Superstition Vista
Water Strategy White paper
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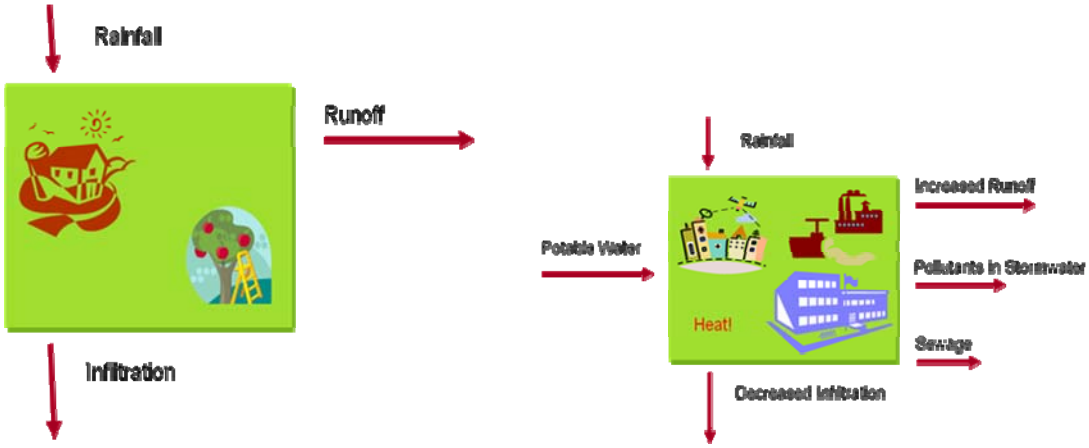
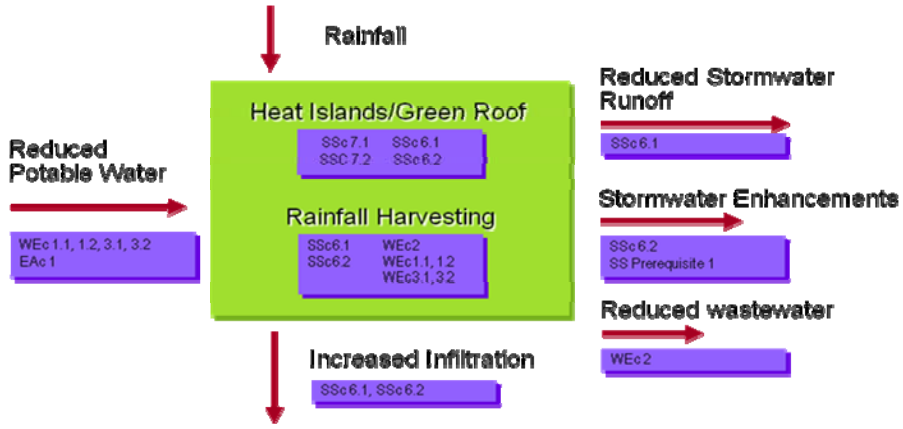
The broad expanse that encompasses Superstition Vista is largely undeveloped and the hydrology of the site can be considered a natural condition. Rainfall lands on the site, resulting in drainage through and off the site and infiltration into the ground. Plants, animals, creeks, and rivers all function to keep the system in its natural balance. A primary definition of sustainability is embodied in the concept of understanding the natural water footprint and the development of strategies that will help to emulate the natural conditions after a program of development is undertaken. The post-development conditions affect the water footprint through increased runoff as impervious area increases, a corresponding decrease in infiltration, additional pollution is conveyed to the rivers and creeks in the stormwater runoff, potable water is treated and delivered to the site, used water in the form of sewage is generated and must be treated, and overall consumption of water increases. The pre- and post-development conditions are depicted in the following concepts, along with a diagram showing the LEED credits that are established for water related sustainability consideration:





The overall goal for Superstition Vista should be to minimize the impact on water resources and natural processes as a result of development. While it may not be possible to entirely eliminate the impacts, developing a set of strategies that deal with water use, water quality, and effects on the natural system is an approach to defining the impacts and issues, measuring the effects, and providing for the new water resource demands as a result of development. The specific goals that will be used to focus the strategies for water related issues can be defined as:

- **Minimize Potable Water Use**
  - Use high efficiency indoor plumbing fixtures
  - Minimize turf and high water demand outdoor landscaping
- **Maximize Water Reuse**
  - Explore the effective use of grey water (water from lavatories and clothes washing)
  - Collect rainwater on roofs for landscaping
  - Consider grey water as a source of toilet flushing water
  - Use reclaimed water for irrigation
- **Flood Protection and Water Quality**
  - Protect property and public from flood events
  - Enhance water quality in stormwater runoff for frequent, smaller storm events (storms up to the 2-year historic event)

