4. NEEDS ASSESSMENT

The needs assessment portion of this study includes a data-driven Geographic Information System (GIS) analysis that combines spatial information, such as USGS topography and NRCS soils information, with local information such as parcel boundaries, building footprint areas, and building uses, to determine what, if any, constraints a property may contain for onsite wastewater treatment and dispersal. The results of the GIS analysis are indicated on Figure 7 by colors summarizing the key constraint(s), if any, for each property.

The results of that analysis were confirmed and refined by including all other sources of information collected and described in Sections 2 and 3. This review resulted in an overall summary of the known and potential limitations on each property. The property-specific recommendations do not necessarily reflect the current actual conditions of the individual wastewater treatment systems in the study area. A displayed limitation simply means that, if an individual system were to malfunction in the future and need replacement, it may be difficult to site a replacement system on the property that meets all of the setbacks and separation distances that are required by the current State wastewater rules. The results of this assessment are summarized on Tables 6-8 and on Figure 7.

Following is a detailed description of the Needs Analysis and a summary of the results for the study area.

4.1. Data-Driven GIS Needs Analysis

The Needs Analysis was performed to identify parcels that may not be suitable for onsite septic systems. There are two main components to the needs analysis: an “available area” analysis and a “required area” analysis, each of which is described below.

The objective of the available area analysis was to identify which developed parcels would be constrained by inadequate lot size if required to install an upgraded onsite system. There are many factors that result in areas of a parcel being unavailable for construction of an onsite system. For example, state and local regulations require that certain "setbacks" or distances from natural or artificial features be maintained in order to protect those resources. One such setback is a required separation of 50 feet from surface waters such as ponds or streams. It is because of setback regulations that the total available area on a parcel is significantly reduced when determining which areas are suitable for onsite systems. A second and equally important part of determining if a parcel has enough suitable land area to support an onsite system is the analysis of the soil conditions on the parcel to determine the area required to treat the wastewater flows from the parcel. Both the determination of available area and that of required area for onsite systems for each developed parcel were addressed. The last step identified those properties with soil conditions where the seasonal high groundwater table was 24 inches or less or where the depth to bedrock was less than 24 inches. Both of these conditions impact the type of onsite system that may be built.

The following assumptions and criteria were used to conduct the needs analysis.

4.1.1. Available Area Analysis

The first step in the assessment of suitable areas was to determine the available area on each developed parcel. This process involved both analyses of GIS data to identify areas unsuitable for onsite system development, as well as complex database operations to identify parcel features that might further limit onsite system development. The table below lists each of the setbacks of features examined in the available area analysis. Each of these features will be briefly discussed.

Limiting Features	Horizontal Setback (ft)
Surface waters (ponds and streams)	50
Wetlands	50
Top of embankment, or slope greater than 30%	25
Bedrock Escarpments	25
Property line	25
Zone 1 Wellhead Protection Area	Extent of defined Wellhead Protection Area
Private Drilled Wells*	100
Private Shallow Wells or Springs*	150
Foundation, Footing, or Curtain Drains	35

** The exclusion distance for private drilled wells and springs also extends up-gradient from the supply location for at least 200 feet (drilled wells) to 500 feet (shallow wells/springs), and can vary additionally depending upon the design demand on the water supply.*

Source: Vermont Environmental Protection Rules, Wastewater System and Potable Water Supply Rules, eff. September 2007.

1. Surface Waters: Streams and ponds were identified from the Vermont Hydrography dataset. These lines and areas were spatially buffered with the indicated setback distance using GIS.
1. Wetlands: Wetlands were identified from the 2010 Vermont Significant Wetlands dataset. The features in this dataset will be spatially buffered with the indicated setback distance using GIS.
2. Top of Embankment, or Slope greater than 30%: Areas with slopes of greater than 30% were identified from the GIS Digital Elevations dataset. These areas were spatially buffered with the indicated setback distance using GIS.

3. Bedrock Escarpments: Bedrock Escarpments were obtained from the Washington County soils dataset. Escarpments were spatially buffered with the indicated setback distance using GIS.
4. Property Lines: Property lines were obtained from the Waitsfield GIS parcel dataset. Property lines were spatially buffered with the indicated setback distance using GIS.
5. Water Supplies: Water supply information was collected from spatial data sources and from permit files. Spatial well locations and wellhead protection areas (for public water supply wells with Zone I Wellhead Protection Areas) were obtained from the State Water Supply GIS dataset, and these data were confirmed against the infrastructure inventory compiled by Phelps in 2000-2001 and updated during this project. Each water supply point was spatially buffered with the indicated setback distance using the shield polygons associated with each point in the inventory. Only protective well buffers belonging to properties that have not opted to connect to the municipal water system were included in the analysis.
6. Building Footprints: Building footprints were obtained from the infrastructure inventory compiled by Phelps in 2000-2001 and updated during this project based on permits, current orthophotographs, and local knowledge. The building footprints were buffered using GIS, and their areas were included in the analysis as areas unavailable for onsite systems.
7. Available Area Calculation: The total available area for a parcel was determined by subtracting an assumed building footprint area from the area of the parcel outside the required setback buffers as calculated by the GIS analysis. This calculation is shown in the following equation:

   Area Available = Parcel Area – Required Setback Buffer – Building Footprint – Wellhead Protection Area Buffer

4.1.2. Required Area Analysis

The required area for construction of an onsite system was estimated from two primary pieces of information: 1) soil properties (percolation rates and long-term acceptance rates) for each parcel, 2) design parameters for each onsite system. Assumptions made regarding the determination of each of the inputs to the required area calculation are described below.

4.1.2.1. Soil Properties

Percolation rates and application rates were estimated for each soil type within the study area. We assigned average percolation rates using the soil textures from the NRCS soils data and the average rates listed in the Vermont Indirect Discharge Rules. Each parcel was assigned the properties of the predominant soil type for purposes of determining the required area.

4.1.2.2. Onsite System Design Assumptions

Where suitable soils existed, the onsite system was assumed to be a standard trench leach field design. The standard Vermont Wastewater System and Potable Water Supply Rules application rates were used in the sizing of the leach field. A standard three-foot wide trench, with four feet separation was used as the typical layout. This resulted in a range of areas needed for the leach field depending on the soil's assumed percolation rate. For soils where only mound systems would be feasible, an estimate of the required area for a mound dispersal system was calculated using the application rates for mounds specified in the Rules. It was assumed that if a leach field (or mound) could be successfully sited on the property there was adequate area for other system components, such as septic tanks and distribution boxes.

Two different methods were used to determine the volume of wastewater (in gallons per day) that would need to be treated on each developed parcel. If there was a DEC permit for the parcel that specified the capacity of the wastewater treatment system, that volume was assumed to be the capacity that would need to be located on the parcel if the existing wastewater system were to be replaced. If no permitted capacity for the wastewater system was available, the flow that would need to be treated and dispersed on that parcel was estimated based on the water supply allocation for the parcel in the master spreadsheet for the municipal water project. We generally multiplied that water supply allocation by a factor of two, because while the municipal water allocation is relatively low to account for flow equalization over many connections, each wastewater system is still on-site or shared among a relatively small number of users. The factor of two is somewhat conservative, but represents the likely peak flow that an individual wastewater system might reasonably be expected to treat.

4.1.3. Area Analysis Assessment

The available area for an onsite system was compared to the required area for each parcel. The required area for a system was based on the predominant soil type on the parcel. Parcels were identified as area limited if the available area was less than the required area. Parcels were identified as being unconstrained by area when the available area was greater than or equal to the required area.

4.1.4. Seasonal High Groundwater Analysis

An additional GIS analysis was conducted for parcels with potential groundwater limitations. Soils with groundwater depths of less than 24 inches would require a raised system, such as a mound, and would indicate a constraint to a typical subsurface system. A parcel was identified as having a groundwater limitation if the area of the parcel with a groundwater depth of greater than 24 inches represented an area smaller than that required for a traditional onsite system. This analysis may overestimate site limitations regarding depth to groundwater, as it does not account for filtrate systems, alternative systems, or desktop hydrogeologic analyses that may be used under the Wastewater System and Potable Water Supply Rules.

4.1.5. Depth to Bedrock Analysis

Depth to bedrock was assessed to identify parcels with potential bedrock limitations. Parcels with shallow bedrock, of less than 24 inches, would require additional fill to allow an onsite system to function properly. A parcel was identified as having a bedrock limitation if the area of the parcel with a depth to bedrock of greater than 24 inches represents an area smaller than that required for a conventional onsite system.

4.2. GIS Analysis Results

The results of the analysis are represented on Figure 7 and summarized in Tables 6 and 7. The factors affecting the analysis results are included in the table.

Of the 63 parcels within the Waitsfield Village portion of the study area, there were 36 parcels that can support an onsite wastewater dispersal system under the assumptions listed above (Table 6). These parcels met all the environmental setbacks required in the Area Analysis Criteria table in section 4.1.1 as well as the depth to groundwater and bedrock criteria described in Sections 4.1.4 and 4.1.5.

There were 27 parcels that the GIS analysis estimated may not be able to support an onsite wastewater dispersal system—however, all of these parcels were constrained by only environmental setbacks (Figure 7). Nearly all of the area-limited parcels in the Waitsfield Village area (21 of the 27 parcels, see Table 6) were limited by the presence of wellhead protection areas. Properties limited by setbacks from steep slopes, as well as properties with predominant soils that were ranked “Not Suited” or “Not Rated” and those with limitations related to setbacks from wetlands, are clustered at the break in slope where Route 100 rises into the Irasville area, at the south end of Waitsfield Village. Properties limited by proximity to surface waters and floodplains included the area at the break in slope described above, but also properties along Bridge Street between Route 100 and the Mad River.

