

The Fields at Sherborn

A TRASK DEVELOPMENT COMMUNITY IN SHERBORN, MA 01770

The Fields at Sherborn

August 27, 2015

Response/submittals/summary for Sherborn Conservation Commission meeting 8/31/15

Submittals presented:

Plans: (6 Copies dropped off to Town, File set sent to reviewing consultants)

1. Layout Plan (C1) by Bruce Saluk and Associates dated December 8, 2014 with revisions through 7/28/15 (Plan changes are added "activity barrier" and snow storage areas) plan is pending some minor updates for cultic drainage system.
2. Landscape Plans L1, L2, L3 by Hawk Design dated 8/27/15.
 - a. **L1 plan** details overall landscaping, along with detailed planting area in proposed mitigation/restoration areas, per CLAWÉ plan attached.
 - b. **L2 plan** detail typically lighting features (both common and private) as well as entrance features. Also detail activity barrier fence details per both CLAWÉ plan and Bruce Saluk Plan.
 - c. **L3 Plan** show proposed areas of irrigation along with total estimated areas to be irrigated (51,000 sf) along with run times and yearly schedule of irrigation system (System to be under control of management company).
3. Wetland and Buffer Zone Impact and Mitigation Plan, (dated August 26, 2015) by Creative Land and Water Engineering LLC (CLAWÉ).

Reports: (6 Copies dropped off to Town Conservation Commission, File sent to reviewing consultants)

-Creative Land and Water Engineering LLC (CLAWÉ) dated August 26, revised through August 27, 2015.

Pending Reports as of 8/27/15

-Final storm water management analysis by Bruce Saluk and Associates.

Concerns detailed by Commission members at last meeting

Confirm, detail limit of work and proposed mitigation

Response:

See details from CLAWÉ report as well as limit of activity and restoration areas detailed in plans referenced above. Note that that the buffer zone disturbance of previously undisturbed areas is 12,144 SF and the buffer zone enhancement of previously disturbed areas (with proposed native plantings and shade trees) is approximately 36,927 sf, or a net 23,783 sf of enhanced/revegetated areas.

It is the intention that after initial work in the areas between proposed limit of work and new activity barrier, the applicant would do final grading, loam and restoration as early as practical during the construction phase. This could be completed during the first growing season of the project in most areas, some areas (near septic tanks and associated retaining

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walls) would need to take place after these tanks and wall are installed. After work is completed in these areas (including well installation, culvert installation, grading, etc) and after the plantings have been completed, a second erosion control barrier could be installed in conjunction with the activity barrier fence to control construction and limit access. Both "levels" of erosion control could remain until issuance of Certificate of Compliance for the project.

Provided well information

See details from CLAWE report regarding surrounding wells, and proposed type and depth of onsite wells.

Provide additional shade tree and planting details

Response

See CLAWE report and landscape plans for mitigation areas and restored areas with planting type and quantities (native species).

Provide fill analysis (quantity and source) per local by-law requirements

Response:

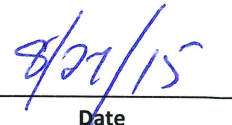
There will be an approximately requirement of 8000-9000 square yards (SY) of material needed; per breakdown:

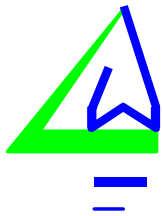
Structural house fill/Roadway deep base:	2500 SY
Roadway/Driveway Gravel:	4500 SY
Septic Gravel/electrical sand/cultic stone etc:	4500 SY
Totals	11,500 SY

All structural materials, trench sand, stone (drainage and septic) and septic gravel will all be supplied by local material yards. Septic gravel, structural fill, stone, trench sand, and drainage stone will all be inspected by either the building department, or the Board of Health. Roadway and driveway gravel will be processed materials typical of all roadway/driveway install (Mass state spec). No other low quality fill materials will be needed. Some loam may be hauled off depending on total requirements for septic gravel import, etc.



Benjamin Stevens, Manager, The Fields at Sherborn


Date



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Effective, Affordable, and Sustainable Solutions for Land & Water Environment

August 26, 2015 Revised August 27, 2015

To: Mr. Steve Gaskin, Chairman
Sherborn Conservation Commission
19 Washington Street
Sherborn, MA 01770

Re: **NOI, Washington Street (Map 3 Lots 88B and 88C), Sherborn, MA, DEP file #283-0366**

Dear Mr. Chairman and Commission Members:

We have received and reviewed the review comments by Beta dated July 29, 2015. This letter addresses wetland impact and ground water mounding issues.

Wetland Impacts

As we all know, the proposed work is mostly within the existing grazing field and woods lacking understory growth. The wetland resource border delineation within 100 ft of the proposed work was approved by the Commission on 8/7/2014 and is still valid. The impact of grazing to wetland and buffer zone included soil compaction, destruction of vegetation and animal waste pollution. See Table 1 for a summary of the existing land use and brief impact description.

Table 1. Existing land use condition

Land use	Area, acres	%	Disturbed, acres	Note	Impact
Wetlands	6.99	39.83%	0.09	Grazing area lacking	Vegetation, compact soil, animal waste
Impervious	0.06	0.34%	0.06	sheds	runoff
Lawn	4.9	27.92%	4.9		Runoff, animal waste pollution
Woods	5.6	31.91%	0.91	grazing area lacking of undergrowth	Vegetation, compact soil, animal waste pollution
Total	17.55		5.96		

The grazing impact can be seen from the grazing path compaction which allowed wetland vegetation (skunk cabbage) to grow in top of hill of sandy soil, which has significant impact on the runoff and recharge of groundwater.

The proposed development followed general wetland protection guideline:

- The Project avoided any direct alteration to bordering vegetated wetlands (BVW) or protected wildlife habitat, which will have no adverse impact on habitat or will be “no take” of any habitat for endangered species wildlife.
- The proposed project will allow restoration and enhancement of currently disturbed wetland and buffer zone close to core wetland resource area. See Tables 2 and 3 for details.

- The proposed project was designed in the way to mitigation impact of the work within buffer zone and beyond:
 - 1) Stormwater water management system meeting and exceeding DEP stormwater standards to reduce runoff and pollution to wetlands and increase groundwater recharge for water supply.
 - 2) More available water resource to protected wetland, water supply recharge. See A: water budget calculation sheets.
 - 3) Landscaping using mulched bed planting area behind buildings to eliminate pesticide and fertilizer and enhance wildlife habitat with better and diversified indigenous plants.
 - 4) In addition, we will provide clear limit of work and install erosion and sediment control along the limit of work which will be set back from wetland line to provide a natural vegetation buffer during construction. The construction site will be monitored during construction to assure and to maintain or adjust the erosion control measures to protect the wetlands on site. For post construction condition, the restoration and mitigation planting will provide better long term benefit and protection to the wetland resource. A permanent demarcation approved by NHESP and Sherborn Conservation Commission will be set up along the limit of approved permanent disturbance. See our correspondence to DFW (NHESP) later for details.

Table 2. Proposed land use condition

Land use	Area, acres	%	Disturbed, acres	Note	Mitigation
Wetlands	6.99	39.83%	0.00	To restore 0.09 acres	To add vegetation and to eliminate compact of soil and animal waste
Impervious	2	11.40%	2.00		Stormwater treatment and recharge
Lawn	3.32	18.92%	2		No pesticide and fertilizers
Woods/landscape	5.24	29.86%	1.90	mulched shrubs and ground covers in buffer zone	Mitigate existing grazing impact and reduce future impact
Total	17.55		5.90	0.66 acres temporary disturbance	See Table 3 for details

Based on our detailed description above, we would like to provide a brief response to the comments by Wetland Strategies, Inc. (WSI):

W1. Yes we have received a new letter from NHESP pending a final plan review as agreed in the following:

Wildlife Habitat Impact

We have submitted the new notice of intent to DFW (NHESP) for review and comments. After reviewing the new project information, DFW We also followed up with Mr. Jesse Leddick regarding any new concerns for compliance with MESA. The following is the summary of Mr. Ledick's comments sent to us by email related to Condition #1 of the Division's October 15, 2014 determination, attached here for reference:

1.a. *The site plans provide a clearly demarcated limit of work, but also show two minor deviations from the previously approved limit of work (e.g., grading on #257 Washington Street and temporary disturbance abutting the Hauck property). However, as both deviations appear to occur outside of the 800-ft vernal pool buffer and/or within non-forested habitat, I don't anticipate having any significant concerns regarding either of these changes relative to state-listed species. Additionally, please note that Level Spreader #2 (Sheet C3)*

appears to be located partially outside of the limit of work; please update the site plans to keep the Spreader and associated grading, etc. within the existing limit of work and re-submit (via email).

1.b. *The site plans do not appear to include signage and/or monumentation along the southerly boundary of the limit of work, as required. Please contact me to discuss signage/monumentation options, update the site plans to include design and location information, and re-submit (via email) for our review and confirmation.*

1.c. *The site plans provide details regarding the design and location of road curbing, which appear sufficient to allow passage of turtles and other small wildlife as required. I do not have any additional questions or concerns regarding this requirement.*

Our email response to Mr. Ledick's comments:

1a. Level spreader 2 will be pulled back to within the limit of work. The grading into the abutting property (257) to the west will be eliminated.

1b. We will provide 4x4 PST posts with mesh fence along the south and southwest limit of work. A sign plate will be fastened to the post stating "Conservation Area: No dumping, NO cutting, No Trespassing!" A sample signage is attached in the photo for your reference.



Sample signage approved by DFW (NHESP)

1c. No issue.

NHESP issued a new progressive approval on October 15, 2015 pending conditions to submit final plans reflecting the above comments. See attached letter.

W2. We modified the project as a better alternative which including the following

- Pull back all grading over spilled to 257 Washington Street
- Pull back the level spreader further away from wetland

- Provide wetland and buffer zone restoration and enhance planting beyond our limit of disturbance
See revised plan, “Wetland and Buffer Zone Impact and Mitigation Plan”, and landscape plan for details.



Sample buffer zone planting



Sample backyard planting draining to wetland: using mulched bed and lower water demand shrubs and ground covers to avoid watering and fertilizing



No watering/fertilizer wildflower groundcover over leaching field

W3. Yes. We provided a revised limit of work and pulled back as much as we can. The limit of work will be staked out first thing in the field. A permanent signage will also be provided as described in response to w1.

W4. Yes. We provided supplemental plantings to enhance buffer zones as we described earlier.

W5. Yes. We will provide revised plans to the Commission as a result of all review agencies.

All drinking water wells will be bedrock wells with minimum depth of 400 ft with adequate casing sealed from the over burden aquifer to avoid and minimize interference and assure drinking water quality. We spoke with BOH staff, there were no water quality and quantity issues to the existing drinking water wells. Therefore, the drinking water wells will have little impact on the wetlands. Given the project is serviced by onsite septic system, 97% of the water will be returned to the groundwater and provide additional water resource to downgradient wetland. The total returned design flow in the leaching fields is about 10.04 ac-ft and as a real flow based on monitoring is about half of it, i.e. 5.02 ac-ft, which is about 30% and 22% of total available water resources on the 11.07 acres of land that we analyzed. See Table 4 for water budget analyses summary.

W6. We plotted ground water contours for high water season condition, which in general follows the surface topography.

W7. The project is a Chapter 40B project that require 25% homes be sold at or below construction cost to provide affordable homes for mid-low income families. As a tradeoff, the project is exempted from the local bylaws. Nevertheless, as we described above, the project design will provide adequate mitigation to protect all wetland interests.

Table 3. Proposed restoration/enhancement and mitigation plan

Area	subarea	Disturbance	Temporary Disturbance	Enhancement /Restoration	Note	Mitigation
		Sq. ft	Sq. ft	sq. ft		
Area #1	A1dd - perm	18823			permanent disturbance in ex disturbance	No lawn in buffer draining to wetland
	A1a - temp		10193		Temporary disturbance in ex disturbance	Improving vegetation by planting
	A1b - ex disturbane			14136	Outside limit of work	Enhancement if approved
	A1c - wetland			3918	Outside limit of work	Restoration if approved
Area #2	A2dd - perm	7415			permanent disturbance in ex disturbance	No lawn in buffer draining to wetland
	A2dn	13144			permanent disturbance in undisturbed	No lawn in buffer draining to wetland
	A2		9796		Temporary disturbance	Improving vegetation by planting
Area #3	A3dd	16194			permanent disturbance in ex disturbance	No lawn in buffer draining to wetland
	A3		8680		Temporary disturbance in ex disturbance	Improving vegetation by planting
Total	sq. ft	55576	28669	18054		
	acres	1.28	0.66	0.41		

Table 4. Summary of water budget analyses

Condition	Total available	Recharge	Runoff	Extra wetland consumption
	ac-ft	ac-ft	ac-ft	ac-ft
Existing	17.010	14.780	3.660	2.210
Proposed	22.67	19.26	3.41	2.21
Change	33.27%	30.31%	6.83%	0.00%

Groundwater Mounding

We had a long phone conversation with the consulting hydrogeologist, Mr. Steve Smith of Geohydrocycle. We have discussed drinking water well status, saturated aquifer hydraulic conductivity; the following summarized our communication and our follow up actions.

1. We have consulted with DEP regarding the public and Private water supply well issue. All wells will not supply to more than 24 services (12 bedrooms) as conditioned by DEP to meet the private water supply well requirements. Each well will have its exclusive well easement. Each well will be at least 400 ft deep to have 5 gpm flow or better. See attached my email communication with DEP.
2. We will likely use a dedicated irrigation well. We will work out a flow rate and water use budget for the irrigation needs in the full build out condition.
3. Based on the onsite testing and research of existing bedrock drinking water supply wells abutting our site (247 Washington st, 1 and 2 Knollcrest lane, no well info for 257 Washington St), the well nominal pumping capacity in the abutting properties ranges 5 to 13 gpm. See attached well completion reports. It also shows that the bedrock depth ranges 40 ft (knollcrest) to 43 ft Washington St. As 247 Washington Street is on the same side and about 100 ft away from the leaching fields, we agreed to use 20 ft saturated aquifer thickness and slower hydraulic conductivity (30 ft/day) to re-check both wastewater and stormwater mounding heights. We also will use Domey's method to calculate the infiltration volume and duration (runoff volume from 2" storm event and check the mounding height to make sure it will be below the bottom of the infiltration trench in 72 hours).
4. The in-situ permeability test was conducted using "constant head test" per U.S. D. I. (1974) *Earth Manual - A Water Resources Technical Publication*, Washington, D.C.. See attached description for details. All tests were conducted in C layer soil both coarse and medium fine sand layer. The conductivity of soil
5. We will plan for the drinking water well testing and monitoring of impacts on the overburden shallow aquifer as you will lay out in our detailed recommendations.
6. Given that we are using lowest hydraulic conductivity to check ground water mounding impact as recommended by the reviewing hydrogeologist, we reserve the right to test the saturated aquifer for higher hydraulic conductivity as we tested in the upper layer of sand.

