

Dennis Ghiglieri

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November 30, 2011

Jason King, Nevada State Engineer
Susan Joseph-Taylor, Chief Hearing Officer
Office of the State Engineer
901 South Stewart Street
Suite 2002, Carson City, Nevada 89701

RE: Comments on water applications in Spring, Cave, Dry Lake, and Delamar Valleys,
Nevada by the SNWA

STATE ENGINEER
2011 DEC -2 PM 3:35

Dear Engineer King and Hearing Officer Joseph-Taylor:

I am a life-long Nevadan who first visited eastern Nevada and what is today Great Basin National Park in the 1960's as a teenager. I have returned many times since then hiking throughout the Schell Creek, North and South Snake, and Fortification Ranges as well as walking and bird-watching through the grasslands of the "swamp cedar forest" and meadows, wetlands and homesteads and cemeteries in Spring Valley and marveling at Big Springs and the extensive meadow and ranch land they support in Snake Valley. I've been going for many years to Rainbow Canyon - Meadow Valley Wash - Pahranaagat Valley and the White River Valley to look for birds and wildlife enjoying the scenery of the wildlife management areas and National Wildlife Refuges and the small-town, friendly environments that make this region a special place to visit. I've walked through the Joshua Tree forests and white sage meadows of Dry Lake Valley where the sweep of the land and sky is a remarkable Great Basin space blended with the Mojave desert. What takes me back to these places time and again are the landscapes, plants and animals -- birds -- and the people who live and make their livelihood in these wide-open valleys and small oases.

Clearly, in Pahranaagat Valley and the White River valley, the springs are the life blood of the wildlife management areas and wildlife refuges and farming and ranching livelihoods. All are at serious risk from pumping proposed in the water applications by the SNWA in Cave, Dry Lake, and Delamar Valleys. There is near certainty that the groundwater in these 3 basins supply a significant amount of groundwater supporting a century of existing water rights in Pahranaagat and White River Valleys and other downstream valleys.

In Spring Valley it is apparent from BLM's DEIS as well as other sources that all the natural features and productivity of the valley will be lost from pumping SNWA applications and that senior water rights will be seriously depleted.

I have attended or listened online to much of the 6 weeks of the hearing and believe that it is an entirely reasonable conclusion that the applications in the 4 valleys should be denied as not environmentally sound, not in the public interest, harmful to senior water rights holders, and

destructive to the future of the valleys and the existing and future economy of the region.

Water Supply for Southern Nevada

Southern Nevada is not bereft of water. Lake Mead is one of the largest reservoirs in the country formed by the federal Hoover Dam. Through various means the SNWA has increased its temporary and permanent supply of water from Lake Mead above Nevada's original allocation of 300,000 AFA. Currently, as part of order 1169 testing, SNWA removes up to 9,000 acre-feet each year from Coyote Spring Valley and can count that as part of its supply in Lake Mead. There are water rights which pre-date the Colorado River Compact on the Virgin River and Muddy River which are and can be moved into Lake Mead to increase the allocation amount. Additionally, there are banked water resources in other states which can serve as a hedge against a mandated reduction under the Colorado River Compact and agreements. Certainly there is no other city, town or county in Nevada which can count on a massive dam and reservoir water supply equal to that available to Southern Nevada's Las Vegas, North Las Vegas, and Henderson. Lake Mead has been a reliable water supply even including the recent decade-long drought. It is critical for all government officials to recognize that Lake Mead's viability through a useable minimum level is essential to Southern Nevada.

It is clear, too, that without the ability to draw water from Lake Mead, there is no "in-state" water supply which can provide water to the region. Lake Mead is essential for the water supply of Southern Nevada's cities. Lake Mead is necessary for return flows to be relevant. Return flows to Lake Mead make the present use by SNWA of the Colorado River allocation possible. Protecting Lake Mead elevations must be a top priority for Southern Nevada and, therefore, is far more important than pursuing additional water through the pipeline project.

Water for indoor uses which return through the sewer system and eventually to Lake Mead do not count as consumptive use because the water is still available in Lake Mead for use of downstream water needs. However, when indoor use efficiency goes up, more people can be served with the same amount of withdrawn water. This is a relevant consideration because the ability to supply water to Southern Nevada cities becomes a capacity issue based on the installed infrastructure of pipelines and storage tanks and the significant energy demand to raise water from Lake Mead to the elevation of the city of over 1,000 feet. The energy and infrastructure investment is reduced as indoor use becomes more efficient. Being able to extend each gallon of distributed water to more people allows an increasing population to be served without additional cost or additional water supply or infrastructure effectively adding to water supply.

