3.0 GROUNDWATER RECHARGE SITE SCREENING

A. INTRODUCTION

Approximately 84% of the Town of Oxford's population currently relies on individual onsite subsurface disposal systems for wastewater management. Of the remaining 16%, 13% are connected to the municipal sewer system that discharges to the Town of Auburn, for eventual treatment at the UBWPAD WWTF, and 3% lay within the ORSD. This district provides wastewater treatment at the ORSD WWTP in North Oxford, which discharges treated wastewater to the French River.

For the design year 2030, the Phase I Report identified about 1.3 MGD of wastewater flow in the Town of Oxford that will require treatment and disposal by a method other than individual onsite subsurface disposal systems. In an effort to sustain the level of groundwater recharge that this wastewater flow affords, this Phase II Report investigated sites for groundwater disposal of treated wastewater. These recharge sites could be associated with an existing WWTF that discharges to a surface water, and/or a new onsite WWTF.

Options for future wastewater treatment mentioned in the Phase I Report to handle flow from needs areas included the ORSD WWTP, the UBWPAD WWTF, the Webster/Dudley Advanced WWTF located in Webster, MA, and the construction of one or more onsite WWTFs within Oxford that would discharge treated wastewater to groundwater. Because of the political, institutional and financial obstacles associated with siting a new WWTF and/or groundwater recharge facility within Oxford, we limited groundwater recharge options to the following three alternatives:

1. Construction of a new WWTF and recharge area(s) in Oxford to handle the entire projected wastewater flow of 1.3 MGD, excluding the projected flow within ORSD (120,000 gpd), and interbasin transfer of the current limit of 84,000 gpd between the French and Blackstone River Basins. This results in a flow of 1.1 MGD.

2. Construction of a new WWTF and recharge area(s) in Oxford to handle the projected wastewater flow in the North focus area and existing sewered areas (462,000 gpd), excluding the projected flow within ORSD and interbasin transfer of 84,000 gpd between the French and Blackstone River Basins. The resulting flow is 0.26 MGD.

3. Expansion of existing ORSD WWTP to handle the projected flow described in (2) above, in addition to future flow within ORSD, with groundwater discharge of flow from outside of ORSD in a new recharge area(s) in Oxford. The flow to the recharge area(s) is also 0.26 MGD.

The Phase I Report provides supporting documentation for the above flows, and Table 4-1 in the following chapter presents similar information.

Of the three existing WWTFs considered for future treatment of Oxford's wastewater, groundwater recharge makes the most sense for the ORSD WWTP because the wastewater transmission would be entirely within town boundaries, and would likely be the shortest distance. In addition, groundwater recharge of treated wastewater from the ORSD WWTP may allow for treatment of more flow from the North focus area at this facility, as opposed to the UBWPAD WWTF, which constitutes an interbasin transfer of wastewater from the French to the Blackstone River Basin.

B. SCREENING CRITERIA FOR GROUNDWATER RECHARGE SITES

For the reasons cited above, a major component of this Phase II Report was the screening of sites for groundwater recharge of treated wastewater. The screening performed involved a three-tier evaluation. The first tier of the analysis included a general evaluation of undeveloped sites greater than or equal to 10 acres after deducting unsuitable areas, as described below. The second tier assigned numerical ratings to sites that survived the first tier screening, accounting for factors such as site area and ownership, cost, soil conditions for groundwater recharge, and topography. The third tier involved a review of the first and second tier evaluations, and other factors that could influence the final decision, to develop an overall ranking for the site. The following outlines each tier of the screening process in more detail.

1. First Tier - Preliminary Screening of Undeveloped Sites

In consideration of the large number of undeveloped parcels in Oxford, this step of the analysis was an attempt to screen out sites that did not provide the minimum criteria to support groundwater recharge. The criteria evaluated for this tier included size of site, soil and groundwater conditions, wetland impacts, surficial geology, flood plain impacts, proximity to drinking water supplies, location of sensitive receptors, presence of hazardous materials, location of historic or archaeological significance, location of park/recreational or agricultural land, current development status of the site, and sites within the Blackstone River Basin.

Size of Site: We screened each site initially according to the total parcel area. We deducted unusable area from the total site area, defined by wetlands, water bodies, flood plain, soil and groundwater conditions, and other criteria noted above. If the usable area was less than 10 acres, or the remaining site configuration not conducive to a groundwater recharge system layout, we considered the site not feasible and did not carry it forward to the second tier of the evaluation.

