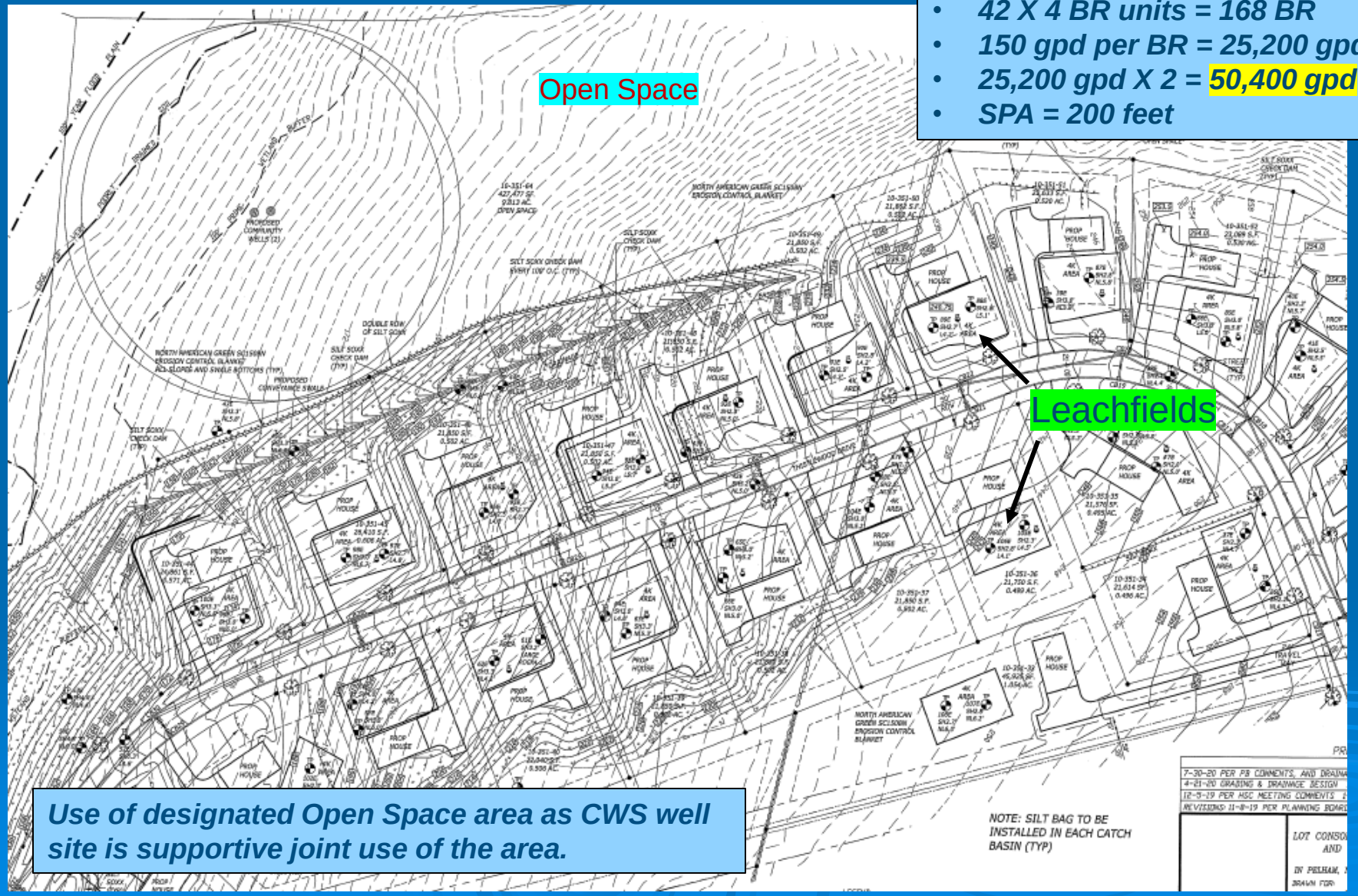


Use of designated Open Space area as CWS well site is supportive joint use of the area.

Community Well Water Quality

EXTENSIVE **Water quality sampling during new well permitting**

- **Identifies constituents that exceed drinking water standards**
- **Defines water system treatment requirements**

Scheduled and routine w**ater quality sampling after first year of CWS activation**

- **Monitors treatment performance**
- **Assures public health standards are met**
- **Schedule varies per parameter**
  - **Weekly**
  - **Monthly**
  - **Annually**
  - **Per 3-years**
  - **Per 6-years**
  - **Per 9-years**

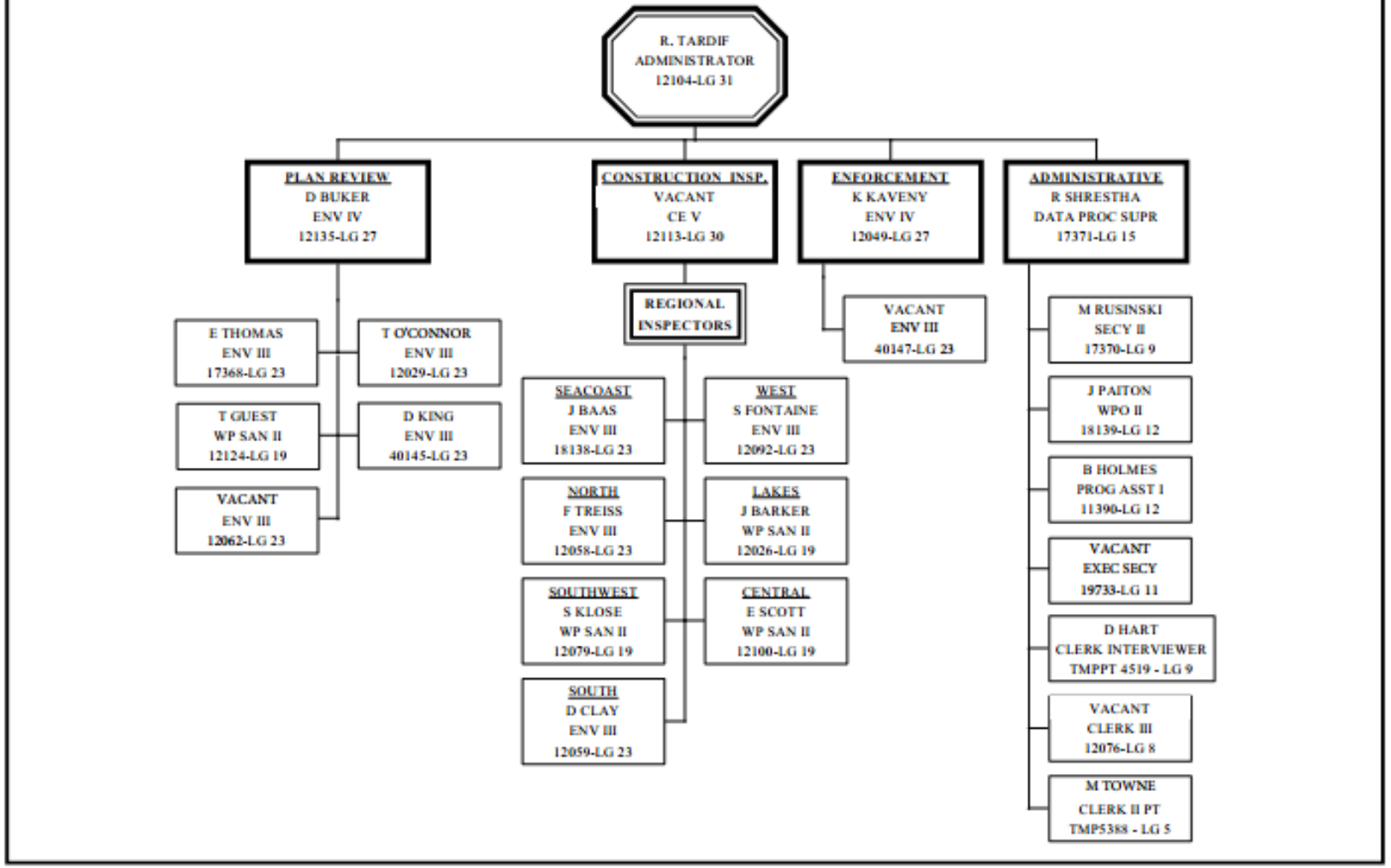
- **Inorganics (Fe, As, Mn)**
- **Radiological (U, Radon)**
- **Microbiological (E.coli)**
- **VOCs (gasoline, solvents)**
- **SVOCs (pest/herbicides)**
- **PCBs - Dioxins**
- **Microparticulates**
- **PFAS (per/poly-fluorinated)**

Subsurface Systems Bureau
Lot Sizing Requirements

Robert A. Tardif, P.E., Administrator
Subsurface Systems Bureau
New Hampshire Department of Environmental Services

robert.a.tardif@des.nh.gov

DEPARTMENT OF ENVIRONMENTAL SERVICES
WATER DIVISION
LAND RESOURCES MANAGEMENT PROGRAM
SUBSURFACE SYSTEMS BUREAU



- The Subsurface Systems Bureau is responsible for the review and issuance or denial of permits that govern approximately two thirds of all development that occurs within the state of New Hampshire. In particular, the bureau is responsible for the following activities:

- Reviews applications for the subdivision of land and the design of septic systems (Approximately 7500 Approvals Per Year)

- Performs on-site inspections of all septic systems installed in order to ensure strict compliance with the approved plans. Also performed site check for every lot prior to subdivision approval.

- Implements and administers the program for permitting (licensing) both designers and installers of septic systems. Subdivision applications must include test pit data stamped by a permitted designer.

- Investigates written complaints received by the Department of Environmental Services relative to situations which are or may be causing degradation to water supplies, pollution to surface and groundwaters, or creating nuisances and potential health hazards.

- Coordinates other necessary permits involved in a particular project or development.

AUTHORITY/HISTORY

- 1965 RSA 149-C “Island Rule” Required that any person proposing to construct a sewage disposal system on any island submit plans and specification for approval.

- 1967 RSA 149-E Required that any person proposing to construct a sewage disposal system within 1000’ of a surface water submit plans and specification for approval

- 1971 RSA 149-E Amended to remove the term “Near Shorelines” thereby requiring that any person proposing to construct a sewage disposal system regardless of its location submit plans and specification for approval

- 1989 RSA 485-A codified.

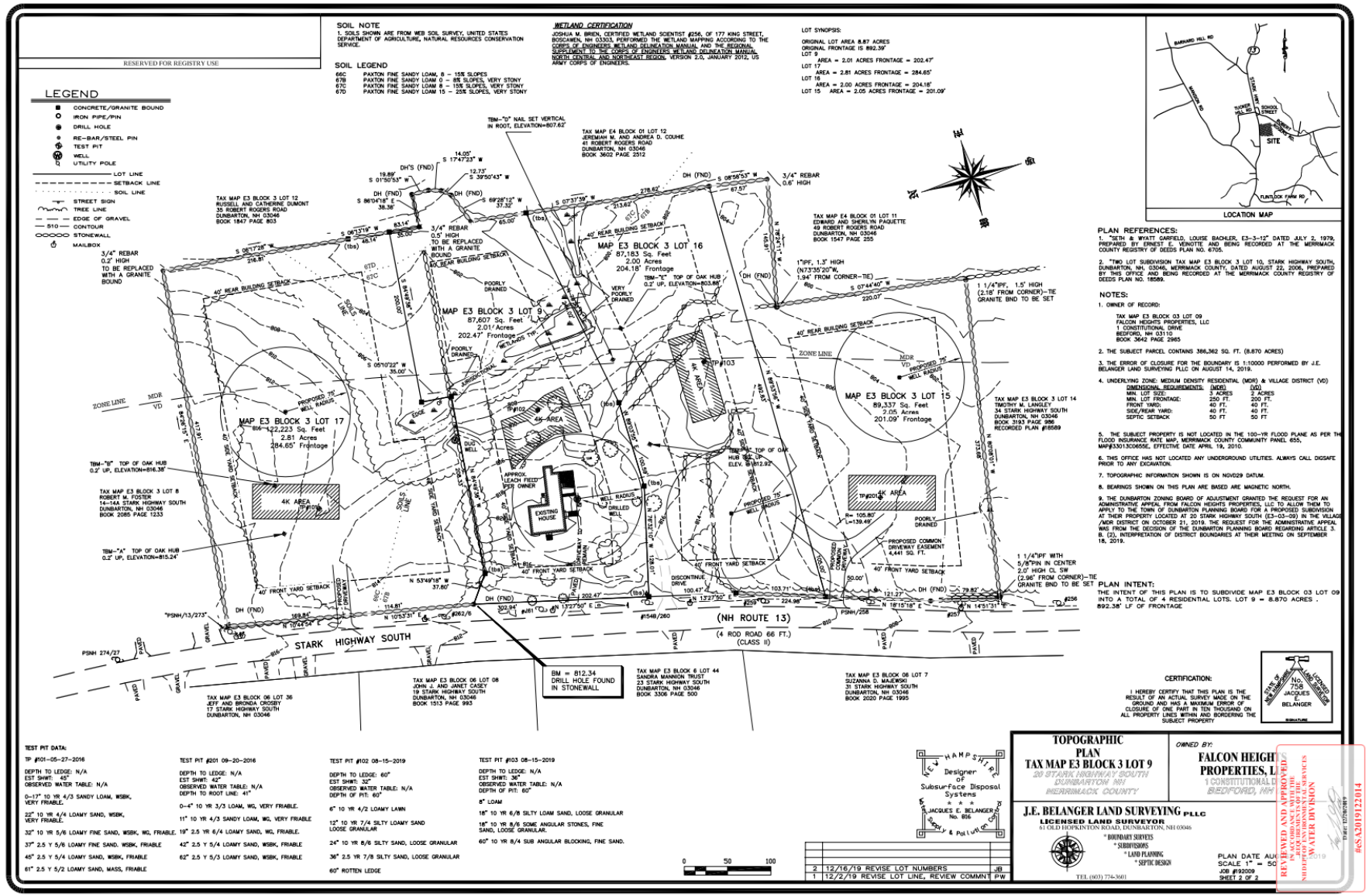
RSA 485-A:2 Definitions

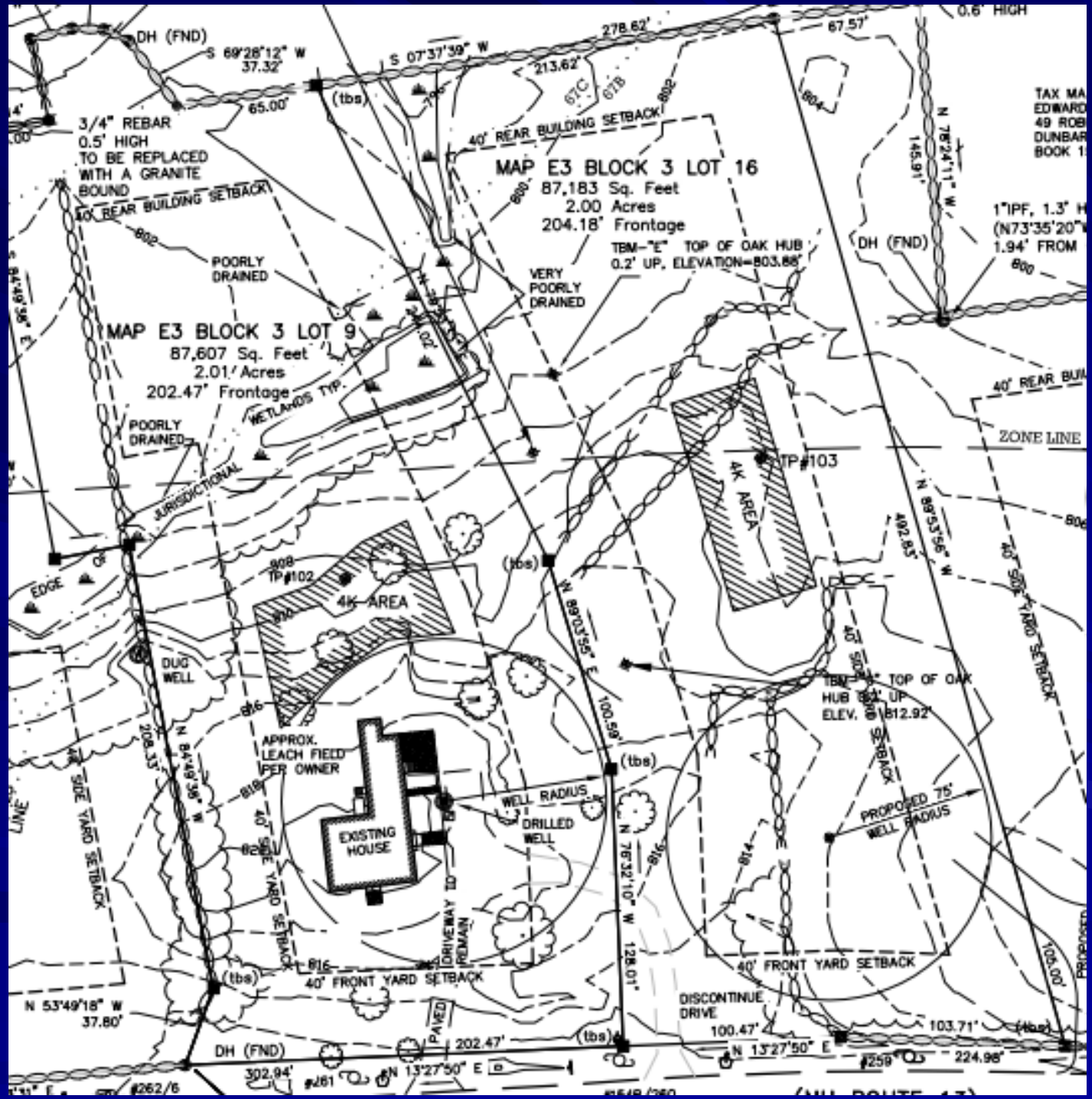
- XIII. “Subdivision” means the division of a tract or parcel of land into 2 or more lots, tracts, or parcels for the purpose, whether immediate or future, of sale, rent, lease, building development, or any other reason….
- Allows for Lot Line Adjustments under certain conditions;
- Includes condominium conveyance, or other conveyance thereof;
- A re-subdivision in which previously approved lots are grouped together to form larger lots shall not be deemed a subdivision.

