

SNOW PLOWING EVALUATION REPORT
STRICTLY PRIVILEGED AND CONFIDENTIAL

**VARIOUS LOCATIONS
WITHIN THE
TOWNSHIP OF VERNON
SUSSEX COUNTY, NJ**

Submitted to:

*Vernon Township
21 Church Street
Vernon, NJ 07462*

Prepared by:

**GOLDEN & MORAN ENGINEERING, LLC
21 MAIN STREET
NEWTON, NJ 07860**

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William Moran, PE
New Jersey Professional Engineer No. 37899

Introduction

This report provides an objective evaluation of the difficulty factor(s) associated with snow removal within private communities balanced against typical public streets. Vernon Township Department of Public Works (DPW) maintains the Townships public roads as well as a few private lake communities whereas private contractors maintain the remaining private communities. The DPW maintains ± 100 miles of roadway along with Township owned property (i.e. firehouses, the municipal building, etc.). The total length of private community roadways maintained by private contractors is ± 72 miles. There are twelve private communities that use their own contractors for snow plowing/salting-sanding services. Seven are lake communities and five are not associated with lakes. At least two private lake communities are maintained by the DPW.

The Municipal Services Act (The Act) requires that the Township reimburse private communities that provide their own snow removal services. The Act, *N.J.S.A. 40:67-23.3*, which became operative on January 1, 1991, and was later amended, effective January 14, 1993, provides, in pertinent part:

a. Except as otherwise provided in subsection b. of this section, the governing body of every municipality shall reimburse a qualified private community for the following services as provided in sections [40:67-23.5 and 40:67-23.6] or provide the following services within a qualified private community in the same fashion as the municipality provides these services on public roads and streets:

- (1) Removal of snow, ice and other obstructions from the roads and streets;
- (2) Lighting of the roads and streets, to the extent of payment for the electricity required, but not including the installation or maintenance of lamps, standards, wiring or other equipment; and
- (3) Collection of leaves and recyclable materials along the roads and streets and the collection or disposal of solid waste along the roads and streets.

b. Nothing in [this Act] shall require a municipality to operate any municipally owned or leased vehicles or other equipment, or to provide any of the services

enumerated in subsection a. of this section, upon, along or in relation to any road or street in a qualified private community which either (1) is not accepted for dedication to public use or (2) does not meet all municipal standards and specifications for such dedication, except for width.

The legislative intent of the Act is to "help eliminate double payment for some services which the residents of qualified private communities now pay through property taxes and fees to their association. "Legislative Fiscal Estimate Statement to S.2869 (April 18, 1989); see *Stonehill Property Owners Ass'n, Inc. v. Township of Vernon*, 312 N.J.Super. 68, 75, 711 A.2d 346 (App.Div.1998) ("[T]he Legislature's underlying intention in passing the Act [was] to relieve condominium owners of the burden of paying twice for municipal services."). The Act has been interpreted as requiring "municipalities to provide within 'qualified private communities' certain municipal services or, in the alternative, to pay for those services."

Paraphrasing the ruling regarding removal of snow, ice and other obstructions from the roads in the "*Stonehill Property Owners Ass'n, Inc. v. Township of Vernon*" case, Judge Stanton determined that 50% should be added to the cost (per mile) or a factor of 1.5 over the Township's cost to do it's roads based on the slope and curves of roads in the development. This determination was made based on his "feel" of the case and not on an actual study.

This report quantifies the various factors that add difficulty to normal plowing/salting activity (i.e. steep grades, curves, number of intersections, width and condition of road, etc.) with "grades" assigned to each of the factors. See the Analysis Methodology below for the description on the approach used for the evaluations.

The spreadsheets, maps and other pertinent information can be found at the end of the report in the appendices.

General Comments Regarding the Report

- Highland Lakes has the most private roadways at 31.4 miles, Barry Lakes has the second most at 11.5 miles with the remaining communities have less than 6.5 miles.