Ground Water Mounding Analysis

As recommended by Mr. Steve Smith, using saturated aquifer thickness of 20 ft and hydraulic conductivity of 29 ft/day, we calculated the groundwater mounding height for single field and for joint three fields to get the worst mounding height scenario. We also calculated the maximum and residual groundwater mounding heights for 100-year storm event for the stormwater infiltration systems. The goals of the analysis is

- 1) to show the bottom of leaching fields will have at least 5 feet groundwater separation from the mounded groundwater table;
- 2) to show that the stormwater infiltration system will meet the DEP stormwater guideline for the hydrogeological condition under the following conditions:
 1. The stormwater infiltration shall have minimum 2 ft groundwater separation from the existing high groundwater
 2. The system shall dewater in less than 72 hours, i.e. the 72 hour residual mounding height be less than 2 ft. The maximum height is only a reference and does not need to be considered.
 3. As the 100-year storm is the worst, we only need to analyze for the 100 year storm condition to satisfy item .
 4. If the above requirement has been met, the design for stormwater management is considered to satisfy the DEP stormwater management guidelines for the hydrogeological condition.

The results of the analyses are presented in Tables 5 and details in attached printouts. As we also know, the real mounding heights would be even smaller as we used the lowest hydraulic conductivity value tested in the fine medium sand for all the analyses.

Table 5. Groundwater Mounding Summary, revised

	Stormwater - 100 Year					Wastewater	
Recharge area	SCS	R1	R2	R3	R4	SAS P1+2+3	SAS P3
Dimension, ft	64 x 101	10.5x85	18x33.5	9x74	19x33.5	2 (86x64) + P3	94x58.7
Area, sq. ft	6464	892.5	603	664	636.5	16525.8	5517.8
Recharge Vol. Cu ft (per day or event)	34717	3528	2744	3136	3136	1235.13	411.71
Duration, day	1.072	0.239	0.275	0.285	0.298	90	90
Recharge rate, ft/day	5.01	16.54	16.55	16.57	16.53	0.0747	0.0746
Dewater time, day	3	3	3	3	3	90	90
Maximum mounding height, ft	8.88	3.35	3.96	3.06	4.23	0.75	0.36
Estimated effective Max MH, ft*	4.83	2.64	3.96	3.06	3.43		
1 day residual height, ft	8.6	0.55	0.45	0.49	0.51		
3 day residual height, ft	1.86	0.16	0.13	0.2	0.2	0.75	0.36
Bottom of stones, ft	172.5	167.5	169.3	169.3	172.4		
Top of stones, ft	175.7	169.6	171.9	171.9	175		
HGW, ft	169.7	165.22	165	165.7	169.37		
100-year elev, ft	175.52	167.45	169.97	172.3	175.86		

- Effective max MH = GW separation + above stone bottom mounding height calculated/3

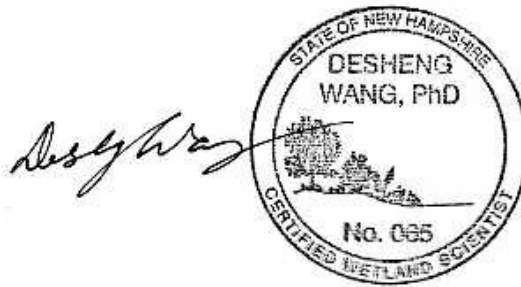
Summary and Conclusions

Based on the above analysis, we have the following summary and conclusions:

1. The proposed design will have no significant adverse impact on wetlands. It provide opportunity to mitigate existing wetland impact.
2. The proposed site will have more available water resources to wetlands and downstream ecosystem.
3. Using the most conservative hydraulic conductivity, we analyzed the groundwater mounding under all stormwater and wastewater subsurface disposal areas.
4. The mounding height under the wastewater will have no impact on the ground water separation for waste water leaching fields.
5. The stormwater mounding will retreat below the bottom in 3 days for 100 year storm events. Therefore, the ground water mounding will not impact stormwater management function. As the stormwater management systems have a minimum 2 ft groundwater separation, they all meet DEP design requirements.

Please feel free to contact us if you have any questions.

Sincerely,
Creative Land & Water Engineering, LLC
by



Desheng Wang, Ph.D., P.E.
Civil/Environmental Engineer and
Certified Wetland Scientist

cc. Ben Stevens, Trask Inc.
Bruce Saluk
Steve Smith, Geohydrocycle, Inc.
Phil F Pardis, Beta Group, Inc.

Enc.:

- A: Water budget calculation sheets
- B: Drinking water well completion reports on abutting properties
- C: Ground water mounding Calculation Output
- D: DFW new letter
- E: Wetland and Buffer Zone Impact and Mitigation Plan
- F: High groundwater contour map

A: Water budget calculation sheets

Table E: Water Budget - Existing Conditions

Project:	The Fields at Sherborn		User:	DSW	Date:	08/19/15	Check:		Runoff (in):		Date:				
	247A Washington Street		Precip. (in):	44.07	Snowfall (in):		45	Lake evap. (in)		26.00	26.00				
	Sherborn, MA		Wet-trans:1	2.00	Wet-trans:2		1.80	Open water:		1.00	Job: 269-1				
												Sheet: 1 of 2			
Land use	Vegetation (%)		Hydrologic Soil Group	Area Acres	Rainfall Inches	Interception Inches	Transpiration Inches	Available Water		Natural Recharge Ac-ft	Natural Runoff ac-ft	Man-made Recharge		Total Recharge Ac-ft	Stormwater Runoff Ac-ft
	Deciduous	Evergreen						Inches	Ac-ft			% of runoff	Ac-ft		
Impervious			c	0.060	44.07	0.88	0.00	43.19	0.22	0.01	0.21	0.00%	0.00	0.01	0.21
Lawns			a	3.370	44.07	4.01	10.76	29.30	8.23	7.86	0.37	0.00%	0.00	7.86	0.37
			b	0.000	44.07	4.01	11.90	28.16	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			c		44.07	4.01	11.90	28.16	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			d	0.500	44.07	4.01	11.60	28.46	1.19	0.81	0.38	0.00%	0.00	0.81	0.38
Meadow			a		44.07	4.34	10.76	28.98	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			b		44.07	4.34	11.46	28.28	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			c		44.07	4.34	11.90	27.83	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			d		44.07	4.34	11.60	28.14	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
Forests	15	85	a	3.880	44.07	10.47	11.00	22.60	7.31	7.02	0.28	0.00%	0.00	7.02	0.28
	85	15	b		44.07	6.07	12.00	26.00	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
	85	15	c		44.07	6.07	12.00	26.00	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
	75	25	d	1.100	44.07	6.70	12.50	24.87	2.28	1.74	0.54	0.00%	0.00	1.74	0.54
Wetland-1	90	10	d	2.160	44.07	4.34	52.00	-12.27	-2.21	-3.81	1.60	0.00%	0.00	-3.81	1.60
Wetland-2	90	10	c		44.07	5.76	46.80	-8.49	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
Man-made pond			c		44.07		26.00	18.07	0.00	0.00	0.00	100.00%	0.00	0.00	0.00
Total				11.07					17.01	13.64	3.37		0.00	13.64	3.37
Depth (in)					44.07		25.63		18.44	14.78	3.66		0.00	14.78	3.66

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Table P : Water Budget - Proposed Conditions

Project:	The Fields at Sherborn	User:	DSW	Date:	08/19/15	Check:		Date:	
	247A Washington Street	Precip. (in):	44.07	Snowfall (in):	45	Lake evap. (in):	26.00	Runoff (in):	26.00
	Sherborn, MA	Wet-trans1:	2.00	Wet-trans2:	1.80	Open water:	1.00		
								Job:	269-1
								Sheet:	1 of 2

Land use	Vegetation (%)		Hydrologic Soil Group	Area Acres	Rainfall Inches	Interception Inches	Transpiration Inches	Available Water		Natural Recharge Ac-ft	Natural Runoff ac-ft	Man-made Recharge		Total Recharge Ac-ft	Managed Runoff Ac-ft
	Deciduous	Evergreen						Inches	Ac-ft			% of runoff	Ac-ft		
Impervious			c	2.500	44.07	0.88	0.00	43.19	9.00	0.45	8.55	90.00%	7.69	8.14	0.85
Lawns			a	3.320	44.07	4.01	10.76	29.30	8.11	7.74	0.37	90.00%	0.33	8.07	0.04
			b	0.000	44.07	4.01	11.90	28.16	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			c		44.07	4.01	11.90	28.16	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			d	0.000	44.07	4.01	11.60	28.46	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
Meadow			a		44.07	4.34	10.76	28.98	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			b		44.07	4.34	11.46	28.28	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			c		44.07	4.34	11.90	27.83	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
			d		44.07	4.34	11.60	28.14	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
Forests	15	85	a	2.050	44.07	10.47	11.00	22.60	3.86	3.71	0.15	0.00%	0.00	3.71	0.15
	85	15	b		44.07	6.07	12.00	26.00	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
	85	15	c		44.07	6.07	12.00	26.00	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
	75	25	d	1.040	44.07	6.70	12.50	24.87	2.16	1.65	0.51	0.00%	0.00	1.65	0.51
Wetland-1	90	10	d	2.160	44.07	4.34	52.00	-12.27	-2.21	-3.81	1.60	0.00%	0.00	-3.81	1.60
Wetland-2	90	10	c		44.07	5.76	46.80	-8.49	0.00	0.00	0.00	0.00%	0.00	0.00	0.00
Man-made pond			c		44.07		26.00	18.07	0.00	0.00	0.00	100.00%	0.00	0.00	0.00
Total				11.07	44.07		21.40	20.91	22.67	9.74	11.17		8.02	17.77	3.15
Depth (in)										10.56	12.11		8.70	19.26	3.41

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B: Drinking water well completion reports on abutting properties

WELL AND PUMP TEST DATA

SHERBORN

BOARD OF HEALTH

SHERBORN BOARD OF HEALTH
RECEIVED

THE FOLLOWING INFORMATION MUST BE SUPPLIED TO THE BOARD OF HEALTH FOR ITS REVIEW BEFORE ANY APPROVAL CAN BE GIVEN FOR USE OF THE WELL:

WELL AND PUMP TEST DATA: (Must be signed by well contractor and also company performing pump test)

The well should be pumped for a period of four (4) hours at a fairly constant drawdown water level. Record the following:

LOCATION: 247 Washington Street DATE OF TEST: 11/13 to 20/86
 WELL DEPTH 300 FEET WELL DIAMETER 6 INCHES
 DEPTH OF LEDGE BELOW SURFACE GRADE 43 FEET
 DEPTH OF CASING 53 FEET TYPE OF SEAL Shoe rock socket
 DEPTH OF WATER LEVEL BELOW GROUND SURFACE BEFORE ANY PUMPING 23 FEET
 BEFORE TEST: 23 FEET
 AT END OF TEST (4 HOURS) FEET
 AFTER 24 HOURS FEET

PUMPING RATE: SHOULD BE CONSTANT THROUGHOUT TEST

STARTED PUMPING AT 10:30 AT RATE OF 10 GMP

STOPPED PUMPING AT 3:30 AT RATE OF 8 GMP

DURING PUMP TEST: DEPTH OF PUMP 280 FEET SIZE OF PUMP 1/2 HP

DEPTH OF PUMP TO BE INSTALLED FOR HOUSE 280 FEET

SIZE OF PUMP TO BE INSTALLED FOR HOUSE 1/2 HP

NAME OF WELL DRILLING COMPANY A & W Artesian Well Co.

(Must be registered with Comm. of MA)

Authorized Signature [Signature]

NAME OF COMPANY PERFORMING PUMP TEST A & W Artesian Well Co.

Authorized Signature [Signature]

THE FOLLOWING BACTERIOLOGICAL AND CHEMICAL ANALYSES MUST BE PERFORMED. SAMPLE MUST BE TAKEN FROM A TAP IN THE BUILDING.

Total Coliform Bacteria

Total Bacteria

Ammonia Nitrogen

Nitrite Nitrogen

Nitrate Nitrogen

Chloride

Sodium

Lead

Arsenic

Total Iron

Manganese

Color

Turbidity

Odor

pH

Total Alkalinity

Total Hardness

Volatile Organics

(EPA 624 testing Method)

Other parameters may be required on a case by case basis if deemed to be necessary in the opinion of the Board of Health.