Soil, Groundwater and Wetlands: Soil and groundwater characteristics are critical to the suitability of a site for groundwater recharge. Based on characteristics identified by the U.S. Soil Conservation Service mapping, we evaluated the soil and groundwater conditions of the site and estimated the area of a site considered suitable for groundwater recharge. We deemed conditions unsuitable if they included shallow depth to rock, shallow depth to groundwater, wetness, flooding, ponding and/or severe slope characteristics. Using MassGIS, we identified specific wetland areas. We subtracted the portion of the site consisting of unsuitable soils, areas within 100 feet of wetlands, etc., from the total site area to assess the usable area of the site.

Surficial Geology: This criterion considers the characteristics of glacial deposits underneath the soil layers. Sites underlain by sand and gravel deposits have a greater potential for infiltration of water than sites underlain by either glacial till or bedrock. Glacial till tends to be dense with low permeability, although it may have areas of moderate permeability. While glacial till may suffice for individual septic systems, it has limited potential for accepting higher volumes of water. Sites underlain by shallow bedrock have no potential. In investigating sites for groundwater recharge, we eliminated those wholly underlain by glacial till or bedrock, and deducted the portions of sites underlain by glacial till or bedrock to estimate the usable site area.

Flood Plain: Since flooding of the recharge bed area would be detrimental to the beds' function, we considered portions of sites within the 100-year flood plain unsuitable for groundwater recharge. We subtracted the portion of the site within the 100-year flood plain from the total site area to determine the usable area of the site.

Water Bodies: Groundwater recharge facilities create a "mound of groundwater" beneath the disposal bed, and the system should be located such that the outer edges of the mound do not significantly influence the hydrology or water quality of the nearby surface water body. We determined that a 500-foot distance from the discharge bed to the surface water body provided an adequate margin of safety to ensure protection and preservation of surface water quality. To assess available site area, we therefore subtracted the portion of the site within 500 feet of all surface water bodies.

Drinking Water Supplies: In March 2009, MassDEP revised regulations under the Groundwater Discharge Permit Program, 314 CMR 5.00. These regulations contain standards for discharge of treated wastewater within a Zone II or Interim Wellhead Protection Area, the boundaries of which provide a two-year travel time from the disposal site to the drinking water supply. MassDEP prohibits any land use not specific to water supply development within 400 feet of a well with a capacity of 100,000 gpd or greater, so we have not included any site area within a 400-foot radius of a public water supply well.

Sensitive Habitats: We screened sites for sensitive habitat areas identified as an estimated habitat of rare wildlife, certified vernal pools, priority habitat sites of rare species, exemplary natural communities, and areas of critical environmental concern. We excluded any such areas in our determination of the usable site area.

Presence of Hazardous Materials: We determined locations where there had been a previously reported spill of oil or hazardous material, as described on MassDEP's website, and deducted these areas in our calculation of usable area for groundwater recharge.

Park/Recreational and Agricultural Lands: Local, state and federal governments often impose constraints on park, recreational and agricultural lands to prevent or hinder change in use of such lands. Our analysis evaluated restrictions placed on the use of potential sites, and what actions would be necessary to allow the location of a groundwater recharge facility at the site. We excluded areas that would require state or federal action to allow the location of a recharge facility, but retained areas that had a perceived conflict in use (used for recreation or agricultural purposes but not designated for this use).

Historical Significance: We evaluated sites with respect to constraints associated with historic interests, such as historic structures, properties and archaeological resources. In our determination of the usable area for groundwater recharge, we excluded sites with identified historic structures or archaeological resources, or areas designated as historic sites on a national, state or local level.

Development Status: Because the assessor's databases utilized for this evaluation are updated annually and do not indicate if development is proposed for a site, we asked Town officials to identify any current or proposed development on potential sites. If a site was in the process of being developed (active planning and development imminent) or had been developed since the last assessor's database update, we considered the site unavailable for groundwater recharge and eliminated it from further evaluation.