- As of this date, GME visited 11 communities of the total 12 private communities, 7 with association representatives or the plow contractor, and 4 without a representative. Stonehill was not evaluated since the judge has already established a difficulty factor. The 4 visited without representation were Hidden Valley, Whispering Woods, Valley View and Black Creek. It appears that Whispering Woods and Valley View are incomplete subdivisions that have not had the roads completed and dedicated to the Township.
- Each community is unique in their own way with physical characteristics that vary from community to community. Variables include, but are not limited to, roadway width, pavement condition, amount of roadway drainage structures, roadway grades, curves in the roadway, amount of curbing, intersections and cul-de-sacs, etc. Each community is responsible for maintaining its roads; therefore structural road conditions vary from community to community.
- Common factors typically found among the communities include lack of curbing (some roads in Scenic Lakes have curbing, Whispering Woods is almost completely curbed), substandard widths on secondary roads, lack of comprehensive drainage facilities (typically only areas with significant drainage issues have structures), etc.
- Differences in elevation and microclimates have a significant effect on the communities. For example, the difference in elevation from town hall and the high points of Highland Lakes, Barry Lakes and Lake Panorama is approximately 900 feet. The typical adiabatic lapse rate for change in temperature as it relates to elevation is about 5.4°F/1,000 ft of elevation, therefore the difference in temperature between different locations can be as much as 5°.
- This report will not include ice storms or icing events since that data is not readily available. Ice storms, or icing conditions, vary depending on multiple finite influences that are not addressed within this report. Furthermore, the difficulty factor is based on

physical characteristics and not the frequency of snow removal. The difficulty factor for an individual community may be applied regardless of the need for snow removal throughout all of Vernon.

- The scope of this report dictated certain general assumptions be incorporated into the analysis. Relatively straight roads with nominal grade changes were not specifically evaluated by site visit. Existing mapping (USGS, Hagstrom, Google Maps, NJGIN Parcel Mapping) was utilized to determine road lengths and grades. A uniform plow width is utilized to maintain consistency between communities even though different trucks with different plow widths may be used.
- Private contractors may incur additional costs that the Township does not pay because of state taxes. They buy supplies at market rate and are subject to the current tax rate while the Township is tax exempt. For example, the tax on 100 tons of salt @ \$70/ton is \$700. Additionally, the Township's fuel is tax-exempt, which is currently about \$0.50/gal less than the market rate. The Township Attorney should address the applicability of costs that do not normally occur in the per mile analysis of typical Township costs.
- The Township maintains roads in certain lake communities including Pleasant Valley Lakes and Lake Wanda, which have similar characteristics to some of the lake communities that are privately maintained. For example, Pleasant Valley Lake is similar to Scenic Lake, which it abuts. Furthermore, the Township maintains several roads outside lake communities that exhibit difficult conditions similar to those addressed herein. As such, the overall Township road characteristics exhibit a difficulty factor greater than 1. Therefore the difficulty factor considered for the Township's typical service must be compared to the individual community difficulty factor in order to establish the appropriate ratio, or cost reimbursement factor.
- It is noted that the Township includes labor, equipment, material, etc. that is used to maintain municipal properties (i.e. the municipal building, firehouses, etc.) in

determining the per mile cost for reimbursement. Certain lake communities incur similar costs.

Analysis Methodology

During the winter and early spring season Golden & Moran Engineering, LLC (GME) visited eleven (11) private communities in Vernon Township that use private contractors for roadway maintenance (i.e. plowing, salting, etc.). The remaining private community in Vernon Township, Stonehill, was not evaluated since the difficulty factor of this community was determined by a court case. GME also visited Lake Lenape and Lake Iliff in Andover Township, both of which are private lake communities in Sussex County with similar characteristics to some of the lake communities in Vernon Township. The intent of these visits was to obtain actual data, baseline conditions, and time factors associated with certain road characteristics.

Additional site visits were conducted throughout Vernon Township to determine the condition of the Township-maintained roadways. These investigations were conducted in the same manner as the lake communities and were used as a baseline to compare against the private lake community data.

The site visits consisted of driving through the selected areas, noting the approximate average pavement width, pavement condition, road grade (steepness and extent), and the approximate amount of road curves that would force a plow to reduce speed. Consideration was also given to the total number of intersections and dead ends (straight or cul-de-sac bulb) found on each street. On-street parking evidence was also initially recorded for use in the study. However on-street parking was determined not to be widely applicable in the overall scope of this investigation. The only private communities with on street (90°) parking were Hidden Valley and Black Creek. Adding additional pavement width, which translates into additional passes and time, compensated for the difficulty of plowing near perpendicular parking spaces.