Given the specific goals for water resources, water strategies can be developed for detailed study. Water strategies include:

- **Reduce Potable Water Use**
  - Low flow toilets
  - Low water use fixtures
  - Cisterns-grey water, stormwater, process water
  - Moisture sensors for landscape management
  - Reliance on native landscapes
  - Retain existing vegetation
  - Limit turf grass to high use public areas
  - Priority water use
- **Harvest Water**
  - Roadways, parks, and open spaces
  - Lots: roof drainage, cisterns
  - Reuse close to the source
  - Grading/swales
- **Treated Effluent Reuse**
  - Common area irrigation
  - Toilet flushing
- **Aquifer Recharge**
  - Promote Infiltration
  - Deep Well Injection System

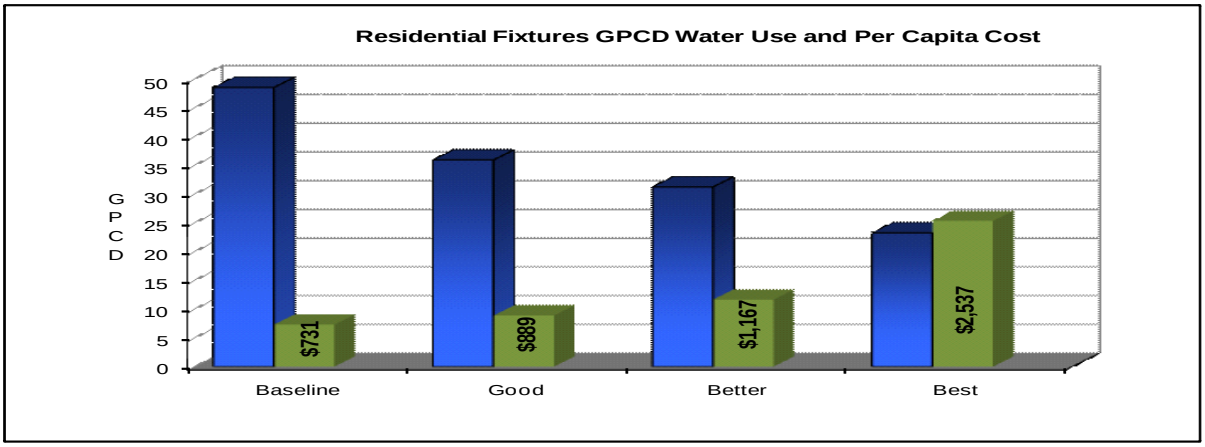
- **Streetscape**
    - Low water use shade trees
    - Native grasses and xeric plantings
- **Public Education**
    - Interpretive signage
    - Xeriscape demonstration gardens
    - Stormwater management manual
    - Landscape vision manual
- **Hillside Construction**
    - Limited to building envelopes
    - Native vegetation restoration
    - On-site BMPs
- **Improve Water Quality**
    - Minimize grading
    - Disperse runoff
    - Retain existing vegetation
    - Sediment erosion control
    - Water quality ponds
    - Grassed drainage swales

Many of the strategies can be implemented on a case-by-case basis and independent of each other. However, developing an overall list of water use goals, dependable water demand planning parameters, and code requirements for equipment and management will result in a new community that more nearly meets the goal of a natural water footprint and helps the community achieve a more sustainable lifestyle. Some of the water conservation reductions that can be achieved rely on multiple and synergistic strategies. For instance, the use of building generated grey water for toilet flushing could reduce potable water demand by up to 30% and reduce sewage treatment requirements by up to 30% as well. If building grey water is used for local irrigation, the potable water demand may be reduced by 30%, but there will be no reduction in sewage treatment requirements.

Since water recycling and reuse have implications for public health and associated treatment costs, it is appropriate to develop strategies that can be used stand-alone or in concert with other strategies to develop overall demand scenarios for Superstition Vista that provide a range of conservation options. Initial estimates of the potential savings, compared to more typical or *business as usual* water management and use strategies, have been developed and generally described as Good, Better, or Best scenarios. The following charts depict the basic interior water demand estimates for these scenarios:

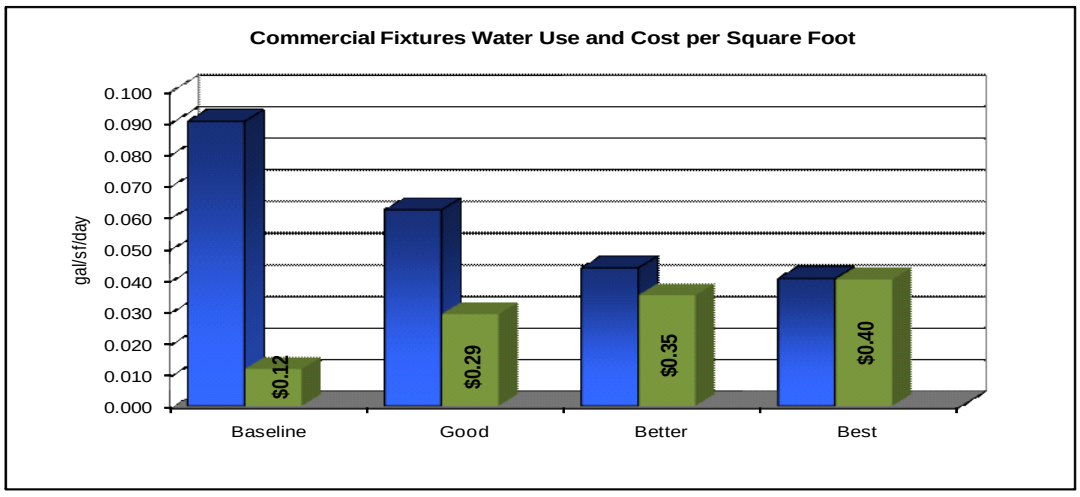
Residential Fixtures

	Baseline	Good	Better	Best
	GPCD	GPCD	GPCD	GPCD
Toilet	8.8	7.7	7.0	6.1
Faucet	3.4	2.1	1.4	1.4
Showerhead	12.5	9.0	7.5	7.5
Clothes Washer	14.4	10.0	9.3	8.5
Dishwasher	1.4	1.2	1.1	0.9
BRAC System				-6.1
Leaks	6.0	4.0	3.0	3.0
Other	2.0	2.0	2.0	2.0
Total GPCD	48.6	36.0	31.3	23.3
Total Cost per Capita	$731	$889	$1,167	$2,537



Commercial Fixtures

	Baseline	Good	Better	Best
	gal/sf/day	gal/sf/day	gal/sf/day	gal/sf/day
Toilet	0.034	0.020	0.018	0.015
Urinal	0.000	0.007	0.001	0.000
Faucet	0.053	0.032	0.021	0.021
Other	0.004	0.004	0.004	0.004
Total gal/sf/day	0.090	0.062	0.044	0.040
Total Cost per sf	$0.12	$0.29	$0.35	$0.40

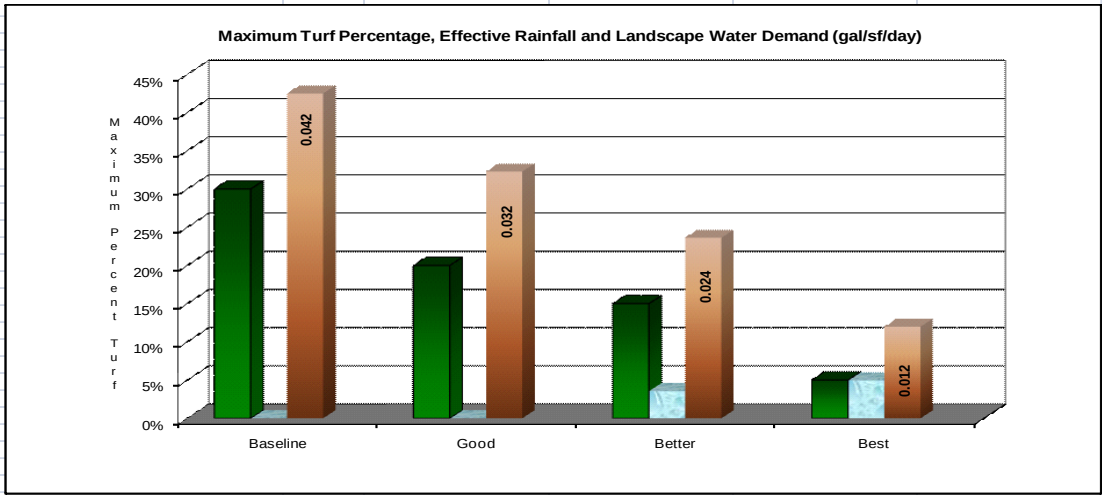


Costs are shown in these graphs, but costs are changing quickly as the costs for more efficient fixtures are coming down and regulation and code requirements are getting more stringent. However, the water demand estimates shown in the graphs are being achieved in newer developments as the more water conservative fixtures are installed.