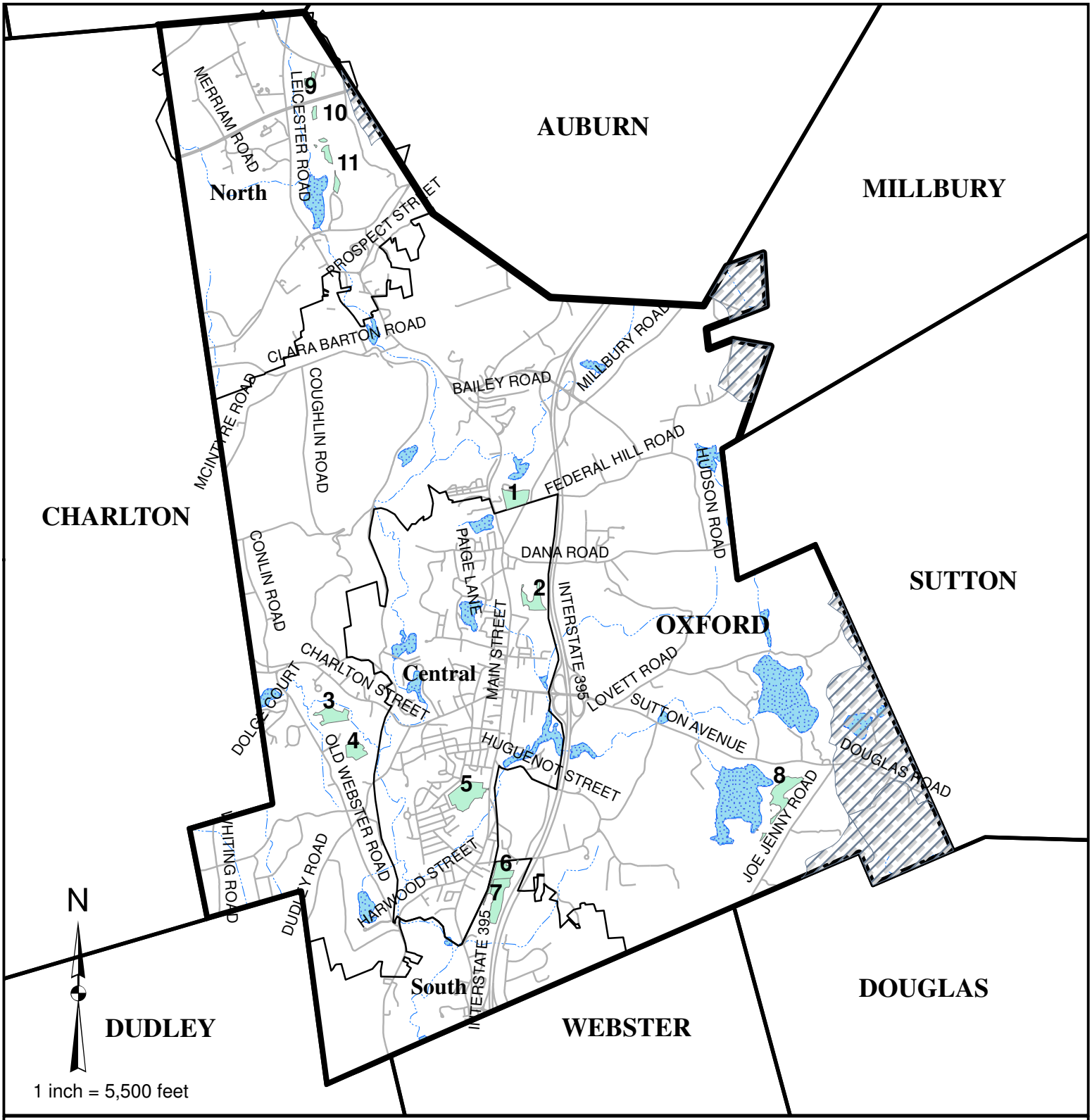
Blackstone River Basin: Because the water used within the Town of Oxford originates from the French River Basin, we considered only parcels within that basin, and not the Blackstone River Basin, for groundwater recharge.

After conducting the first-tier of screening, eight sites remain within the Town. Town officials also brought to our attention three sites within close proximity to the ORSD WWTP. These sites are developed – one contains the ORSD WWTP, and the other two comprise a new condominium development known as Ashworth Hill. While each site has less than 10 acres of available recharge area, the combination of the three sites has a total of 10 acres, and both ORSD and Ashworth Hill have an interest in additional wastewater treatment and disposal options. Figure 3-1 depicts the 11 remaining sites, and Table 3-1 presents the relevant information. All of the sites in Figure 3-1 proceeded to the second tier of the Phase II screening process.