Well Completion Report

TYPE OR PRINT ONLY

RECEIVED

138435

JUN 13 2013

07/16/13
MO 6/13/13
es to file

1. WELL LOCATION		GPS (OPTIONAL) LATITUDE _____ LONGITUDE _____ DATUM _____																																											
Address at Well Location: <u>Lot # 1 Kroll Crest (2)</u>		Property Owner/Client: <u>Roberts Dev Corp</u>																																											
Subdivision Name: <u>RT16 WASHINGTON ST</u>		Mailing Address: <u>115 Coolidge ST</u>																																											
City/Town: <u>SHARBORN, MA 01770</u>		City/Town: <u>SHARBORN, MA 01770</u>																																											
Assessors Map _____ Assessors Lot #: _____		NOTE: Assessors Map and Lot # mandatory if no street address available																																											
Board of Health permit obtained: Yes ☐ Not Required ☐		Permit Number _____ Date Issued _____																																											
2. WORK PERFORMED		3. PROPOSED USE																																											
☒ New Well ☐ Abandon ☐ Deepen ☐ Recondition ☐ Replace ☐ Other _____		☒ Domestic ☐ Irrigation ☐ Monitoring ☐ Municipal ☐ Industrial ☐ Other _____																																											
4. DRILLING METHOD																																													
☐ Cable ☐ Auger ☐ Air Hammer ☐ Direct Push ☐ Mud Rotary ☒ Other <u>Air Rotary</u>																																													
5. WELL LOG		6. SITE SKETCH (Use permanent landmarks with distances)																																											
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>From (ft)</th> <th>To (ft)</th> <th>Water Bearing Zones</th> <th>Unconsolidated</th> <th>Consolidated</th> <th>Rock Type and Description</th> </tr> <tr> <th></th> <th></th> <th></th> <th>Clay Silt Sand Gravel Cobbles Boulders</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4'</td> <td></td> <td>X X</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>30</td> <td></td> <td></td> <td>X X X</td> <td></td> </tr> <tr> <td>30</td> <td>40'</td> <td></td> <td></td> <td></td> <td>Hard Pan</td> </tr> <tr> <td>40</td> <td>100'</td> <td></td> <td></td> <td></td> <td>Granite</td> </tr> <tr> <td>100</td> <td>150'</td> <td>X</td> <td></td> <td></td> <td>Granite</td> </tr> </tbody> </table>		From (ft)	To (ft)	Water Bearing Zones	Unconsolidated	Consolidated	Rock Type and Description				Clay Silt Sand Gravel Cobbles Boulders			0	4'		X X			4	30			X X X		30	40'				Hard Pan	40	100'				Granite	100	150'	X			Granite		
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7. WELL CONSTRUCTION		8. CASING																																											
Total Depth Drilled <u>150'</u>		From (ft) To (ft) Casing Type and Material Size I.D. (in) Well Seal Type																																											
Date Complete <u>8/8/05</u>		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td><u>+2</u></td> <td><u>-58</u></td> <td><u>17 G SPMAL</u></td> <td><u>6 5/8"</u></td> <td><u>Grouted Drweshoe</u></td> </tr> </table>		<u>+2</u>	<u>-58</u>	<u>17 G SPMAL</u>	<u>6 5/8"</u>	<u>Grouted Drweshoe</u>																																					
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9. SCREEN																																													
From (ft) To (ft) Slot Size Screen Type and Material Screen Diameter																																													
10. FILTER PACK / GROUT / ABANDONMENT MATERIAL		11. ADDITIONAL WELL INFORMATION																																											
From (ft) To (ft) Material Description Purpose		Developed? ☐ Yes ☒ No Fracture Enhancement? ☐ Yes ☒ No Method _____ Disinfected? ☒ Yes ☐ No																																											
12. WELL TEST DATA (ALL SECTIONS MANDATORY FOR PRODUCTION WELLS)		13. STATIC WATER LEVEL (ALL WELLS)																																											
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Date</th> <th>Method</th> <th>Yield (GPM)</th> <th>Time Pumped (hrs & min)</th> <th>Drawdown to (Ft. BGS)</th> <th>Time to Recover (hrs & min)</th> <th>Recovery to (Ft. BGS)</th> </tr> </thead> <tbody> <tr> <td><u>8/30/05</u></td> <td><u>Pump</u></td> <td><u>20</u></td> <td><u>4 Hrs</u></td> <td><u>73'</u></td> <td><u>45 min</u></td> <td><u>30'</u></td> </tr> </tbody> </table>		Date	Method	Yield (GPM)	Time Pumped (hrs & min)	Drawdown to (Ft. BGS)	Time to Recover (hrs & min)	Recovery to (Ft. BGS)	<u>8/30/05</u>	<u>Pump</u>	<u>20</u>	<u>4 Hrs</u>	<u>73'</u>	<u>45 min</u>	<u>30'</u>	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Date Measured</th> <th>Depth Below Ground Surface (FT)</th> </tr> </thead> <tbody> <tr> <td><u>8/30/05</u></td> <td><u>17'</u></td> </tr> </tbody> </table>		Date Measured	Depth Below Ground Surface (FT)	<u>8/30/05</u>	<u>17'</u>																								
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14. PERMANENT PUMP (IF AVAILABLE)		15. NAME/ADDRESS OF PUMP INSTALLATION COMPANY																																											
Pump Description <u> Gould K032480</u> Horsepower <u>1</u> Pump Intake Depth <u>125</u> (ft) Nominal Pump Capacity <u>13</u> (gpm)		<u>SAME</u>																																											
16. COMMENTS																																													
17. WELL DRILLER'S STATEMENT																																													
Driller: <u>David Sullivan</u> Supervising Driller Signature: <u>[Signature]</u> Registration #: <u>03213</u> Firm: <u>Welltech Corp.</u> Date: <u>8/30/05</u> Rig Permit #: <u>00719</u>																																													

NOTE: Well Completion Reports must be filed by the registered well driller within 30 days of well completion.

DRILLER COPY

156398

TYPE OR PRINT ONLY

Well Completion Report

WELL LOCATION GPS (Required) North 42° 13.210 West 71° 24.289

Address at Well Location: LOT #4 (1) Property Owner/Client: ROBERTS REALTY DEVELOPMENT CORP

Subdivision Name: KNOLLCREST Mailing Address: 115 COOLIDGE ST

City/Town: SHERBORN City/Town: SHERBORN, MA 01770

Assessors Map _____ Assessors Lot #: _____ NOTE: Assessors Map and Lot # mandatory if no street address available

Board of Health permit obtained: Yes ☐ Not Required ☐ Permit Number _____ Date Issued _____

2. WORK PERFORMED	3. WELL TYPE	4. DRILLING METHOD		6. CASING				
N W	O M S T	Overburden	Bedrock	From (ft)	To (ft)	Type	Thickness	Diameter
		M P	A A	+1	-54	S T A	SCH 40	60 7/8

5. WELL LOG		OVERBURDEN		Water Bearing Zone	Loss or Addition of Fluid	Drop in Drill Stem	Extra Fast or Slow Drill Rate
LITHOLOGY		Code	Color				
From (ft)	To (ft)						
0	40	SSG			Y / N	Y / N	F / S
					Y / N	Y / N	F / S
					Y / N	Y / N	F / S
					Y / N	Y / N	F / S
					Y / N	Y / N	F / S
					Y / N	Y / N	F / S
					Y / N	Y / N	F / S
					Y / N	Y / N	F / S
					Y / N	Y / N	F / S

7. SCREEN				
From (ft)	To (ft)	Type	Slot Size	Diameter

8. ANNULAR SEAL/FILTER PACK/ABANDONMENT MTL.				
From (ft)	To (ft)	Material Description	Purpose	

[illegible][illegible]

12. PERMANENT PUMP (IF AVAILABLE) Pump Description ☒ ☒ ☒ ☒ Horsepower _____ Pump Intake Depth <u>135'</u> (ft) Nominal Pump Capacity <u>10</u> (gpm)		13. ADDITIONAL WELL INFORMATION Developed ☒ ☒ Fracture Enhancement ☒ ☒ Disinfected ☒ ☒ Surface Seal Type ☐ ☒ ☐ Total Well Depth <u>150'</u> Depth to Bedrock <u>40'</u>
14. COMMENTS 		

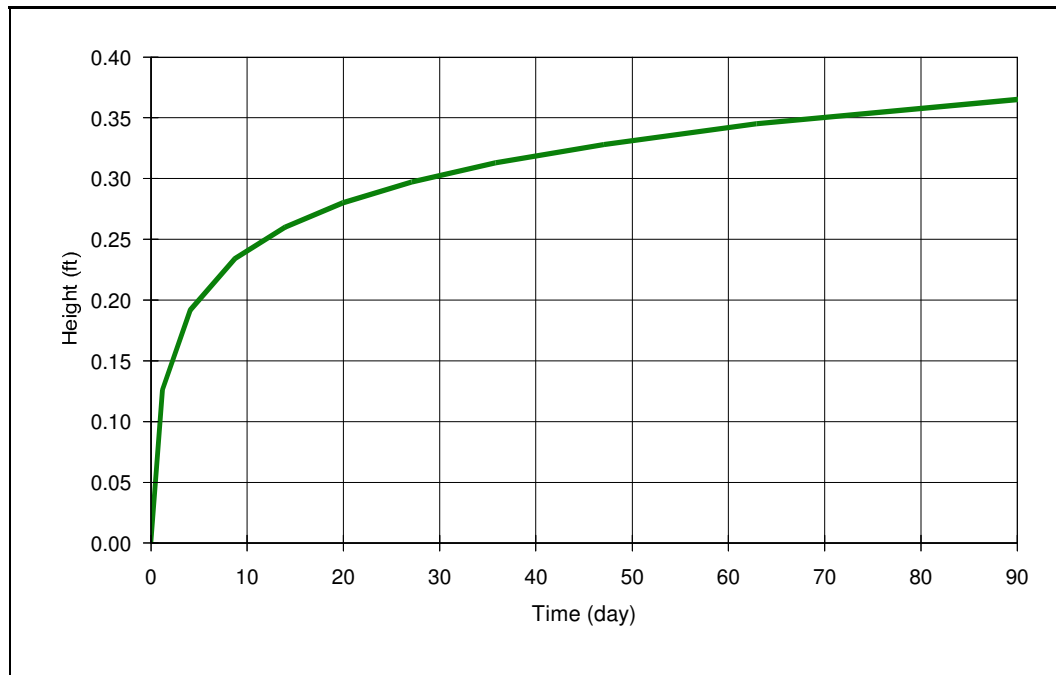
15. WELL DRILLER'S STATEMENT		This well was drilled, altered, and/or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge.	
Driller: <u>DAN MARBLE</u>	Supervising Driller Signature: <u>[Signature]</u>	Registration #: <u>13123</u>	
Firm: <u>WELTECH CORPORATION</u>	Date Complete: <u>MAY 9, 2008</u>	Rig Permit #: <u>1266</u>	

NOTE: Well Completion Reports must be filed by the registered well driller within 30 days of well completion.

BOARD OF HEALTH COPY

C: Ground water mounding Calculation Output

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - SAS Pr3

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 10:08:43 PM

INPUT PARAMETERS

Application rate: 0.0747 c.ft/day/sq. ft

Duration of application: 90 day

Total simulation time: 90 day

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 94 ft

Width of application area: 58.7 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

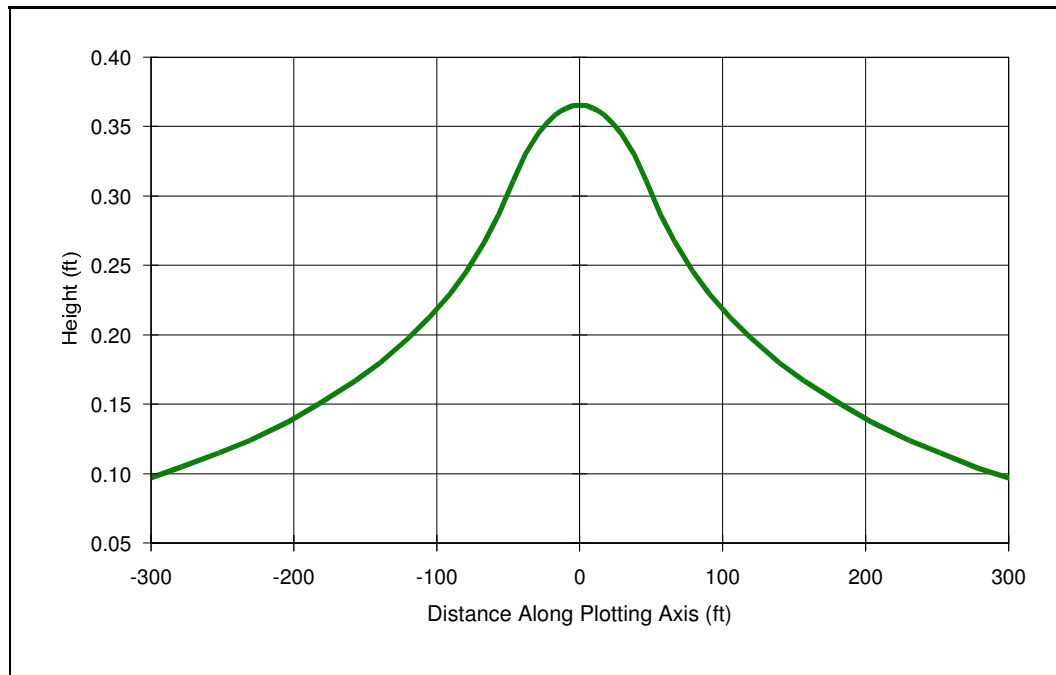
Y coordinate: 0 ft

Total volume applied: 37096.17 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
1	0.13
4	0.19
9	0.23
14	0.26
20	0.28
27	0.30
36	0.31
47	0.33
63	0.34
90	0.36

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - SAS P03
(ft)

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 10:08:53 PM

INPUT PARAMETERS

Application rate: 0.0747 c.ft/day/sq. ft

Duration of application: 90 days

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 94 ft

Width of application area: 58.7 ft

No constant head boundary used

Plotting axis from Y-Axis: 0 degrees

Edge of recharge area:

positive X: 0 ft

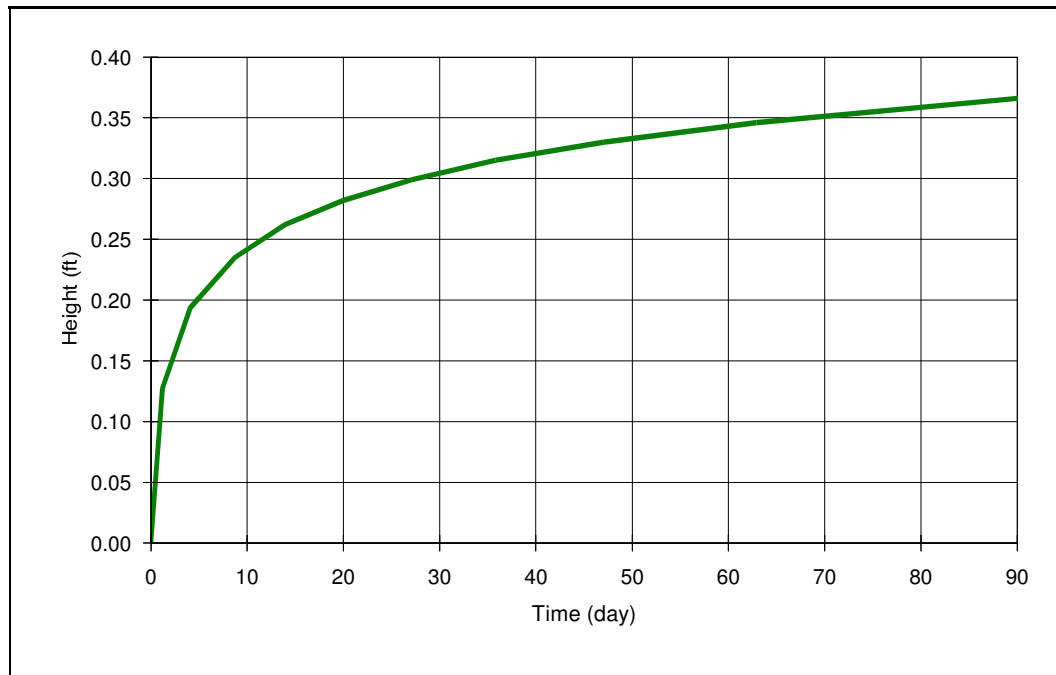
positive Y: 47 ft

Total volume applied: 37096.17 c.ft

MODEL RESULTS

Y (ft)	Plot Axis (ft)	Mound Height (ft)
-300	-300	0.1
-252.3	-252	0.12
-204.6	-205	0.14
-156.9	-157	0.17
-119.4	-119	0.2
-90.3	-90	0.23
-66.5	-67	0.27
-46.5	-46	0.31
-29.1	-29	0.34
-17.4	-17	0.36
-9.4	-9	0.36
0	0	0.36
9.4	9	0.36
17.4	17	0.36
29.1	29	0.34
46.5	46	0.31
66.5	67	0.27
90.3	90	0.23
119.4	119	0.2
156.9	157	0.17
204.6	205	0.14
252.3	252	0.12
300	300	0.1