The following description outlines how each variable was handled:

- **Road Length:** Footage for many of the Township-maintained roads was obtained through a list provided by the Township DPW. For Township roads not on the list, approximate lengths were obtained either in the field or from parcel mapping. For the privately maintained lake communities, the footage was approximated using parcel mapping obtained from the NJGIN website, available from the State of New Jersey. The mileage was directly calculated from the footage using 5,280 feet per mile. It is noted that there are some discrepancies in the lengths in report and those utilized by the Township that can be attributed to different measuring techniques.
- **Intersections:** Road intersections were visually counted during site visits. Additional intersection information is obtained from Google Maps in areas where site visits were not performed. Intersections are counted on the basis of one intersection per side of a connection to a more heavily traveled street (see Example-1), or one intersection per connection to a bounding street (see Example-2).
 - Example-1: Street A is a side street and crosses Street B, a more heavily traveled through street; one intersection is counted for Street A *per side* of the connection resulting in two intersections total, none for Street B.
 - Example-2: Street A meets and ends at Street B; one intersection is counted for Street A, none for Street B.

Additional intersection counts were added for 90-degree bends in the road and for driveways in cul-de-sacs. In these circumstances the plow would need to spend additional time grooming the snow to ensure adequate access for homeowners and safety for the traveling public.

- **Dead Ends:** Dead Ends were visually counted during site visits and also obtained from a study of aerial photography as represented in Google Maps. All dead ends are separated into two categories: those that are straight and those that have cul-de-sac bulbs. In researching historical plow data, plow operators equate the approximate time required to plow one cul-de-sac with the time required to plow one mile of straight roadway. This information was utilized in the calculations for the cul-de-sacs, and a modified version was utilized for straight dead ends.
- **Pavement Width:** Pavement widths for Township-maintained roads are generally obtained from a list provided by the Township DPW. For all roads not found on the list, including those within the privately maintained lake communities, approximate widths were visually obtained during the site visits. Occasional measurements were taken to maintain practical accuracy for the purposes of this study.
- **Number of Passes:** The total number of plow passes to adequately clear the roadway is calculated using the pavement width divided by the plow swath. The plow swath was determined using a consistent blade width of 8 feet at an angle of 25 degrees with a cleared overlap of 1 foot from the leading vertical edge of the plow. It is noted that the DPW and the private contractors utilize various plow vehicles with different plow widths, however to minimize the amount of variables in the calculations, a consistent width is used throughout the analysis.
- **Pavement Condition:** The pavement condition is a factor between 0.0 and 1.0 reflecting overall road conditions based on deterioration, or complete lack of, pavement. Uneven pavement, potholes, rutting, etc, also increase the difficulty of plowing. These conditions were visually documented during the site visits. In areas not specifically visited, conditions were extrapolated based on local knowledge, current mapping and aerial photography.

- *Steep Areas:* The approximate steepness of the roadways is a coefficient between 0.0 and 1.0 reflecting the increasing difficulty of plowing steeper gradients. The steepest grades observed (in excess of 15%) received the highest coefficient. This information was compiled during site visits based on visual observations. For areas not visited, additional grade information was approximated from Google Maps' Terrain Feature.
- *Steepness Per Length:* This coefficient reflects the approximate percentage of total road length encumbered by steep gradients observed during site visits. For portions not directly observed, information was obtained from Google Maps' Terrain Feature.
- *Curves Per Length:* This coefficient reflects the approximate percentage of total road length that may be encumbered by curves making plowing more difficult and time consuming. For roadways not directly observed, information was obtained from Google Maps.

The data is analyzed to effectively expand the length of each roadway based on the factors that make it more difficult to plow than an "ideal" street (i.e.: even pavement, straight, and flat). Additionally, the coefficients used in this analysis were selected to show to what extent a given condition would increase the difficulty of plowing the road. Intersections and dead-ends were added at a fixed mileage rate based on comparative research and actual observations. Ultimately, these calculations determine a "theoretical mileage" for a given stretch of roadway, which, when applied to a typical plowing speed, is used to compute an anticipated duration of the plowing for the roadway.