Table 3-1
Tier 1 - Potential Groundwater Recharge Sites

Site #	Location	Site Area* (acres)	Recharge Area** (acres)
1	Federal Hill Rd.	20	11
2	Hall Rd.	19	8
3	Charlton St.	26	10
4	Old Webster Rd.	11	8
5	Locust St.	31	19
6	Holbrook Rd.	16	9
7	Main St.	23	15
8	Sutton Ave.	131	15
9	ORSD WWTP	18	3
10	Ashworth Hill	10	1
11	Ashworth Hill	73	6

* Site Area = Total Parcel Area minus wetlands and floodplain.
** Recharge Area = Total Parcel Area minus all Tier 1 screening criteria and a 25% reduction of remaining acreage to account for buffer areas.



Legend

- Potential Sites
- Blackstone River Basin
- Focus Areas

TOWN OF OXFORD, MASSACHUSETTS
FIGURE 3-1
TIER 1 - POTENTIAL GROUNDWATER RECHARGE SITES

Data compiled from MassGIS and FST

FAY, SPOFFORD & THORNDIKE - SEPTEMBER 2010

To assess how the recharge areas in Table 3-1 correlate with the area requirements of the three groundwater recharge alternatives presented earlier (Alternatives 1 – 3), we made the following assumptions regarding groundwater recharge parameters:

- Type of disposal: Leaching chambers in a trench configuration
- Effluent loading rate: 1.5 gpd/square foot (sf) (percolation rate of 10 – 20 minutes/inch)
- Redundancy: 100%

Using these assumptions, the recharge area needed for Alternative 1 (1.1 MGD) is about 33.7 acres, and for Alternatives 2 and 3 (each 0.26 MGD), 7.9 acres. This includes the acreage to meet redundancy requirements. A preliminary layout of chambers in a trench configuration, allowing three times the trench width in between the trenches to satisfy redundancy needs, indicates that these acreage estimates are satisfactory. A combination of sites is needed to handle the flow for Alternative 1, but with Sites 9, 10 and 11 combined, all of the sites can manage the flow, including 100% redundancy, for Alternatives 2 and 3. All of the sites seem to have sufficient acreage to accommodate the WWTF, so we assumed the onsite WWTF alternatives would have the treatment facility and disposal area on the same parcel.

2. Second Tier – Site Ranking

The second tier of the screening process ranked the sites that survived the first-tier screening to identify the most feasible sites for Alternatives 1, 2 and 3. Only the portion of the site considered usable for groundwater recharge was evaluated under this tier.

Because of Site 5's central location in the community and the fact that it's a town-owned parcel, we determined that Site 5 should be included in the mix of all site combinations considered for Alternative 1. To meet the acreage requirements for Alternative 1, we made a logical grouping of sites to be combined with Site 5. We then ranked this grouping, as opposed to individual sites that would have to be combined to satisfy the acreage need. The sites that we grouped together for this analysis included: Sites 1 and 2; 3 and 4; 6 and 7; 6 and 8; and 1, 9, 10 and 11.

There is a need to conduct site ranking for Alternatives 2 and 3 for both primary and redundant recharge, and we ranked the sites individually, except for the combination of Sites 9, 10 and 11, because each site can handle both primary and redundant acreage needs.

Below are the criteria and assigned values for the second-tier site ranking process, which we used to develop three separate rankings for the three groundwater recharge alternatives.

Site Size: This criterion takes into account the practicality of a site's use for groundwater disposal. The larger the site, the greater its capacity to handle treated effluent. If a site had over 20 acres available for groundwater disposal, it received a rating of 1. If a site had between 15 and 20 acres available, it received a rating of 2. If a site had between 10 and 15 acres available, it received a rating of 3.

Topography: We considered sites that were relatively flat, and in need of only minor site work to allow for the construction of a groundwater disposal bed to be the best sites. We did not judge areas of sites with severe slopes (>15%), as designated by Soil Conservation Service mapping, to be usable for groundwater disposal, and therefore did not include the severe slope portions of sites in this evaluation. Sites that were relatively flat (0 – 3% slope) and in need of only minor site work received a rating of 1. Those requiring moderate site work (3 – 8% slope) received a rating of 2, and those requiring substantial site work (8 – 15% slope) earned a rating of 3.