At present the SNWA is consumptively taking about $\frac{3}{4}$ of Nevada's original Colorado River allocation. (Water not used can be banked for future use.) Except for system losses and unaccounted for uses, nearly all of this water is consumptively used in outdoor landscape and golf course evapotranspiration, direct loss through evaporation from the surface of private amenities found in residential and commercial development lakes and ponds and exposed swimming pools, and some lost through mechanical systems for air-conditioning buildings.

The presence of Lake Mead makes water supply in Southern Nevada unique because a simple equation which limits the outdoor losses described above to the available consumptive use effectively balances water needs with water supply. Stated simply, Southern Nevada must conserve outdoor use of its municipal water and increase indoor water use efficiencies, so that its capacity to supply water for any future population growth can be met. There are many means to practically and effectively reduce water use which are outlined in the *Pacific Institute's* "Hidden Oasis" 2007 report. All of these will be enormously less expensive than the pipeline project which is proposed to take water through 300 miles of pipes from the 4 basins the subject of this hearing.

Implementing efficiency and conservation measures preserves the financial capacity of Southern Nevada to look at other means for preserving Lake Mead which is truly the essential water supply component for all Southern Nevada cities. Lower cost for water equates to a better business climate which everyone will benefit from.

The glass is not half empty for Southern Nevada, but half full. Embracing conservation and efficiency will enable Southern Nevada a better future than building an unneeded and expensive pipeline and pumping project to desert valleys far away. Using scarce financial resources for protecting Lake Mead and Southern Nevada's Colorado River water allocation is far more likely to lead to water security and prosperity than the pipeline project.

All of us who live in Nevada are living in an arid landscape. Southern Nevada's cities lie in one of the driest and most arid landscapes in North America. Yet, there can be many benefits to living in an arid climate as long as we recognize that water must not be used in a manner which is not sustainable given the limitations of climate. There are plenty of alternatives to large landscaped yards of eastern-seaboard or tropical oasis styles of vegetation plantings.

Each of us as Nevadans will benefit when we recognize that it is easier and far less expensive to live within the limits of our water resources – including Nevada's allocation from the Colorado River for Southern Nevada – than it is to be at odds with the reality of our aridity. Efficiency and conservation now and continual work to protect Lake Mead can only lead to greater prosperity and certainly more harmony and a healthier environment in the 4 basins the subject of this hearing.

I submit that Southern Nevada will be the beneficiary of your decision to deny the applications in the 4 basins and allow Southern Nevada to implement water efficiency and conservation programs commensurate with the aridity of the Mojave Desert in which it is located. Drying out remote areas of Nevada and impacting existing water rights throughout eastern and southern Nevada must not be the legacy we leave to future generations. Each region can begin to live within its means. Just because changes to patterns of outdoor water use long desired by developers to attract buyers will come is no reason to wait to prudently use outdoor water and increase indoor efficiencies. There will still be water for many outdoor plantings that are beautiful and enhance property values and attract visitors. Indoor conservation is usually

accomplished without any real change to lifestyle and can be part of the investment the utilities make for customers to reduce per capita demand.

It is entirely reasonable to recognize that all of us need to change our view of water – not just in Southern Nevada – but throughout the state. We will all benefit by no longer deceiving ourselves about the realities as well as benefits of living in this arid desert state we call home.

Cave, Dry Lake, and Delamar Valley Water Applications

It is apparent from driving through or viewing from Google Earth images, that the 3 valleys where the SNWA wants to pump and pipe up to 34,000 acre-feet of water each year to Southern Nevada Cities in Clark County lack significant surface water discharge areas. There are small springs but no significant areas of vegetation which are capable of transpiring groundwater. There doesn't seem to be any dispute on the lack of local discharge from the 3 valleys. It appears clear, at least, that any recharge to the groundwater in these valleys is supporting groundwater flow to the valleys primarily to the west and lower in elevation. Given the proximity of large regional springs in White River Valley and Pahrangat Valley, it is not unreasonable to assume that some significant portion of the recharge in the 3 higher valleys are supporting springs in the lower valleys. Undoubtedly some water also flows to Coyote Spring Valley and beyond to Moapa Warm Springs and the Muddy River as well.

While there is dispute among experts as to the recharge, there seems to be agreement between the original Recon and the 1990 Kirk and Campana reports. These reports respectively show a range for recharge of 14,000-12,000 for Cave, 5000-6700 for Dry Lake, and 1000-1900 for Delamar. Certainly, given the critical nature of the springs in White River and Pahrangat Valleys it is prudent to err on the side of the more conservative estimate (recharge limited to approx. 20,000 AFA over all but with 65% occurring in Cave).