LOT SIZING/LOADING

- RSA 485-A:29 - Any Lot Less Than 5 Acres, That Is Not Served By Public Sewer, Requires Subdivision Approval

- Lot Sizes Are Determined Individual Lot Characteristics (Soils, Wetlands, Slopes, Ledge, Water Supply…) And Are Based On The Lots Ability To Support/Manage The Sewage Load


RESERVED FOR REGISTRY USE
SOIL NOTE
1. SOILS SHOWN ARE FROM WEB SOIL SURVEY, UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE.
SOIL LEGEND
66C PAXTON FINE SANDY LOAM, 8 – 15% SLOPES
67B PAXTON FINE SANDY LOAM 0 – 8% SLOPES, VERY STONY
67C PAXTON FINE SANDY LOAM 8 – 15% SLOPES, VERY STONY
67D PAXTON FINE SANDY LOAM 15 – 25% SLOPES, VERY STONY
WETLAND CERTIFICATION
JOSHUA M. BRIEN, CERTIFIED WETLAND SCIENTIST #256, OF 177 KING STREET, BOSCAWEN, NH 03303, PERFORMED THE WETLAND MAPPING ACCORDING TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL AND THE REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTH CENTRAL AND NORTHEAST REGION, VERSION 2.0, JANUARY 2012, US ARMY CORPS OF ENGINEERS.
LOT SYNOPSIS:
ORIGINAL LOT AREA 8.87 ACRES
ORIGINAL FRONTAGE IS 892.39'
LOT 9 AREA = 2.01 ACRES FRONTAGE = 202.47'
LOT 17 AREA = 2.81 ACRES FRONTAGE = 284.65'
LOT 16 AREA = 2.00 ACRES FRONTAGE = 204.18'
LOT 15 AREA = 2.05 ACRES FRONTAGE = 201.09'
LEGEND
CONCRETE/GRANITE BOUND
IRON PIPE/PIN
DRILL HOLE
RE-BAR/STEEL PIN
TEST PIT
WELL
UTILITY POLE
LOT LINE
SETBACK LINE
SOIL LINE
STREET SIGN
TREE LINE
EDGE OF GRAVEL
CONTOUR
STONEWALL
MAILBOX
TBM-"D" NAIL SET VERTICAL IN ROOT, ELEVATION=807.62'
TAX MAP E4 BLOCK 01 LOT 12
JEREMIAH M. AND ANDREA D. COUHE
41 ROBERT ROGERS ROAD
DUNBARTON, NH 03046
BOOK 3602 PAGE 2512
TAX MAP E3 BLOCK 3 LOT 12
RUSSELL AND CATHERINE DUMONT
35 ROBERT ROGERS ROAD
DUNBARTON, NH 03046
BOOK 1847 PAGE 803
3/4" REBAR 0.2' HIGH TO BE REPLACED WITH A GRANITE BOUND
3/4" REBAR 0.5' HIGH TO BE REPLACED WITH A GRANITE BOUND
3/4" REBAR 0.6' HIGH
TAX MAP E4 BLOCK 01 LOT 11
EDWARD AND SHERILYN PAQUETTE
49 ROBERT ROGERS ROAD
DUNBARTON, NH 03046
BOOK 1547 PAGE 255
1"IPF, 1.3' HIGH (N73°35'20"W, 1.94' FROM CORNER)–TIE
1 1/4"IPF, 1.5' HIGH (2.18' FROM CORNER)–TIE GRANITE BND TO BE SET
MAP E3 BLOCK 3 LOT 16
87,183 Sq. Feet
2.00 Acres
204.18' Frontage
MAP E3 BLOCK 3 LOT 9
87,607 Sq. Feet
2.01 Acres
202.47' Frontage
MAP E3 BLOCK 3 LOT 17
816–122,223 Sq. Feet
2.81 Acres
284.65' Frontage
MAP E3 BLOCK 3 LOT 15
89,337 Sq. Feet
2.05 Acres
201.09' Frontage
TBM-"C" TOP OF OAK HUB 0.2' UP, ELEVATION=803.86'
TBM-"B" TOP OF OAK HUB 0.2' UP, ELEVATION=816.38'
TBM-"A" TOP OF OAK HUB 0.2' UP, ELEVATION=815.24'
TBM-"E" TOP OF OAK HUB ELEV. 812.92'
TAX MAP E3 BLOCK 3 LOT 8
ROBERT M. FOSTER
14-14A STARK HIGHWAY SOUTH
DUNBARTON, NH 03046
BOOK 2085 PAGE 1233
TAX MAP E3 BLOCK 3 LOT 14
TIMOTHY M. LANGLEY
34 STARK HIGHWAY SOUTH
DUNBARTON, NH 03046
BOOK 3193 PAGE 986
RECORDED PLAN #8589
TP#101 4K AREA
TP#103 4K AREA
TP#201 4K AREA
EXISTING HOUSE
DRILLED WELL
DUG WELL
APPROX. LEACH FIELD PER OWNER
PROPOSED 75' WELL RADIUS
PROPOSED COMMON DRIVEWAY EASEMENT 4,441 SQ. FT.
PROPOSED DRIVEWAY
DISCONTINUE DRIVE
POORLY DRAINED
VERY POORLY DRAINED
WETLANDS TYP.
ZONE LINE MDR VD
40' REAR BUILDING SETBACK
40' FRONT YARD SETBACK
R= 105.80' L=139.49'
1 1/4"IPF WITH 5/8"PIN IN CENTER 2.0' HIGH CL SW (2.96' FROM CORNER)–TIE GRANITE BND TO BE SET
PSNH/13/273
PSNH 274/27
PSNH/258
#1548/260
#262/6
#259
#257
#256
(NH ROUTE 13)
(4 ROD ROAD 66 FT.)
(CLASS II)
STARK HIGHWAY SOUTH
BM = 812.34 DRILL HOLE FOUND IN STONEWALL
TAX MAP E3 BLOCK 06 LOT 36
JEFF AND BRONDA CROSBY
17 STARK HIGHWAY SOUTH
DUNBARTON, NH 03046
TAX MAP E3 BLOCK 06 LOT 08
JOHN J. AND JANET CASEY
19 STARK HIGHWAY SOUTH
DUNBARTON, NH 03046
BOOK 1513 PAGE 993
TAX MAP E3 BLOCK 6 LOT 44
SANDRA MANNION TRUST
23 STARK HIGHWAY SOUTH
DUNBARTON, NH 03046
BOOK 3306 PAGE 500
TAX MAP E3 BLOCK 06 LOT 7
SUZANNA D. MAJEWSKI
31 STARK HIGHWAY SOUTH
DUNBARTON, NH 03046
BOOK 2020 PAGE 1995
BARNARD HILL RD
MARCEL RD
TURKEY HILL RD
SCHOOL STREET
CLARK LANE
FLINTLOCK FARM RD
SITE
LOCATION MAP
PLAN REFERENCES:
1. "SETH & WYATT GARFIELD, LOUISE BACHLER, E3–3–12" DATED JULY 2, 1979, PREPARED BY ERNEST E. VENOTTE AND BEING RECORDED AT THE MERRIMACK COUNTY REGISTRY OF DEEDS PLAN NO. 6705.
2. "TWO LOT SUBDIVISION TAX MAP E3 BLOCK 3 LOT 10, STARK HIGHWAY SOUTH, DUNBARTON, NH, 03046, MERRIMACK COUNTY, DATED AUGUST 22, 2006, PREPARED BY THIS OFFICE AND BEING RECORDED AT THE MERRIMACK COUNTY REGISTRY OF DEEDS PLAN NO. 18589.
NOTES:
1. OWNER OF RECORD:
TAX MAP E3 BLOCK 03 LOT 09
FALCON HEIGHTS PROPERTIES, LLC
1 CONSTITUTIONAL DRIVE
BEDFORD, NH 03110
BOOK 3642 PAGE 2965
2. THE SUBJECT PARCEL CONTAINS 386,362 SQ. FT. (8.870 ACRES)
3. THE ERROR OF CLOSURE FOR THE BOUNDARY IS 1:10000 PERFORMED BY J.E. BELANGER LAND SURVEYING PLLC ON AUGUST 14, 2019.
4. UNDERLYING ZONE: MEDIUM DENSITY RESIDENTIAL (MDR) & VILLAGE DISTRICT (VD)
DIMENSIONAL REQUIREMENTS: (MDR) (VD)
MIN. LOT SIZE: 3 ACRES 2 ACRES
MIN. LOT FRONTAGE: 250 FT. 200 FT.
FRONT YARD: 40 FT. 40 FT.
SIDE/REAR YARD: 40 FT. 40 FT.
SEPTIC SETBACK 50 FT 50 FT
5. THE SUBJECT PROPERTY IS NOT LOCATED IN THE 100–YR FLOOD PLANE AS PER THE FLOOD INSURANCE RATE MAP, MERRIMACK COUNTY COMMUNITY PANEL 655, MAP#33013C0655E, EFFECTIVE DATE APRIL 19, 2010.
6. THIS OFFICE HAS NOT LOCATED ANY UNDERGROUND UTILITIES. ALWAYS CALL DIGSAFE PRIOR TO ANY EXCAVATION.
7. TOPOGRAPHIC INFORMATION SHOWN IS ON NGVD29 DATUM.
8. BEARINGS SHOWN ON THIS PLAN ARE BASED ARE MAGNETIC NORTH.
9. THE DUNBARTON ZONING BOARD OF ADJUSTMENT GRANTED THE REQUEST FOR AN ADMINISTRATIVE APPEAL FROM FALCON HEIGHTS PROPERTIES, LLC TO ALLOW THEM TO APPLY TO THE TOWN OF DUNBARTON PLANNING BOARD FOR A PROPOSED SUBDIVISION AT THEIR PROPERTY LOCATED AT 20 STARK HIGHWAY SOUTH (E3–03–09) IN THE VILLAGE /MDR DISTRICT ON OCTOBER 21, 2019. THE REQUEST FOR THE ADMINISTRATIVE APPEAL WAS FROM THE DECISION OF THE DUNBARTON PLANNING BOARD REGARDING ARTICLE 3. B. (2), INTERPRETATION OF DISTRICT BOUNDARIES AT THEIR MEETING ON SEPTEMBER 18, 2019.
PLAN INTENT:
THE INTENT OF THIS PLAN IS TO SUBDIVIDE MAP E3 BLOCK 03 LOT 09 INTO A TOTAL OF 4 RESIDENTIAL LOTS. LOT 9 = 8.870 ACRES . 892.38' LF OF FRONTAGE
CERTIFICATION:
I HEREBY CERTIFY THAT THIS PLAN IS THE RESULT OF AN ACTUAL SURVEY MADE ON THE GROUND AND HAS A MAXIMUM ERROR OF CLOSURE OF ONE PART IN TEN THOUSAND ON ALL PROPERTY LINES WITHIN AND BORDERING THE SUBJECT PROPERTY
STATE OF NEW HAMPSHIRE LICENSED LAND SURVEYOR No. 758 JACQUES E. BELANGER
SIGNATURE
TEST PIT DATA:
TP #101–05–27–2016
DEPTH TO LEDGE: N/A
EST SHWT: 45"
OBSERVED WATER TABLE: N/A
0–17" 10 YR 4/3 SANDY LOAM, WSBK, VERY FRIABLE.
22" 10 YR 4/4 LOAMY SAND, WSBK, VERY FRIABLE.
32" 10 YR 5/6 LOAMY FINE SAND, WSBK, WG, FRIABLE.
37" 2.5 Y 5/6 LOAMY FINE SAND. WSBK, FRIABLE
45" 2.5 Y 5/4 LOAMY SAND, WSBK, FRIABLE
61" 2.5 Y 5/2 LOAMY SAND, MASS, FRIABLE
TEST PIT #201 09–20–2016
DEPTH TO LEDGE: N/A
EST SHWT: 42"
OBSERVED WATER TABLE: N/A
DEPTH TO ROOT LINE: 41"
0–4" 10 YR 3/3 LOAM, WG, VERY FRIABLE.
11" 10 YR 4/3 SANDY LOAM, WG, VERY FRIABLE
19" 2.5 YR 6/4 LOAMY SAND, WG, FRIABLE.
42" 2.5 Y 5/4 LOAMY SAND, WSBK, FRIABLE
62" 2.5 Y 5/3 LOAMY SAND, WSBK, FRIABLE
TEST PIT #102 08–15–2019
DEPTH TO LEDGE: 60"
EST SHWT: 32"
OBSERVED WATER TABLE: N/A
DEPTH OF PIT: 60"
6" 10 YR 4/2 LOAMY LAWN
12" 10 YR 7/4 SILTY LOAMY SAND LOOSE GRANULAR
24" 10 YR 8/6 SILTY SAND, LOOSE GRANULAR
36" 2.5 YR 7/8 SILTY SAND, LOOSE GRANULAR
60" ROTTEN LEDGE
TEST PIT #103 08–15–2019
DEPTH TO LEDGE: N/A
EST SHWT: 36"
OBSERVED WATER TABLE: N/A
DEPTH OF PIT: 60"
8" LOAM
18" 10 YR 6/8 SILTY LOAM SAND, LOOSE GRANULAR
18" 10 YR 8/6 SOME ANGULAR STONES, FINE SAND, LOOSE GRANULAR.
60" 10 YR 8/4 SUB ANGULAR BLOCKING, FINE SAND.
0 50 100
NEW HAMPSHIRE Designer of Subsurface Disposal Systems JACQUES E. BELANGER No. 856
2 12/16/19 REVISE LOT NUMBERS JB
1 12/2/19 REVISE LOT LINE, REVIEW COMMNT PW
TOPOGRAPHIC PLAN
TAX MAP E3 BLOCK 3 LOT 9
20 STARK HIGHWAY SOUTH
DUNBARTON NH
MERRIMACK COUNTY
OWNED BY:
FALCON HEIGH PROPERTIES, L
1 CONSTITUTIONAL D
BEDFORD, NH
J.E. BELANGER LAND SURVEYING PLLC
LICENSED LAND SURVEYOR
61 OLD HOPKINTON ROAD, DUNBARTON, NH 03046
* BOUNDARY SURVEYS
* SUBDIVISIONS
* LAND PLANNING
* SEPTIC DESIGN
TEL (603) 774-3601
PLAN DATE AU
SCALE 1" = 50
JOB #92009
SHEET 2 OF 2
REVIEWED AND APPROVED
SUBJECT TO ALL APPLICABLE
REQUIREMENTS OF THE
SUBDIVISION REGULATIONS
WATER DIVISION
Date: 12/26/2019
#6A20191220141


MAP E3 BLOCK 3 LOT 16
87,183 Sq. Feet
2.00 Acres
204.18' Frontage
MAP E3 BLOCK 3 LOT 9
87,607 Sq. Feet
2.01 Acres
202.47' Frontage
3/4" REBAR
0.5' HIGH
TO BE REPLACED
WITH A GRANITE
BOUND
DH (FND)
S 69°28'12" W
37.32'
65.00'
S 07°37'39" W
278.62'
213.62'
67.57'
40' REAR BUILDING SETBACK
POORLY
DRAINED
VERY
POORLY
DRAINED
TBM-"E" TOP OF OAK HUB
0.2' UP, ELEVATION=803.88'
WETLANDS TYP.
JURISDICTIONAL
EDGE
TP#102
TP#103
4K AREA
ZONE LINE
DUG
WELL
APPROX.
LEACH FIELD
PER OWNER
EXISTING
HOUSE
WELL RADIUS
DRILLED
WELL
PROPOSED 75'
WELL RADIUS
DRIVEWAY TO
REMAIN
PAVED
DISCONTINUE
DRIVE
N 89°03'55" E
100.59'
N 84°49'36" W
208.33'
N 76°32'10" W
128.01'
N 53°49'18" W
37.80'
N 13°27'50" E
202.47'
N 89°53'56" W
492.83'
N 76°24'11" W
145.91'
100.47'
103.71'
224.98'
302.94'
106.00'
SIDE YARD SETBACK
FRONT YARD SETBACK
TAX MA
EDWARD
49 ROB
DUNBAR
BOOK 1
1"IPF, 1.3' H
(N73°35'20"W
1.94' FROM