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington Street Sherborn MA - SAS Pr1

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 10:10:37 PM

INPUT PARAMETERS

Application rate: 0.0747 c.ft/day/sq. ft

Duration of application: 90 day

Total simulation time: 90 day

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 86 ft

Width of application area: 64 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

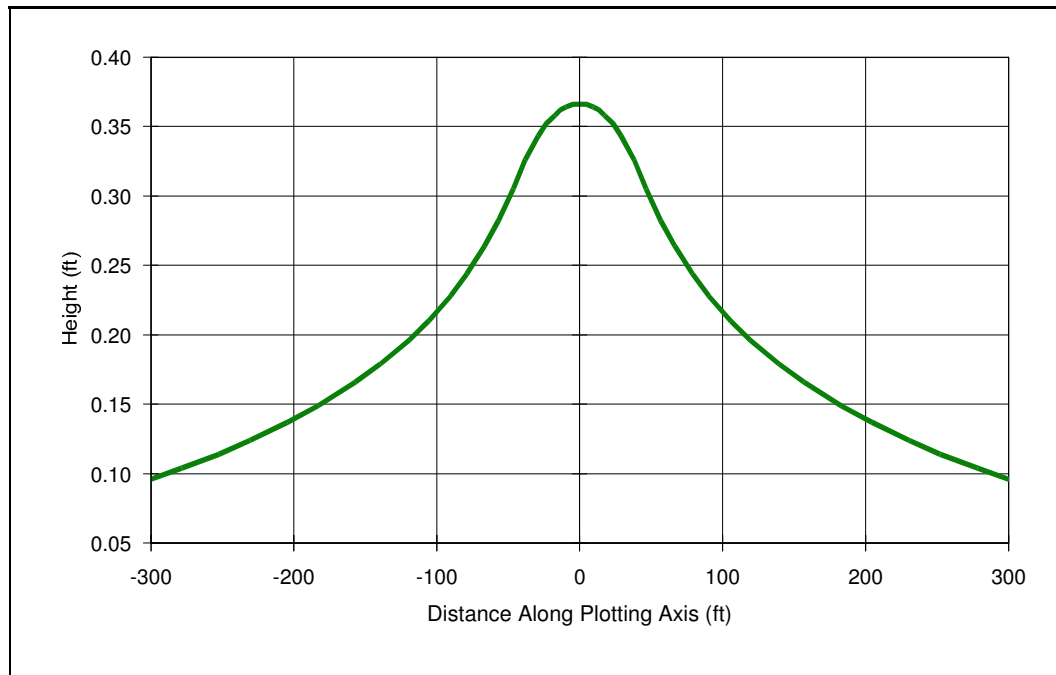
Y coordinate: 0 ft

Total volume applied: 37003.39 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
1	0.13
4	0.19
9	0.24
14	0.26
20	0.28
27	0.30
36	0.32
47	0.33
63	0.35
90	0.37

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington Street Sherborn MA - S&S Pr1

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 10:10:54 PM

INPUT PARAMETERS

Application rate: 0.0747 c.ft/day/sq. ft

Duration of application: 90 days

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 86 ft

Width of application area: 64 ft

No constant head boundary used

Plotting axis from Y-Axis: 0 degrees

Edge of recharge area:

positive X: 0 ft

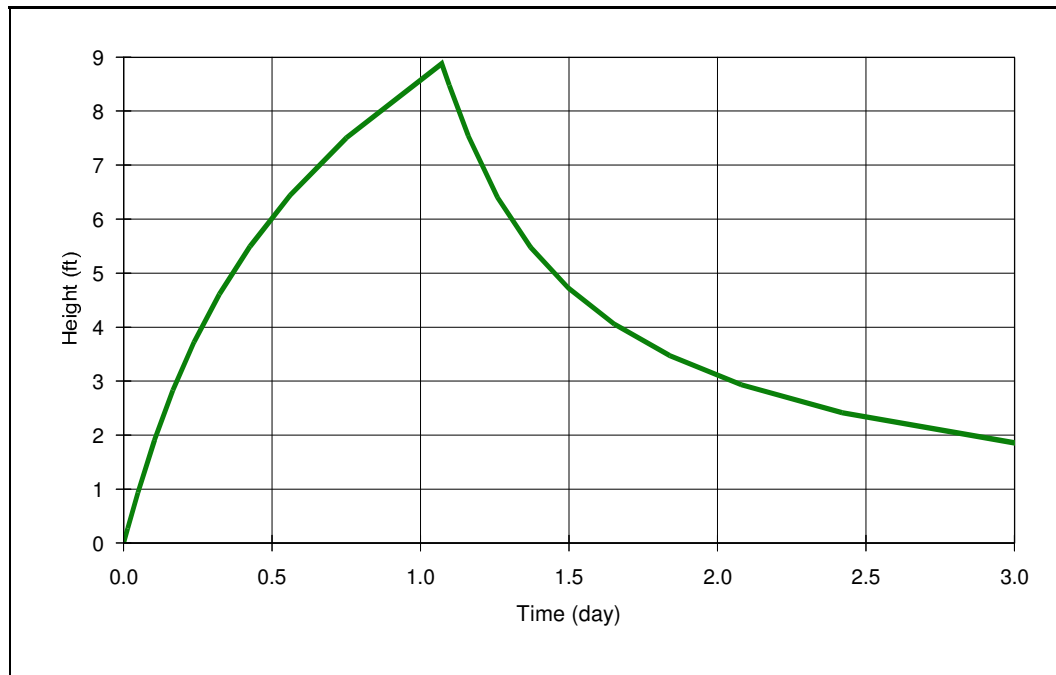
positive Y: 43 ft

Total volume applied: 37003.39 c.ft

MODEL RESULTS

Y (ft)	Plot Axis (ft)	Mound Height (ft)
-300	-300	0.1
-252.3	-252	0.11
-204.6	-205	0.14
-156.9	-157	0.17
-119.4	-119	0.2
-90.3	-90	0.23
-66.5	-67	0.26
-46.5	-46	0.3
-29.1	-29	0.34
-17.4	-17	0.36
-9.4	-9	0.36
0	0	0.37
9.4	9	0.36
17.4	17	0.36
29.1	29	0.34
46.5	46	0.3
66.5	67	0.26
90.3	90	0.23
119.4	119	0.2
156.9	157	0.17
204.6	205	0.14
252.3	252	0.11
300	300	0.1

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - SCS 100 yr

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 9:53:16 PM

INPUT PARAMETERS

Application rate: 5.01 c.ft/day/sq. ft

Duration of application: 1.072 day

Total simulation time: 3 day

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 101 ft

Width of application area: 64 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

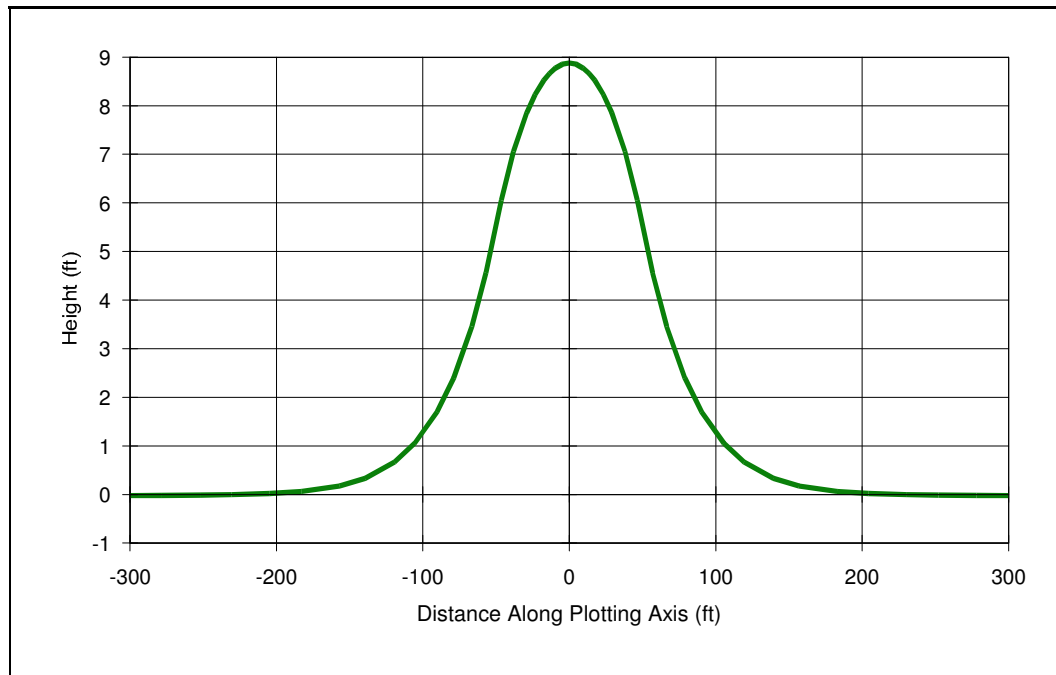
Y coordinate: 0 ft

Total volume applied: 34716.34 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.27
0	0.94
0.1	1.9
0.2	2.83
0.2	3.73
0.3	4.61
0.4	5.5
0.6	6.44
0.7	7.5
1.1	8.88
1.1	8.48
1.2	7.55
1.3	6.4
1.4	5.48
1.5	4.71
1.7	4.05
1.8	3.47
2.1	2.94
2.4	2.42
3	1.86

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - SCS 100 yr

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 9:55:00 PM

INPUT PARAMETERS

Application rate: 5.01 c.ft/day/sq. ft

Duration of application: 1.072 days

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 101 ft

Width of application area: 64 ft

No constant head boundary used

Plotting axis from Y-Axis: 0 degrees

Edge of recharge area:

positive X: 0 ft

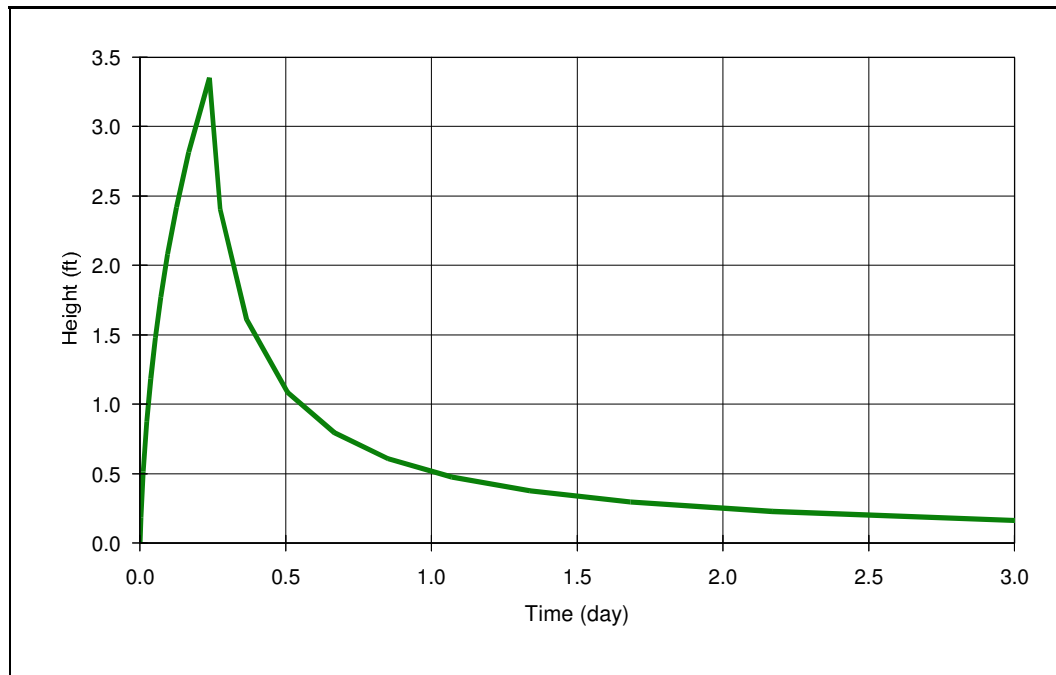
positive Y: 50.5 ft

Total volume applied: 34716.34 c.ft

MODEL RESULTS

Y (ft)	Plot Axis (ft)	Mound Height (ft)
-300	-300	-0.02
-252.3	-252	-0.01
-204.6	-205	0.02
-156.9	-157	0.18
-119.4	-119	0.67
-90.3	-90	1.7
-66.5	-67	3.46
-46.5	-46	6.05
-29.1	-29	7.85
-17.4	-17	8.52
-9.4	-9	8.77
0	0	8.88
9.4	9	8.77
17.4	17	8.52
29.1	29	7.85
46.5	46	6.05
66.5	67	3.46
90.3	90	1.7
119.4	119	0.67
156.9	157	0.18
204.6	205	0.02
252.3	252	-0.01
300	300	-0.02

