

MEMORANDUM

To: Cherry Creek Basin Water Quality Authority – Technical Advisory Committee

Cc: Jim Worley, Manager

From: William P. Ruzzo, PE, Dr. F. Robert McGregor, PE

Date: November 5, 2002

Re: Updated Analysis of “Bow Tie” Property

During negotiations for the Bowtie property and water well, the parcels survey indicated that purchase of another parcel of land (called the “Freund property”) was needed to complete the project as originally envisioned. Subsequently, two additional analyses were conducted, one to update the original concept to include additional property purchase (and other adjustments) and, two to evaluate the project in two phases, should acquisition of the Freund property be delayed. The results and conclusions of these analyses are presented below.

Summary of Conclusions

There are offsetting savings and increased costs for the updated Bowtie PRF project. Therefore, the total cost of the updated project would remain essentially the same for the updated Bowtie PRF concept as for the original Bowtie PRF concept. The long-term performance of the updated Bowtie PRF would likely be the same regardless of which method is used to establish wetlands. Therefore, the projected long-term performance of the updated Bowtie PRF concept is the same as the original concept.

Costs and benefits were estimated for the phasing approach, which would purchase the entire property but would only construct the channel stabilization and allow wetlands to occur naturally. Phasing of the updated Bowtie PRF was found to provide similar, if not more economical, long-term performance in immobilization of phosphorus as the original concept.

Original Bowtie PRF Concept Update

The original “bow tie” PRF¹ was estimated to reduce the long-term, annual phosphorus load to the Reservoir by 235-pounds through the construction of a sediment basin, channel stabilization and wetlands. Capital costs (with contingencies) were estimated to be \$826,200 and the assumed land costs are \$300,000. Annual operations and maintenance costs are estimated to be \$6,400. The total annualized cost of the PRF is \$94,850, which results in a cost of \$400 per pound of phosphorus immobilized. These costs did not include water augmentation, but gross estimates of annual water consumption by the wetlands were provided and acquisition of the water well would meet the project’s water requirements.

¹ Ruzzo and McGregor, February 11, 2002. *Analysis of “Bow Tie” Property*

The original concept regarding wetlands planting was also reevaluated. It was previously estimated that wetlands planting would be required at a cost of \$150,000, plus contingencies. Upon further consideration, it is likely that stabilizing the Piney Creek and Cherry Creek confluence with partial cutoff walls would result in increased natural vegetation, which would reduce capital costs for the project. Whereas there is still uncertainty on the need for augmentation water, the opinion at this time is the wetlands are incidental to the project (i.e.: stabilization), which could further reduce project costs.

Survey information was combined with aerial photography to produce Figure 1. From this information, it was determined that the proposed trail/berm relocation needed for the sediment basin portion of the project would require acquisition of the small triangular piece of land (1.1-acre), called the "Freund property". In addition, it was assumed that the "flag pole" property (2.5-acres) would also need to be acquired at the same time, but could provide alternate access to the project. Acquisition of these two parcels (3.6-acres) would offset the cost savings by not planting wetlands. *Therefore, the total cost of the project would remain essentially the same for the updated Bowtie PRF concept.*

Since it is likely that establishment of the wetlands would take longer if allowed to occur naturally, the initial performance of the updated concept would be less than estimated for 3 to 5-years. However, the long-term performance would likely be the same regardless of which method is used to establish wetlands. *Therefore, the projected long-term performance of the updated Bowtie PRF concept is the same as the original concept.*

Phasing of the Updated Bowtie PRF

Due to the uncertainty in the acquisition of the Freund property, the updated Bowtie PRF concept was divided into two phases. The first phase would construct the channel stabilization at the confluence and allow the wetlands to occur naturally. The second phase would add the sediment basin, which requires construction of the trail/berm across Piney Creek through the Freund property.

Costs and phosphorus reduction benefits for Phase I were evaluated. Capital costs (with contingencies) were estimated to be \$227,500 and the assumed land costs are \$300,000. Annual operations and maintenance costs are estimated to be \$1,140. The total annualized cost of the PRF is \$41,760, which results in a cost of \$278 per pound of phosphorus immobilized. *Therefore, phasing of the updated Bowtie PRF would provide similar, if not more economical long-term performance in immobilization of phosphorus as the original concept.*

If acquisition of the Freund property is not possible, then facilities required to create the sediment basin can be modified to fit within the limits of the Bowtie property. It is possible, however, that the modified sediment basin concept would have higher capital costs or would not perform as well as the original concept. But in either case, the original Bowtie concept can be implemented with or without the Freund property.