- Lots Must Support A Minimum Of 600 Gallons Per Day. A One Acre Lot With The Best Soils Can Support 2000 Gallons Per Day

- Determined By Using The Formula
  - Lot Size = (Q (gpd)/2,000 (gpd/acre)) x sewage loading factor

Table 1005-1: Minimum Lot Size - Residential, 1 to 4 Bedrooms; Sewage Loading Factors

Soil Group→ Slope ↓	1	2	3	4	5	6
0-8% or A/B	30,000 ft^2 1.0	39,000 ft^2 1.3	48,000 ft^2 1.6	43,500 ft^2 1.45	90,000 ft^2 3.0	See (c)
8-15% or C	33,000 ft^2 1.1	43,000 ft^2 1.43	53,000 ft^2 1.76	48,000 ft^2 1.6	Not Applicable	See (c)
15-25% or D	36,000 ft^2 1.2	46,800 ft^2 1.56	62,000 ft^2 2.08	52,000 ft^2 1.73	Not Applicable	See (c)
25-35% or E	39,000 ft^2 1.3	50,700 ft^2 1.69	72,000 ft^2 2.4	57,000 ft^2 1.90	Not Applicable	See (c)

- The Minimum Lot Size For Lots With On-Site Waste Water and On-Site Well is 30,000 Sq. Ft. (0.67 Acres)

- The Minimum Lot Size For Lots With On-Site Waste Water and Off-Site Well is 20,000 Sq. Ft. (0.46 Acres)

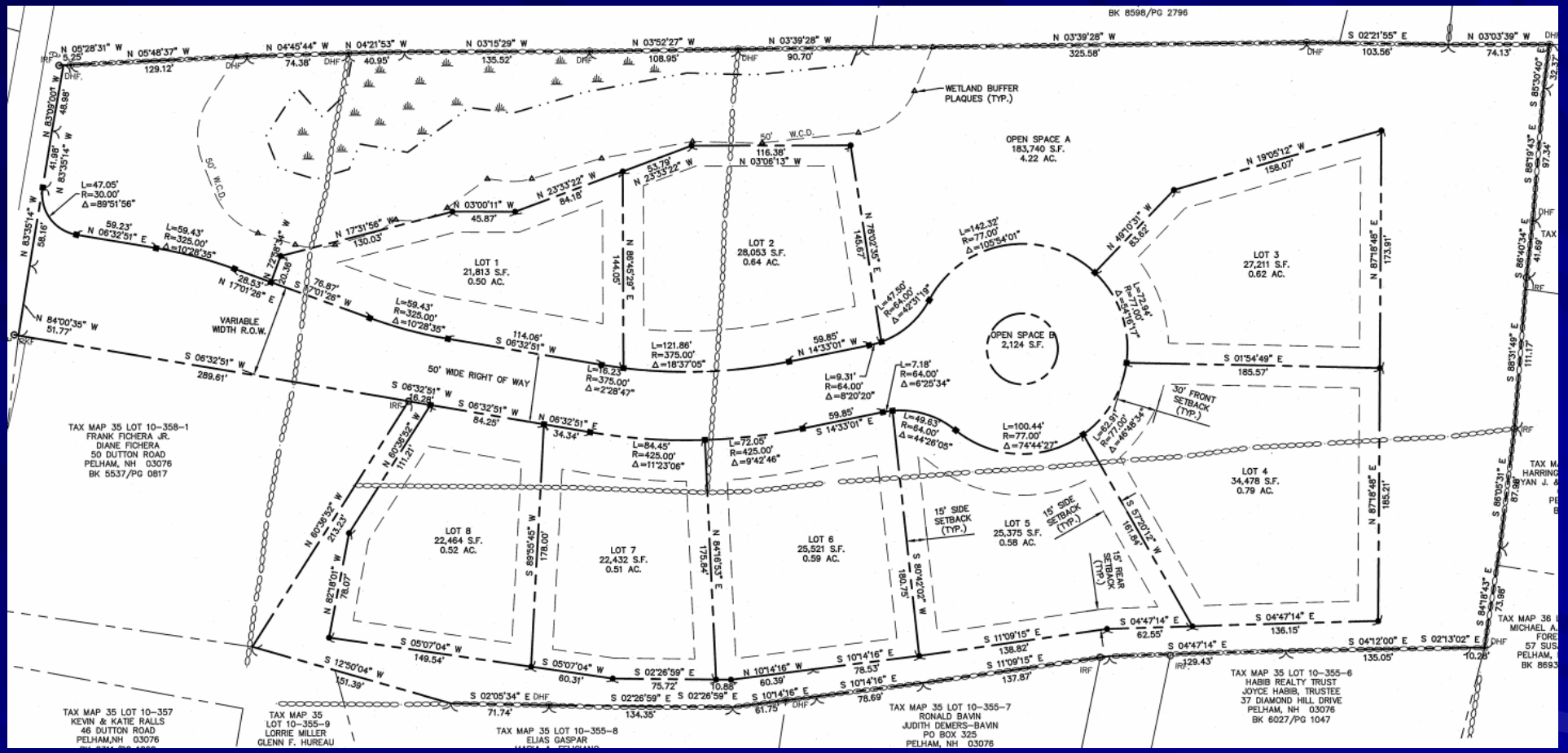
- The Minimum Lot Size For Lots With Off-Site Waste Water and Off-Site Well is Determined By The Municipality.

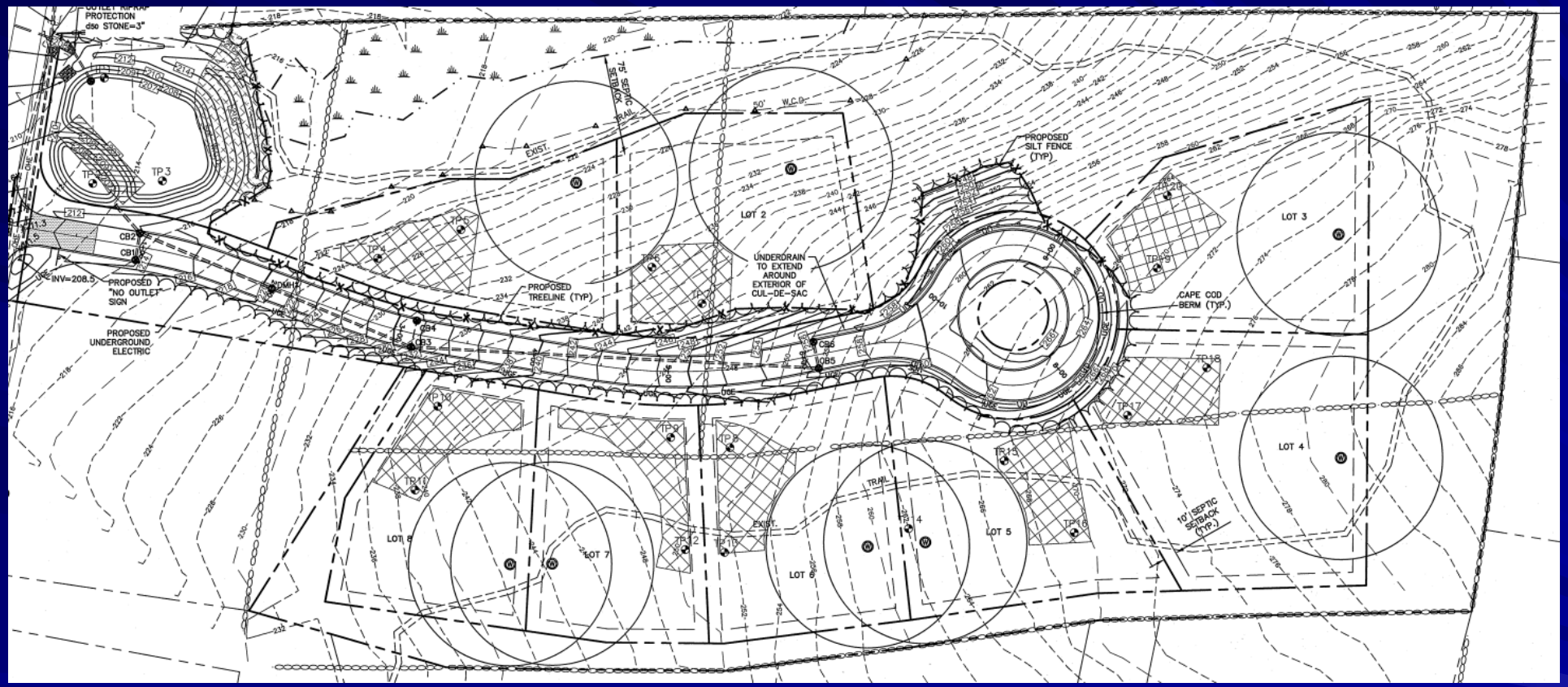
CONSERVATION SUBDIVISIONS

- Conservation (a.k.a., Open Space, Cluster) Subdivisions Allow For Smaller Individual Lot Sizes.

- Conservation Subdivisions Must Include Conservation Land To Account For The Sewage Load Not Supported By The Smaller Lots

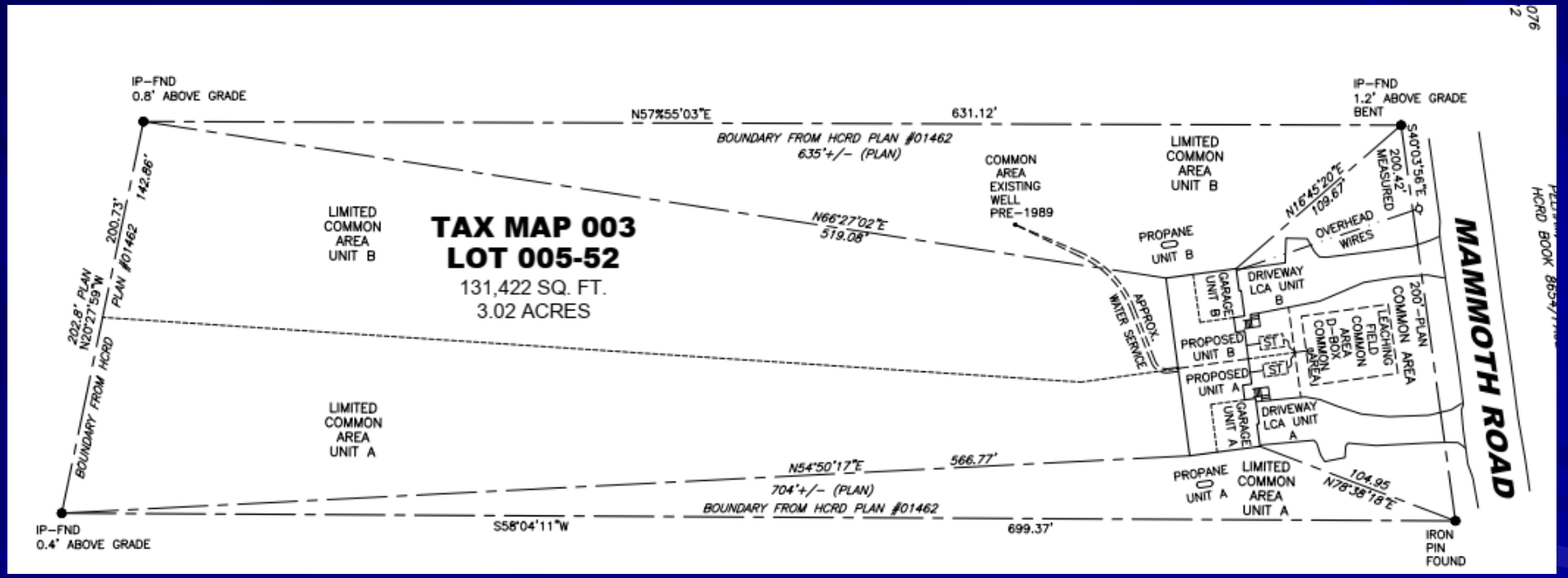
- The Total Combined Land Area, i.e., Individual Lots Plus Conservation Area Must Meet The Sewage Loading For Proposed Use.
- Well Radii Do Not Have To Be Wholly Maintained On-Lot.
- Conservation Area Easement Must Be Held By A Third Party, Many Times The Local Conservation Commission.


BK 8598/PG 2796
WETLAND BUFFER PLAQUES (TYP.)
OPEN SPACE A
183,740 S.F.
4.22 AC.
LOT 1
21,813 S.F.
0.50 AC.
LOT 2
28,053 S.F.
0.64 AC.
LOT 3
27,211 S.F.
0.62 AC.
OPEN SPACE B
2,124 S.F.
LOT 4
34,478 S.F.
0.79 AC.
LOT 5
25,375 S.F.
0.58 AC.
LOT 6
25,521 S.F.
0.59 AC.
LOT 7
22,432 S.F.
0.51 AC.
LOT 8
22,464 S.F.
0.52 AC.
50' W.C.D.
50' WIDE RIGHT OF WAY
VARIABLE WIDTH R.O.W.
30' FRONT SETBACK (TYP.)
15' SIDE SETBACK (TYP.)
15' REAR SETBACK (TYP.)
TAX MAP 35 LOT 10-358-1
FRANK FICHERA JR.
DIANE FICHERA
50 DUTTON ROAD
PELHAM, NH 03076
BK 5537/PG 0817
TAX MAP 35 LOT 10-357
KEVIN & KATIE RALLS
46 DUTTON ROAD
PELHAM,NH 03076
TAX MAP 35
LOT 10-355-9
LORRIE MILLER
GLENN F. HUREAU
TAX MAP 35 LOT 10-355-8
ELIAS GASPAR
TAX MAP 35 LOT 10-355-7
RONALD BAVIN
JUDITH DEMERS-BAVIN
PO BOX 325
PELHAM, NH 03076
TAX MAP 35 LOT 10-355-6
HABIB REALTY TRUST
JOYCE HABIB, TRUSTEE
37 DIAMOND HILL DRIVE
PELHAM, NH 03076
BK 6027/PG 1047


OUTLET RIPRAP PROTECTION
d50 STONE=3"
75' SEPTIC SETBACK
EXIST.
50' W.C.D.
PROPOSED SILT FENCE (TYP)
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
UNDERDRAIN TO EXTEND AROUND EXTERIOR OF CUL-DE-SAC
PROPOSED TREELINE (TYP)
CAPE COD BERM (TYP.)
10' SEPTIC SETBACK (TYP.)
PROPOSED "NO OUTLET" SIGN
PROPOSED UNDERGROUND ELECTRIC
INV=208.5
TRAIL
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP18
CB1
CB2
CB3
CB4
CB5
CB6
DMH1

CONDOMINIUMS

- Any Lot On Which Condominiums Exist Must Be Able To Support The Sewage Load For The Proposed Development.


IP–FND
0.8' ABOVE GRADE
N57°55'03"E
631.12'
BOUNDARY FROM HCRD PLAN #01462
635'+/– (PLAN)
IP–FND
1.2' ABOVE GRADE
BENT
S40°03'56"E
200.42'
MEASURED
N16°45'20"E
109.67'
OVERHEAD WIRES
MAMMOTH ROAD
LIMITED COMMON AREA UNIT B
COMMON AREA EXISTING WELL PRE–1989
N66°27'02"E
519.08'
TAX MAP 003
LOT 005-52
131,422 SQ. FT.
3.02 ACRES
PROPANE UNIT B
GARAGE UNIT B
DRIVEWAY LCA UNIT B
APPROX. WATER SERVICE
PROPOSED UNIT B
PROPOSED UNIT A
200'–PLAN COMMON AREA
LEACHING FIELD COMMON AREA
D-BOX COMMON AREA
ST
ST
142.86'
200.73'
202.8' PLAN
N20°27'59"W
PLAN #01462
BOUNDARY FROM HCRD
LIMITED COMMON AREA UNIT A
GARAGE UNIT A
DRIVEWAY LCA UNIT A
N54°50'17"E
566.77'
704'+/– (PLAN)
BOUNDARY FROM HCRD PLAN #01462
PROPANE UNIT A
LIMITED COMMON AREA UNIT A
104.95
N78°38'18"E
IP–FND
0.4' ABOVE GRADE
S58°04'11"W
699.37'
IRON PIN FOUND

MANUFACTURED HOUSING PARKS

- Manufactured House Park Sites Shall Be At Least 10,000 FT^2
- Any Lot On Which Manufactured Homes Exist Must Be Able To Support The Sewage Load For The Proposed Development.

Quick Note on Innovative Technologies

- Innovative Treatment Technologies Allow For Smaller Septic Systems (EDA), But Do Not Allow For Smaller Lots (Lot Loading).