The theoretical mileage for a roadway is determined by the following formula:

$$T = \text{Unencumbered} + \text{Poor Pavement} + \text{Steepness} + \text{Curves} + \text{Intersections} + \text{Dead Ends} + \text{Cul-de-sacs}$$

$$T = (M \times P) + (M \times P \times C \times Cc) + (M \times P \times S \times L \times Sc) + (M \times P \times W \times Wc) + (I \times Ic) + (D \times Dc) + (B \times Bc)$$

where:

- T = Theoretical Mileage (miles extrapolated from difficulty factors))
- M = Actual Mileage (miles)
- P = Number of Passes
- C = Magnitude of Poor Pavement Condition
- Cc = Pavement Condition Coefficient
- S = Average Intensity of the Steep Grades
- L = % of Actual Mileage subject to Steep Grade
- Sc = Steepness Coefficient
- W = % Curves Per Length
- Wc = Curve Coefficient
- I = Number of Intersection
- Ic = Intersection Coefficient
- D = Number of Dead Ends (Straight)
- Dc = Dead End (Straight) Coefficient
- B = Number of Dead Ends (Cul-De-Sac)
- Bc = Dead End (Cul-De-Sac) Coefficient

The coefficients utilized for cul-de-sacs, curves, pavement condition, etc., were obtained during a round table discussion with a panel of nine (9) Public Works employees responsible for maintaining roads in an alternate Municipality. The panel was asked to quantify the time required to plow steep, curvy, poor pavement condition, intersections, rectangular dead ends, and cul-de-sacs compared to flat, straight roads. The individual study parameters were reviewed and a factor determined equating additional time required for each constraint. Specific time factors, based on a percentage above ideal road structure, were obtained from each member. The results were tallied and an average for each facto determined. These time influences were used individually, or in combination throughout the report.

Upon calculation of the theoretical mileage for a plow route or lake community, a difficulty factor can be determined simply by dividing the theoretical mileage by the actual mileage. For

the purpose of this project, the difficulty factor of the overall ("typical") Township-maintained routes is calculated to create a baseline, against which the individual privately maintained lake communities are compared. This comparison results in an individual ratio, or "Difficulty Factor", for each privately maintained community. The ratio represents a quantitative analysis of how much more or less difficult the maintenance of each community road network compares to the Township as a whole.

The use of the ratio for roadway characteristics is substantiated based on core cost data maintained by Vernon Township. The Township's "cost-per-mile" identified for each calendar year reflects the unique characteristics of that year's storm events. While the finite elements of individual storms may affect each community differently, when taken in total, these conditions can be averaged for the Township as a whole. The remaining physical road attributes therefore reflect the difficulty factor associated with plowing a community based on each storm event. However, snow removal costs may be incurred in communities at higher elevations, whereas lower lying areas may not incur equitable costs per event. The Township should consider additional reimbursement for the storm events that sporadically affect the communities in the higher elevations.

Private Community Descriptions

Highland Lakes

Highland Lakes is located in the northeast section of Vernon near the intersection of Breakneck Road and County Route 638, Highland Lakes Road. It has ± 31.5 miles of private roadways, including ±1,970 homes, with both full time residents and "summer" residences. The community was conceived and mostly constructed in the 1930's. As such, the layout of the lots and roadways does not follow standard planning criteria or typical Township standards. The community has many roads with steep slopes and curves necessary to conform to topographic conditions. Unique conditions associated with Highland Lakes are its altitude relative to Vernon valley, 900' higher at its highest point and the layout of the development that was done in the 1930's.

The size of the lake and exposure result in windblown snow conditions on southeast areas of the community even if there is not a snow event. Wind conditions immediately after a snow event can also cover the road. There are areas in the community that are subject to groundwater seepage and subsequent icing conditions when the temperatures are below freezing. Two maintenance staff members equipped with a pickup truck with plows do the winter storm road maintenance; and a fleet of plow trucks and salt spreaders provided by a private contractor, Ray Bross Excavating. According to the Association's representatives, the contractor has provided this service to Highland Lakes for over 15 years.

All the roads in the development are paved. The majority of road conditions are very good; however certain roads exhibit potholes and frost heaves. The county maintains Route 638 that ends in Highland Lakes and the town maintains Breakneck Road. The community has a salt storage facility within their property. When considered relative to typical Township road networks, the overall Highland Lakes factor is relatively low based on the overall mileage when compared to the magnitude of constrained areas. Furthermore, lake effects and windblown conditions are not considered in the scope of this study.