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - R1 100 yr

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 5:08:57 PM

INPUT PARAMETERS

Application rate: 16.54 c.ft/day/sq. ft

Duration of application: 0.239 day

Total simulation time: 3 day

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 85 ft

Width of application area: 10.5 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

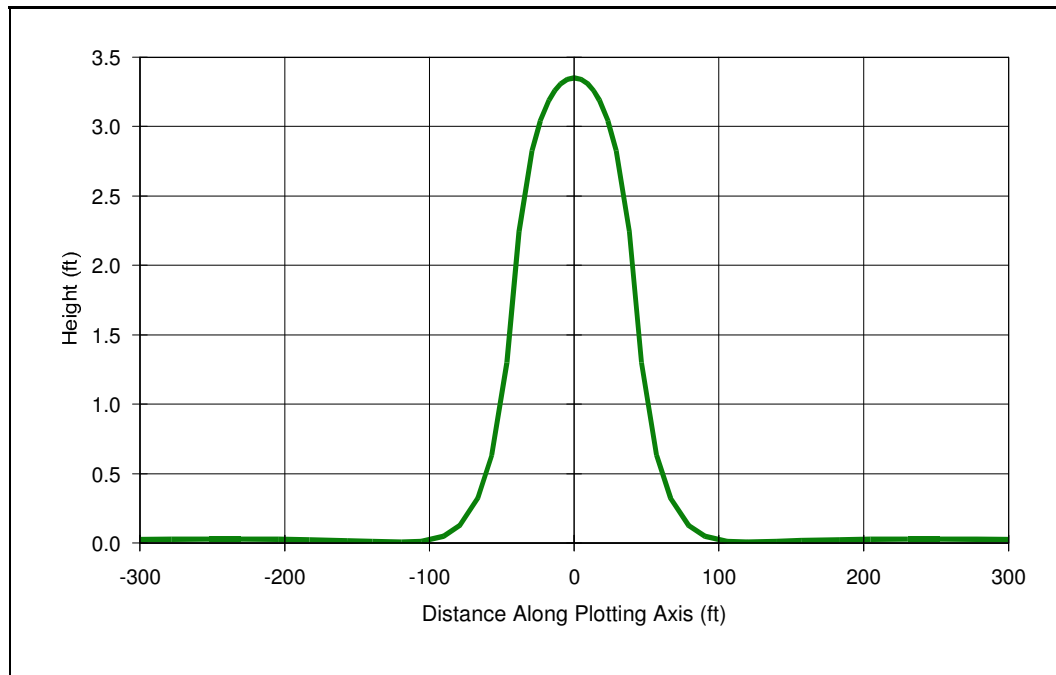
Y coordinate: 0 ft

Total volume applied: 3528.106 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.19
0	0.52
0	0.87
0	1.18
0.1	1.48
0.1	1.77
0.1	2.08
0.1	2.42
0.2	2.81
0.2	3.35
0.3	2.4
0.4	1.61
0.5	1.08
0.7	0.8
0.9	0.61
1.1	0.48
1.3	0.38
1.7	0.3
2.2	0.23
3	0.16

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - R1 10X yr
(ft)

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 5:09:21 PM

INPUT PARAMETERS

Application rate: 16.54 c.ft/day/sq. ft

Duration of application: 0.239 days

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 85 ft

Width of application area: 10.5 ft

No constant head boundary used

Plotting axis from Y-Axis: 0 degrees

Edge of recharge area:

positive X: 0 ft

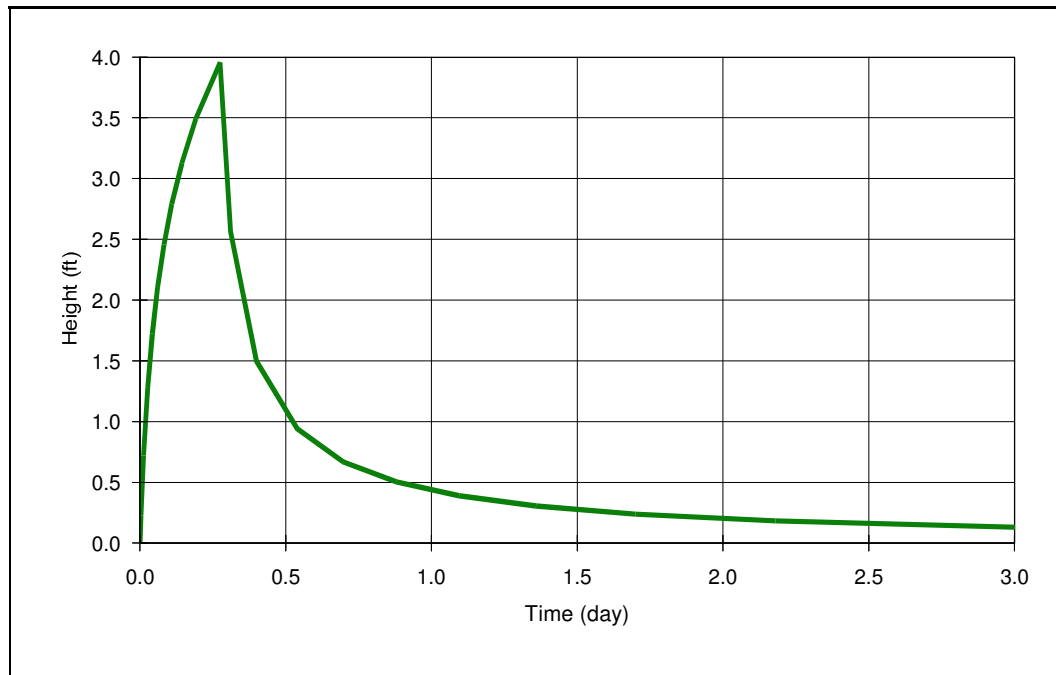
positive Y: 42.5 ft

Total volume applied: 3528.106 c.ft

MODEL RESULTS

Y (ft)	Plot Axis (ft)	Mound Height (ft)
-300	-300	0.03
-252.3	-252	0.03
-204.6	-205	0.03
-156.9	-157	0.02
-119.4	-119	0.01
-90.3	-90	0.05
-66.5	-67	0.32
-46.5	-46	1.3
-29.1	-29	2.83
-17.4	-17	3.19
-9.4	-9	3.31
0	0	3.35
9.4	9	3.31
17.4	17	3.19
29.1	29	2.83
46.5	46	1.3
66.5	67	0.32
90.3	90	0.05
119.4	119	0.01
156.9	157	0.02
204.6	205	0.03
252.3	252	0.03
300	300	0.03

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - R2 100 yr

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 5:11:53 PM

INPUT PARAMETERS

Application rate: 16.55 c.ft/day/sq. ft

Duration of application: 0.275 day

Total simulation time: 3 day

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 33.5 ft

Width of application area: 18 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

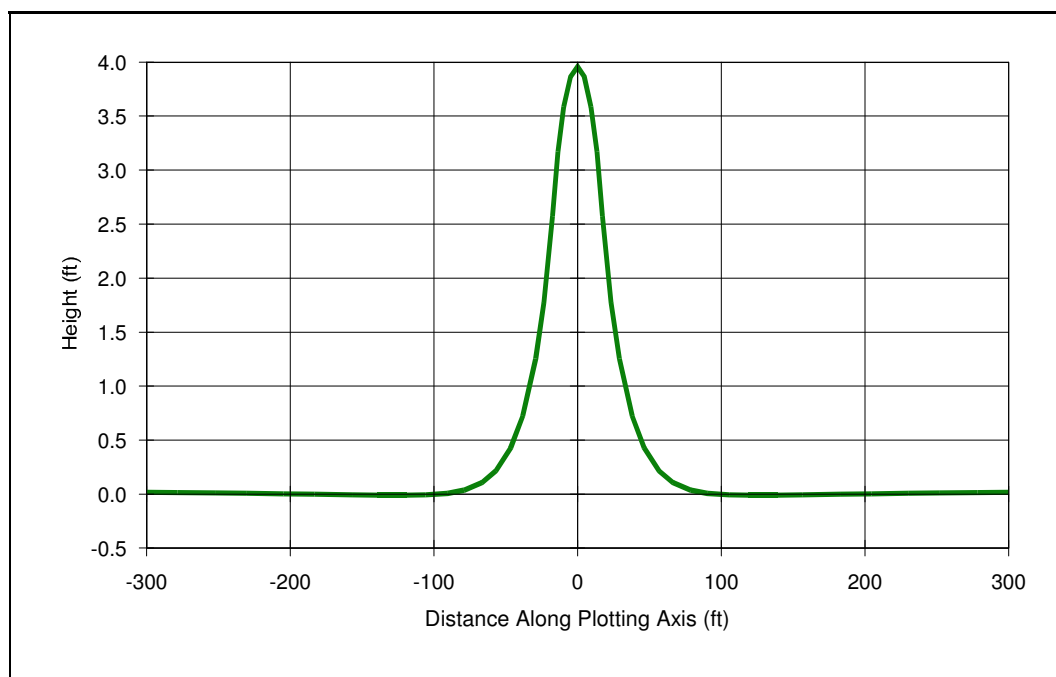
Y coordinate: 0 ft

Total volume applied: 2744.404 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.23
0	0.72
0	1.28
0	1.72
0.1	2.11
0.1	2.46
0.1	2.79
0.1	3.13
0.2	3.49
0.3	3.96
0.3	2.56
0.4	1.5
0.5	0.94
0.7	0.67
0.9	0.5
1.1	0.39
1.4	0.31
1.7	0.24
2.2	0.18
3	0.13

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - R2 100yr
(ft)

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 5:12:09 PM

INPUT PARAMETERS

Application rate: 16.55 c.ft/day/sq. ft

Duration of application: 0.275 days

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 33.5 ft

Width of application area: 18 ft

No constant head boundary used

Plotting axis from Y-Axis: 0 degrees

Edge of recharge area:

positive X: 0 ft

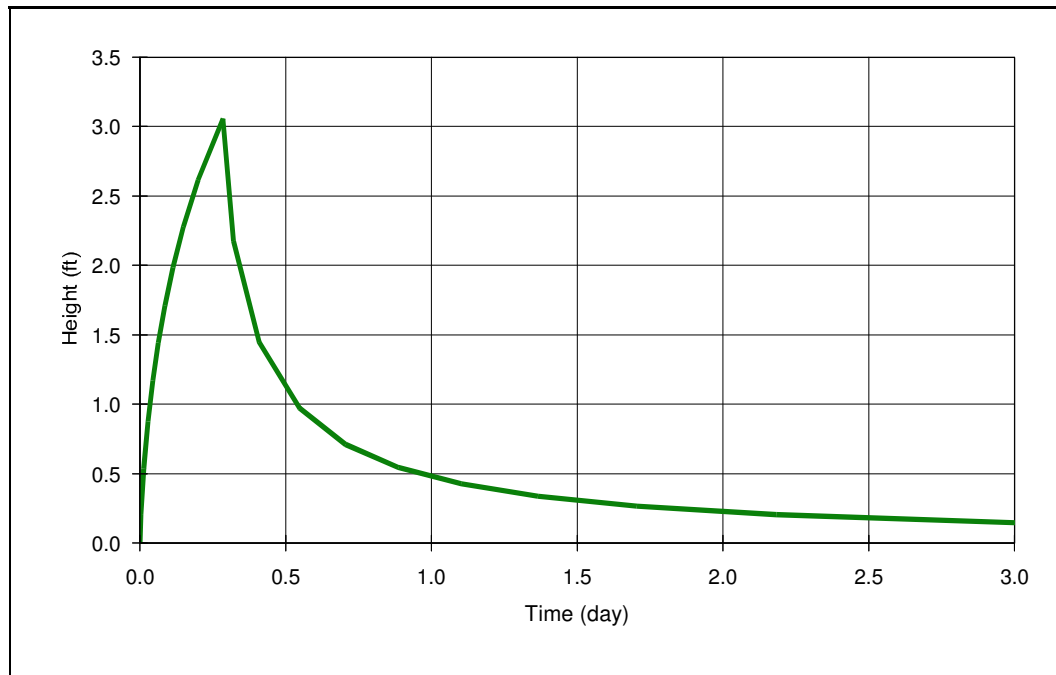
positive Y: 16.8 ft

Total volume applied: 2744.404 c.ft

MODEL RESULTS

Y (ft)	Plot Axis (ft)	Mound Height (ft)
-300	-300	0.02
-252.3	-252	0.01
-204.6	-205	0
-156.9	-157	-0.01
-119.4	-119	-0.01
-90.3	-90	0.01
-66.5	-67	0.11
-46.5	-46	0.43
-29.1	-29	1.25
-17.4	-17	2.57
-9.4	-9	3.59
0	0	3.96
9.4	9	3.59
17.4	17	2.57
29.1	29	1.25
46.5	46	0.43
66.5	67	0.11
90.3	90	0.01
119.4	119	-0.01
156.9	157	-0.01
204.6	205	0
252.3	252	0.01
300	300	0.02

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - R3 100 yr

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 5:13:51 PM

INPUT PARAMETERS

Application rate: 16.52 c.ft/day/sq. ft

Duration of application: 0.285 day

Total simulation time: 3 day

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 74 ft

Width of application area: 9 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