Conservation Subdivision Design:

A Flexible Design Approach for Siting Septic Systems and Wells in Rural Subdivisions

rgarendt@comcast.net

Second Edition

RURAL BY DESIGN

PLANNING FOR TOWN AND COUNTRY

RANDALL ARENDT

Conservation Design for Subdivisions

A PRACTICAL GUIDE TO CREATING OPEN SPACE NETWORKS

Randall G. Arendt

Natural Lands Trust, American Planning Association, and American Society of Landscape Architects

GROWING GREENER

Putting Conservation into Local Plans and Ordinances

Randall Arendt

Natural Lands Trust • American Planning Association • American Society of Landscape Architects

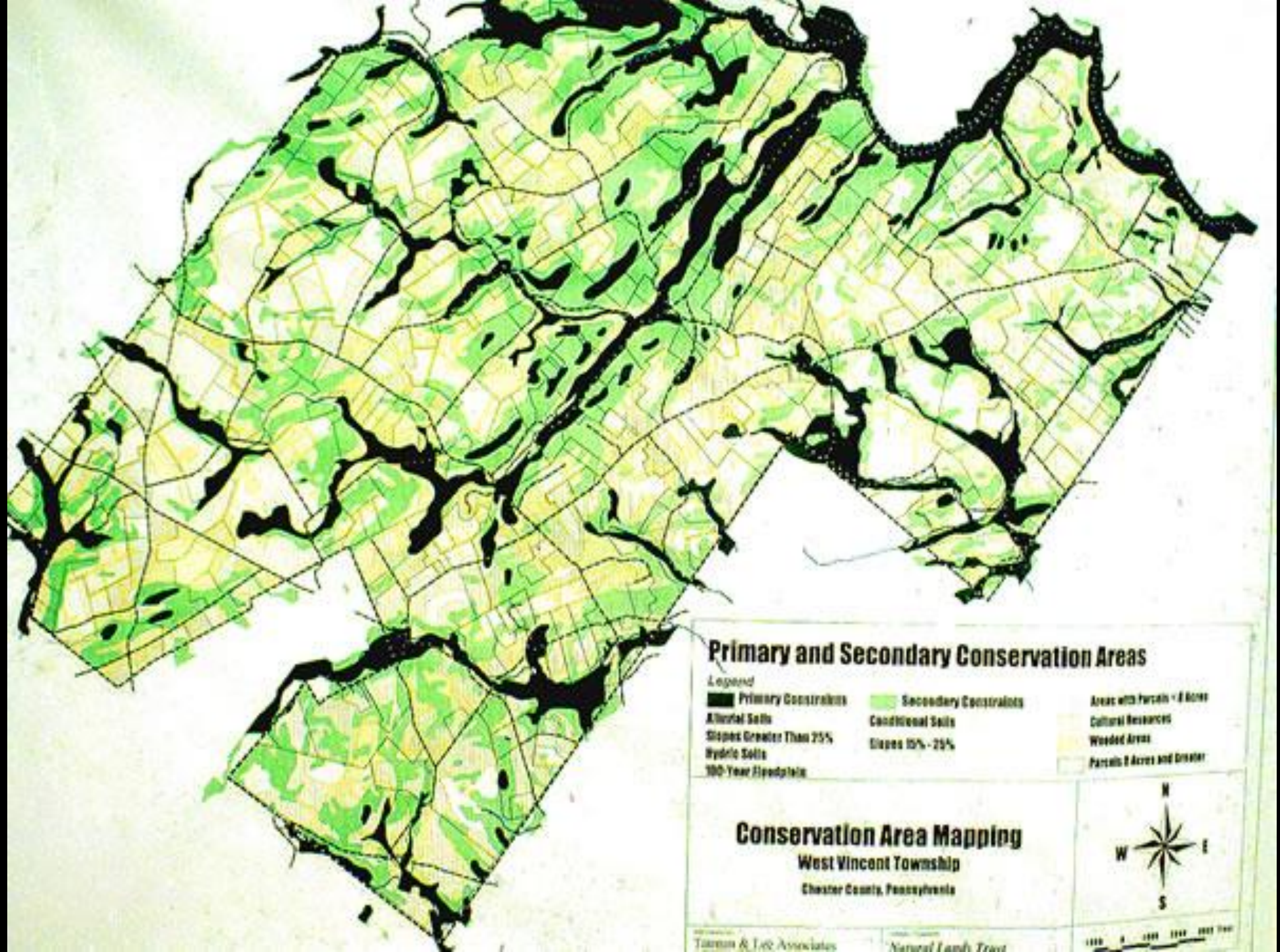
This is a *Density-Neutral* Design Approach

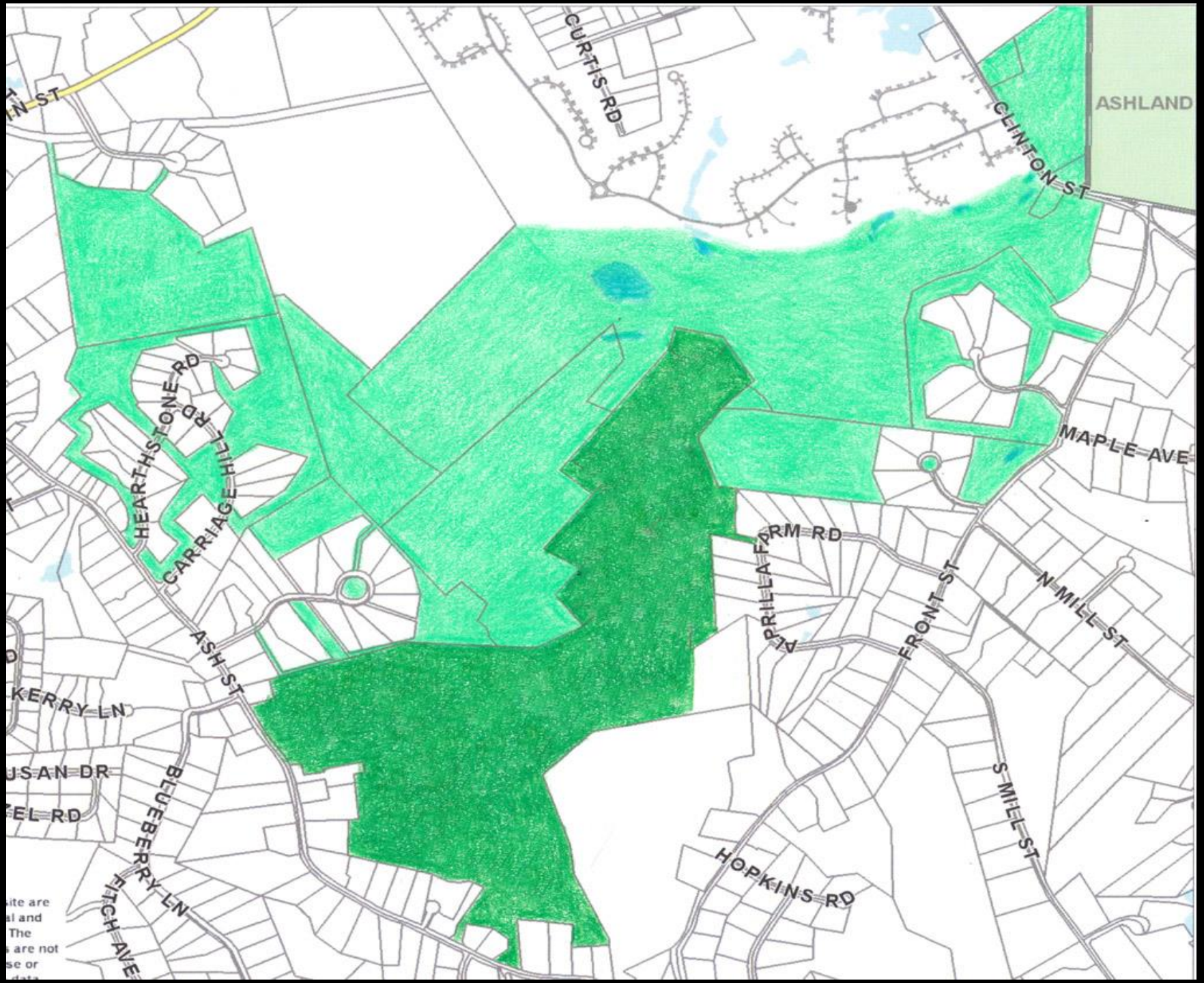
Lot count is determined either by a realistic “Yield Plan” or by a formula based on net buildable land.

Mapping:

Build-out Scenarios
and

Potential Greenspace Networks


Primary and Secondary Conservation Areas
Legend
Primary Constraints
Alluvial Soils
Slopes Greater Than 25%
Hydric Soils
100-Year Floodplain
Secondary Constraints
Conditional Soils
Slopes 15% - 25%
Areas with Parcels < 8 Acres
Cultural Resources
Wooded Areas
Parcels 8 Acres and Greater
Conservation Area Mapping
West Vincent Township
Chester County, Pennsylvania
N
W
E
S


ASHLAND
CURTIS RD
CLINTON ST
MAPLE AVE
HEARTHSTONE RD
CARRIAGE HILL RD
ASH ST
PRILLA FARM RD
FRONT ST
N MILL ST
S MILL ST
HOPKINS RD
BLUEBERRY LN
KERRY LN
USAN DR
EL RD
ITCH AVE

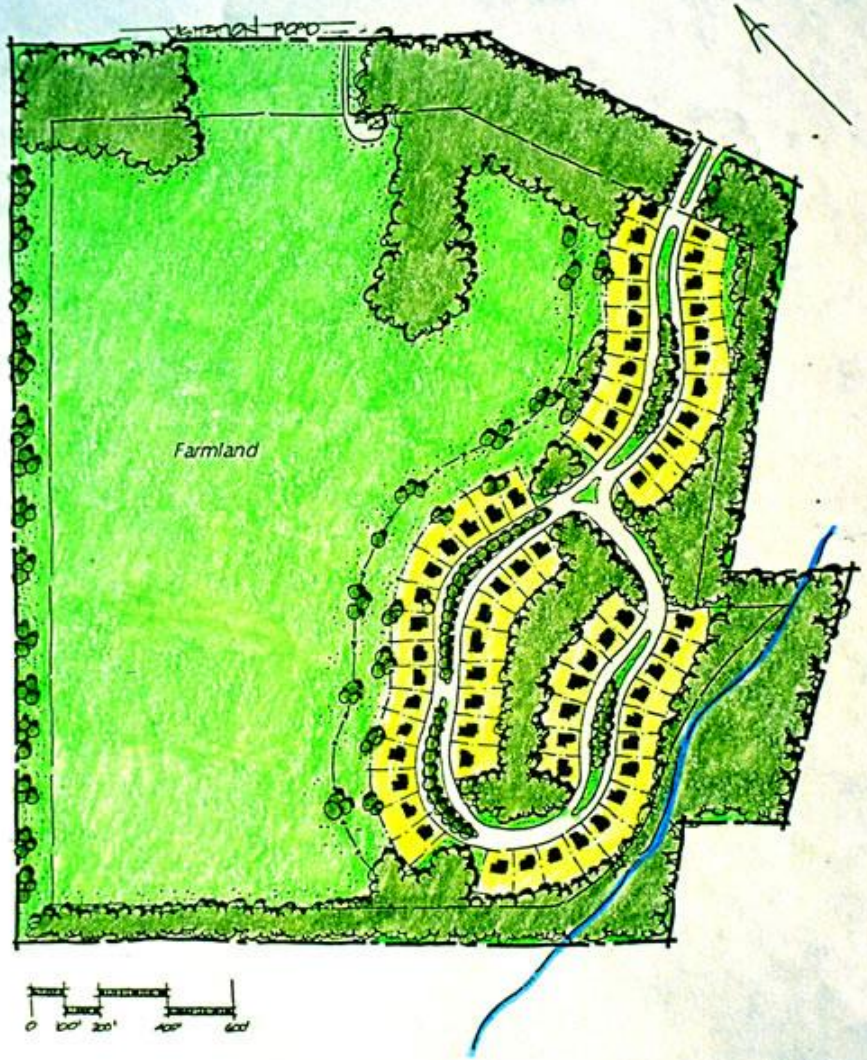
Choosing which Site Features to protect, and which to build on

DESIGN STUDY – LAND PRESERVATION DISTRICT

- Save Woodland

DESIGN STUDY – LAND PRESERVATION DISTRICT

- Save Farmland



Prepared by the Montgomery County Planning Commission, October 1990.

Site Visits:

An Essential First Step

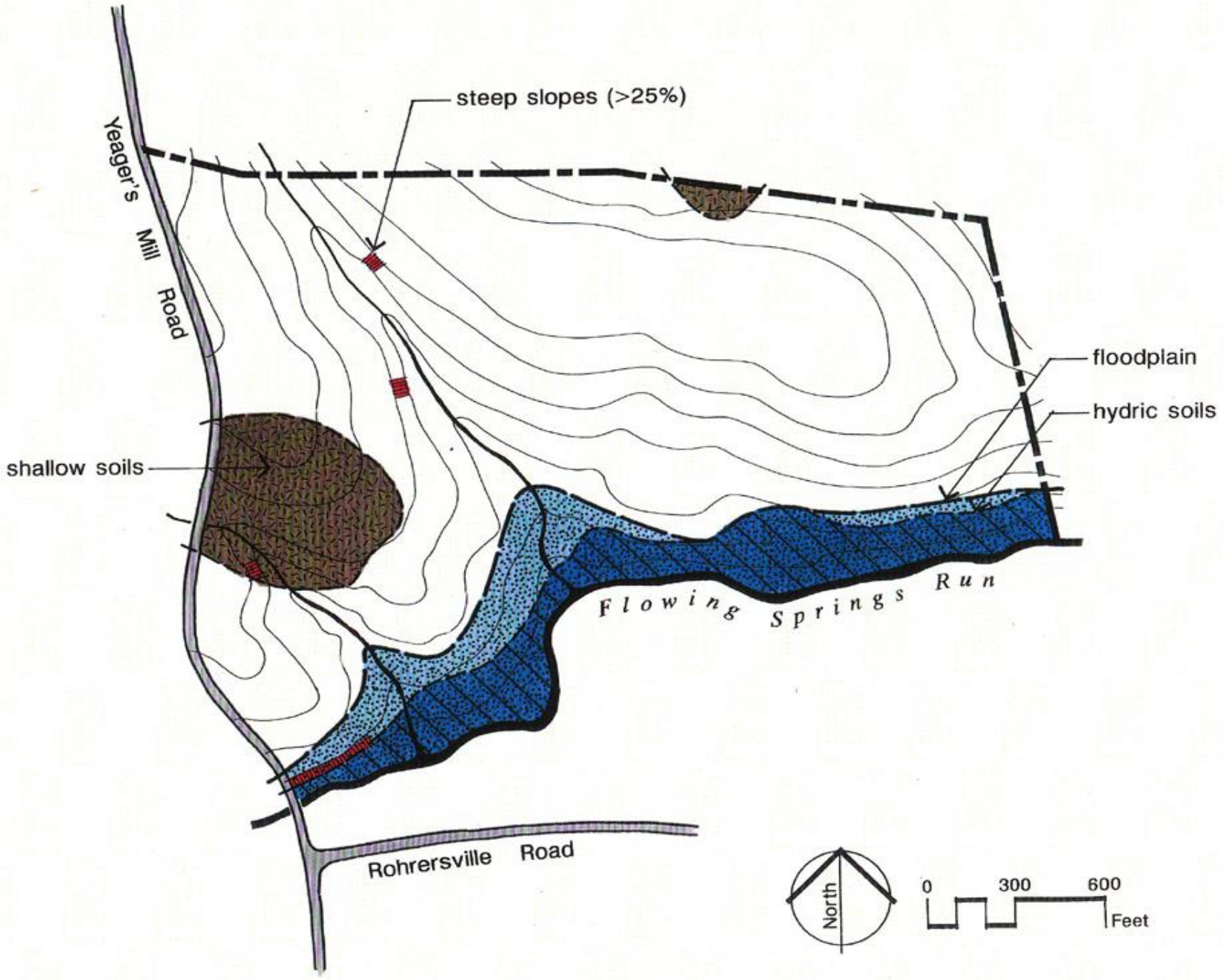
with Applicants (and abutters)