Barry Lakes

Barry Lakes is located in the northeast section of Vernon north of Highland Lakes on Wawawanda Road and Barry Drive and surrounded by Wawawanda State Park. It has \pm 11.5 miles of private roadway and about 650 homes consisting of mostly full time residents with some "summer" residences. The altitude and microclimate is similar to Highland Lakes. The community is newer than Highland Lakes with the dwellings probably constructed in the 1960's and 1970's. The roadway and lot layouts exhibit better planning than Highland lakes with fewer dead ends and steep roadways. All of the roadways are paved and the roadway widths are more conforming to Township standards. Generally speaking the roadways are in good condition. The town maintains Wawayanda road and Barry Lakes road within the community with the remaining roads maintained by the community's private contractor. The community has a salt storage facility within their property across from the clubhouse.

Community representatives were to supply some additional requested information such as the contractors contact information, equipment utilized, etc. As of this time, we have not received any of the information requested.

Scenic Lakes

Scenic Lakes is located in the southwest section of Vernon on the border of Hardyston Township off of Scenic Lakes Road. The Township line bisects the southern portion of the community. The Township of Hardyston maintains the roadways within the community that fall within Hardyston. It has \pm 4.8 miles of private roadway and homes consisting of mostly full time residents with a few "summer" residences. All of the roadways are paved and the roadway widths are more conforming to Township standards. Generally speaking the roadways are in good condition. There are cul-de-sacs at most roadway ends. Although they are not standard diameter, they do allow for a comfortable turn around for passenger type vehicles. Some roadways in the community are curbed with asphalt, concrete or Belgian block. Groundwater seepage does not appear to be a major problem. There are no provisions for salt storage and they have been told by NJDEP that permission for the same would not be granted. Costs necessary to load salt from off-site providers is not considered.

Lake Panorama

Lake Panorama is located in the Northwest section of Vernon off of county route 565, Glenwood Road. It has \pm 4.7 miles of private roadway and homes consisting of mostly full time residents. All of the roadways are paved and the roadway widths are more conforming to Township standards with the exception of the upper Lakeside Drive NW which is narrow and winding. Generally speaking the roadways are in good condition and are laid out in loop configuration with several short dead ends. The town maintains the access to the community, Winding Hill Road and the loop road around the community consisting of Winding Hill Road, Panorama Drive and a portion of Lakeside Drive NW. The community has a small salt storage area for use by the contractor. The contractor, Cosh Excavating, uses 2 F-250

pick-ups with salt spreaders, and a Bobcat loader to maintain the roadways. Occasionally, large front-end loaders are used to remove snow when the snow banks become too large.

Wallkill Lake

Wallkill Lake is located in the Northwest section of Vernon at the base of the mountain from Lake Panorama at the end of county route 667, Lake Wallkill Road. It has \pm 4.9 miles of private roadway and homes consisting of a mix of full time and summer residents. The maintenance man at the lake maintains the roads with a pick up truck with a plow and salt spreader with occasional part time help. He maintains all the roads within the community and the access road to county route 667. The roads are paved with oil and stone and the condition of the roadways vary from good to poor with potholes and frost heaves. The community has installed speed humps on Lakeside drive for traffic calming. It should be noted that they are not installed to generally accepted standards/dimensions. There are numerous dead ends in the community as well as areas of steep road grades. Typical roadway widths range from 14-16'. There are no provisions for salt storage within the community.

Hidden Valley

Hidden Valley is located in the Northeast section of Vernon adjacent to the Hidden Valley Ski area near the intersection of county route 515, Stockholm Road, and Breakneck Road, Lake Wallkill Road. It has \pm 2.2 miles of private roadway and homes consisting of a mix of full time and part time residents in detached single-family homes and condominiums. The single-family homes at the top of the mountain adjacent to ski lift drop off areas abut the boundary with Highland Lakes. The roads within the development are paved and in good condition. The road grades vary from almost level in the area of the condominiums to very steep at the end of Hidden Valley and for areas adjacent to the ski area. The roadway widths nearly conform to acceptable standards with widths ranging from 22 - 24'.