However, I argue that there is little need to have an exact recharge number since it is evident from the lack of a local discharge from the 3 valleys of any significance, means that the groundwater here has already been allocated to surface water rights in adjacent basins lower in elevation and connected through the carbonate aquifer. The interconnection is not newly discovered. The only issue is the quantity and that appears to be largely irrelevant. Any decrease in flow of the springs in White River Valley will harm existing water rights, likewise in Pahrangat Valley, and on a longer time frame flows in Coyote Spring and Moapa Warm Springs.

The State Engineer's management on a basin by basin approach does not preclude assigning the water from one basin to the use within another. In fact, this is precisely what prudent groundwater management is all about. It would be imprudent and wrong to knowingly harm senior water rights and negatively affect an entire region. Attempting to correct a harm after the fact, when evidence is readily available now that shows harm will occur, ultimately will lead to a loss of important public and private water dependent resources and economic viability. It sets up a situation where these unacceptable losses are guaranteed.

None of the groundwater applications in Cave, Dry Lake, or Delamar Valleys should be granted because there is ample evidence presented by the protestants that substantial harm to existing surface water resources and water rights will occur and that once damage does occur, it cannot be corrected.

Spring Valley Water Applications

Spring Valley, while still a desert valley in the driest state in the country, has surface water resources which made it an important place for Native Americans as well as attractive to settlers who built ranches and farms and mining towns beginning in the mid-1800s. Unlike Cave, Dry Lake, and Delamar Valleys which have little discharge within the valleys, Spring Valley has numerous springs and streams and wetlands which support people and wildlife and contribute significantly to the culture of Native American's. The LDS Church runs a large ranch which is part of its considerable charitable activities.

The valley has extensive grasslands and shrublands which support domestic livestock as well as a substantial native wildlife population including deer, elk and antelope. As if to draw attention to its difference with other desert valleys in Nevada, Spring Valley is also home to large stands of Rocky Mountain juniper trees or "swamp cedar" growing in the valley bottom in both northern and southern parts of the valley. The valley bottom swamp cedar trees are separated from the forests of juniper and other conifer species found in the higher elevations of the mountain ranges by dry desert foothills and alluvial fans. The swamp cedar forest in the valley bottom is no accident, but directly related to the presence of groundwater near (or in many places at) the land surface. It is not hard to find young sapplings and old trees wherever the swamp cedar occur.

Like the valley bottom forest, there are extensive grasslands intermixed with shrubs outside of the swamp cedar forest areas. There are both perennial and seasonal wetlands with migrating water fowl and shorebirds.

It seems clear from the BLM's Groundwater Development Project (GWDP) DEIS on the SNWA proposed project and the testimony at the hearing that the valley's extensive springs, wetlands, grasslands, and forests cannot continue to exist once pumping commences. There is little doubt that as pumping continues year-after-year the decline in groundwater elevations will dry meadows and wetlands and cause springs to flow less and then ultimately become dry. The trees and shrubs will gradually die out and their replacement seedlings will not find a hospitable environment to grow so no replacement trees will be recruited. Meadow grasses will face desiccation as the water table drops to be replaced by either bare soil or, perhaps, by some as yet unknown plant. In either case, the value of the resource for local enterprise is lost and the vested rights to the groundwater are forfeit.

The existing water rights in the valley represent only a fraction of the beneficial use of the groundwater due to vested rights from the extensive sub-irrigated lands which form the basis of

the grazing of domestic livestock throughout the groundwater discharge area. Likewise, wildlife have access now to springs and seeps and ponded surface water discharged from the groundwater throughout the valley. Wildlife can graze throughout the valley, but rich resources from sub-irrigated lands provide food and cover which is rare in Nevada. There are ponds filled by both natural groundwater discharge and artesian well flow important to the survival of populations of endangered fish as well as numerous springs with unique species of snails.

The GWDP DEIS using a model developed by the SNWA for the purpose of the DEIS, shows long-term drawdowns of the water table in the 5 targeted valleys in the proposed action. There are significant drawdowns after 75 years and those impacts only continue to increase up to 200 years. However, in no case did the impacts to the groundwater show a leveling even after the 200 year period. In the State Engineer's hearing focusing just on Spring Valley, Dr. Myers shows that drawdowns of the groundwater continue for more than a thousand years. It becomes clear that the numerous surface water resources dependent on the groundwater discharges in Spring Valley are to be sacrificed and that the valley will become completely dry. Further, the recovery of groundwater levels should pumping be stopped is unlikely to occur for an even longer time period, if ever.