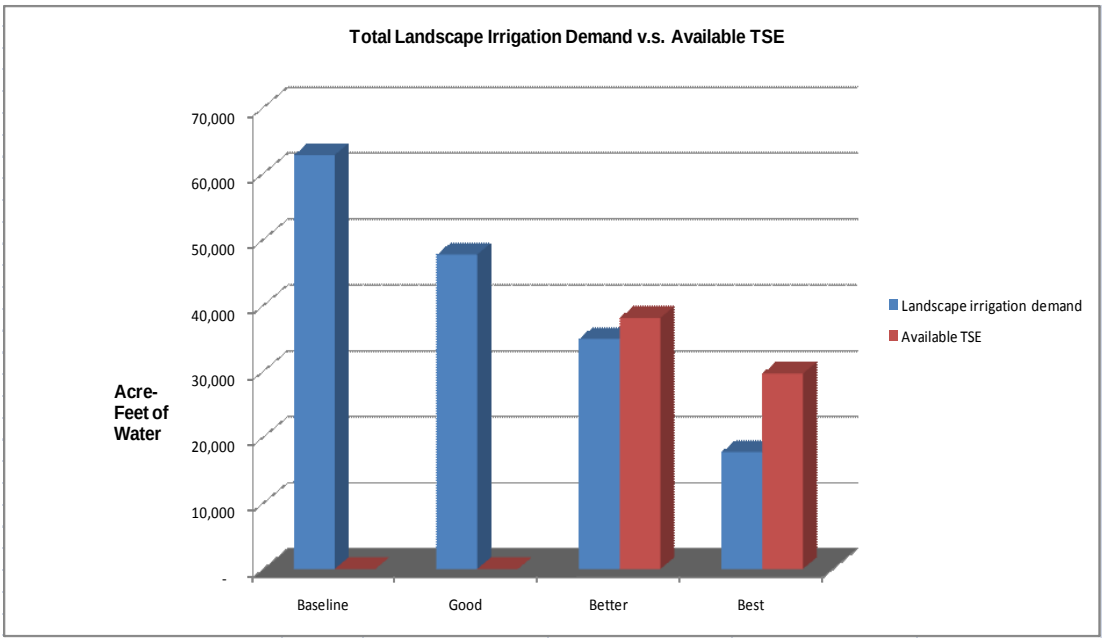
Landscape irrigation is the most significant consumptive use of water. The landscape is also one of the most important aesthetic and environmental outdoor features for people in our communities. The landscape can also have a significant impact on building temperatures, parking lot and street environments, parklands, and open space. It is clear that we do not need to provide supplemental irrigation to all our landscapes, but portions of the landscape will require irrigation, especially as the landscapes are used more intensively by the public. Potable water can be used, but its use should be minimized. Nonpotable water sources, such as grey water, treated sewage effluent, and raw water are more appropriate and can often be supplied at lower cost. A greater investment may be required for infrastructure to deliver this water, but the increased cost may be offset by lower water and treatment costs.

Landscape irrigation should consider the appropriate landscape for the development, without sacrificing the active recreational areas and proper aesthetics. Water demand can be reduced given these considerations, and the level of reduction is estimated as follows:

Landscape	Baseline	Good	Better	Best
Turf limit %	30%	20%	15%	5%
Treated Sewage Effluent (TSE)	0.04	0.03	0.03	0.02
Effective rainfall %	0.000	0.000	0.004	0.005
Landscape Demand (gal/sf/day)	0.042	0.032	0.024	0.012
Landscape Cost - $/S.F.	$4.00	$3.75	$3.25	$2.50



As we begin to employ the synergies of water reuse, more arid landscape, and better water management practices, we start to balance the demand for irrigation with the supply of reclaimed water. The cost of installed landscape starts to go down along with the demand for water. We can develop a scenario that uses less water for indoor use resulting in less available TSE, and we can match the landscape water demand with the appropriate water supply resulting in a community that minimizes water demand, uses the water appropriately and multiple times, and reduces the impact on the environment. Initial projections for this scenario show:



Water is not a “throw-away” commodity anywhere in the world, but especially in the desert southwest. Overall, water management is essential and the basic approach includes the following items:

- Establish goals – realistic, but aggressive
- Develop strategies
- Meet with local agencies – code requirements
- Cost/benefit – account for synergies
- Define responsibilities for implementation
- Measure and monitor results
- Educate the community
- Adaptive management – what works, what doesn’t adapt to change

The commitment to a sustainable lifestyle and community includes good stewardship of water resources. The greatest overall cost savings and reduction in greenhouse gases may not be realized for water conservation as compared to energy and transportation, but the quality of life will be greatly enhanced with the wise use of water.