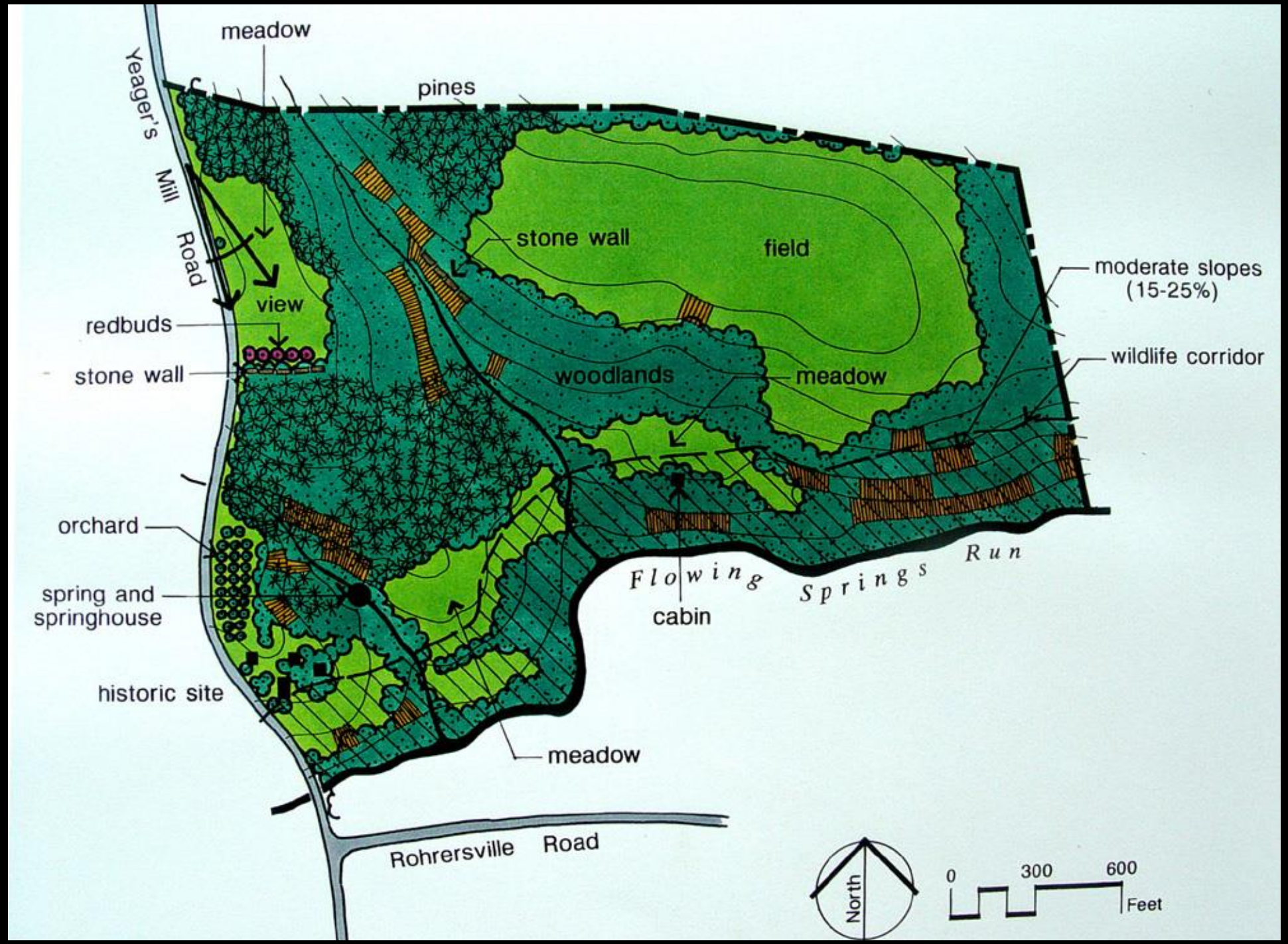
To Discover and Evaluate
Special Site Features

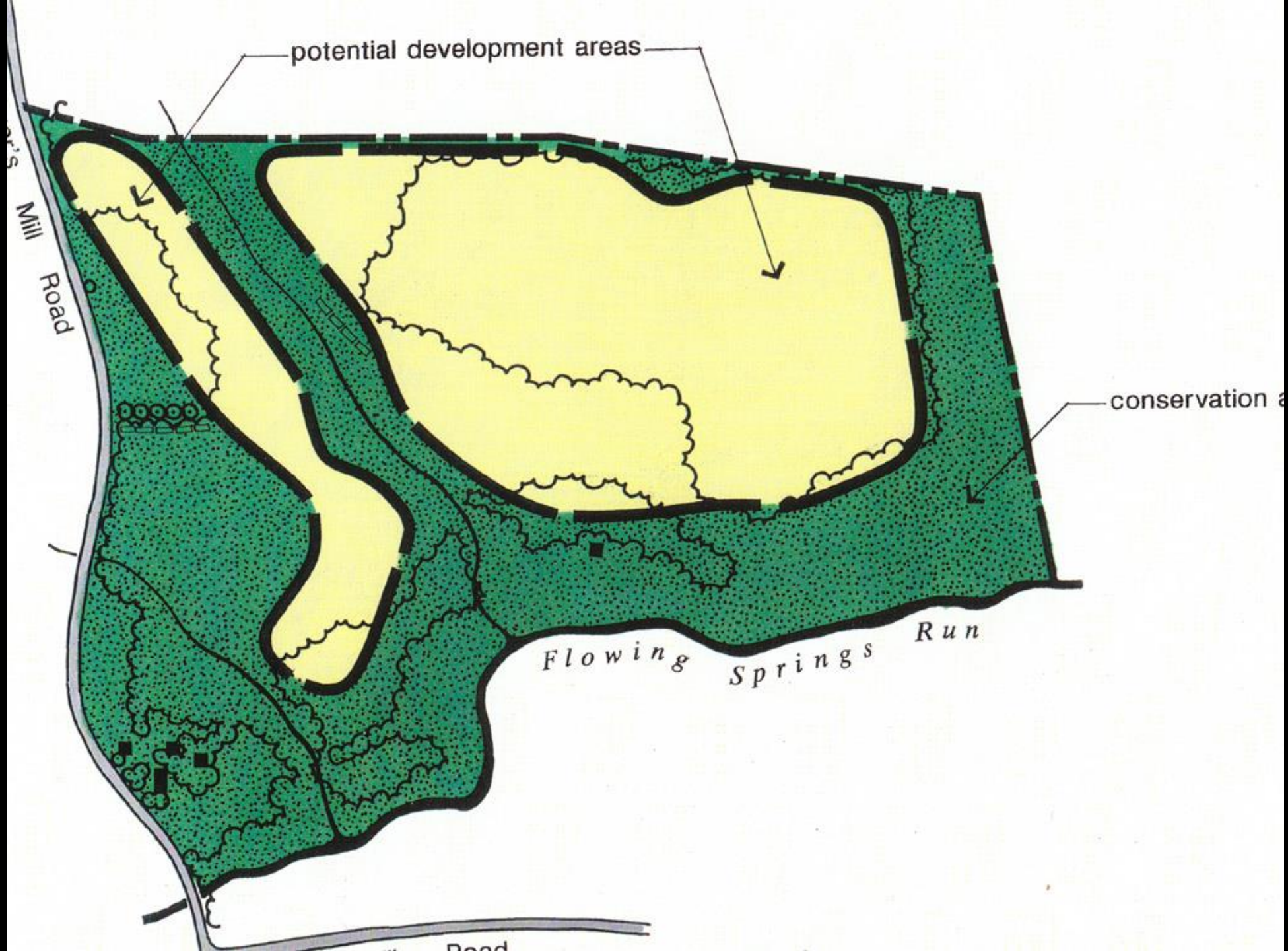
Four-Step Design Process

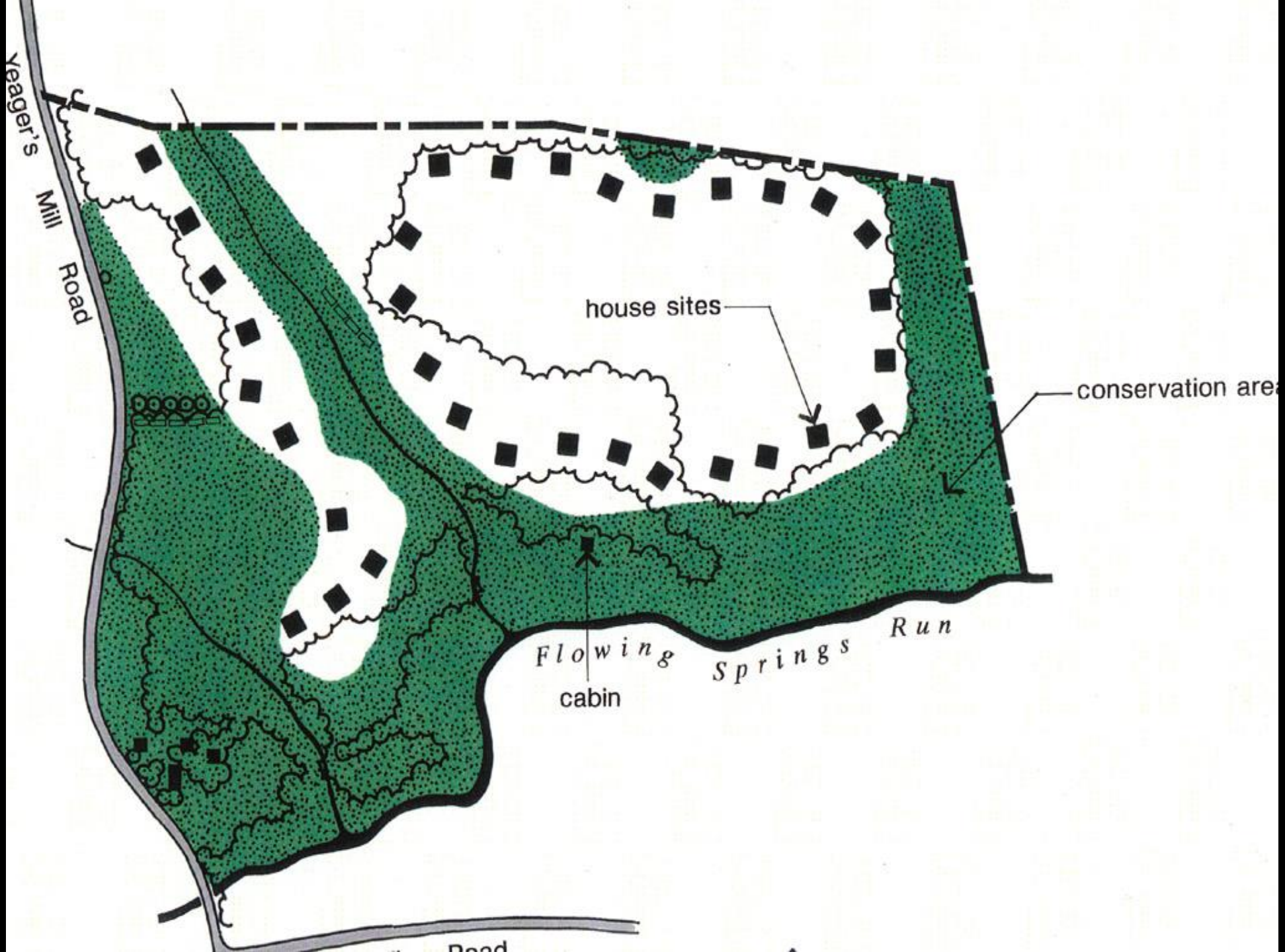
Identify Potential Conservation Areas
Locate House Sites
Connect Homes with Streets
Draw in the Lot -Lines

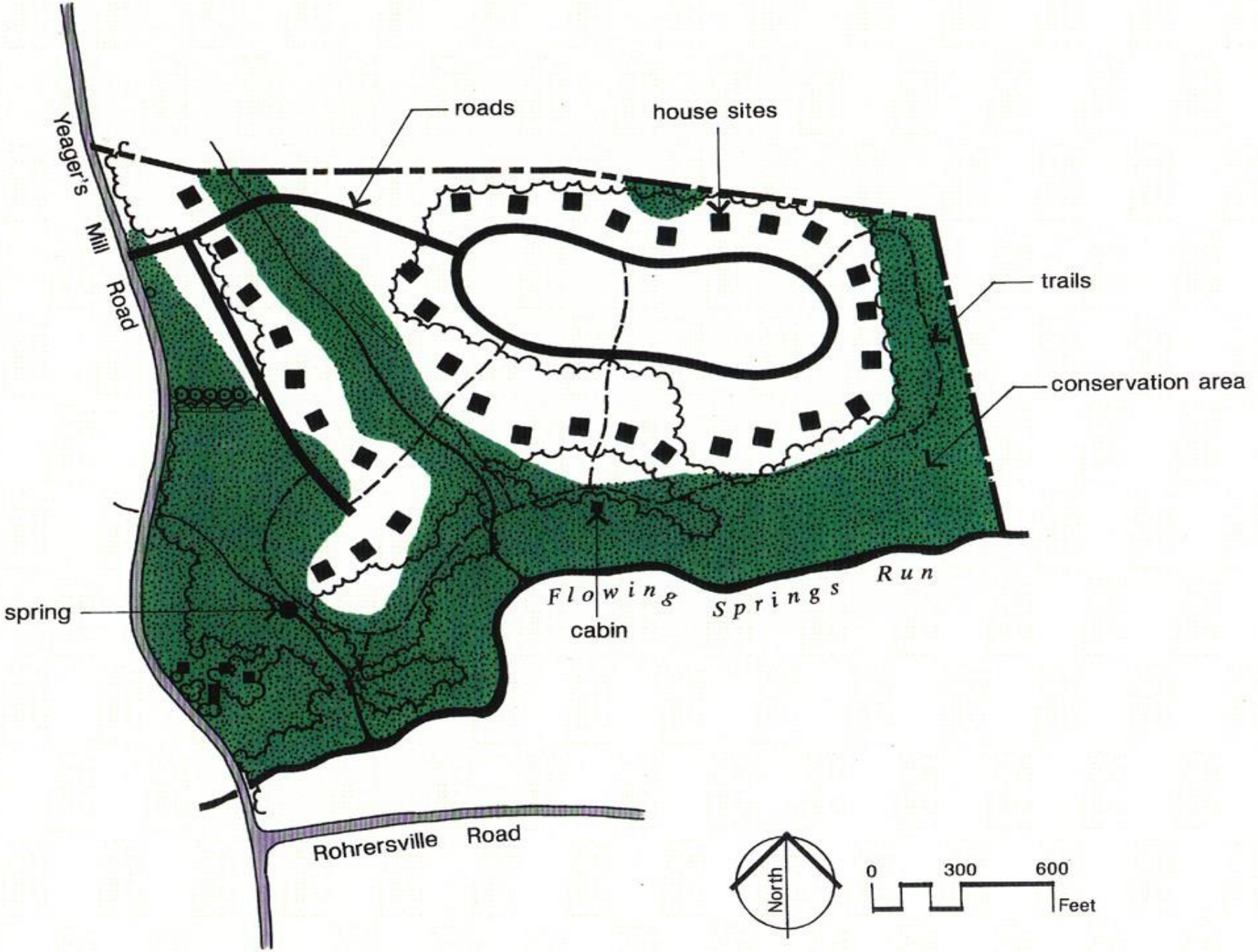

Yeager's Mill Road
Flowing Springs Run
Rohrersville Road
• floodplain
• hydric soils
• shallow soils
• moderate to steep slopes (>15%)
North
0
300
600
Feet


steep slopes (>25%)
Yeager's Mill Road
floodplain
hydric soils
shallow soils
Flowing Springs Run
Rohrersville Road
North
0
300
600
Feet


meadow
pines
Yeager's Mill Road
stone wall
field
moderate slopes
(15-25%)
view
redbuds
stone wall
woodlands
meadow
wildlife corridor
orchard
Flowing Springs Run
spring and
springhouse
cabin
historic site
meadow
Rohrersville Road
North
0
300
600
Feet