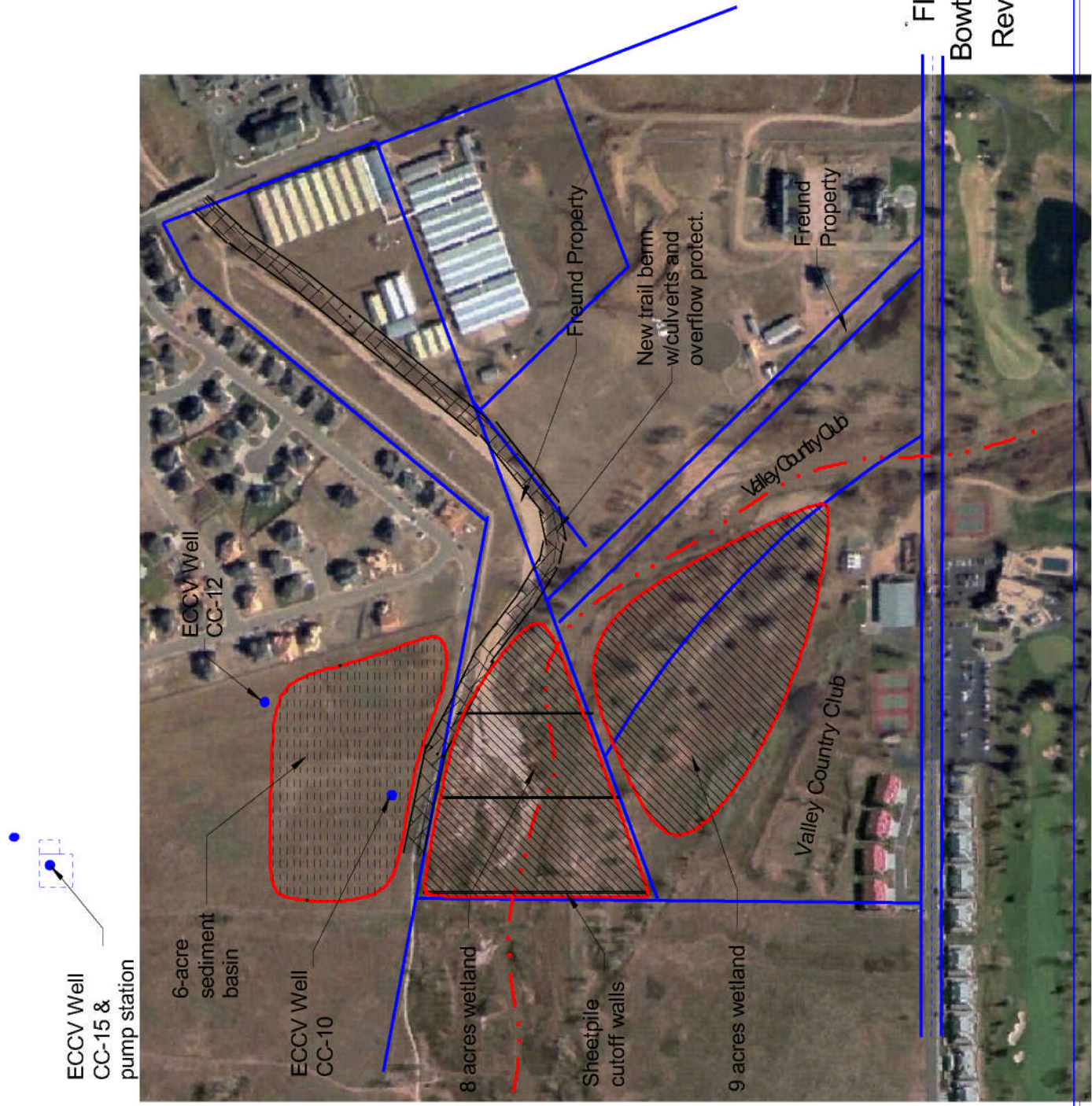


FIGURE 1
 Bowtie Area PRF
 Rev 11/01/02