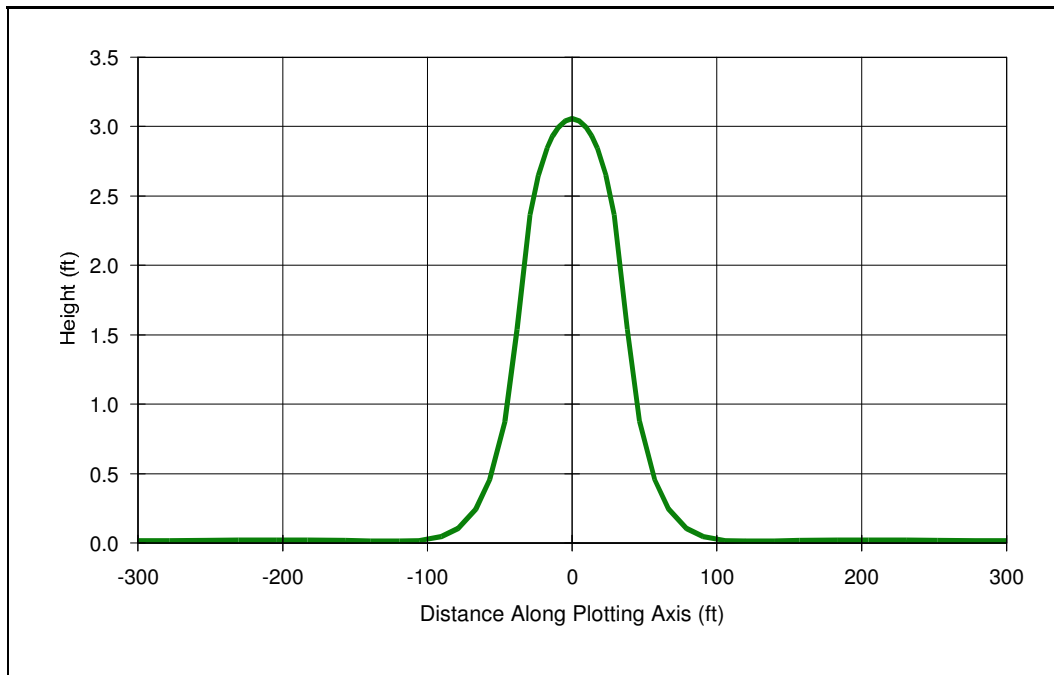
Y coordinate: 0 ft

Total volume applied: 3135.661 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.21
0	0.54
0	0.88
0	1.17
0.1	1.44
0.1	1.71
0.1	1.99
0.1	2.28
0.2	2.61
0.3	3.06
0.3	2.18
0.4	1.45
0.5	0.97
0.7	0.71
0.9	0.55
1.1	0.43
1.4	0.34
1.7	0.27
2.2	0.2
3	0.15

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - R3 100yr
(ft)

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 5:14:05 PM

INPUT PARAMETERS

Application rate: 16.52 c.ft/day/sq. ft

Duration of application: 0.285 days

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 74 ft

Width of application area: 9 ft

No constant head boundary used

Plotting axis from Y-Axis: 0 degrees

Edge of recharge area:

positive X: 0 ft

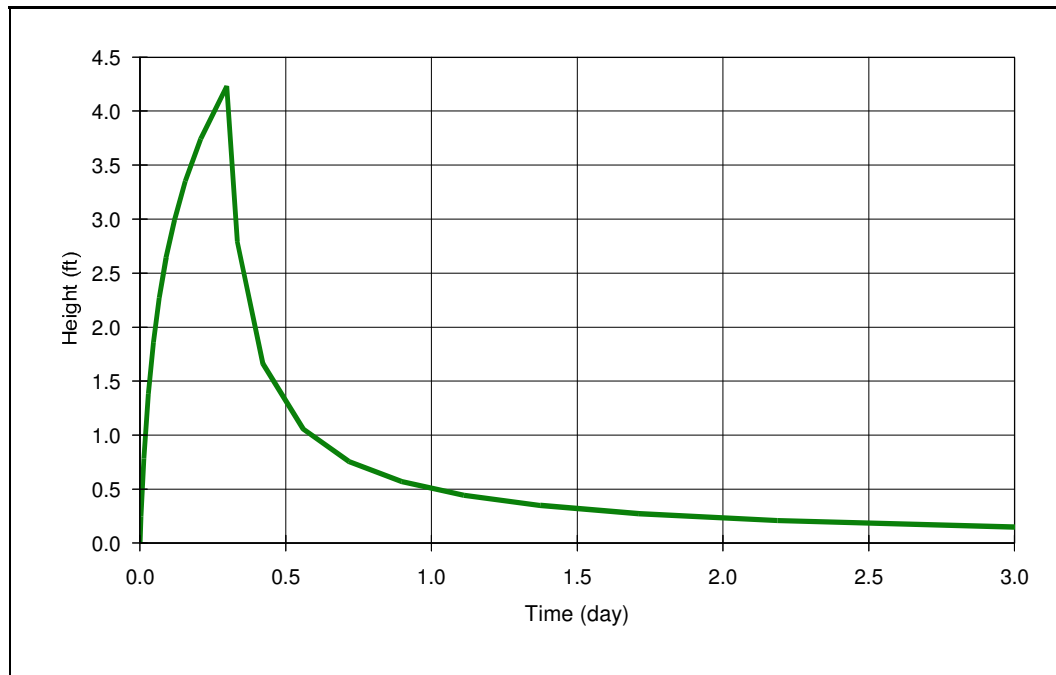
positive Y: 37 ft

Total volume applied: 3135.661 c.ft

MODEL RESULTS

Y (ft)	Plot Axis (ft)	Mound Height (ft)
-300	-300	0.02
-252.3	-252	0.02
-204.6	-205	0.02
-156.9	-157	0.02
-119.4	-119	0.01
-90.3	-90	0.05
-66.5	-67	0.25
-46.5	-46	0.88
-29.1	-29	2.36
-17.4	-17	2.84
-9.4	-9	3
0	0	3.06
9.4	9	3
17.4	17	2.84
29.1	29	2.36
46.5	46	0.88
66.5	67	0.25
90.3	90	0.05
119.4	119	0.01
156.9	157	0.02
204.6	205	0.02
252.3	252	0.02
300	300	0.02

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - R4 100 yr

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 5:15:32 PM

INPUT PARAMETERS

Application rate: 16.53 c.ft/day/sq. ft

Duration of application: 0.298 day

Total simulation time: 3 day

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 33.5 ft

Width of application area: 19 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 0 ft

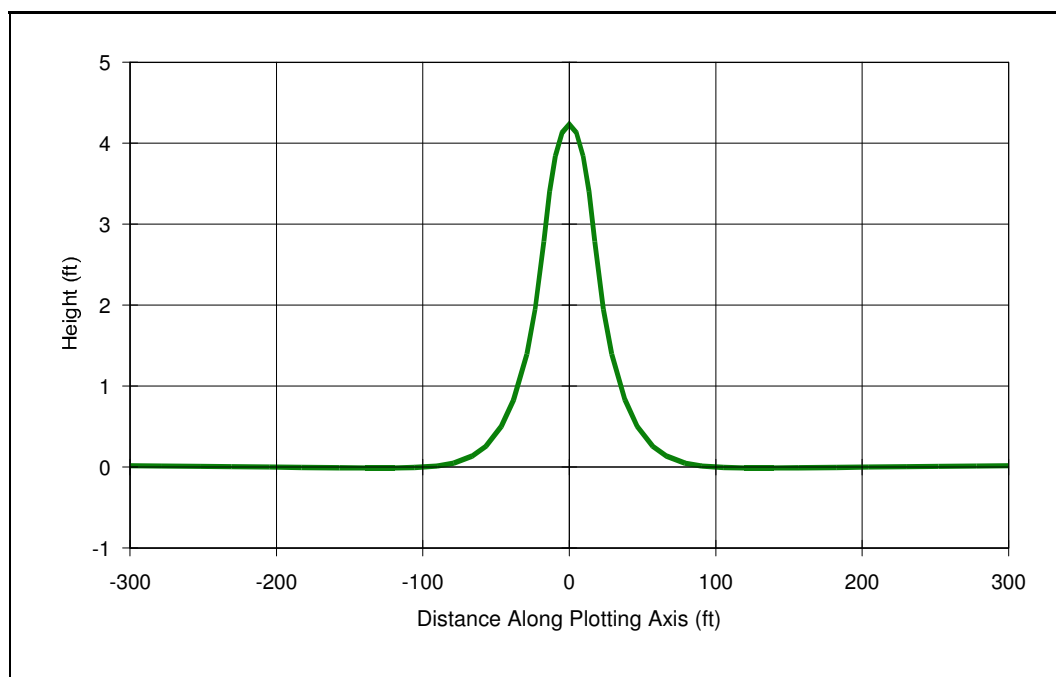
Y coordinate: 0 ft

Total volume applied: 3135.361 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0.25
0	0.78
0	1.38
0	1.86
0.1	2.27
0.1	2.64
0.1	3
0.2	3.35
0.2	3.74
0.3	4.23
0.3	2.8
0.4	1.66
0.6	1.06
0.7	0.76
0.9	0.57
1.1	0.44
1.4	0.35
1.7	0.27
2.2	0.21
3	0.15

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CLAWE

PROJECT: 247a Washington St Sherborn MA - R4 100yr
(ft)

ANALYST: Desheng Wang

DATE: 8/26/2015 TIME: 5:15:45 PM

INPUT PARAMETERS

Application rate: 16.53 c.ft/day/sq. ft

Duration of application: 0.298 days

Fillable porosity: 0.26

Hydraulic conductivity: 29 ft/day

Initial saturated thickness: 20 ft

Length of application area: 33.5 ft

Width of application area: 19 ft

No constant head boundary used

Plotting axis from Y-Axis: 0 degrees

Edge of recharge area:

positive X: 0 ft

positive Y: 16.8 ft

Total volume applied: 3135.361 c.ft

MODEL RESULTS

Y (ft)	Plot Axis (ft)	Mound Height (ft)
-300	-300	0.02
-252.3	-252	0.01
-204.6	-205	0
-156.9	-157	-0.01
-119.4	-119	-0.01
-90.3	-90	0.01
-66.5	-67	0.14
-46.5	-46	0.5
-29.1	-29	1.4
-17.4	-17	2.79
-9.4	-9	3.84
0	0	4.23
9.4	9	3.84
17.4	17	2.79
29.1	29	1.4
46.5	46	0.5
66.5	67	0.14
90.3	90	0.01
119.4	119	-0.01
156.9	157	-0.01
204.6	205	0
252.3	252	0.01
300	300	0.02



Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Jack Buckley, *Director*

August 14, 2015

Ben Stevens
Trask Inc.
30 Turnpike Road, Unit 8
Southborough, MA 01772

Sherborn Conservation Commission
19 Washington Street
Sherborn, MA 01770

RE:	Applicant:	Ben Stevens, Trask Inc.
	Project Location:	Washington Street, SHERBORN (Assessor's Map 3, Lots 88B and 88C)
	Project Description:	Construction of 36-Unit Residential Subdivision
	DEP Wetlands File No.:	283-0366
	NHESP File No.:	13-32841

Dear Commissioners & Applicant:

The Natural Heritage & Endangered Species Program of the MA Division of Fisheries and Wildlife (the "Division") has received and reviewed a Notice of Intent and site plans entitled "The Fields at Sherborn" (revised through 6/30/2015; prepared by Bruce Saluk & Assoc., Inc.) in compliance with the rare wildlife species section of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.58(4)(b), 10.59). The Division recently reviewed this project pursuant to the MA Endangered Species Act Regulations (321 CMR 10.18).

WETLANDS PROTECTION ACT (WPA)

Based on a review of the information that was provided and the information that is currently contained in our database, the Division has determined that this project, as currently proposed, **will not adversely affect** the actual Resource Area Habitat of state-protected rare wildlife species. Therefore, it is our opinion that this project meets the state-listed species performance standard for the issuance of an Order of Conditions.

Please note that this determination addresses only the matter of **rare** wildlife habitat and does not pertain to other wildlife habitat issues that may be pertinent to the proposed project.

MASSACHUSETTS ENDANGERED SPECIES ACT (MESA)

The Division previously determined that this project will not result in a prohibited "take" of state-listed rare species (Division letter dated October 15, 2014, attached) **provided** that the Applicant adheres to the conditions provided therein and there are no changes to the site plans. The Division has been working with the Applicant to refine the site plans referenced above pursuant to Condition #1 of the Division's previous determination. Therefore, the Division's review of the site plans as stated in Condition #1 is ongoing.

www.mass.gov/nhesp

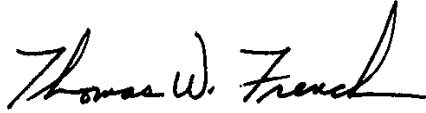
Division of Fisheries and Wildlife

Field Headquarters, One Rabbit Hill Road, Westborough, MA 01581 (508) 389-6300 Fax (508) 389-7890

An Agency of the Department of Fish and Game

If you have any questions regarding this letter, please contact Jesse Leddick, Endangered Species Review Biologist, at jesse.lednick@state.ma.us or (508) 389-6386.