Transmission Issues*:* This criterion looked at the difficulties in transporting treated wastewater to the groundwater disposal site, and attempted to account for varying difficulties associated with the location of the proposed wastewater transmission line. The areas with the greatest difficulty would be state roads/major highways and river crossings, while construction in cross-country easements would be the easiest. If the groundwater disposal site was located adjacent to the onsite WWTF (Alternative 2), the site received a rating of 0. If a proposed wastewater transmission line were to be installed in town roads and easements, it received a rating of 1. If installed in state roads/major highways, or if a river crossing were required, then the site received a rating of 3.

***Distance to WWTF (Collection)*:** This issue considered how far the raw wastewater would have to be transported to get to the WWTF. For Alternative 1, we considered only one site - Site 5 – for the location of the WWTF, so we assigned a rating of 0 to all sites for this parameter. For Alternative 3, a rating of 0 applied to all of the sites, because all of the sewers bring the raw wastewater to the ORSD WWTP for treatment. This parameter thus only varied for Alternative 2, where both the WWTF and entire disposal area were on the same site. The best sites were deemed to be within two miles of the Leicester Road Pump Station, which would be the starting point for transporting wastewater from the North focus area for treatment. If a site were within two miles, it received a rating of 1, if between 2 and 5 miles, it received a rating of 2, and if greater than 5 miles, it received a rating of 3.

***Distance to Recharge Area (Effluent)*:** This parameter investigated how far the treated effluent would have to be transported to get to the recharge location. For Alternative 1, we looked at the distance from the WWTF on Site 5 to the other recharge sites, and for Alternative 3, we determined the distances from the ORSD WWTP to the recharge site. If a site were within two miles, it received a rating of 1, if between 2 and 5 miles, it received a rating of 2, and if greater than 5 miles, it received a rating of 3. For Alternative 2, the recharge site is located adjacent to the WWTF, so all sites received a rating of 0.

Institutional Issues: This factor took into account public acceptance and legal issues. The most acceptable sites were those owned by the Town and not designated for any specific public use (park, recreation or open space); these received a rating of 1. The least acceptable sites, from both a public acceptance and legal standpoint, were considered to be those that are privately owned since the Town would need to acquire the land; these received a rating of 3. Finally, we assigned a rating of 2 for public land that would require a change of use to qualify for groundwater recharge.

Costs: We used relative costs to evaluate the potential financial impacts associated with transporting and discharging treated wastewater to each site. Due to the minimum level of detail available at this time for each site, we developed and used these costs to compare sites, as opposed to developing construction cost estimates.

Once we determined the relative costs, we ranked the sites, assigning a rating of 1 to the lowest third, a rating of 2 to the middle third, and a rating of 3 to the highest third (as compared to the highest cost). Relative unit costs used to perform this evaluation were as follows:

- $500,000 per small pumping station (community collection).
- $1,000,000 per large pumping station (Webster/Dudley interceptor sewer)
- $50/LF of force main in easements.
- $100/LF of force main in Town roads. (Rt. 12 and Rt. 56)
- $200/LF of force main in State roads. (Rt. 20, I-90, and I-395)
- $200/LF of gravity sewer.
- $50,000 for each bridge or river crossing.
- $1500/LF for each crossing of an active railroad.
- $104,000 per acre for purchase of private or State-owned land (excluding wetlands and flood plains).
- $250,000 per acre for construction of subsurface infiltration beds.

As noted, these costs are "relative costs" for comparison purposes only, and should not be considered actual estimated construction costs. Regarding the cost for land purchase, we assumed the Town would have to purchase the entire parcel for Sites 1 – 8. For Sites 10 and 11, we assumed the Town would need to purchase just the acreage required for groundwater recharge, plus buffer area, plus five acres for a treatment facility for Alternative 2, at a cost of $52,000/acre (one-half the average cost). For Site 9, adjacent to the ORSD WWTP, for Alternatives 1 and 2 (new WWTFs), we assumed the Town would need to purchase the northerly portion of the parcel (about 12 acres), but would not have to buy any land on this site for Alternative 3 (ORSD WWTP expansion).