Could the valley soils remain stable as all groundwater is withdrawn to depths of 50-100-200 feet below their current levels as pumping continues? Could streams coming from the mountains ever be able to reach the playas and seasonally flood them as occurs now?

Regardless of those important, but unanswered questions, the result of pumping drawdowns will be damage or loss to most springs and probably all meadows, wetlands, tree cover, and to senior and vested water rights including the unidentified reserved water rights of the BLM and other federal and state agencies responsible for the protection of vegetation, wildlife and fish habitats. Nevada water law requires water to be left at the source for wildlife – a form of vested water right.

Dr. Myers estimated that groundwater recharge in the whole of Spring Valley is 72,000 acre-feet per year. That estimate is reasonable in light of the large error possible from estimating evapotranspiration (ET). With ET estimates taken at a few discrete locations and then extrapolated to large areas, the estimation error can be very high. It is not prudent and is extremely harmful to existing senior water rights holders when a liberal recharge estimate is accepted when other estimates that are more conservative have just as much reason to be accepted. The objective should be to never harm existing users through an action by the state or, in this case, a State Engineer decision. By using a reasonable number averaged from existing literature and not directly tied to work by the applicant or protestants, the State Engineer will have less likelihood of directly harming existing water rights holders.

Spring Valley can also be viewed as a northern portion north of highway 50 with significant recharge coming from the east side of the Schell Creek mountains and the west side of the North Snake Range and a southern portion south of highway 50 with significant recharge coming from the west side of the South Snake Range. How that recharge would divide north to

south is not the issue I want to raise, however.

The issue at stake is that in the northern portion of the valley the applications SNWA has filed about the LDS Ranch property as well as sitting in the recharge area of Cleve Creek. One doesn't really need to be an expert to know that pumping groundwater from those application locations will effectively (and quickly) lower the groundwater enough to capture the existing flow to the ranch springs and sub-irrigated meadows and beyond to springs and wetlands on public and private land. (I point out that much expert testimony did agree with the above view.) It could capture Cleve Creek flows as well, but it certainly is reasonable to expect that it will capture the groundwater which now flows to springs and sub-irrigated meadows.

In southern Spring Valley application locations will capture water over time that supports flows to Snake and Hamlin Valleys and supplies some groundwater that discharges at Big Spring in Snake Valley. It will more quickly stop flows to Shoshone Pond and sub-irrigated meadows and the swamp cedar forest that is found in the southern Spring Valley. Other pumping locations will capture the groundwater which supports springs in the southern Spring Valley bottom west of Mt. Washington and the sub-irrigated meadows which are found widespread in this area as well as other phreatophyte vegetation that support domestic livestock and wildlife. Again, as vegetation dies off there will be open ground which will remain exposed as long as and until some kind of plant finds the location suitable. Whether that happens or not is subject to endless speculation but the loss of what is now there is a known and cannot be mitigated with any amount of money or effort or good intentions.

It is not likely the BLM will move to protect existing groundwater dependent resources found on public lands (forests, sub-irrigated meadows, wetlands, streams, springs, and even habitats now designated for endangered species) and a certainty that BLM will make no attempt to protect private groundwater dependent resources through any record of decision on the GWDP. In large measure this is most likely because the GWDP DEIS relies on the 5 year old "stipulated agreements" which provide no effective protection for public or private resources.

Such a view of the stipulated agreements is not simply my own, but can be found in critiques presented in the State Engineer's recent hearing by several protestants witnesses and summed up nicely by Mr. Paul Hejmanowski. My less elegant and less complete summation is simply that the "stips" exclude the very people in the valleys and counties who will be most affected by the pumping, lack triggers or goals, lack time frames for actions to stop or reduce pumping, and provide for no actions to be taken to avert negative affects at any level.

In the water hearing we heard the applicant argue that it is 1) reasonable for the SNWA to press for more groundwater than many recharge estimates show is available in Spring Valley and 2) approval of the 91,000 acre-feet annually is critical to Southern Nevada's very survival. At the same time, SNWA says that the stipulated agreement will protect resources currently found in Spring Valley including the swamp cedar which are obviously connected to the groundwater near the land surface (especially for recruitment of new trees) as well as "significant" springs. Yet, the only way to protect any of these resources is for SNWA to greatly reduce or stop

pumping which would seem to belie its claim that the rural groundwater is critical. Yet, the resource plan presented both at the hearing and in the DEIS does not show any decreases in the use of the groundwater resources from the GWDP.