potential development areas
Mill Road
Flowing Springs Run

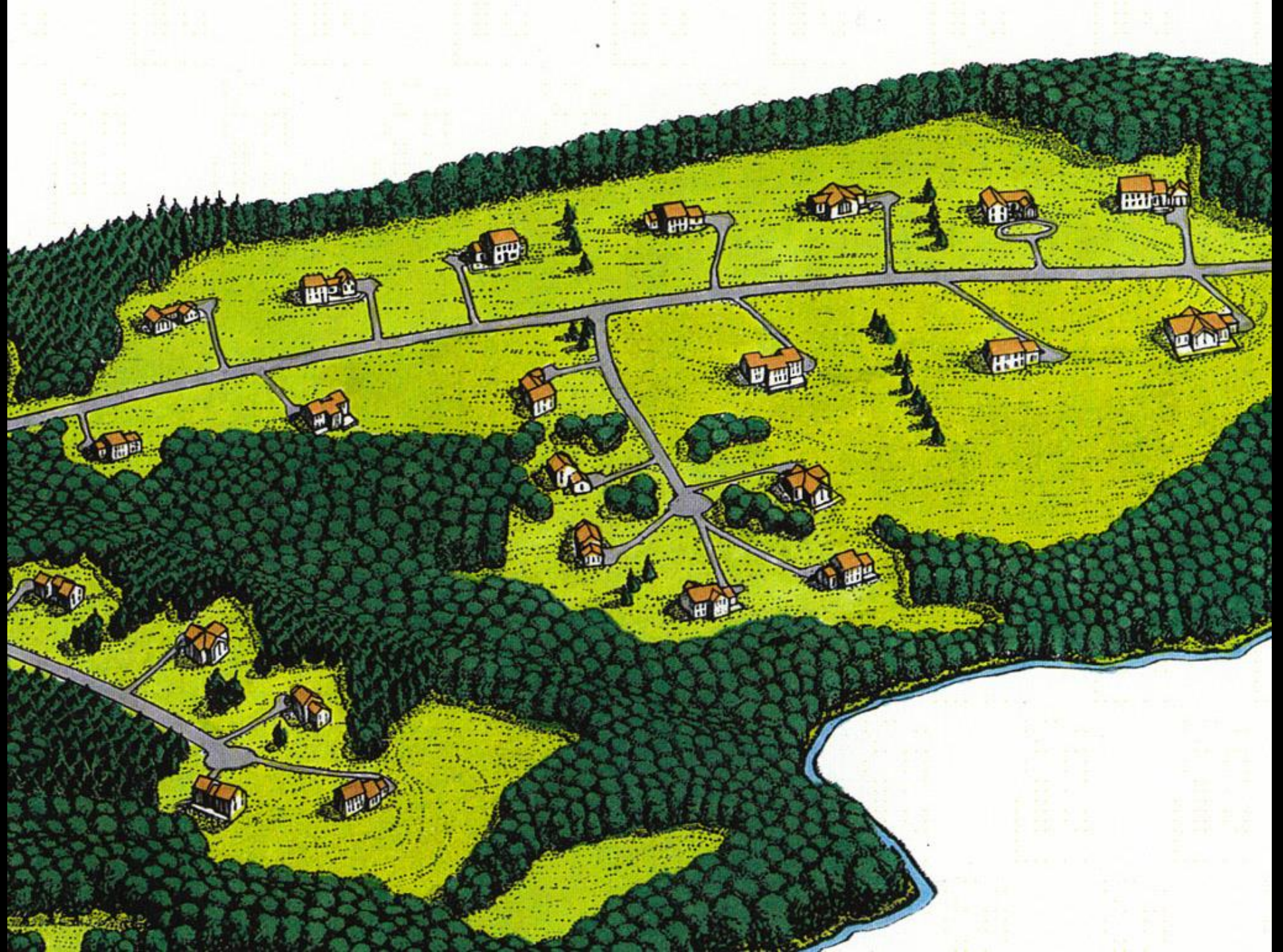

Yeager's Mill Road
house sites
conservation area
Flowing Springs Run
cabin

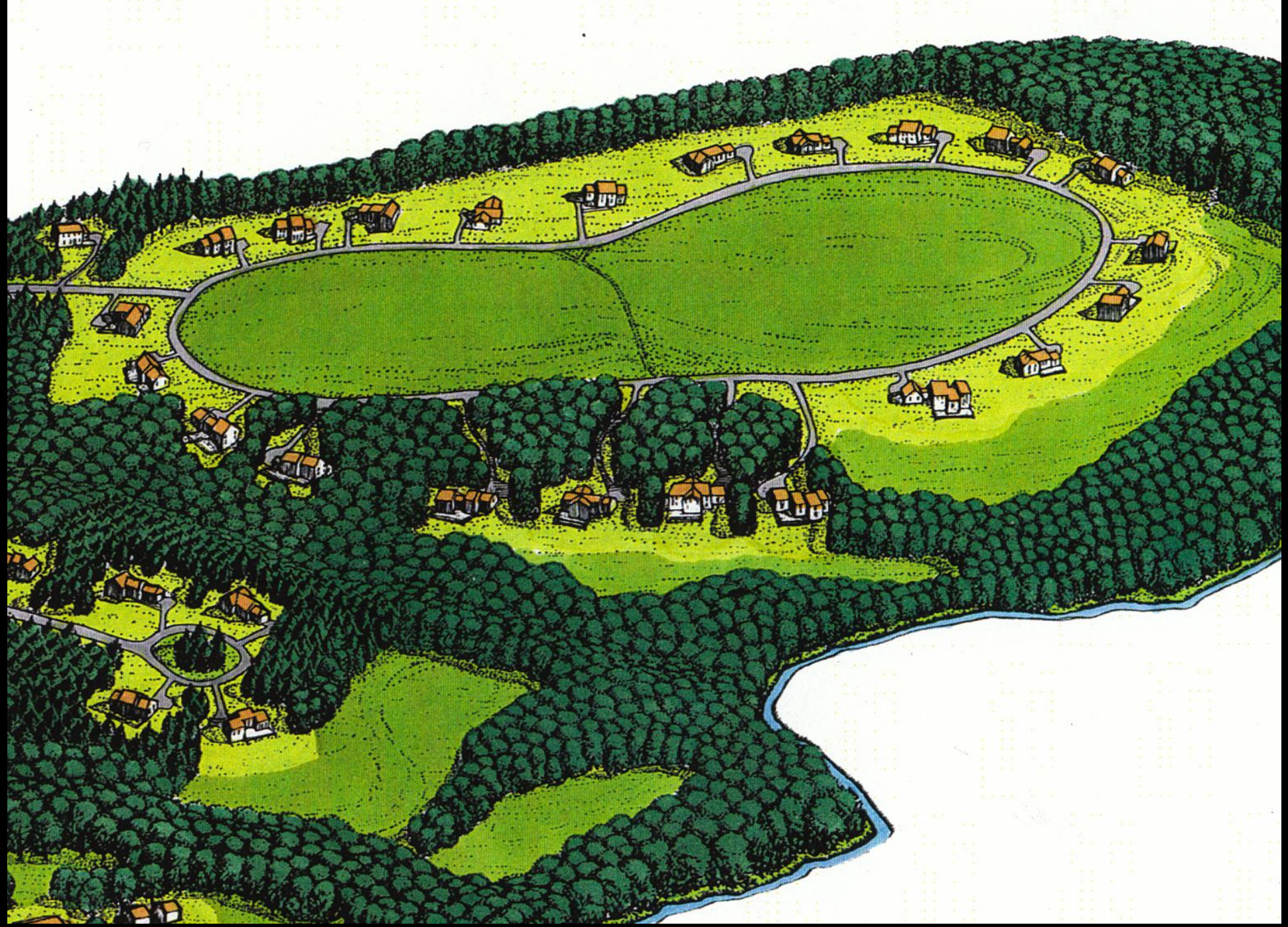

roads
house sites
trails
conservation area
Yeager's Mill Road
spring
Flowing Springs Run
cabin
Rohrersville Road
North
0
300
600
Feet


meadow
future road extension
Yeager's Mill Road
stone wall
meadow
trails
redbuds
stone wall
woodlands
orchard
Flowing Springs Run
spring and springhouse
cabin
meadows
historic site
Rohrersville Road
North
0
300
600
Feet


Yeager's Mill Road
Flowing Springs Run
Rohrersville Road
• floodplain
• hydric soils
• shallow soils
• moderate to steep slopes (>15%)
North
0
300
600
Feet


meadow
future road extension
Yeager's Mill Road
stone wall
meadow
trails
redbuds
stone wall
woodlands
orchard
Flowing Springs Run
spring and springhouse
cabin
meadows
historic site
Rohrersville Road
North
0
300
600
Feet



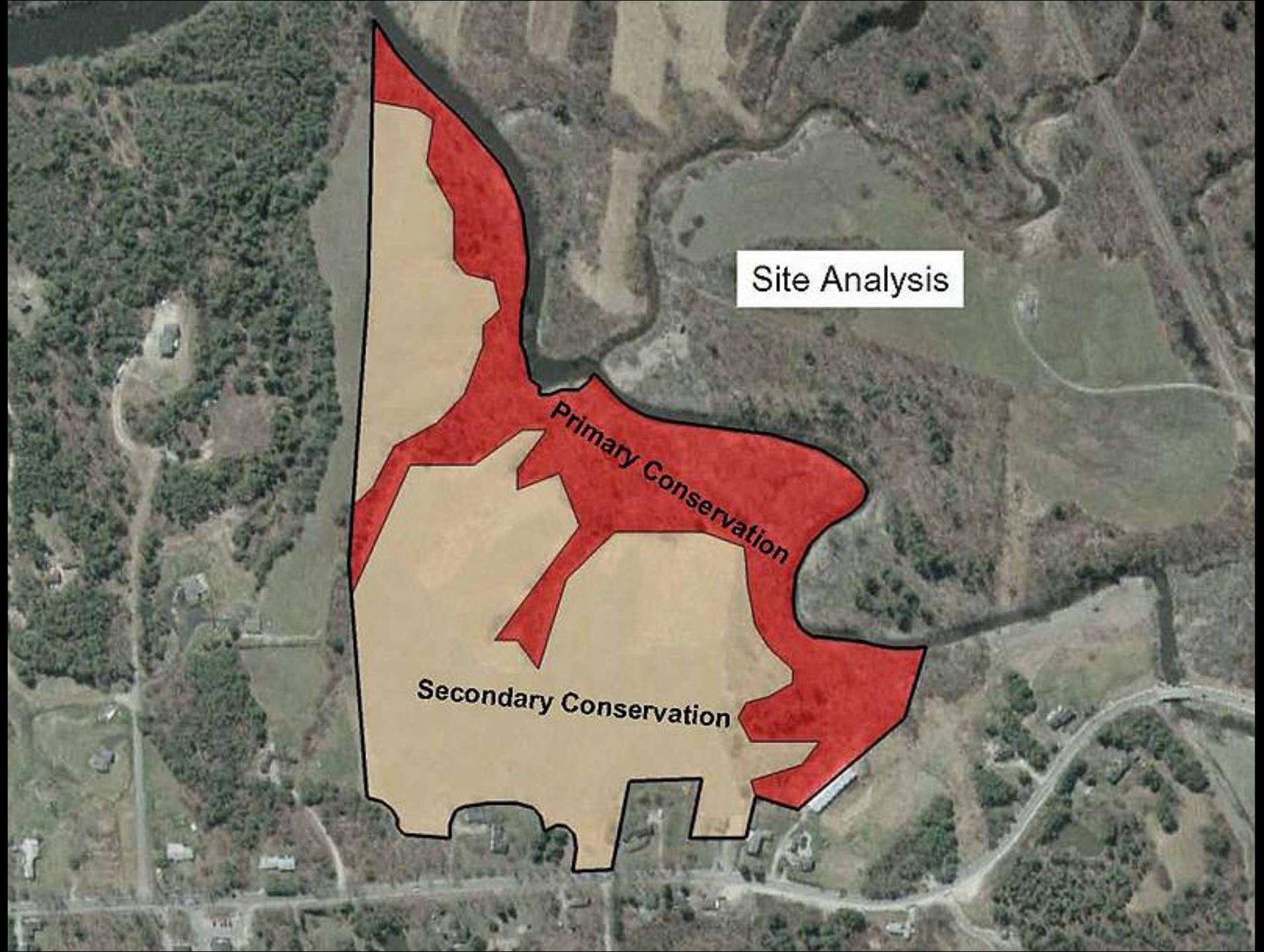


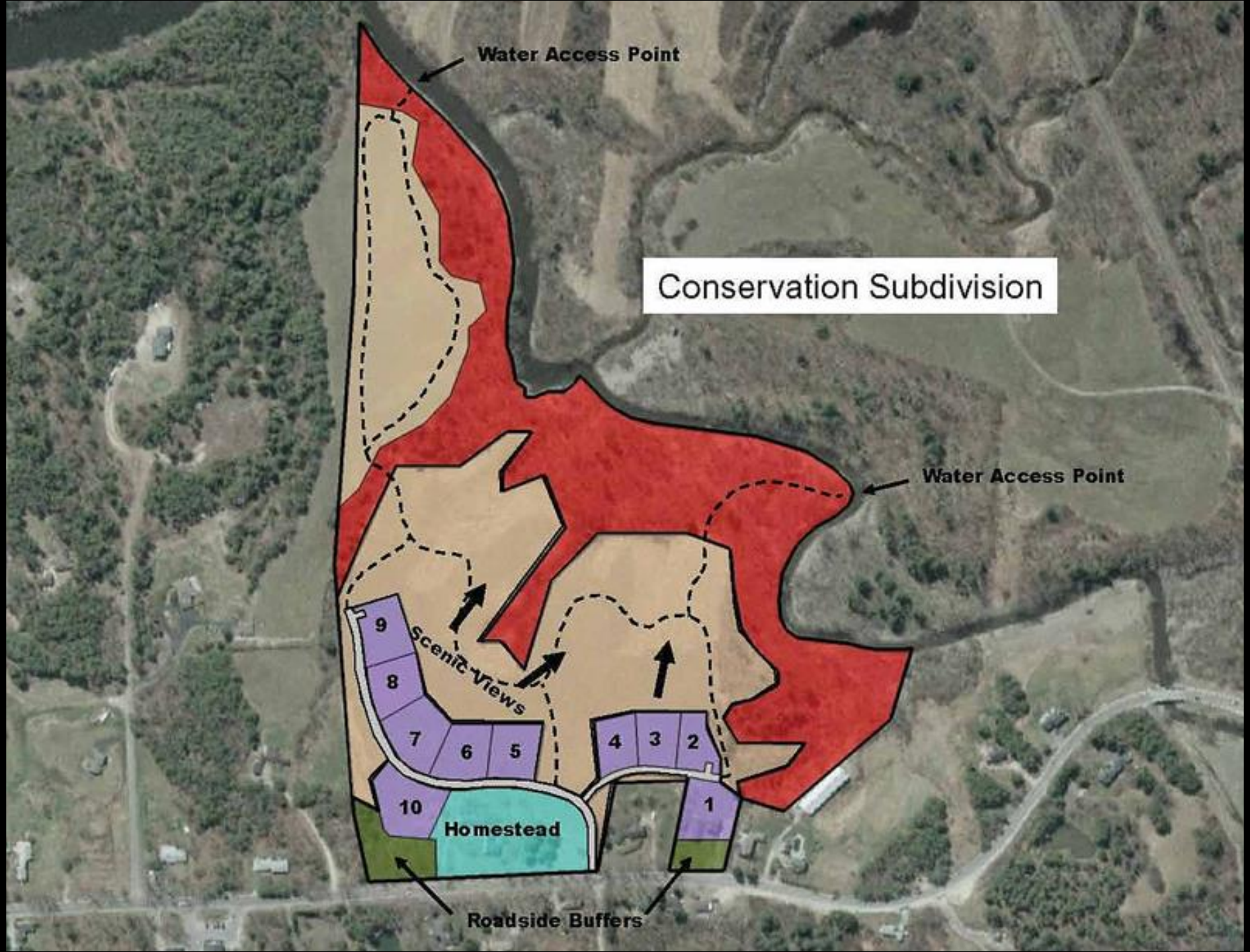

SPRITZER
PEACH


potential development areas


The Merrill Farm


Conventional Subdivision
6
7
8
9
10
5
4
3
2
1


Site Analysis
Primary Conservation
Secondary Conservation


Water Access Point
Conservation Subdivision
Water Access Point
9
8
7
6
5
Scenic Views
4
3
2
10
Homestead
1
Roadside Buffers

Compare Two Sketch Plans

(prepared by a LA or Planner)