Table 3-2 summarizes the above criteria and assigned rating. Tables 3-3, 3-4 and 3-5 contain the second tier ranking results for Alternatives 1, 2 and 3, respectively, and Tables 3-6, 3-7, and 3-8 present the breakdown of site costs, including cost per gallon of wastewater disposed.

Table 3-2
Site Ranking Criteria and Values

Criterion	Value
Site Size	
10 – 15 acres	3
15 – 20 acres	2
> 20 acres	1
Topography	
Substantial site work (8-15% slope)	3
Moderate site work (3-8% slope)	2
Minimal site work (0-3% slope)	1
Transmission Issues	
State highway/river crossing	3
Town roads/easements	1
Adjacent to WWTF	0
Distance to WWTP	
> 5 miles	3
2 – 5 miles	2
< 2 miles	1
Distance to Recharge Area	
> 5 miles	3
2 – 5 miles	2
< 2 miles	1
Onsite	0
Institutional Issues	
Private	3
Public, Use Change Required	2
Public, Unrestricted	1
Cost	
Top third in expense	3
Middle third in expense	2
Lowest third in expense	1

Table 3-3
Site Ranking Criteria and Values
Alternative 1 – New 1.1-MGD WWTF

	Site				
Criterion	**1,2**	**3,4**	**6,7**	**6,8**	**1,9,10,11**
Site Size	2	2	1	1	1
Topography	2	1	2	3	2
Transmission Issues	3	3	3	3	3
Distance to WWTF	0	0	0	0	0
Distance to Recharge Area	2	2	1	2	3
Institutional Issues	3	3	3	3	3
Cost	2	2	2	3	2
Total	14	13	12	15	14
Rank	3	2	1	4	3

Table 3-4
Site Ranking Criteria and Values
Alternative 2 – New 0.26-MGD WWTF

	Site								
Criterion	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9,10,11**
Site Size	3	3	3	3	1	3	2	2	3
Topography	2	2	1	1	2	2	2	3	2
Transmission Issues	0	0	0	0	0	0	0	0	0
Distance to WWTF	2	2	3	3	2	3	3	3	1
Distance to Recharge Area	0	0	0	0	0	0	0	0	0
Institutional Issues	3	3	3	3	2	3	3	3	2
Cost	1	1	2	1	1	1	1	3	1
Total	11	11	12	11	8	12	11	14	9
Rank	3	3	4	3	1	4	3	5	2

Table 3-5
Site Ranking Criteria and Values
Alternative 3 – ORSD WWTP Expansion

	Site								
Criterion	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9,10,11**
Site Size	3	3	3	3	1	3	2	2	3
Topography	2	2	1	1	2	2	2	3	2
Transmission Issues	3	3	3	3	3	3	3	3	3
Distance to WWTF	0	0	0	0	0	0	0	0	0
Distance to Recharge Area	3	3	3	3	3	3	3	3	1
Institutional Issues	3	3	3	3	2	3	3	3	2
Cost	1	1	2	1	1	1	2	3	1
Total	15	15	15	14	12	15	15	17	12
Rank	3	3	3	2	1	3	3	4	1

Table 3-6
Site Feasibility
Alternative 1 - New 1.1 MGD WWTF and Recharge Area

Site	Pumping Stations	Force Main (easements)	Force Main (Town Road)	Force Main (State Road)	Gravity Sewer	Bridge/River Crossing	Active RR Crossing	Purchase Private Land	GW Disposal Subsurface Bed	Site Capacity Subsurface Bed (MGD)	Total Cost	Cost/gal
1,2	$500,000	$0	$1,200,000	$0	$0	$50,000	$60,000	$4,992,000	$4,200,000	1.10	$11,002,000	$10.02
3,4	$500,000	$70,000	$1,100,000	$0	$0	$50,000	$0	$5,512,000	$4,200,000	1.10	$11,432,000	$10.39
6,7	$500,000	$15,000	$500,000	$0	$0	$50,000	$60,000	$4,888,000	$4,200,000	1.10	$10,213,000	$9.28
6,8	$500,000	$0	$1,500,000	$0	$0	$200,000	$60,000	$19,760,000	$4,200,000	1.10	$26,220,000	$23.84
1,9,10,11	$500,000	$80,000	$2,900,000	$0	$0	$250,000	$0	$5,304,000	$4,200,000	1.10	$13,234,000	$12.03

