



October 3<sup>rd</sup>, 2021

**Bill Green**

Nordic Mountain Water Inc  
4786 E 2600 N  
Huntsville, UT 84317

**SUBJECT      Feasibility Narrative for Nordic Valley Ski Resort Base Development to Connect to Nordic Mountain Water, Inc.**

Bill,

On behalf of Skyline Mountain Base, Talisman Civil Consultants (TCC) has prepared a feasibility narrative providing conceptual design for Nordic Mountain Water to provide water services to future development of the two phases of construction at Nordic Valley Ski Resort. The purpose of this narrative is to provide Nordic Mountain Water with enough information to provide Skyline Mountain Base with a letter of feasibility, which is required for a re-zone application that is necessary for future development on the mountain. The feasibility letter provided by Nordic Mountain Water is not a commitment, but rather a record of intent to work with Skyline Mountain Base and their proposed development at Nordic Valley Ski Resort.

**Existing Source Capacity**

According to information provided by Nordic Mountain Water from a study performed in December 2014:

- The existing source capacity is drawn from 3 wells:
  - Liberty Well:                      600                      gpm
  - Viking Drive Well:                      30                      gpm
  - Nordic Valley Way Well:                      30                      gpm
  - **Safe Yield Source Capacity: 660                      gpm**

TCC reached out to the Division of Drinking Water (DDW) for the capacity analysis they have on file for Nordic Mountain Water. According to the DDW:

- The existing source capacity is drawn from 2 wells:
  - Well #2:                                      75                                      gpm
  - Rhodes Well                                      500                                      gpm
  - **Safe Yield Source Capacity: 575                                      gpm**

The existing source capacity as reported by the DDW is 85 gallons per minute less than what was reported by Nordic Mountain Water in 2014. There is a significant discrepancy. Based on conversations with Nordic Mountain Water, it is assumed that source capacity as reported by the DDW is out of date and incorrect, and that the source capacity reported by Nordic Mountain Water will be used. It is also assumed that the source capacities reported by both Franson Civil and the DDW are the safe yield capacity, where safe yield

is 2/3 that of the total well capacity.

**Existing Demands**

Water demands can be broken down to:

- Indoor Demands (Culinary Use)
- Outdoor Demands (Irrigation)

For indoor demands, Utah State Administrative Code R309-510 require a peak day demand of 800 gallons per day per equivalent residential connection (ERC), such:

$$1 \text{ ERC} = 800 \text{ gallons per day}$$

Per the information provided by Nordic Mountain Water in a study performed in 2014:

- Existing ERCs: 226
- Commercial ERCs: 1
- Promised/Future ERCs: 97
- **Total ERCs: 380**

It follows that:

$$380 \text{ ERCs} * \frac{800 \text{ gallons per day}}{1 \text{ ERC}} = 304,000 \text{ gallons per day} = 211.15 \text{ gallons per minute}$$

Therefore, the total existing and promised indoor demand is **211.15 gpm**.

Outdoor demands are calculated via an irrigation map and table provided in Utah Administrative Code R309-510. Per the Code irrigation demands for the Ogden Valley are defined as “Irrigation Zone 3” which corresponds 3.39 gpm per irrigated acre.

Per the Division of Drinking Water, it is conservatively estimated that there are 0.25 irrigated acres per connection such that:

$$380 \text{ ERCs} * \frac{0.25 \text{ Irrigated Acres}}{1 \text{ ERC}} = 95 \text{ Irrigated Acres}$$

$$95 \text{ Irrigated Acres} * \frac{3.39 \text{ gallons per minute}}{\text{Irrigated Acre}} = 322.05 \text{ gpm}$$

Therefore, the existing and promised outdoor irrigation demands are conservatively calculated to be **322.05 gpm**



See Table 1 below for a tabular summary of the existing and promised demands

Table 1 – Existing and Promised Demand Summary

Residential	Unit Count	ERC (800 GPD)	GPD	GPM		
ERCs	379.00	379.00	303,200.00	210.60		
<b>Total</b>	<b>379.00</b>	<b>379.00</b>	<b>303,200.00</b>	<b>210.60</b>		
Commercial	Unit Count	ERC (800 GPD)	GPD	GPM		
ERCs	1.00	1.00	800.00	0.56		
<b>Total</b>	<b>1.00</b>	<b>1.00</b>	<b>800.00</b>	<b>0.56</b>		
Irrigation	Unit Count	Acre/Unit	GPM/Acre	ERC (800 GPD)	GPD	GPM
ERCs	380.00	0.2500	3.39	579.57	463,659.83	322.05
<b>Total</b>				<b>579.57</b>	<b>463,659.83</b>	<b>322.05</b>
<b>Total Existing ERCs</b>	<b>959.57</b>					
<b>Total Existing GPD</b>	<b>767,659.83</b>					
<b>Total Existing GPM</b>	<b>533.20</b>					

### Proposed Demands for Nordic Valley Ski Resort Base Development

**Phase 1** of the proposed development at Nordic Valley Ski Resort consists of 320 residential units, 8,000 SF of restaurant area, and 18,320 SF of commercial area. 6 Buildings are anticipated to be constructed during Phase 1. It is estimated that each building will have 10,000 SF of grass/landscaping that will need to be irrigated at 3.39gpm per irrigated acre.