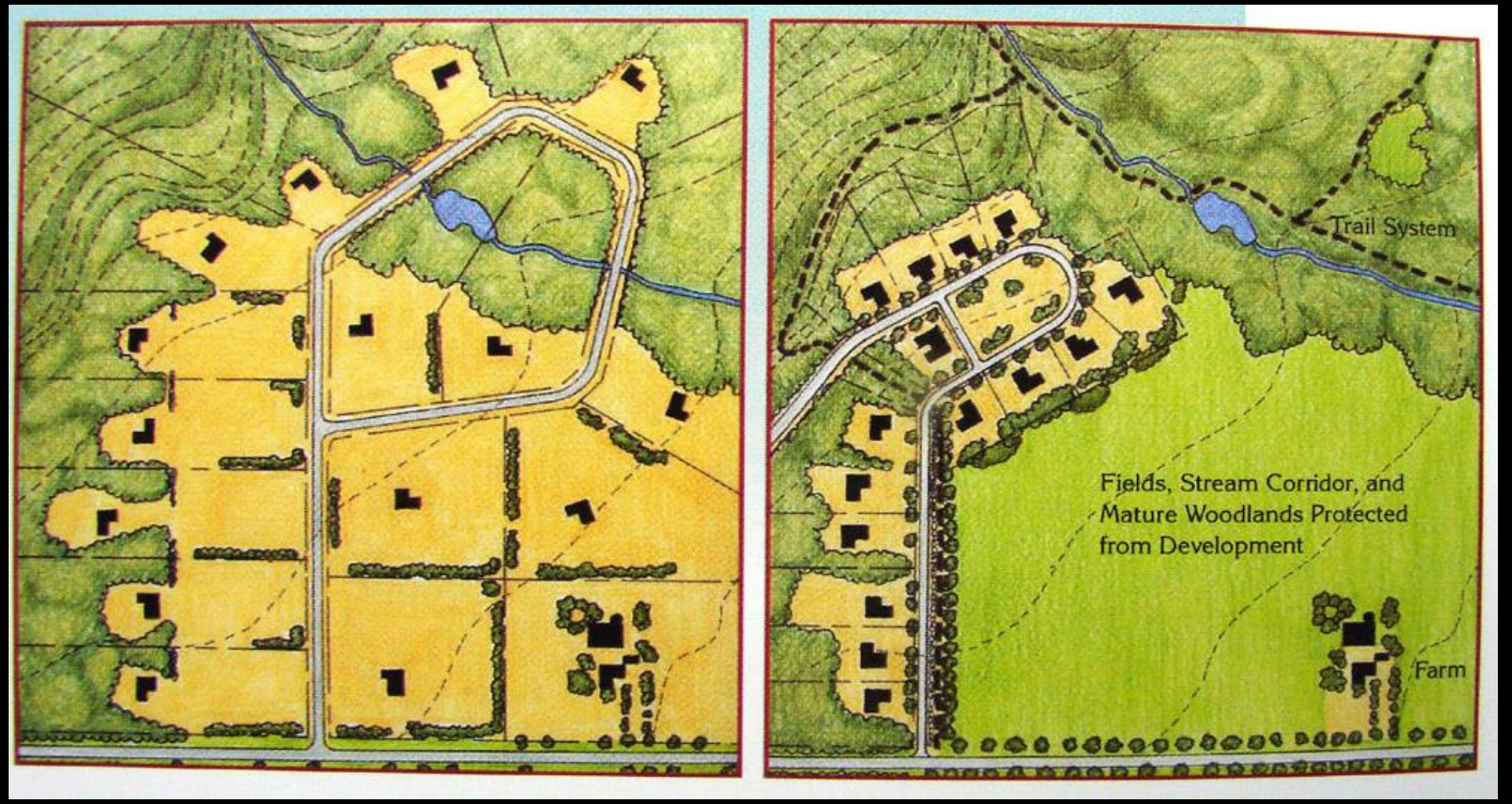
BEFORE

“Preliminary” Plan is Submitted

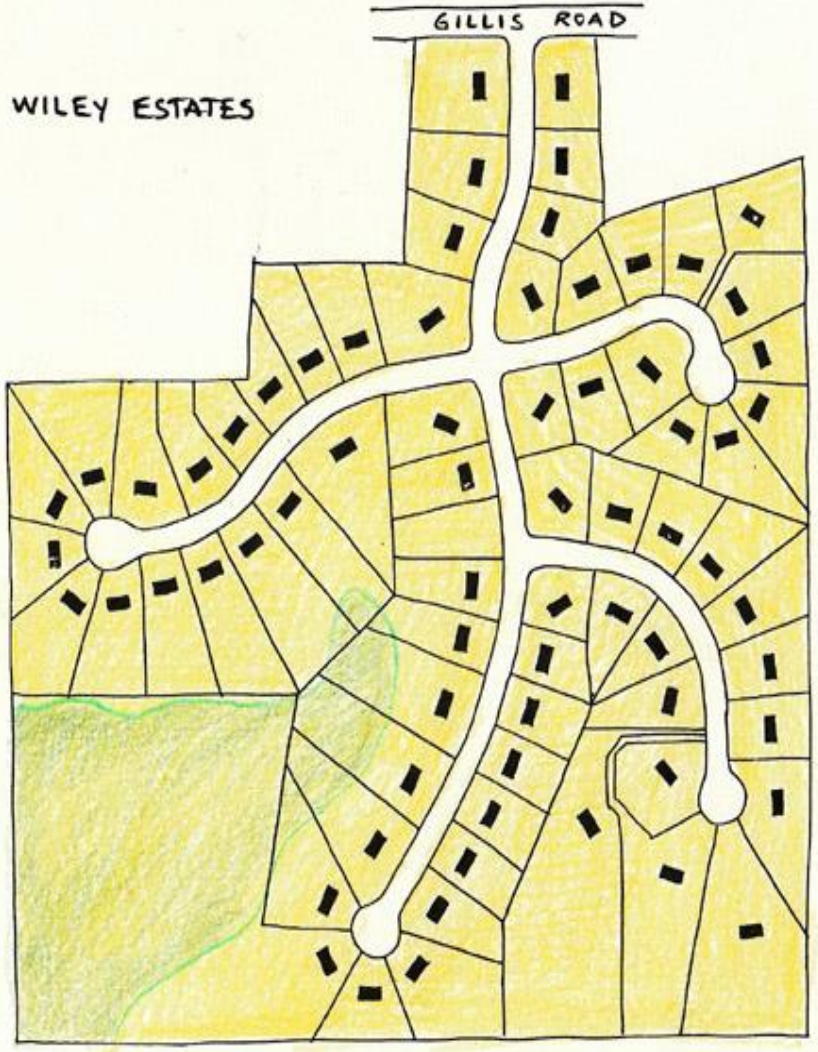
PB decides which one better complies with Bylaws and Comp Plan policies


Yeager's Mill Road
Flowing Springs Run
Rohrersville Road
• floodplain
• hydric soils
• shallow soils
• moderate to steep slopes (>15%)
North
0
300
600
Feet

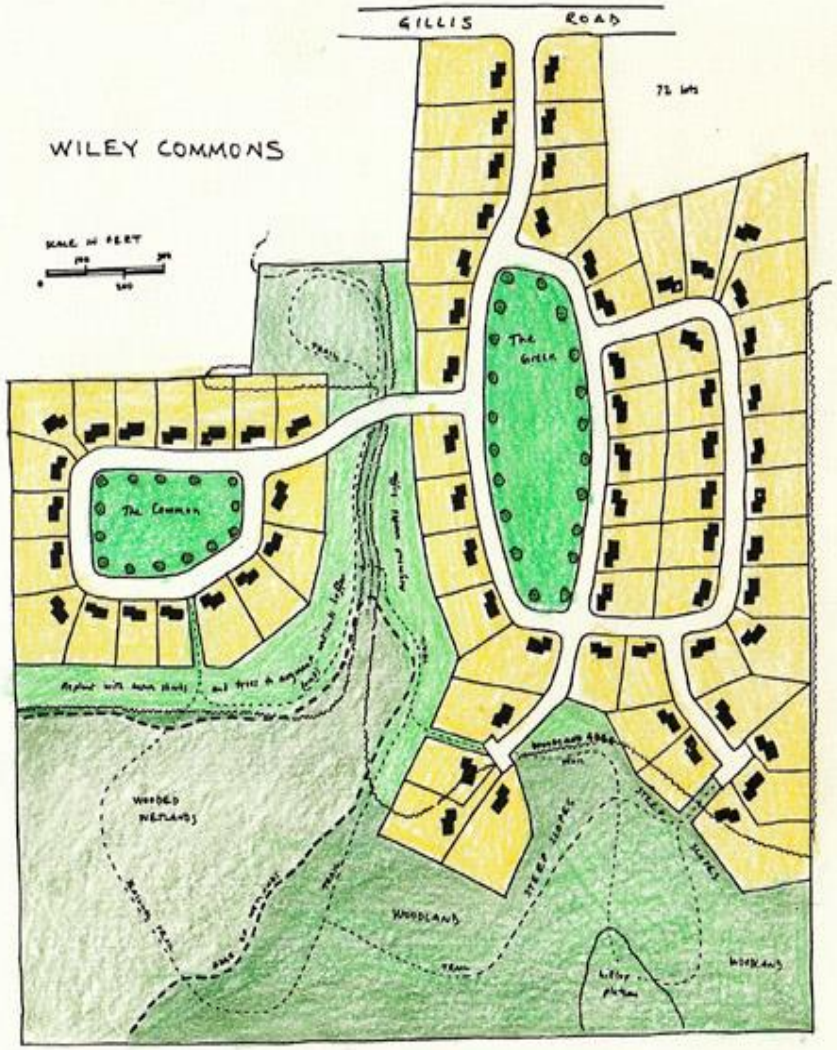

meadow
future road extension
Yeager's Mill Road
stone wall
meadow
trails
redbuds
stone wall
woodlands
orchard
Flowing Springs Run
spring and springhouse
cabin
meadows
historic site
Rohrersville Road
North
0
300
600
Feet

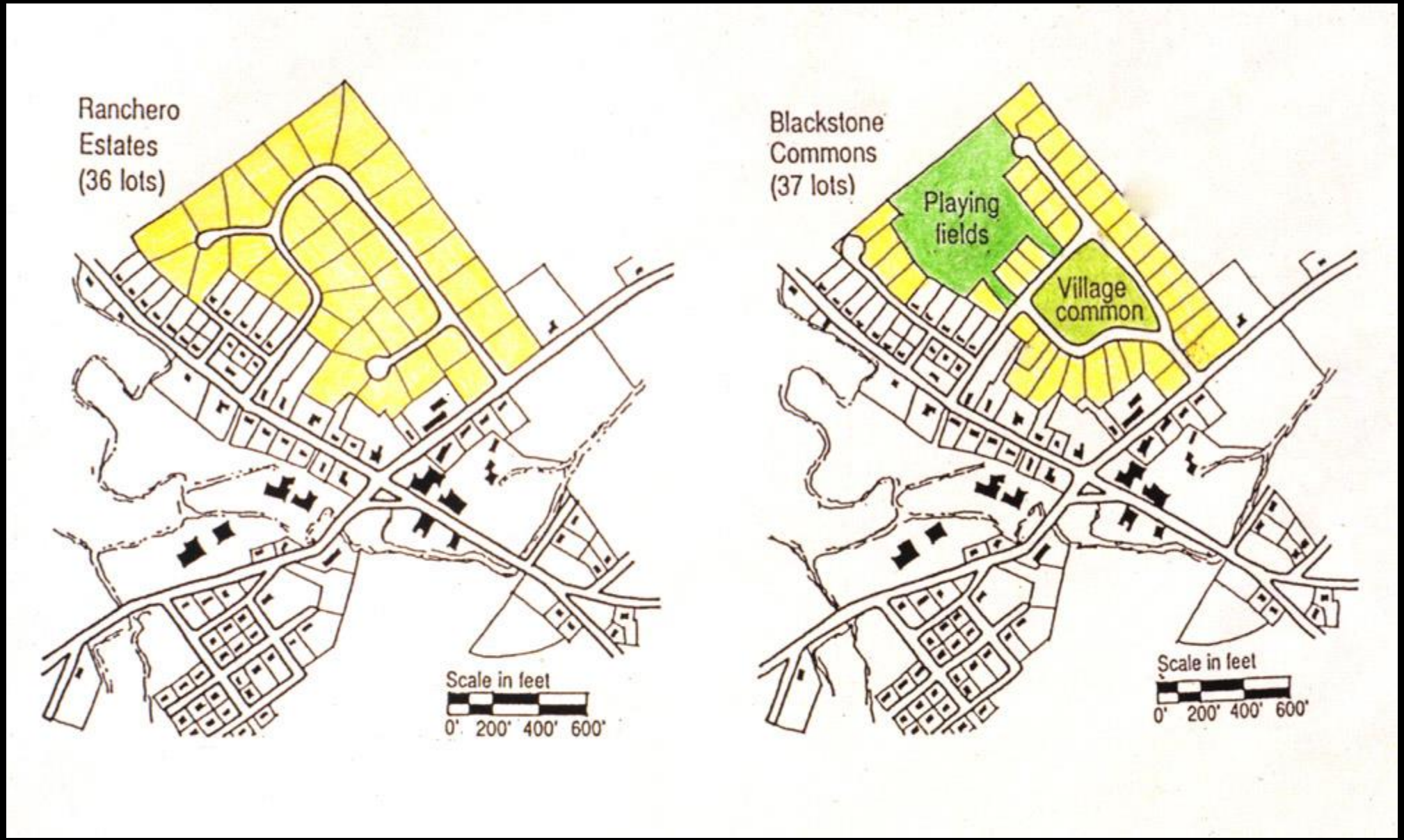

Trail System
Fields, Stream Corridor, and
Mature Woodlands Protected
from Development
Farm

WILEY ESTATES



WILEY COMMONS




Ranchero
Estates
(36 lots)
Scale in feet
0' 200' 400' 600'
Blackstone
Commons
(37 lots)
Playing
fields
Village
common
Scale in feet
0' 200' 400' 600'

Ways that Conservation Lands Have Been Used

Acres Saved with Conservation Subdivision Design

(as of 2014)

Municipalities

Westborough, MA 448 acres

Westford, MA 650 acres

Hamburg Twp, MI 750 acres

Hopkinton, MA 875acres

Counties

Cherokee County, GA 1,374 acres

Waukesha County, WI 1,670 acres

Hanover County, VA 5,550 acres

Calvert County, MD 7,765 acres

San Luis Obispo County, CA 9,000 acres

Nationwide Estimate: 100,000 to 180,000 acres

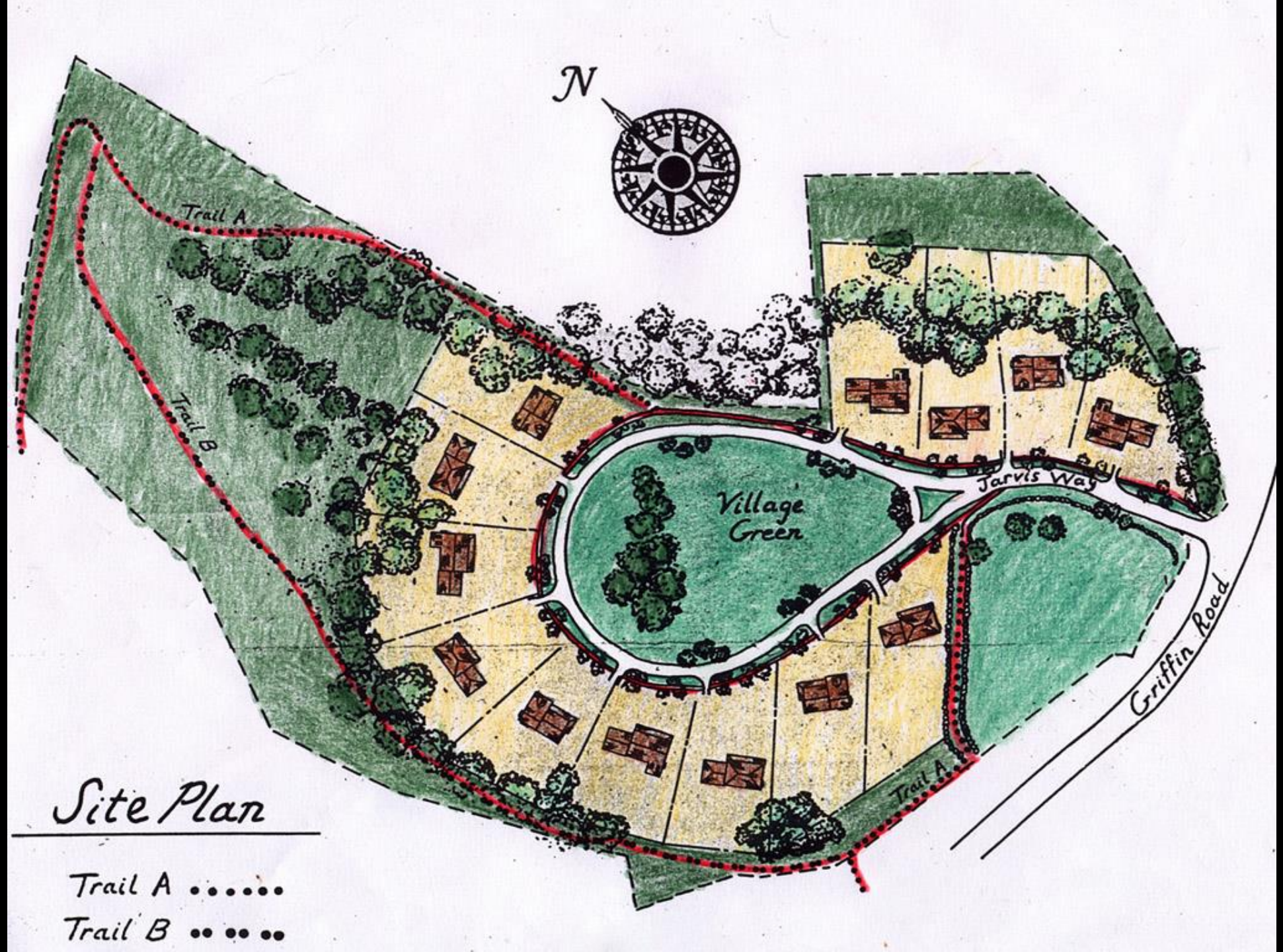
On-Lot

Well and Septic

Jarvis Farm

Westford, MA

(Lots range from 0.5 to 0.6 acres = 22,500 to 26,000 SF)