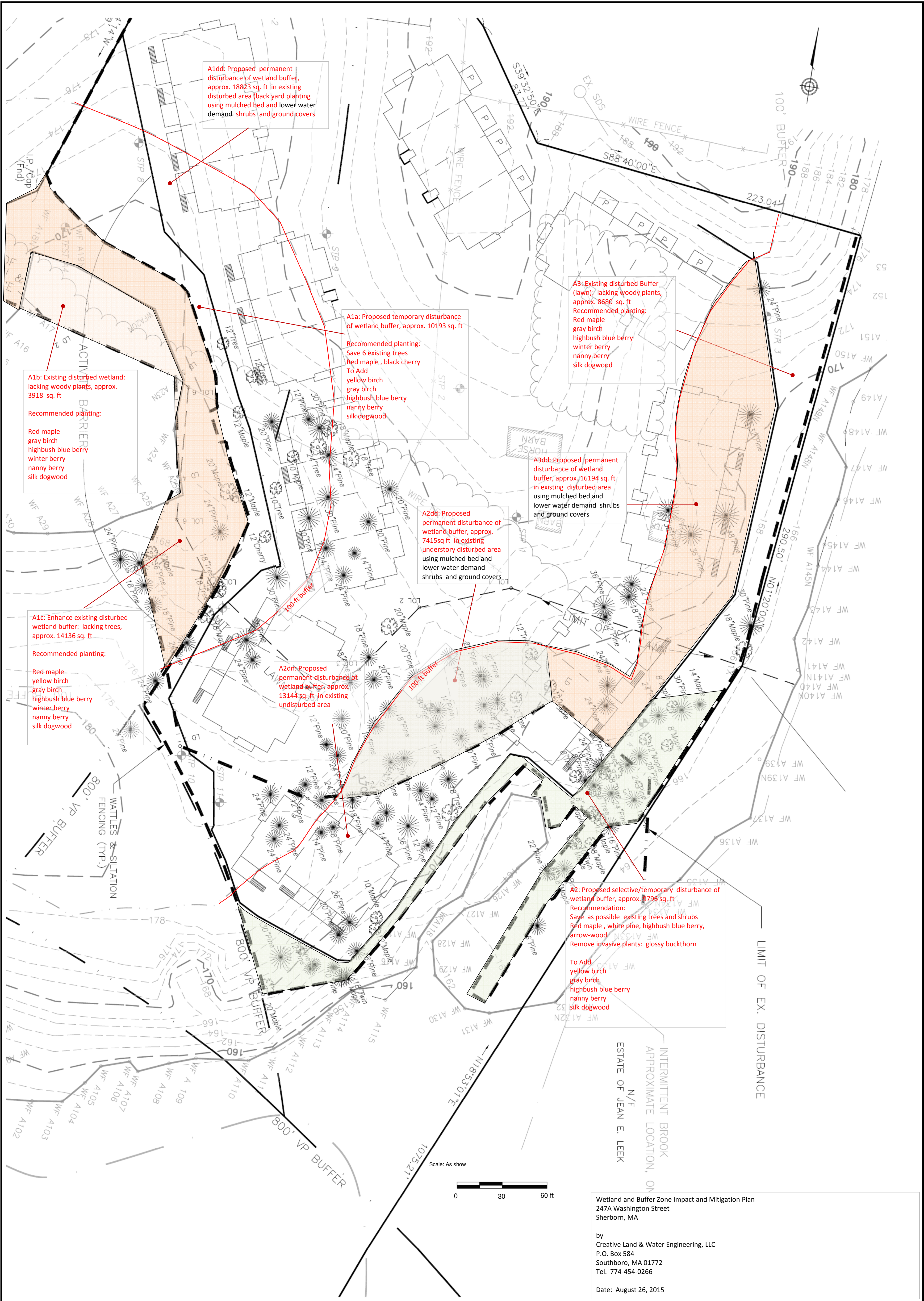
Sincerely,

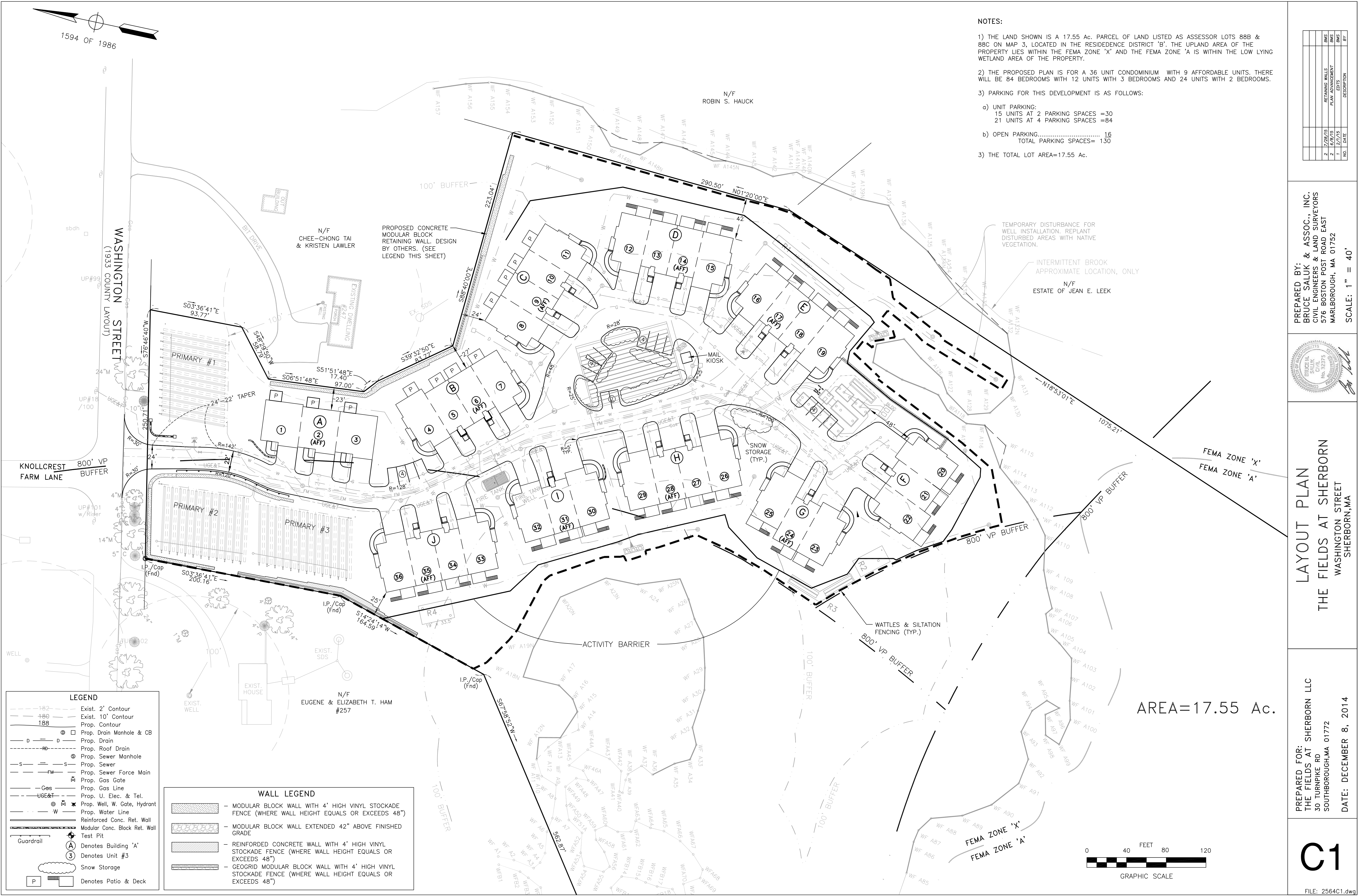
A handwritten signature in black ink that reads "Thomas W. French". The signature is fluid and cursive, with the first name "Thomas" and last name "French" clearly legible.

Thomas W. French, Ph.D.
Assistant Director

cc: Desheng Wang, Creative Land and Water Engineering
Mike Trum
MA DEP Northeast Region

Encl. MESA Determination Letter (dated October 15, 2014; issued by the Division)





NO.	DATE	EDITS	PLAN ADVANCEMENT	BY
2	7/28/15	BUS	RETAINING WALLS	
2	6/8/15	BUS	PLAN ADVANCEMENT	
1	2/7/15	BUS	EDITS	
1	2/7/15	BUS	DESCRIPTION	

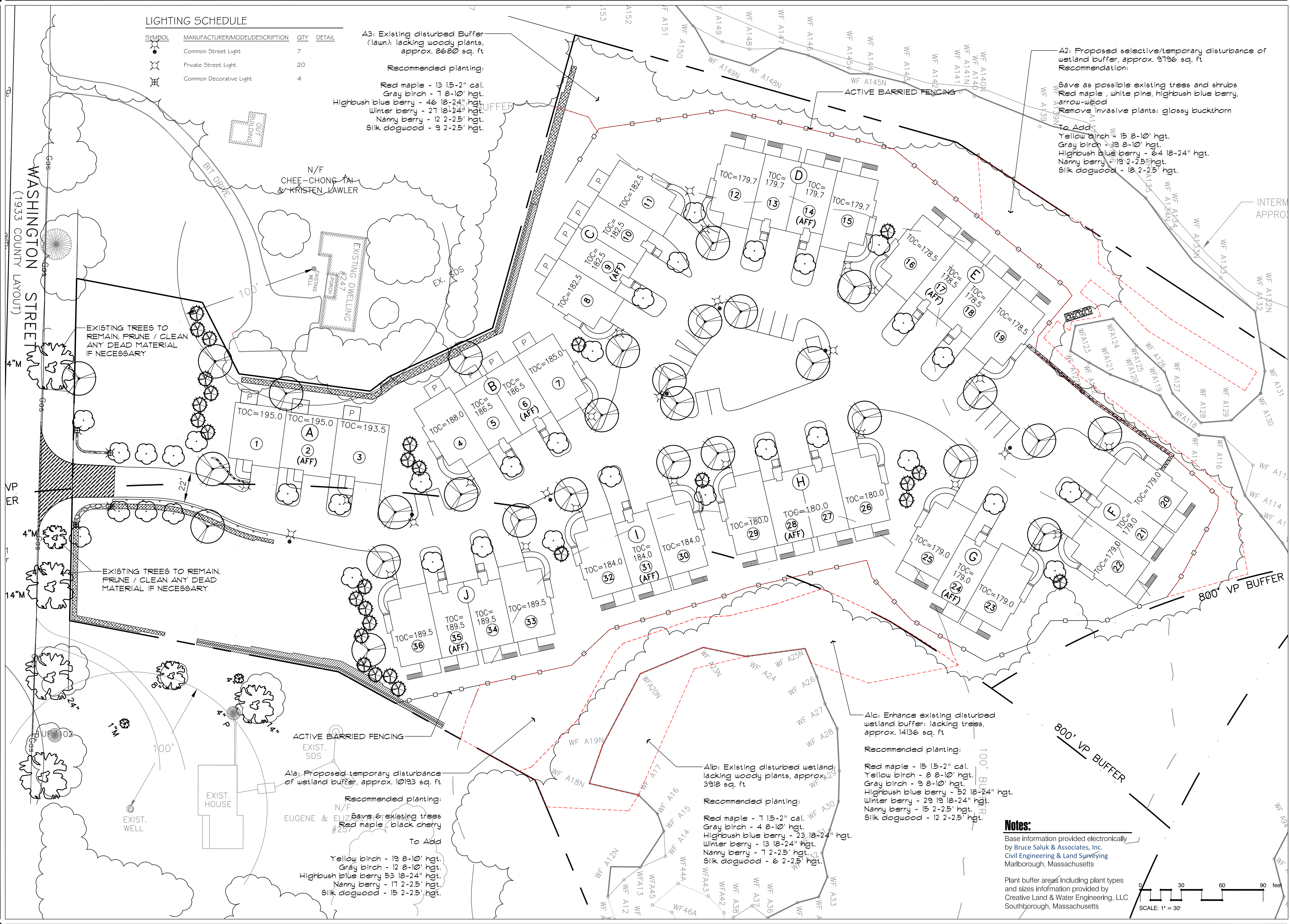
PREPARED BY:
BRUCE SALUK & ASSOC., INC.
CIVIL ENGINEERS & LAND SURVEYORS
576 BOSTON POST ROAD EAST
MARLBOROUGH, MA 01752



LAYOUT PLAN
THE FIELDS AT SHERBORN
WASHINGTON STREET
SHERBORN, MA

PREPARED FOR:
THE FIELDS AT SHERBORN LLC
30 TURNPIKE RD
SOUTHBOROUGH, MA 01772

DATE: DECEMBER 8, 2014



LIGHTING SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY	DETAIL
	Common Street Light	7	
	Private Street Light	20	
	Common Decorative Light	4	

A3: Existing disturbed Buffer (lawn): lacking woody plants, approx. 8680 sq. ft

Recommended planting:

Red maple - 13 1.5-2" cal.
Gray birch - 7 8-10' hgt.
Highbush blue berry - 46 18-24" hgt.
Winter berry - 27 18-24" hgt.
Nanny berry - 12 2-2.5' hgt.
Silk dogwood - 9 2-2.5' hgt.

A2: Proposed selective/temporary disturbance of wetland buffer, approx. 9796 sq. ft
Recommendation:

Save as possible existing trees and shrubs
Red maple, white pine, highbush blue berry, arrow-wood
Remove invasive plants: glossy buckthorn

To Add:
Yellow birch - 15 8-10' hgt.
Gray birch - 13 8-10' hgt.
Highbush blue berry - 64 18-24" hgt.
Nanny berry - 19 2-2.5' hgt.
Silk dogwood - 18 2-2.5' hgt.

Alc: Enhance existing disturbed wetland buffer: lacking trees, approx. 14136 sq. ft

Recommended planting:

Red maple - 15 1.5-2" cal.
Yellow birch - 8 8-10' hgt.
Gray birch - 9 8-10' hgt.
Highbush blue berry - 52 18-24" hgt.
Winter berry - 29 18-24" hgt.
Nanny berry - 15 2-2.5' hgt.
Silk dogwood - 12 2-2.5' hgt.

Alb: Existing disturbed wetland: lacking woody plants, approx. 3918 sq. ft

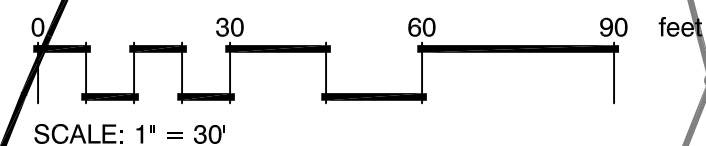
Recommended planting:

Red maple - 7 1.5-2" cal.
Gray birch - 4 8-10' hgt.
Highbush blue berry - 23 18-24" hgt.
Winter berry - 13 18-24" hgt.
Nanny berry - 7 2-2.5' hgt.
Silk dogwood - 6 2-2.5' hgt.