Of the 72 parcels within the Irasville portion of the study area, there were 55 parcels that can support an onsite wastewater dispersal system under the assumptions listed above for the area, depth to groundwater, and depth to bedrock analyses described above (Table 7).

There were 17 parcels in the Irasville area that the GIS analysis estimated may not be able to support an onsite wastewater dispersal system—or only about 25% of the developed parcels in this area (Figure 7). The majority (13 of 17 parcels) were constrained by only environmental setbacks. About half of the area-limited parcels were constrained by the presence of wellhead protection areas (6 of 13 parcels, Table 7); parcels with this limitation were primarily located in the vicinity of Dugway Road, but also included the Waitsfield Inn and a single parcel at the top of the break in hill slope between the Waitsfield Village and Irasville areas. Parcels that were constrained by setbacks to wetland areas were located at the north end of Irasville, but also included the Irasville Incubator property. Parcels with area restrictions related to

surface waters or floodplains were primarily located in the southern end of the Irasville area, near the Mad River Meadows Apartments and Fiddler's Green and immediately bordering the Mad River or Mill Brook. The remaining four parcels were constrained either by shallow seasonal high groundwater only, or by both available area and shallow seasonal groundwater.

None of the currently developed parcels in either Waitsfield Village or Irasville appear to be constrained primarily by shallow bedrock.

4.3. Lot-by-Lot Review and Capacity Needs Estimations

Once the results of the GIS analyses were produced, a lot-by-lot review was conducted. This review included using all of the additional information known about the properties, confirming the results of the GIS analyses, including constraints and wastewater treatment capacity needs indicated by property owners, and as well as knowledge of other issues articulated by Wastewater Committee members.

In order to gain an approximate understanding of the potential needs for wastewater treatment capacity in Waitsfield Village and Irasville, the wastewater design flows utilized in the needs assessment (Section 4.1.2.2) were summarized for each of several categories (Tables 6 and 7, and Figure 7, as follows:

- Parcels that the GIS analysis indicated may have challenges replacing onsite systems in the future
- Parcels where property owners indicated, on the survey, that they planned to change use in the future
- Parcels where property owners indicated they might change use if wastewater capacity were available
- Parcels where property owners indicated both plans and capacity needs on the survey
- Other issues or potential issues articulated by Wastewater Committee members

The summary wastewater flow numbers in Tables 6 and 7 were estimated simply, by adding together the estimated water use/wastewater design flow numbers for each parcel that were developed for the GIS needs assessment (Figure 5). As such, these flows are indicative of the total design flow that would likely be needed if each property's wastewater treatment system were replaced on that property. The potential wastewater capacity needs described in Tables 6 and 7 are therefore conservative and do not reflect in any way the potential benefit of flow equalization that may be gained by connecting multiple parcels to a single shared wastewater treatment system.

The results of the needs assessment and the lot-by-lot review indicate some clear contrasts between Waitsfield Village and Irasville. Within Waitsfield Village, the remaining presence of many public and private water supplies results in a significant number of properties where, if a system were to need

replacement in the future, the resulting system would likely be installed in a "best fix" situation if it were installed on the property. The relatively high number of parcels identified by the GIS analysis as potentially limited does result in a significant amount of potential wastewater capacity needed (around 24,000 gallons per day maximum, see Table 6). In the Waitsfield Village area, significant areas of relatively suitable soils correspond closely with the pattern of existing dense development, and the potential future plans indicated by property owners may in some cases be accommodated through the addition of advanced wastewater treatment components to existing systems (thus increasing the capacity of pre-existing leachfields by improving the quality of the effluent these fields receive), or by providing some relatively small shared off-site dispersal capacity for extremely small lots.

Within the Irasville area, a significant number of both public and private water supplies will be taken off-line once the municipal water project is complete, and parcel sizes are generally larger than in the Waitsfield Village area. As a result, there are fewer overall parcels in this area that the GIS analysis identified as potentially limited—but because of the more water-intensive, commercial uses of most of these properties, the potential need in terms of wastewater treatment capacity stemming from the GIS analysis alone is around 33,600 gallons per day (Table 7). As should be expected in an area designated as the growth center for much of the Mad River Valley, property owners in this area indicated that they remain interested in growing their businesses, and in changing the uses of their properties in ways that require additional wastewater treatment capacity. The potential future needs or changes in use identified through the property owner survey include about 22,500 gallons per day of wastewater treatment capacity (Table 7). Other issues regarding wastewater treatment capacity identified in the Irasville area include about 5,500 gallons per day of wastewater, for which replacement systems or off-site solutions may be needed (Table 7).

The results for Waitsfield Village and Irasville are combined in Table 8 to show the overall conditions for the study area.