Table 3-7
Site Feasibility
Alternative 2 - New 0.26 MGD WWTF and Recharge Area*

Site	Pumping Stations	Force Main (easements)	Force Main (Town Road)	Force Main (State Road)	Gravity Sewer	Bridge/River Crossing	Active RR Crossing	Purchase Private Land	GW Disposal Subsurface Bed	Site Capacity Subsurface Bed (MGD)	Total Cost	Cost/gal
1	$1,000,000	$0	$130,000	$0	$2,400,000	$50,000	$0	$2,392,000	$1,050,000	0.26	$7,022,000	$27.01
2	$1,000,000	$0	$130,000	$0	$2,800,000	$50,000	$60,000	$2,600,000	$1,050,000	0.26	$7,690,000	$29.58
3	$1,500,000	$45,000	$1,030,000	$0	$3,220,000	$200,000	$0	$4,368,000	$1,050,000	0.26	$11,413,000	$43.90
4	$1,500,000	$25,000	$900,000	$0	$3,220,000	$200,000	$0	$1,144,000	$1,050,000	0.26	$8,039,000	$30.92
5	$1,500,000	$0	$230,000	$0	$4,400,000	$100,000	$0	$0	$1,050,000	0.26	$7,280,000	$28.00
6	$2,000,000	$0	$310,000	$0	$5,000,000	$150,000	$60,000	$1,768,000	$1,050,000	0.26	$10,338,000	$39.76
7	$2,000,000	$0	$310,000	$0	$5,200,000	$150,000	$60,000	$3,120,000	$1,050,000	0.26	$11,890,000	$45.73
8	$2,000,000	$35,000	$1,330,000	$340,000	$3,600,000	$250,000	$60,000	$17,888,000	$1,050,000	0.26	$26,553,000	$102.13
9,10,11	$500,000	$75,000	$560,000	$0	$0	$150,000	$0	$3,016,000	$1,050,000	0.26	$5,351,000	$20.58

* Assumes transport of sewage from the intersection of Routes 12 and 56

Table 3-8
Site Feasibility
Alternative 3 - Expansion of ORSD WWTP and New 0.26 MGD Recharge Area

Site	Pumping Stations	Force Main (easements)	Force Main (Town Road)	Force Main (State Road)	Gravity Sewer	Bridge/River Crossing	Active RR Crossing	Purchase Private Land	GW Disposal Subsurface Bed	Site Capacity Subsurface Bed (MGD)	Total Cost	Cost/gal
1	$500,000	$45,000	$2,570,000	$0	$0	$200,000	$0	$2,392,000	$1,050,000	0.26	$6,757,000	$25.99
2	$500,000	$45,000	$2,970,000	$0	$0	$200,000	$60,000	$2,600,000	$1,050,000	0.26	$7,425,000	$28.56
3	$500,000	$90,000	$3,870,000	$0	$0	$350,000	$0	$4,368,000	$1,050,000	0.26	$10,228,000	$39.34
4	$500,000	$70,000	$3,870,000	$0	$0	$350,000	$0	$1,144,000	$1,050,000	0.26	$6,984,000	$26.86
5	$500,000	$45,000	$3,570,000	$0	$0	$250,000	$0	$0	$1,050,000	0.26	$5,415,000	$20.83
6	$500,000	$45,000	$3,870,000	$0	$0	$300,000	$60,000	$1,768,000	$1,050,000	0.26	$7,593,000	$29.20
7	$500,000	$60,000	$4,070,000	$0	$0	$300,000	$60,000	$3,120,000	$1,050,000	0.26	$9,160,000	$35.23
8	$500,000	$45,000	$4,270,000	$340,000	$0	$400,000	$60,000	$17,888,000	$1,050,000	0.26	$24,553,000	$94.43
9,10,11	$500,000	$75,000	$0	$100,000	$0	$0	$0	$1,768,000	$1,050,000	0.26	$3,493,000	$13.43

3. Third Tier - Overall Site Evaluation

We developed an overall site evaluation during the third-tier screening process. Based on this evaluation and the second tier ranking, we made a final selection of the most feasible sites, with input from the Town and CAC members. Thus, the Town and the CAC had direct input into identifying the most feasible sites to be carried forward into Phase III of the CWMP for more detailed analyses.