Notes:

Base information provided electronically by Bruce Saluk & Associates, Inc.
Civil Engineering & Land Surveying
Marlborough, Massachusetts

Plant buffer areas including plant types and sizes information provided by Creative Land & Water Engineering, LLC
Southborough, Massachusetts



Hawk Design, Inc.
Landscape Architecture
Land Planning
Sagamore, MA
508-833-8800
info@hawkdesigninc.com
www.hawkdesigninc.com

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Date: 8/27/15

Revisions:
Num. Date Description

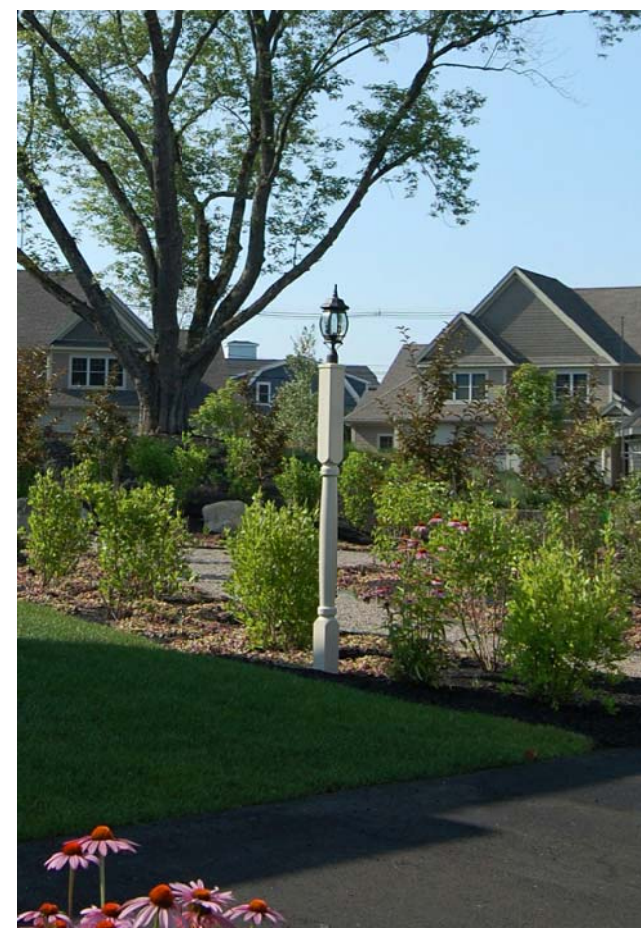
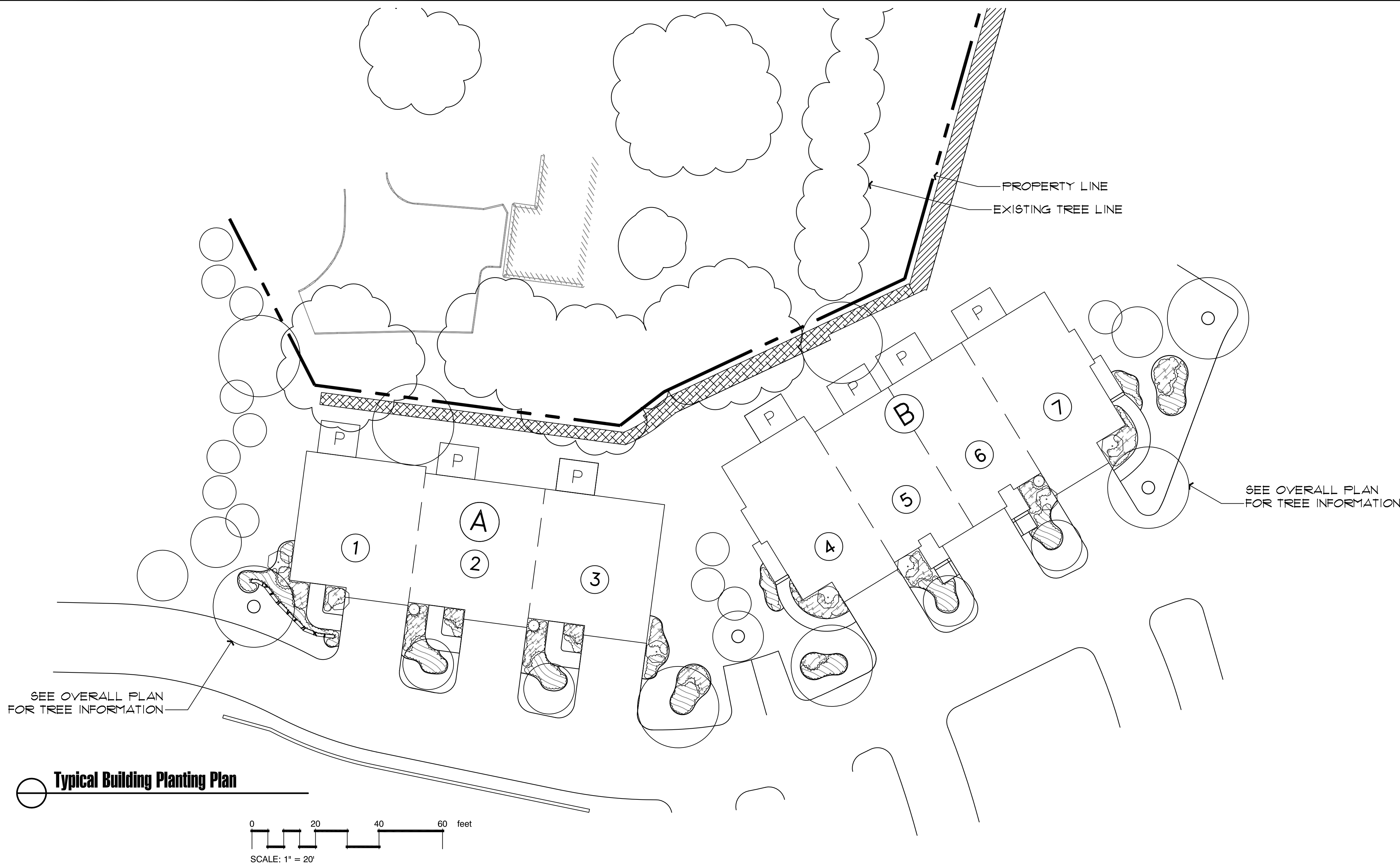
The Fields at Sherborn
Washington Street, Sherborn Mass
Trask Development

Drawn By: _____ Checked By: BL

Overall Conceptual Landscape Plan

Scale: 1" = 30'-0"

Sheet: **L1**



Common Steet Light

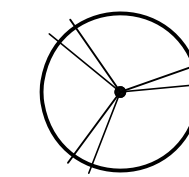


Common Private Light



Common Decorative Light

CONCEPT PLANT SCHEDULE



SHADE TREE
Acer rubrum / Red Maple
Carya ovata / Shagbark Hickory
Gleditsia triacanthos inermis "Halka" / Halka Thornless Honey Locust
Liriodendron tulipifera / Tulip Tree
Quercus alba / White Oak
Quercus palustris / Pin Oak
Quercus rubra / Red Oak
Tilia americana / American Linden
Ulmus americana / American Elm



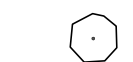
FLOWERING TREE
Amelanchier canadensis / Shadblow Serviceberry
Betula nigra / Multi-Trunk River Birch
Malus x "Red Jade" / Red Jade Crabapple
Prunus serrulata "Kwanzan" / Kwanzan Cherry
Prunus x yedoensis "Shidare Yoshino" / Yoshino Cherry
Pyrus calleryana "Anstocrat" TM / Anstocrat Flowering Pear



EVERGREEN TREES
Abies concolor / White Fir
Abies fraseri / Fraser Fir
Picea glauca / White Spruce
Picea pungens / Colorado Spruce
Pinus strobus / White Pine



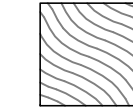
SCREENING: 3.5' HT. MIN.
Juniperus chinensis "Spartan" / Spartan Juniper
Taxus x media "Hatfieldii" / Hatfield Yew
Thuja occidentalis "Emerald Green" / Emerald Green Arborvitae



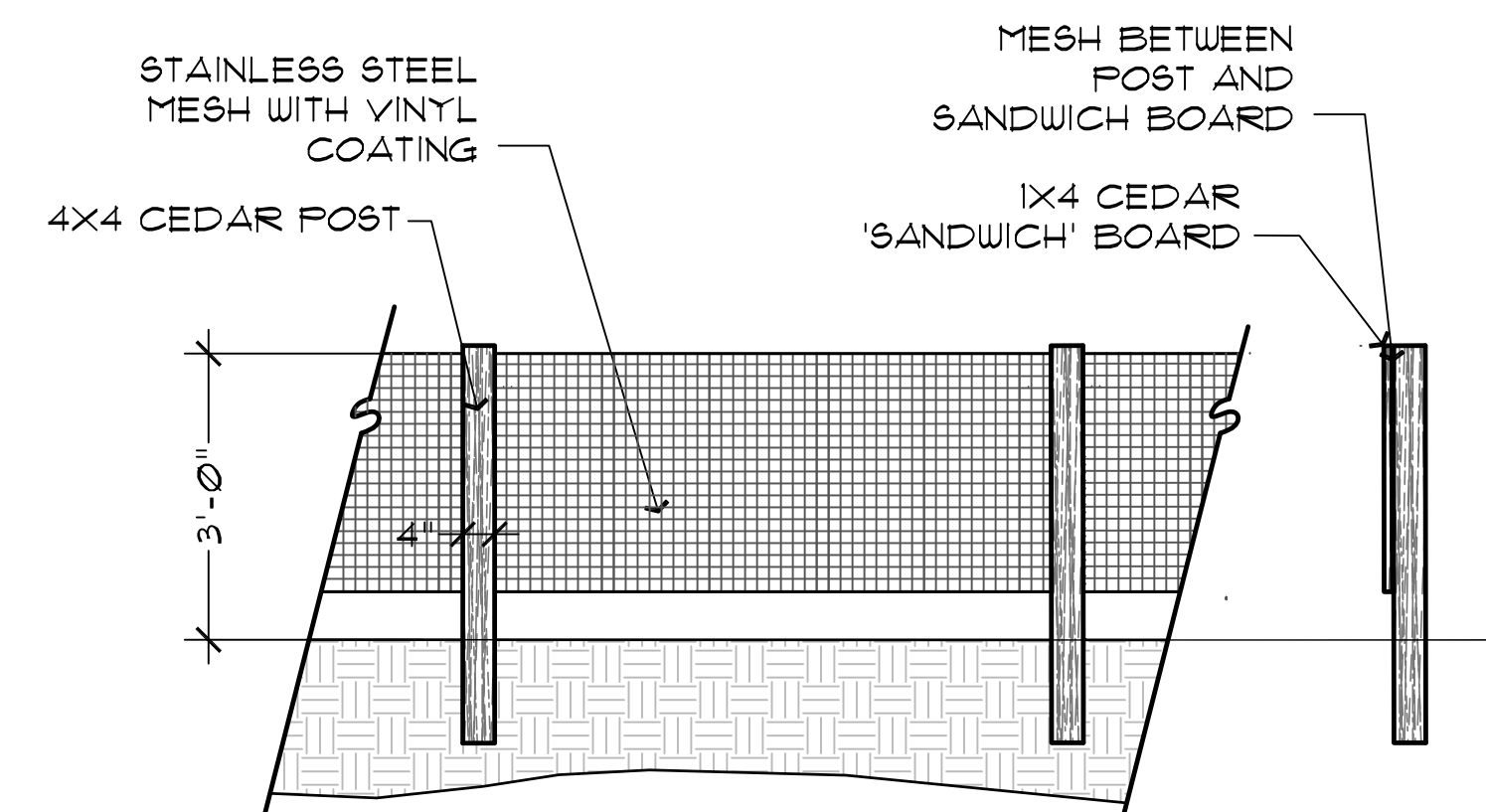
LARGE DECIDUOUS SHRUB: 6' HT.
Amelanchier alnifolia / Serviceberry
Hibiscus syriacus / Rose of Sharon



FOUNDATION PLANTINGS: 2-5' HT.
Ilex glabra "Compacta" / Compact Inkberry
Plenis japonica "Mountain Fire" / Mountain Fire Andromeda
Rhododendron x "English Roseum" / English Roseum Rhododendron
Rhododendron x "Nova Zembla" / Rhododendron
Taxus cuspidata "Emerald Spreader" TM / Emerald Spreader Japanese Yew
Viburnum plicatum "Manisii" / Manis Doublefile Viburnum



LOW SHRUBS: 2' HT. MAX.
Azalea x "Bloomathon Pinki" / Bloomathon Pinki Azalea
Azalea x "Mother's Day" / Azalea
Clethra alnifolia "Sixteen Candles" / Summersweet Clethra
Cotoneaster adpressus "Tom Thumb" / Tom Thumb Cotoneaster
Euonymus fortunei "Emerald Gaiety" TM / Emerald Gaiety Euonymus

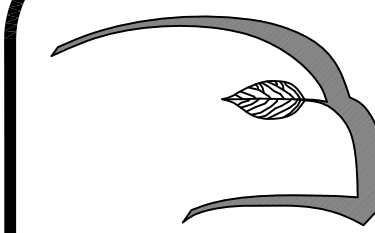


NOTES

1. PICKET SPACING TO BE IN ACCORDANCE W/ STATE & LOCAL REGULATIONS FOR POOL FENCES
2. FENCE CONTRACTOR SHALL VERIFY & INSTALL FENCE IN ACCORDANCE W/ ALL STATE & LOCAL REGULATIONS FOR POOL FENCES
3. FOOTING WIDTH TO BE APPROX. 4X POST WIDTH.
4. DETAIL IS FOR SCHEMATIC USE ONLY, REFER TO PLANS/SHOP DRAWINGS FOR CONSTRUCTION DOCUMENTS
5. CONTRACTOR TO REPORT ANY DISCREPENCIES /CONFLICTS TO HDI PRIOR TO FABRICATION OR INSTALLATION

ACTIVITY BARRIER MESH FENCE DETAIL

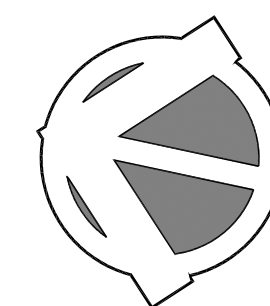
1/2" = 1'-0"



Hawk Design, Inc.
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Land Planning

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info@hawkdesigninc.com
www.hawkdesigninc.com

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Date: 8/27/15

Revisions:

Num. Date Description

The Fields at Sherborn
Washington Street, Sherborn Mass
Trask Development

Drawn By: Checked By: BL

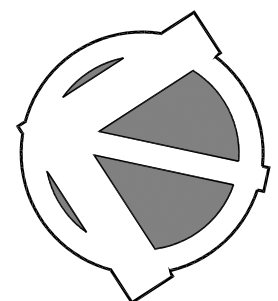
**Typical 3 & 4 Unit
Conceptual
Landscape Plans**

Scale: AS NOTED

Sheet:

L2

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Date: 8/27/15

Revisions:
Num. Date Description

The Fields at Sherborn
Washington Street, Sherborn Mass
Trask Development

Drawn By: _____ Checked By: BL

Irrigation Limits Plan

Scale: 1" = 30'-0"

Sheet: **L3**



IRRIGATION NOTES:

- AREAS TO BE IRRIGATED
50,125 SF TOTAL
- IRRIGATION WILL ONLY BE RUN JUNE THROUGH SEPTEMBER DURING THE HOURS OF 12:00am TO 5:00am.

Notes:

Base information provided electronically by Bruce Saluk & Associates, Inc. Civil Engineering & Land Surveying Marlborough, Massachusetts