

# **RIVER RUN ANNEXATION AND DEVELOPMENT AGREEMENT**

**By and Between**

**CITY OF KETCHUM**

**And**

**SUN VALLEY COMPANY**

## **Exhibit Q Revised Water Audit**

Prepared for: Sun Valley Company  
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July 9, 2010

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# Memo

**To:** Andy Gunion, East West Partners  
**From:** Charles G. Brockway, Ph.D., P.E.  
**Cc:** Evan Robertson  
**Date:** July 8, 2010  
**Re:** River Run project – review of water demand and water supply issues

Water supply for the River Run project will be provided from the City of Ketchum municipal system. The project has been annexed into the City and a development agreement is in the process of being negotiated, one aspect of which involves water demand and water supply for the project. At the request of Sun Valley Company and East West Partners, Brockway Engineering has conducted a review of water demand estimates, water supply and storage requirements, and water rights considerations for the project. This work involved both a review of previous work, as well as independent water demand estimates for comparison. The following documents were reviewed:

1. November 9, 2009 Water/Sewer/Irrigation Audit by Benchmark Associates.
2. February 26, 2010 memo to Steve Hansen from Tracy Ahrens of J-U-B Engineers regarding the Benchmark water audit.
3. March 5, 2010 memo from Steve Hansen to Lisa Horowitz regarding the Benchmark water audit and J-U-B comments.
4. March 27, 2010 memo to East West Partners from Benchmark Associates.
5. May 14, 2010 irrigated area take-offs and irrigation demand estimates by Design Workshop.
6. May 20, 2010 Revised Water Audit by Benchmark Associates (draft, not submitted to the City).

Benchmark Associates has been made aware of Brockway Engineering involvement in the project. The City of Ketchum, which is a client of Brockway Engineering, has also been made aware of this work. Both parties have provided written notification that they have no objection to Brockway Engineering performing this work.

### Water Demand Review

#### Potable Demand

Benchmark originally utilized the empirical equation presented in DEQ's Design File Note – Public Water Systems. This equation embodies typical irrigation for single-family traditional subdivision situations, which would likely not be applicable to the River Run project. For this project, actual irrigation demand and to some extent the per-capita potable demand should be considerably lower than would be expected for a typical subdivision. In the revised demand calculations presented in the draft water and sewer audit dated May 20, 2010,

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Benchmark utilized the same DEQ equation but omitted the irrigation term, and relied on a separate irrigation takeoff and demand calculation made by Design Workshop for the irrigation component. Splitting the potable and irrigation components is a prudent approach for this case and should result in a more accurate estimate of total water demand.

As a check of the potable demand, an independent estimate was made using the traditional approach using per-capita or per-unit average daily values, and applying peaking factors to estimate maximum day demand and peak hour demand. The average daily demand of 83.5 gpcd was taken from the Residential End Uses of Water Study funded by the American Water Works Association in 1999. This was an extensive study of actual measured flows from individual homes in twelve municipalities, which found that the mean in-house flow ranged from 57.1 gpcd to 83.5 gpcd. The highest value was used for the present analysis.

To estimate the maximum day demand, peaking factors of 3.0 for residential and 1.5 for the hotel were applied to the average daily potable demand. Typical values for small residential communities consistently range from 2 to 3. Hotels typically have lower peak day factors. To estimate the peak hour demand, a peaking factor of 1.7 was applied to the maximum day demand. Peak hour factors are the least-certain parameter in a demand estimation process and are highly dependent on site-specific conditions. The above value is believed to be reasonable based on a literature review and examination of other municipalities' guidance documents and measured values. Typical ratios of peak hour to peak day demand for potable usage range from 1.3 to 2.0. The State of Idaho has not adopted a particular value for use in design, but the Oregon Department of Health has adopted 1.7 as a guideline.