Phase 1 **RESIDENTIAL** demands are as follows:

$$320 \text{ ERCs} * \frac{800 \text{ gpd}}{1 \text{ ERC}} = 256,000 \text{ gpd} = \mathbf{177.78 \text{ gpm}}$$

Phase 1 **RESTAURANT** demands are as follows:

$$\text{Restaurant Area: } (8,000 \text{ ft}^2) * \frac{1 \text{ Person}}{12 \text{ ft}^2} * \frac{35 \text{ gpd}}{1 \text{ Person}} = 23,333.33 \text{ gpd} = \mathbf{16.21 \text{ gpm}}$$

Phase 1 **RETAIL** demands are as follows:

$$\text{Retail Area: } (18,320 \text{ ft}^2) * \frac{1 \text{ Person}}{310 \text{ ft}^2} * \frac{10 \text{ gpd}}{1 \text{ Person}} = 590.97 \text{ gpd} = \mathbf{0.41 \text{ gpm}}$$

Phase 1 **IRRIGATION** demands are as follows:

$$\text{Irrigation Area: } (1.377 \text{ Acres}) * \frac{3.39 \text{ gpm}}{\text{Acre}} = 4.67 \text{ gpm}$$

Table 2 – Proposed Phase 1 Demand Summary

Residential	Unit Count	ERC (800 GPD)	GPD	GPM	
Units	320.00	320.00	256,000.00	177.81	
Retail & Restaurant	Unit Count	Demand (GPD)	ERC (800 GPD)	GPD	GPM
Restaurant (Seats)	666.67	35.00	29.17	23,333.33	16.21
Retail (People)	59.10	10.00	0.74	590.97	0.41
<b>Total</b>			<b>29.91</b>	<b>23,924.30</b>	<b>16.62</b>
Irrigation	Acres	GPM/Acre	ERC (800 GPD)	GPD	GPM
	1.38	3.39	8.40	6,720.63	4.67
<b>Total ERCs</b>	<b>358.31</b>				
<b>Total GPD</b>	<b>286,644.93</b>				
<b>Total GPM</b>	<b>199.10</b>				

**Phase 2** of the proposed development at Nordic Valley Ski Resort consists of 443 residential units broken up between townhomes, cabins, mountain chalets, and multi-story residential buildings. Phase 2 will also account for 11,880 SF of commercial space. We have conservatively estimated there to be 11.54 acres needed for irrigation for all the various Phase 2 developments.

Phase 2 **RESIDENTIAL** demands are as follows:

$$443 \text{ ERCs} * \frac{800 \text{ gpd}}{1 \text{ ERC}} = 354,0400 \text{ gpd} = 246.16 \text{ gpm}$$

Phase 2 **RETAIL** demands are as follows:

$$\text{Retail Area: } (11,880 \text{ ft}^2) * \frac{1 \text{ Person}}{310 \text{ ft}^2} * \frac{10 \text{ gpd}}{1 \text{ Person}} = 383.23 \text{ gpd} = 0.27 \text{ gpm}$$

Phase 2 **IRRIGATION** demands are as follows:

$$\text{Irrigation Area: } (11.54 \text{ Acres}) * \frac{3.39 \text{ gpm}}{\text{Acre}} = 39.11 \text{ gpm}$$

Table 3 – Proposed Phase 2 Demand Summary

Residential	Unit Count	ERC (800 GPD)	GPD	GPM	
Units	443.00	443.00	354,400.00	246.16	
Retail & Restaurant	Unit Count	Demand (GPD)	ERC (800 GPD)	GPD	GPM
Restaurant (Seats)	0.00	35.00	0.00	0.00	0.00
Retail (People)	38.32	10.00	0.48	383.23	0.27
<b>Total</b>			<b>0.48</b>	<b>383.23</b>	<b>0.27</b>
Irrigation	Acres	GPM/Acre	ERC (800 GPD)	GPD	GPM
	11.54	3.39	70.38	56,302.03	39.11
<b>Total ERCs</b>	<b>443.48</b>				
<b>Total GPD</b>	<b>354,783.23</b>				
<b>Total GPM</b>	<b>246.43</b>				

Please See Table 4 below for a tabular summary of the proposed demands for both phases.