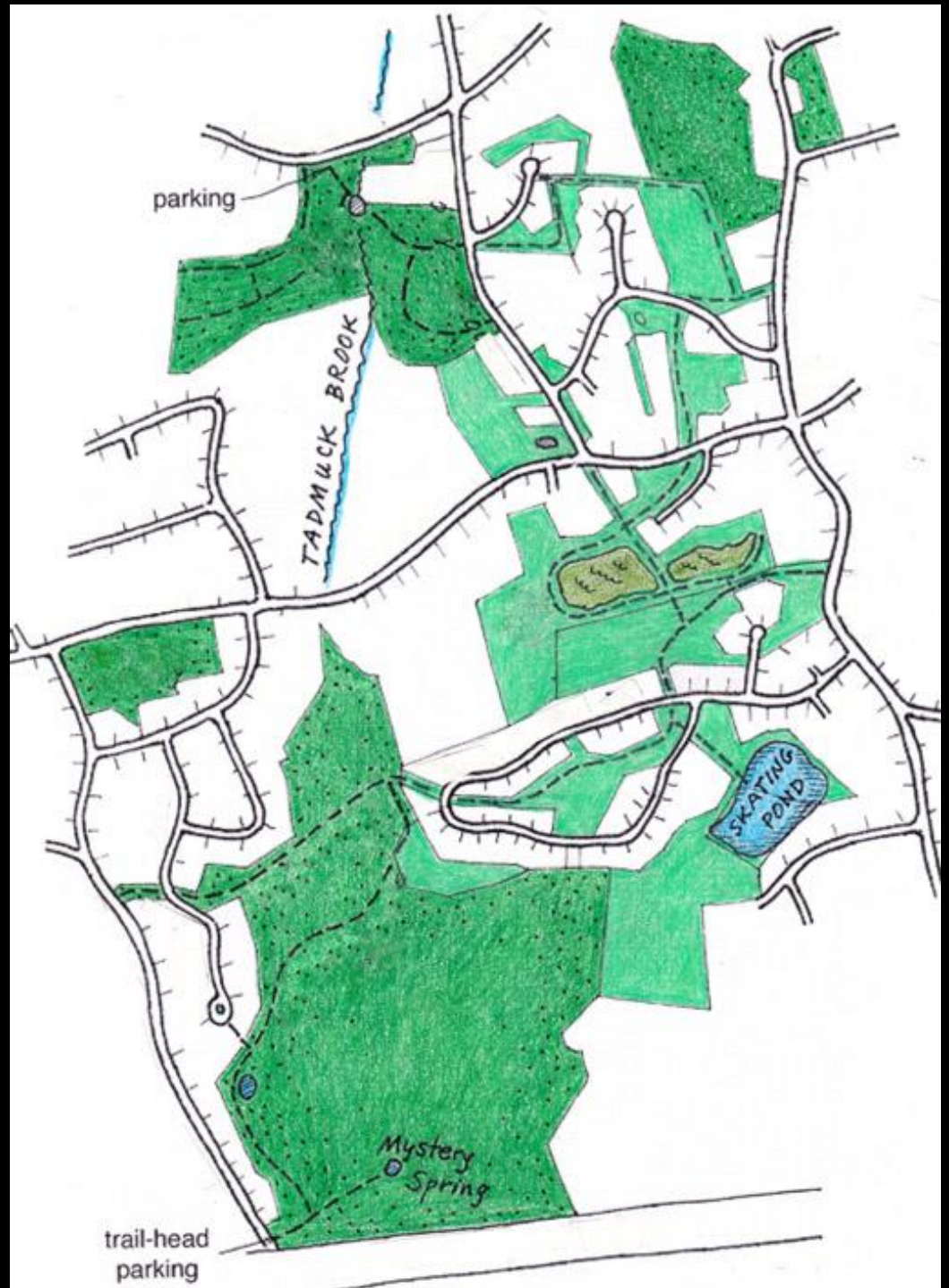
Site Plan

Trail A ••••••

Trail B •• •• ••

Jarvis Way
Jarvis Way
Little Bear Hill Rd


Trails in Westford, Massachusetts
Showing Connecting Links
Through New "Open Space" Subdivision
Scale in feet
0'
200'
400'
600'


parking
TADMUCK BROOK
SKATING POND
Mystery Spring
trail-head parking

Off-Lot Septic

Can be either Individual or Shared Systems

(on utility easements in the open space)

This flexible design approach allows septic systems to be located on the deepest and best drained soils on the property.

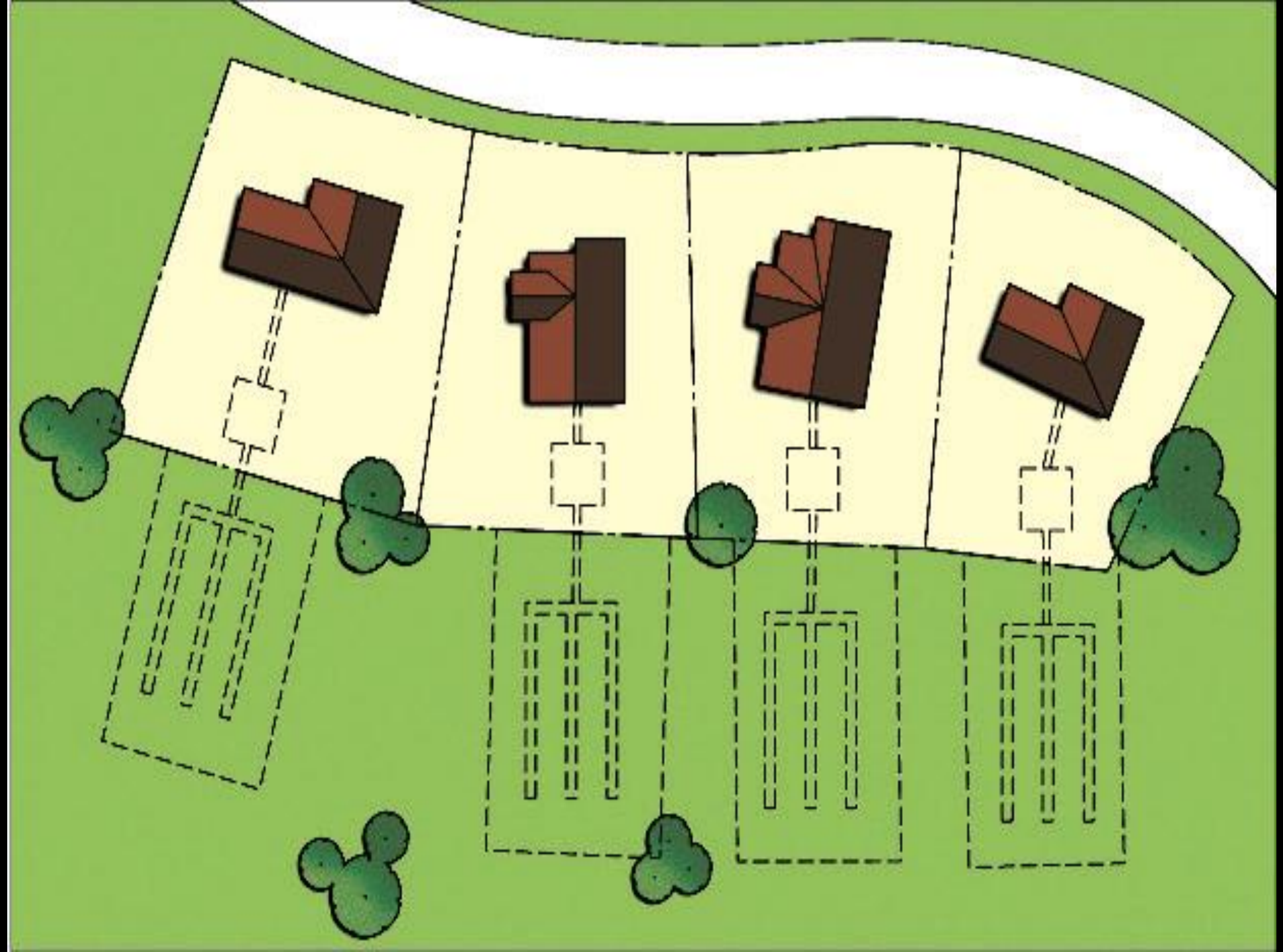
This is not the case in conventional subdivisions, where lots are spread out across the entire property, causing some lots to have much more marginal soils than others (they all pass, but some just barely).

Strathmore Farm

Madison, CT

Condominiums on EUAs of 10,000 to 12,000 SF

River Rd
Longview Terrace
Kingsbridge Way



Off-Lot

Community Septic

(on utility easements in the open space)

Partridgeberry Place

Ipswich, MA


Abbott Lane
Illegal Play Structure
Trail
Trail
100' wetland Buffer
Wetlands
Wild Cranberry
Bog
Upland
Woods
Knoll
Hood Farm Road
Trail
Trail
Stable
Cranberry Crescent
Wooded Park
Knoll
Knob
Trail
Trail
Woodland Buffer
Trail
N


Abbott Ln
Hood Farm Rd
Partridgeberry Pl
Partridgeberry Pl

Multiple Shared Septic Systems

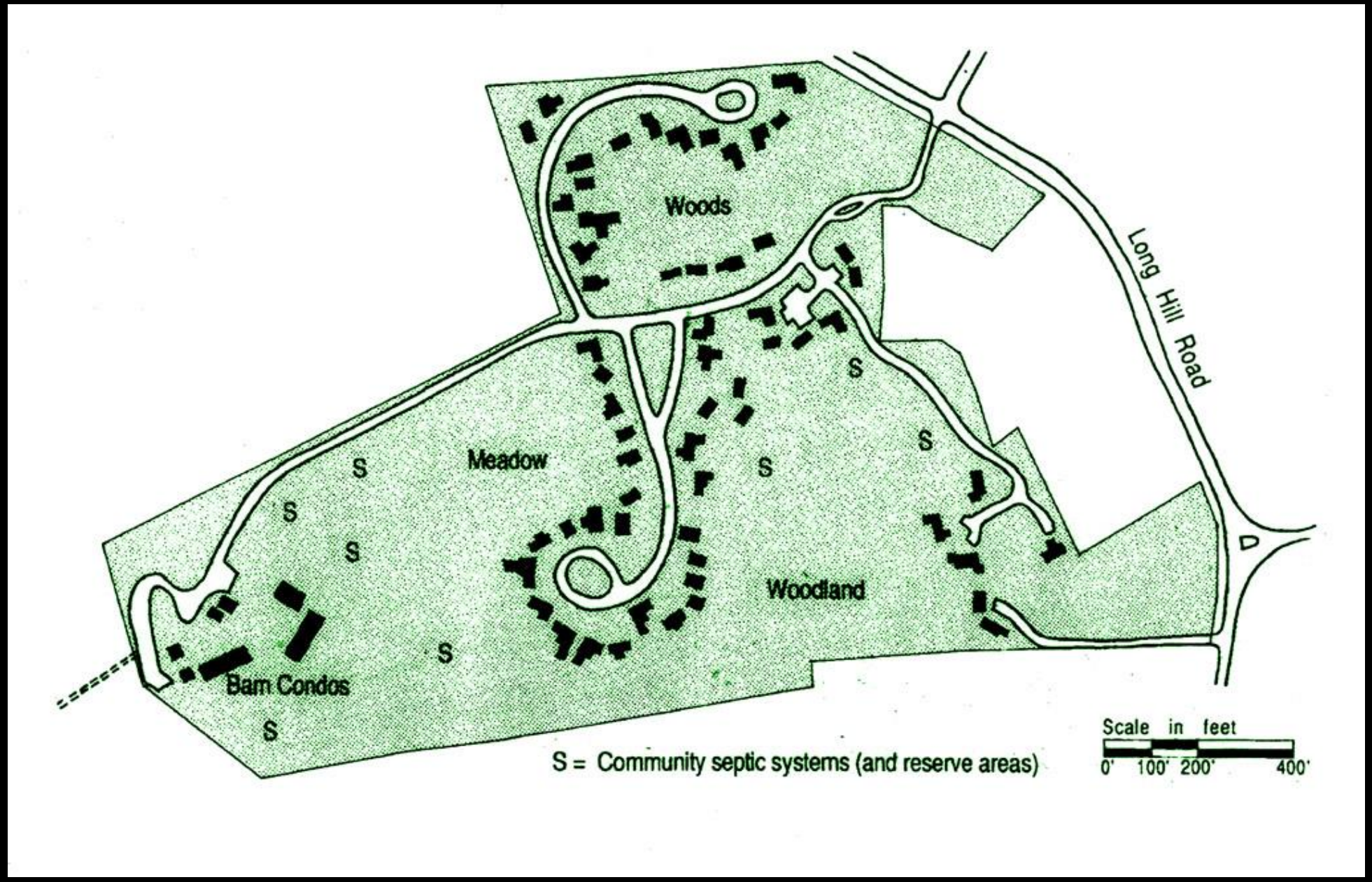
and Shared Wells

(on utility easements in the open space)

Long Hill Farm

Guilford, CT

Condominiums on 5,000 SF EUAs


Woods
Long Hill Road
Meadow
Woodland
Barn Condos
S
S = Community septic systems (and reserve areas)
Scale in feet
0' 100' 200' 400'

Ringfield

Chadds Ford Township,
Chester County, PA

Most homes on small individual lots

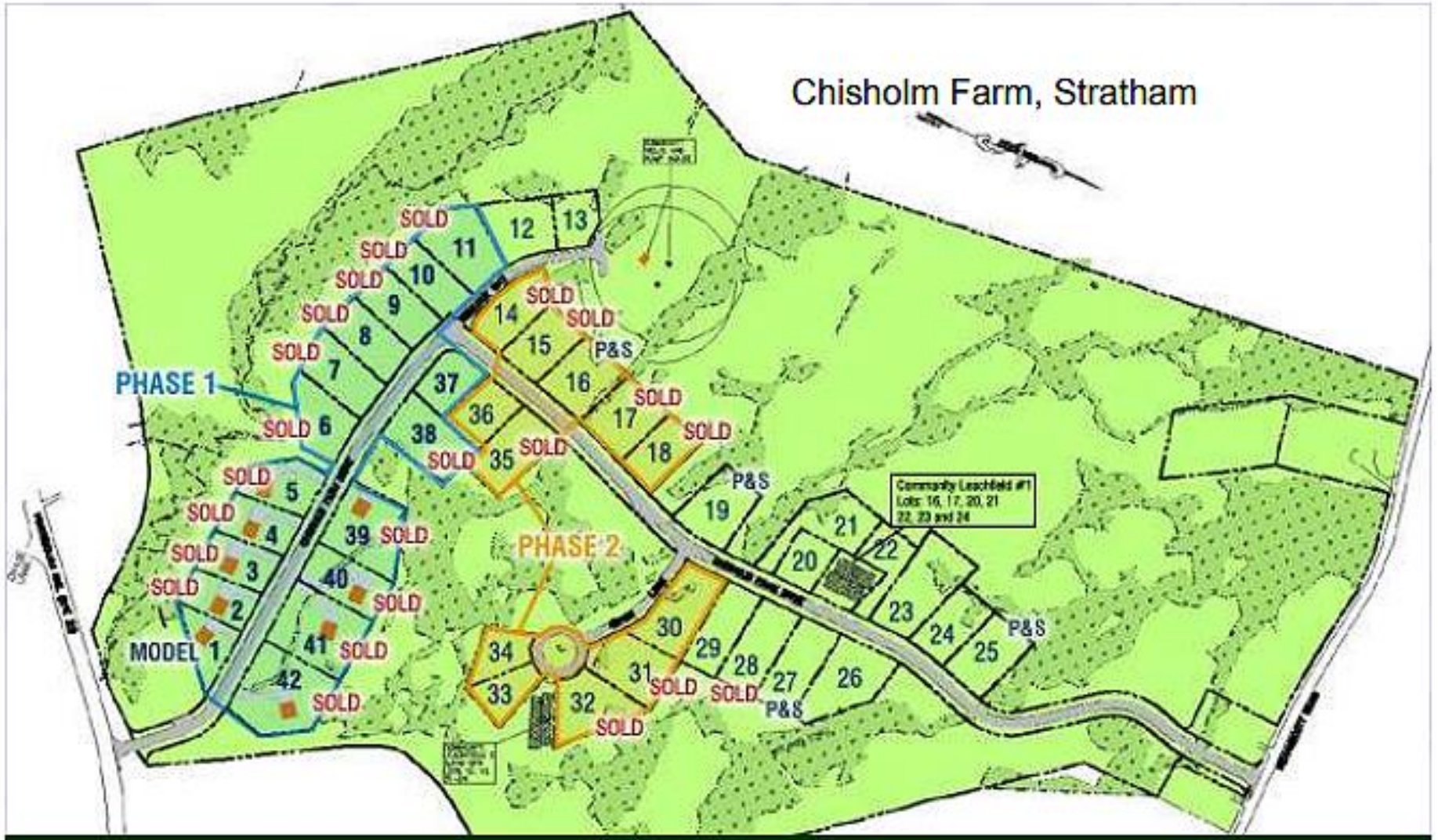
(with mostly shared septics, but with some individual off-lot septics)


woodlands
w
s
meadow
single
family
lots
w
s
pond
s
w
s
w
townhouses
s
w
meadow
condominiums
original
farmhouse
w
pond
pond
s
s
woodlands
s
Ring Road
0
200
400
800ft
s = septic field
w = well house

Central Septic System

and Central Well

(on utility easements in the open space)



- 115 acres, 85 acres as open space (74%)
- 42 house lots (1/3+ to just under 1 acre)
- Community Leachfield and Community Well

Deerfield Knoll

(“Detached Townhouses”)

WillistownTownship,
Chester County, PA

Condominiums on EUAs of about 5,500 SF


Sign in
Cranberry Ln
Cranberry Ln
Cohasset Ln
Cohasset Ln

Resources

- *Innovative Land Use Planning Techniques – A Handbook for Sustainable Development* - NH DES; NH Association of Regional Planning Commissions; NH OSI; NH Municipal Association, October 2008
  - *Conservation Subdivision Chapter*
- *Conservation Subdivision Design. Minimizing the Impact of Subdivisions* - Carolyn B. Russell, AICP, NH DES
- *Rural by Design, Second Edition* – Randall Arendt, F.R.T.P.I., ASLA (Hon). To purchase a copy e-mail rgarendt@comcast.net or go to http://www.greenerprospects.com/index.html

Questions and Answer Section

- If you would like to ask a question, please either raise your hand and we will give you the ability unmute yourself or type your question in the Chat box. If on the phone, lines have been unmuted

Thank you!

- All Conference Session slides and recordings will be available next week on the Conference webpage

Feedback Encouraged!

- Please fill out the Anonymous Evaluation Form that can be found at the link below

Click Here for Feedback Survey