Using the above assumptions the following demands were estimated for potable water usage:

	Max Day - Potable	Peak Hour - Potable
Low Estimate	325,700 gpd (226 gpm)	553,800 gpd (385 gpm)
High Estimate	486,400 gpd (338 gpm)	826,900 gpd (574 gpm)

The above values for maximum day demand are very close to those estimated by Benchmark using the DEQ equations without the irrigation term. The peak hour demands are about 20 to 25% lower than those estimated using the DEQ equations. The DEQ equations do not utilize a peaking factor directly, but imply a peak hour to peak day ratio of about 2.0, which is more conservative but probably still reasonable.

#### Irrigation Demand

The peak demand estimate for irrigation usage prepared by Design Workshop (DW) was reviewed. DW calculated gross areas of each type of usage within the project, and estimated the percentage of irrigation likely to occur in each zone to derive the following irrigated areas:

'N' Residential Parcels	2.47 acres
Treelawn / Road ROW	3.85 acres
R-1 Residential Parcels	2.84 acres

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R-2 Residential Parcels	3.33 acres
Native Greenways	1.60 acres
Hotel Core	4.55 acres
<u>TOTAL</u>	<u>18.65 acres</u>

DW then assumed 75% of this area, or 14.0 acres, for demand calculation purposes. Apparently this is to account for the fact that not all of the gross irrigated area will be planted and watered. However, for planning purposes and to be conservative, it is recommended to make the assumption that 18.65 acres is sprinkled.

Peak daily evapotranspiration (ET) was estimated from Allen & Robison (2009), which is the source utilized by IDWR in determining irrigation water requirements. For irrigated turfgrass or similar planting, the 90% design exceedance level of ET was calculated to be 0.27 in/day. Irrigation efficiency was assumed to be 70%. The calculated peak daily irrigation demand is 7.3 gpm/acre: 195,900 gpd on 18.65 acres or 147,056 gpd on 14.0 acres. This is significantly higher than the estimate by Design Workshop. The peak demand of 104,311 gpd calculated by DW implies an irrigation efficiency of 100% based on peak ET of 0.27 in/day, which might be approached with ultra-efficient drip systems in certain zones, but would not generally be realistic when considering the overall project. For planning purposes, a value of 195,900 gpd or 136 gpm is recommended for the irrigation demand.

#### Total Demand

Adding the peak irrigation demand estimate to the potable water demand estimates, an estimate of the total project demands would be:

	<u>Max Day - Total</u>	<u>Peak Hour - Total</u>
Low Estimate	521,700 gpd (362 gpm)	749,700 (521 gpm)
High Estimate	682,300 gpd (474 gpm)	1,022,800 gpd (710 gpm)

#### Supply Capacity Requirement

IDAPA 58.01.08.501.17 requires that with the largest source out of service, the system must be able to supply either 1) peak hour demand, or 2) maximum day demand plus equalization storage. Based on the review memo from Tracy Ahrens of J-U-B Engineers and conversation with Steve Hansen, the City of Ketchum currently cannot meet this requirement and an additional well is being developed in the Sun Peak area to bring the City into compliance. The Sun Peak well project will likely commence in one to two years, but this well would only bring the City into compliance with its current maximum day demand, and therefore an additional water supply well must be developed to serve the River Run project. The flow rate provided by the new well must be at least equal to the maximum daily demand, according to the DEQ rules.

A new well could be developed in the vicinity of the River Run project. Based on the aquifer properties at this location and a cursory review of known well yields, it is highly likely that a well with a yield of 500 to 1000 gpm could be developed.

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### Storage Considerations

As noted above, DEQ requires that new sources must have a discharge at least equal to the maximum day demand (estimated herein to be a maximum of 474 gpm). Equalization storage must be provided, but the required volume of storage decreases if the source can supply more than the maximum day demand. If the source can supply the peak hourly demand, no equalization storage is required. DEQ has developed a procedure to estimate storage requirement for sources supplying flows ranging from maximum daily up to peak hourly demands. The storage requirement of 258,876 gallons referenced in the J-U-B memo appears to have been calculated assuming a source which supplied exactly the maximum daily demand.

If a new well could be developed with a capacity sufficient to meet the peak hourly demand (estimated to be 710 gpm), then equalization storage would not be necessary. Emergency or standby storage is required unless adequate standby power exists to supply the average day demand for 8 hours (IDAPA 58.01.08.003(f) and 58.01.08.501.07).