Lake Pochung

Lake Pochung is a private community with 2 unpaved roads accessing the dwellings located adjacent to the lake. The total length of roads is about 1.5 miles with one accessing the lake from Lake Pochung Road (Pochung Trail) and the other accessing the lake (Decker Pond Trail) from Route 565 (Glenwood Rd.). There are about 25 dwellings within the community with a mix of full-time and "summer" residences. The roadway is about 16' in width with mild slopes and is comprised of crushed stone/quarry processed stone with some potholing evident during the site visit. A private contractor maintains the roads with one pick up equipped with a sander.

Glenwood Lake

Glenwood Lake is private community off of Route 565 (Glenwood Rd.) with \pm 1.75 miles of unpaved roads that serve the private lake community. The majority of the roads in the community contain steep grades with the exception of Lakeshore Drive NW (the longest road in the community) which is relatively level. There is a minimum of drainage structures so road/roadside erosion is prevalent, especially in the spring. The community is a mix of full-time and "summer" residences. A private contractor maintains the roads with one pick up equipped with a sander.

Valley View

Valley View is a private community off of Route 565 (Glenwood Rd.) near Vernon High School with \pm 1.75 miles of paved roads that serve the private community. The community is a relatively new residential subdivision that contains numerous vacant lots. The roads are in very good condition with no curbing and roadside swales for drainage conveyances. The roads are relatively straight with an area of moderate slope on Vernon View Dr. It appears the roads have not been dedicated to the Township since the subdivision was completed.

Whispering Woods

Whispering Woods is private community off of Route 638 (Highland Lakes Rd.) near Mastodan Lake with \pm 0.35 miles of paved roads (according to Township provided records) that serve the private community. The actual length appears to be much longer although some roads do not have the final top course of pavement. The community is a relatively recent residential subdivision that contains numerous vacant lots. The roads are in very good condition with Belgian block curbing and standard inlets for drainage conveyances. The roads are relatively straight with a few areas of moderate slope. It appears that since the subdivision was not built out, the roads have not been entirely completed and dedicated to the Township.

Black Creek

Black Creek is a townhouse development located on Sand Hill Road near the Mountain Creek Ski Area. It is a gated community with a parking lot located near the entrance adjacent to the gatehouse. An additional large parking lot is located just past the gatehouse and does not appear to serve the townhouses directly since there is on street parking directly in front of the townhouses. For the purpose of this report, these 2 parking areas were ignored. No on street parking is located on the main access road.

Pleasant Valley Lake (Township Maintained)

Pleasant Valley Lake is located in the southwest section of Vernon on the border of Hardyston Township off of Route 94 (Hamburg-McAfee Road). The Township line is located adjacent to the southern portion of the community and it abuts Scenic Lakes. It has \pm 7.3 miles of private roadway and homes consisting of mostly full time residents with a few "summer" residences. All of the roadways are paved and the roadway widths are more conforming to Township standards. Generally speaking the roadways are in good condition. There are cul-de-sacs at most roadway ends, however they are not standard diameter but do

allow for a comfortable turn around for passenger type vehicles. The major roadways in the community are curbed and the pavement appears to be good condition. Groundwater seepage does not appear to be a major problem in the community. There are characteristics in this community that are similar to the other communities that are maintained by private contractors, in particular, Scenic Lakes which it abuts. Pleasant Valley Lake has roads with steep grades, curves and substandard pavement widths. There is also on-street 90 degree parking on West Shore Road next to the beach.

Lake Wanda (Township Maintained)

Lake Wanda is located northwest of Highland Lakes and is accessible from Wawayanda Road and Canistear Road. The community consists of mostly full time residents with a few "summer" residences along \pm 3.9 miles of roadways that are paved with either asphalt or oil and stone in generally fair condition. Roadway width is generally comparable to other lake communities in that most of the interior road widths are substandard. Road grades are generally shallow with some steep sections in certain areas. Cul-de-sacs at road ends are substandard and require additional maneuvering to adequately turn-around a vehicle.

General Description of Township Maintained Roads

The Township currently maintains \pm 100 miles of roadway in addition to various Township facilities. The roadways throughout the Township are generally paved and in good/fair condition. Pavement widths in the most recently developed areas generally conform to current design standards, while those in older areas, especially the Township-maintained lake communities are generally narrower, and frequently substandard. The community has many roads with steep slopes and curves necessary to conform to topographic conditions. There are many Township roads that exhibit similar characteristics of those found in the various communities which are the subject of this study. As such, the Township as a whole presents its own difficulty factor for typical services.