Table 4 – Proposed Total Demand Summary

	ERCs	GPD	GPM
<b>Phase 1</b>	358.31	286,644.93	199.10
<b>Phase 2</b>	443.48	354,783.23	246.43
<b>Total</b>	<b>801.79</b>	<b>641,428.15</b>	<b>445.52</b>

### Available Source Capacity and Deficiency

The available source capacity for Nordic Mountain Water and source deficiency for the Nordic Valley Ski Resort Base Development depends on the available safe yield source capacity as reported by Nordic Mountain Water. Please see Table 5 below:

Table 5 – Source Capacity Summary

	Indoor Demand (gpm)	Outdoor Demand (gpm)	Total Demand (gpm)
<b>Existing Nordic Mountain Water Demands</b>	211.15	322.05	<b>533.20</b>
<b>Nordic Valley Phase 1 Demands</b>	194.43	4.67	<b>199.10</b>
<b>Nordic Valley Phase 2 Demands</b>	246.43	39.11	<b>285.53</b>
<b>Total Demand</b>	<b>405.58</b>	<b>326.72</b>	<b>732.30</b>
	<b>Franson Civil (gpm)</b>	<b>DDW (gpm)</b>	
<b>Existing Safe Yield Source Capacity</b>	660.00	575.00	
<b>Existing Nordic Mountain Water Demands</b>	533.20	533.20	
<b>Existing Available Capacity</b>	<b>126.80</b>	<b>41.80</b>	
<b>Nordic Valley Phase 1 Demands</b>	199.10	199.10	
<b>Nordic Valley Phase 2 Demands</b>	285.53	285.53	
<b>Source Capacity Deficiency</b>	<b>-357.83</b>	<b>-442.83</b>	

Nordic Mountain Water is 357.83 gpm to 442.83 gpm deficient in source capacity based on estimated demands for the proposed development at Nordic Valley Ski Resort.

### Storage Capacity

According to Nordic Mountain Water records, the existing storage capacity for Nordic Mountain Water is 570,000 gallons.

According to calculations by the DDW, the required fire flow volume is 120,00 gallons, which would allow for a 1,000-gpm fire flow for a duration of one hour.

Per R309-510, 400 gallons of storage are reserved per connection, and per the DDW, 2,528 gallons of storage are required per irrigated acre.

Please see Table 6 below for a tabular summary of the storage capacity

Table 6 – Storage Capacity Summary

	Unit Count	Storage Volume per Unit (gal)	Storage Volume Required (gal)
Existing ERCs	380	400	152,000
Existing Irrigated Acres	95	2,528	240,160
Fire Flow	-	-	120,000
<b>Existing Storage Volume Required (gal)</b>	-	-	<b>512,160</b>
<b>Phase 1</b>			
Proposed Phase 1 ERCs	320	400	128,000
Proposed Phase 1 Irrigated Acres	1.38	2,528	3,481
<b>Phase 1 Storage Volume Required</b>	-	-	<b>131,481</b>
<b>Phase 2</b>			
Proposed Phase 2 ERCs	443	400	177,200
Proposed Phase 2 Irrigated Acres	11.54	2,528	29,173
<b>Phase 2 Storage Volume Required</b>	-	-	<b>206,373</b>
<b>Phase 1 + Phase 2 Storage Volume Required</b>	-	-	<b>337,854.18</b>
	<b>Volume (gal)</b>		
Total Storage Available	570,000		
Existing Storage Required	512,160		
<b>Existing Available Storage</b>	<b>57,840</b>		
<b>Phase 1 + Phase 2 Storage Volume Required</b>	337,854.18		
<b>Storage Volume Deficiency</b>	<b>-280,014.176</b>		

It is estimated that at Phase 1 Buildout, Nordic Mountain Water will be deficient **73,650 gallons** of storage. It is estimated with Phase 2 buildout, Nordic Mountain Water will be deficient **280,000 gallons** of storage.



## Conclusion

This narrative is meant to inform Nordic Mountain Water Company of the anticipated demands to the water system, and the improvements required to meet future build out at Nordic Valley Ski Resort.

The proposed development at Nordic Valley Ski Resort will put additional demand on the Nordic Mountain Water Company infrastructure. The existing source capacity and storage capacity are insufficient to meet Nordic Valley's source and storage demands for Phase 1 and Phase 2.

As a result, Skyline Mountain Base is willing to invest in additional Nordic Mountain Water Company infrastructure to meet Phase 1 and Phase 2 demands for the Nordic Valley Ski Resort Base Development. This includes developing additional source capacity in terms of drilling a new well and providing additional storage capacity by construction of new tanks.

To complete our re-zone application with the County to approve new development, a feasibility letter from Nordic Mountain Water Company is required. To reiterate, this feasibility letter does not need to provide any will serves or commitments to Nordic Valley. The purpose is to show the county that Nordic Mountain Water is willing to work with Skyline Mountain Base and their proposed development.

Please provide us with a letter of feasibility that we may submit to the County. If an example letter of feasibility is required, we will be happy to provide you with one.

We look forward to working with you further on this development.

A handwritten signature in blue ink that reads 'Jeff Palmer'.

Jeff Palmer, PE  
Director of Civil Engineering  
Talisman Civil Consultants, LLC

A handwritten signature in blue ink that reads 'Jefferson Bell'.

Jefferson Bell, PE  
Associate Engineer