Figure 3-1 shows the location of the nine potential groundwater recharge sites, and the following looks at other considerations in the third-tier screening process to determine the most feasible of the nine sites. As in the previous screening processes, we considered the combination of Sites 9, 10 and 11 as one site.

Alternative 1 - Treatment of 1.1 MGD of Wastewater at a New WWTF with Groundwater Recharge: For this alternative, we determined prior to the tier 2 screening process that Site 5 was the most feasible as a WWTF site, and for groundwater recharge in combination with other sites from the perspective of relative cost, location, and ability to handle the most effluent. Regarding institutional criteria, the site will probably require a land use modification to allow groundwater recharge and construction of a WWTF. Site 5 is currently town-owned property used for recreational purposes, which can continue with the installation of a subsurface leaching system. Residential properties surround the site, which may pose a public acceptance issue, however, for a WWTF and possibly groundwater recharge.

The tier 2 screening process indicated that the combination of Sites 6 and 7 was the best option for Alternative 1 to supplement Site 5 for groundwater recharge, again considering cost, proximity to the proposed WWTF, site size, topography, etc. Institutionally, the sites may require a land use change to accommodate groundwater recharge. Located adjacent to Route 395, the privately-owned sites are zoned for industrial use, and have abutters in the categories of industrial, central business and suburban residential. This location appears to be well-suited for groundwater recharge from a public acceptance perspective, and especially so with the use of subsurface leaching. If this alternative proceeds into Phase III of the CWMP, and investigations show that Site 5 is not the best choice for a WWTF, then the Town could pursue Sites 6 and 7 for this purpose, and use either Site 5 or the combination of Sites 3 and 4 for additional groundwater recharge.

Alternative 2 - Treatment of 0.26 MGD of Wastewater at a New WWTF with Groundwater Recharge: For this alternative, the second-tier screening exercise showed that Site 5 was the top-ranked site, with Sites 9, 10 and 11 coming in a close second, again accounting for relative construction cost, proximity to the proposed WWTF, site size, topography, etc. Sites 10 and 11 are privately-owned, multi-family-zoned parcels that are part of the proposed Ashworth Hill condominium development, and Site 9 is the parcel that the ORSD WWTP currently occupies. If Site 5 were chosen as the preferred site, it would contain the new WWTF and both the primary and redundant groundwater recharge areas. With the choice of Sites 9, 10 and 11, the new WWTF would be located on either Site 10 or 11, and primary and redundant groundwater recharge areas would be located on a combination of the three sites.

The discussion under Alternative 1 above covers the advantages and disadvantages of Site 5. Sites 9, 10 and 11 have the advantage of being closest to the area of wastewater generation (North focus area and sewered areas just to the south), and the proposed Ashworth Hill development may be amenable to locating wastewater treatment and disposal facilities on its properties as a means of managing its wastewater needs. Site 9 abuts some residential parcels, but the area is already used for wastewater treatment, so there should not be a concern with additional facilities of a similar nature.

Alternative 3 – ORSD WWTP Expansion for an Additional 0.26 MGD: Second-tier screening of Alternative 3 resulted in a tie between Site 5 and the combination of Sites 9, 10 and 11 as the highest ranked site. The difference between this alternative and Alternative 2 is that Site 9 would contain the expanded ORSD WWTP, and either Site 5, or a combination of Sites 9, 10 and 11 would contain the primary and redundant groundwater recharge areas. ORSD has an interest in expansion, and so is an advocate of this alternative. As previously mentioned, we assumed no land purchase costs for the ORSD parcel (Site 9) for this alternative, whereas we included land purchase costs for this parcel for Alternatives 1 and 2.

C. SUMMARY OF MOST FEASIBLE SITES

After completing the three-tier screening process for the 9 sites, with assistance from the Town and the CAC, we determined the following sites to be the most feasible for groundwater recharge:

Alternative 1 – Site 5 *and* the combination of Sites 6 and 7

Alternative 2 – Site 5 *or* the combination of Sites 9, 10 and 11

Alternative 3 – Site 5 *or* the combination of Sites 9, 10 and 11

The following chapter compares wastewater treatment and disposal options that encompass these and other alternatives. Depending on the results of these analyses, further investigation of the above sites may proceed into Phase III of the CWMP.