Findings

A detailed analysis of each Township-maintained route resulted in a theoretical mileage, which was then compared to the actual mileage in order to obtain a weighted factor for the route. The average of the weighted factors for the three Township-maintained routes was utilized as a base line against which the individual weighted factors of the privately maintained lake communities were compared. The attached summary identifies the average Township-maintained plow route as having a weighted factor of 9.2, which was used as a baseline. (See "Summary of Findings" for details.) When the weighted factors of the privately maintained lake communities were compared to this baseline, the following Difficulty Ratings were determined for each privately maintained community:

Lake Community	Difficulty Factor	
	Actual	Recommended
• Barry Lakes:	1.23	1.25
• Highland Lakes:	1.15	1.15
• Panorama Lake:	1.06	1.10
• Scenic Lake:	1.30	1.30
• Lake Wallkill:	1.36	1.35
• Lake Pochung	1.13	1.15
• Hidden Valley	1.23	1.25
• Lake Glenwood	1.06	1.10
• Whispering Woods	0.78	1.00
• Valley View	0.98	1.00
• Black Creek	1.23	1.25

Notes: 1) Stonehill was not analyzed since the judge in Stonehill vs. Vernon Township determined its difficulty factor. Furthermore, Stonehill exhibits other unique qualities not found in the areas studied.

Pleasant Valley Lake, which is a Township-maintained lake community, has been analyzed individually for comparison to the privately maintained communities.

<u>Lake Community</u>	<u>Difficulty Rating</u>
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- Pleasant Valley Lake: 1.05

As noted above, this study was completed with limited available information. Time constraints dictated certain assumptions and generalized data be used so that a reasonable comparison can be made regarding physical roadway characteristics. While no two storms are alike, the comparative nature of the project approach assumes most intangibles can be averaged when considering multiple storm events.

The following list reflects some of the items that influence overall costs not considered herein:

- Private contractors are subject to certain fees for materials (taxes on salt and fuel) where the Township is exempt.
- Pickup and delivery of salt and/or other necessary materials.
- Climatologic influences due to elevation or orientation, including frequency or intensity of individual storm events.
- Proximity to snowmaking operations (i.e. Hidden Valley).
- Frequency and effect of icing conditions.
- Private roadway maintenance (potholes, pavement, etc.); the Township should consider if communities maintain their roads to acceptable standards, if applicable.
- Minor variations in roadway characteristics; each road was taken as a whole with conditions averaged over the entire length.
- Individual tendencies of private contractors.

- Exhibits

1. Spreadsheets from Vernon Township
 - Snow Removal Cost Analysis, containing a community list, community contact info, and plowing costs for 2005 – 2009
 - Snowfall amounts for 2005 - 2009.
2. Spreadsheet by Dave Pullis, Vernon Township DPW Supervisor, tracking costs and reimbursements for privately maintained communities from 2005 - 2009.
3. List of DPW Plow Crews and associated plow routes by community or road, provided by the Vernon Township DPW Supervisor.
4. List of Vernon Township Roads, dated July 2000, provided by the Vernon Township DPW Supervisor.
5. Spreadsheets and/or terrain mapping for private communities with contractor maintenance.
 - Barry Lakes spreadsheets and mapping
 - Highland Lakes spreadsheets and mapping
 - Lake Panorama spreadsheets and mapping
 - Scenic Lake spreadsheet and mapping
 - Wallkill Lake spreadsheet and mapping
 - Hidden Valley spreadsheet and mapping
 - Glenwood Lake spreadsheet and mapping
 - Lake Pochung spreadsheet
 - Whispering Woods spreadsheet
 - Valley View spreadsheet
 - Black Creek spreadsheet
6. Spreadsheets and terrain mapping for private communities and Township maintained roads done by DPW staff/equipment.
 - Crew #1 spreadsheet and mapping (incl. Cliffwood Lake, Lake Conway, and Lake Wanda)
 - Crew #2 spreadsheet and mapping (incl. Vernon Valley Lake)
 - Crew #3 spreadsheet
 - Pleasant Valley Lake spreadsheet and mapping
7. Summary of Findings, including difficulty factors for all communities and Difficulty Ratings for privately maintained communities.
8. Plowing Standards
9. Site Photographs