Fire flow storage, according to the J-U-B memo, can be satisfied by the existing City storage and no additional is required.

### Water Right Considerations

Any new water supply must be covered either by the City's existing water rights or by a new water right. The City currently holds the following municipal groundwater rights:

37-4413	9/1/1954	2.67 cfs	Recommended in the SRBA
37-4414	8/1/1955	2.23 cfs	Recommended in the SRBA
37-7150	7/16/1972	0.3 cfs	Recommended in the SRBA
37-7682	10/7/1977	3.0 cfs	Recommended in the SRBA
37-8195	10/5/1984	2.75 cfs	Permit, no large tract irrigation
37-8269	4/28/1986	5.0 cfs	Permit, domestic irrigation only
37-8575B	10/26/1989	0.8 cfs	Permit

The flow rate under rights that are recommended in the Snake River Basin Adjudication totals 8.20 cfs (3,680 gpm) which is less than the City's current maximum day demand according to the J-U-B memo. Additional flow authorized by the outstanding permits is 8.55 cfs (3,837 gpm). Several other claims were filed in the adjudication based on historic beneficial use, but IDWR has recommended these claims for disallowal and the objection process is currently pending with the court. In addition to the groundwater rights, the City owns an irrigation water right from Trail Creek in the amount of 7.0 cfs for irrigation of 55.5 acres. This right was acquired from the Weyyakin subdivision and is currently not being used directly by the City.

Although the City may have sufficient authorization under its current rights to supply the River Run development, Steve Hansen indicated that because of the uncertainty of the amount that the City will have after the adjudication is finalized, the City would prefer that the project provide water rights to cover its use, independent of the City rights.

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A moratorium has been in place since 1991 on development of new consumptive groundwater and surface water uses within the Snake River basin and its tributaries. However, the moratorium does allow domestic development and under current State policy a new water right for municipal usage could be granted, which would allow in-house usage and the statutory domestic irrigation allowance of 0.5 acres per domestic unit. However, this right would have a 2010 priority date and the irrigation component would likely be in severe jeopardy of curtailment when the State implements conjunctive management of surface water and groundwater in the Big Wood River basin. The in-house component may or may not be subject to curtailment, but this has not been resolved by the State. Implementation of conjunctive management will likely occur within 5 to 10 years, depending on State budgetary constraints.

Prudent long-term planning would dictate that the River Run project secure an adequate water supply having minimal risk of curtailment even during a dire conjunctive management scenario. One option would be to secure a new groundwater right as described above and mitigate for the consumptive component of the usage by acquiring a surface right with an early priority date and utilizing it in an approved mitigation plan involving aquifer recharge or other mechanism. This approach would require a transfer of the water right and considerable hydrologic evaluation and negotiation with IDWR. Another option would be to acquire a surface water right and use it directly in a separate non-potable water system.

#### Summary

- The estimates of potable water demand by Benchmark Associates in the draft revision to the water and sewer audit dated May 20, 2010 are reasonable; the peak hourly flow may be slightly high but not unreasonable. Irrigation demand estimated by Design Workshop appears to be somewhat low. Independent estimates of potable and irrigation demand were made by Brockway Engineering. For planning purposes, the following values of total project demand are recommended:
  - Max daily flow = 682,300 gpd or 474 gpm
  - Peak hourly flow = 1,022,800 gpd or 710 gpm
- A new water supply well will be necessary for the River Run project. A productive well in the vicinity of the project likely can be obtained with a discharge of 500 to 1000 gpm.
- If the well supplies the peak hourly demand, no equalization storage should be required by DEQ.
- If the well has adequate standby power, no emergency storage should be required by DEQ.
- Fire flow storage can be supplied by existing City storage.
- The project should secure water rights having a minimal risk of curtailment when conjunctive management is implemented. The recommended approach is to secure a surface water right and utilize it either directly or in a mitigation plan in conjunction with a new groundwater permit.