



Memorandum

Date: June 1, 2022
To: Mr. Tom Morton, Mr. Jack Hoagland
From: Nate Hines, Hines Inc
Re: Bromley Farms Traditional or Community Based Irrigation Water Supplies

The purpose of this memorandum is to provide a review of conventional approaches to landscape irrigation which utilize a potable water source as compared to the development of an independent, secure, efficiently managed, non-potable irrigation system managed in a community context. We approach this topic with the following tenets in mind:

- A world without landscape is no place for humans to live
- Water is a key element necessary to sustain and grow healthy landscapes and people
- Water in the West is a highly constrained resource demanding far better management and monitoring than historic precedent illustrates
- Municipal landscape irrigation water use is a source of incredible waste, often overwatering in excess of 60%, which signals a unique conservation opportunity. We can save significant amounts of water & simultaneously grow vital, healthy, regionally appropriate landscapes essential for human flourishing.

A Community managed non-potable irrigation system consists for several fundamentally different approaches and design requirements which may lead to significant water savings, landscape vitality enhancements, & community natural resource awareness due to a change in the following elements: Water Allotment & Supply, System Design & Technology, Incentivized Operation, Resulting Water Use. When compared to a traditional potable water supply, we believe the former to be superior.

Traditional Potable Irrigation System

Water Allotment & Supply:

There is no meaningful connection between site water allotment & the daily, weekly, or monthly operation of a site irrigation system. The traditional, potable irrigation system is served by the potable water supply – often municipally provided. This is often perceived as a limitless water supply accessed by simply opening the tap or faucet. Until recently, water has been relatively inexpensive (and in fact, per gallon usage is quite inexpensive in Colorado as compared to other parts of the country). Raw water dedication, tap fees, and related costs are very costly in Colorado, but many end users do not have direct

visibility to these costs. As such, there is little demand for efficient water use, system performance, effective pricing, & accountability.

In many contexts, municipal raw water dedications represent an over dedication to provide redundant irrigation supplies to meet:

- Historic waste patterns
- Full irrigation demand supply even in dry or drought conditions
- Historic landscape water use assumptions that are no longer valid due to smaller lot sizes & landscape typology adjustments

Additionally, the treatment of potable water, for landscape irrigation, which is then discharged on-site and does not return to the treatment plant for filtration and re-use, removes water from the hydrogeologic cycle. Leading to a net loss to the water provider. Significant season water demands for irrigation in summer leads to significant cost increases in WWTP sizing and operation to meet summer water demands which include water which is simply wasted on-site.

System Design & Technology:

This lack of awareness and visibility is transferred into the design of irrigation system water delivery and distribution. Massively oversized irrigation systems, designed to maximize the sale of sprinklers & piping, take precedence over creating a culture of efficient system size to match a targeted site water balance. Additionally, technologies to monitor, manage, and control irrigation system water use are totally divorced from water delivery, supply, & enforceable management strategies. On a typical development, landscape irrigation systems are managed by dozens or hundreds of individual users with very little, or no, central operating parameters or guidelines.

Incentivized Operation:

Based on the above, under a traditional irrigation system design and development protocol, there is very little incentive to manage water correctly, little to no accountability between the water providers allotment, pricing mechanisms, system operation, & end user water management. Rather, incentives are generally aligned to hire the least expensive, and often least component water manager, who will simply add more water to combat all landscape health related challenges. This is true in both a common area landscape & private residential context.

Resulting Water Use:

The average irrigation system wastes in excess of 60% during the course of regular, seasonal operation. Based on research by office of over 10,000 commercial properties across the Western US, we believe that 50% of all water users overwater by 100%.

Community Managed Non-Potable Irrigation System

Water Allotment & Supply:

In this scenario, water allotment and supply may be tied far more closely to an engineered landscape irrigation water balance based on specific plant typologies, project phasing, temporary native grass establishment timeframes, & project drought planning. This requires and incentivizes the community to utilize design, technology, and maintenance practices to steward water resources more closely within the community.

Utilization of non-treated water prioritizes healthy hydro-geologic function of an already existing system. Rather than diverting and losing water resources from the potable

water system, non-potable irrigation prioritizes the use of native water supplies and maintains downstream flows. Irrigation water use does delay, somewhat, in stream flows, but largely maintains this important function.

Finally, beginning to remove irrigation water use demand from the potable system reduces summer, peak demand spikes which require significant oversizing of WWTP infrastructure & distribution piping. Non-potable systems can be competently, and adequately sized and constructed at lesser cost to meet irrigation system requirements.

System Design & Technology:

System design & the underlying technologies utilized when developing a Community Managed Irrigation Water Supply to meet site and landscape specific requirements giving the community the tools required to efficiently irrigate, monitor, and control water use to meet a specific seasonal water balance.

Community accountability can be more effectively tied to actual water use on a daily, weekly, or seasonal basis using inexpensive, readily available technologies.

Incentivized Operation:

The above items provide a unique set of incentives because when the water has been used, the system is turned off. Similarly, in significant drought conditions, each community operates to a reduces water allotment to prioritize the irrigation of high value landscape, while allowing other landscape materials to lie dormant.

Resulting Water Use:

In our experience, there are significant water savings possible which in may ways can only be achieved through the development of non-potable, community managed irrigation systems. The resulting, measured savings can range from 40-60% depending on the baseline water use test case we draw from. Additional benefits such as: matching water allotment more closely to actual landscape need, enhanced accountability for meeting seasonal water budgets, the judicious use of water management technologies, & tying irrigation system performance to actual seasonal weather requirements are more highly incentivized in this case.