I find the claim of absolute need for the water on the one hand and willingness to reduce or stop pumping to protect any particular existing spring or vegetation resources within Spring Valley on the other hand to be illogical and unsupportable. It is far more reasonable that the resource plan in effect at the time will be the determining factor for an agency determined to increase water supply. The mission to supply water will outweigh the need to protect resources 275 miles away. The promises made now will have less and less importance to an agency reliant on “new” supply rather than conservation and efficiency investments and expenditures to enhance and extend the reliability of existing resources.

The resources that exist in Spring Valley are worth keeping and the loss of those resources incrementally as pumping continues year-by-year is not environmentally sound and will limit the future of Spring Valley – the basin of origin. There is no precedent for the kind of groundwater extraction project planned in Spring Valley by the SNWA. The impacts of groundwater removal are severe and long-lasting and the impact to other water rights and vested rights debilitating to the people and the economy and cannot be mitigated.

Some Personal Observations

In hearings such as the one which just concluded, the expert testimony is fascinating and interesting but needs to be viewed through the lens of time and what these places mean to people – residents and visitor alike. So I close this letter with my personal view of Spring Valley today and my plea to you that it remain as a viable resource for local agriculture, local and native people and its current native wildlife, and one of Nevada's scenic treasures.

In a 1970 paper by Alvin McLane with the unwieldy title “Evaluation of Swamp Cedar Ecological Area White Pine County, Nevada for eligibility for Registered Natural Landmark designation”, he notes that Captain J. H. Simpson saw and talked about these trees in 1859 in Spring Valley as he surveyed a shorter cross-country route. Simpson's journal entry of Spring Valley is still true today: “ ... and intermingled ... are extensive groves of tall cedars, which thus far on our routes, existing, as these groves do, in the bottom of the valley, is quite an anomaly [*sic*]. ... Birds frequent these groves, and make the air resonant [*sic*] with their music. The scenery [*sic*], too, is quite pretty.” McLane's paper noted that Maxey and Eakin recognized in their 1949 paper that the swamp cedar (Rocky Mountain Juniper) were dependent on groundwater near the land surface.



Swamp cedar, examined by Joseph ...
on swamp cedar, 7 May 1970

Simply put, the trees were and still are part of the ecosystem because of the groundwater.

As I stand on a lookout near a large bat cave in Spring Valley the view west is of a place that to my eye is unique within Great Basin valleys. The dry foothills give way to a rich valley landscape of grasslands, springs, wetlands, meadows, and a forest of trees in the valley bottom.



Spring Valley view from bat cave

The trees and meadows have a sharp demarcation between the upland and the valley – an arc which carves across the landscape from south to north where the Rocky Mountain Juniper trees stretch across as well as up and down the valley. No "swamp cedar" trees are growing above that line; the trees are limited to the valley bottom below the line. The arc of trees lives in a yellow-green meadow that stretches westward to the Schell Creek foothills. Within the meadow there are rivulets of water which shine in the late afternoon light and make their way northeast across the meadow land. Cattle graze here scattered widely around the meadow. There's one antelope herd visible through a scope.

Closer to the meadow edge is a spring right on the line of trees. Mountain blue birds call nearby from the tops of the trees. A short distance away is a family of burrowing owls along a fence line close to their burrow. Overhead a red-tailed hawk soars above the meadow.

In the early evening the night critters take over. The bats from the caves in the rocky cliffs start their evening work scooping up many thousands of insects which swarm over the meadows and wetlands throughout the valley. Great Horned and even Long-eared Owls, hidden during the day, search for prey among the trees and throughout the meadows.



Avocets in wetland meadow in Spring Valley

In the case of Spring Valley at least, much of this life is the result of its groundwater which manifests as springs, meadows, wetlands, and this rare Great Basin Valley bottom forest.



Spring Valley Shoshone Pond

I've camped near the Shoshone ponds at the base of Wheeler Peak where I've seen a truck load of kids popping in and out of the water and running through the grass and families having impromptu picnics. There are cattle here, too. And antelope and deer.

As I walk through the "swamp cedar" here, it's easy to see why that name fits so well. All around are flooded meadows so you have to pick your way carefully through the trees to bird and look for wildlife. Water flows out across the meadows from a flowing well. I

expect the water to be cold, but instead it feels warm.

South down the road from the ponds there are stacks of hay being harvested in fields anytime from spring through fall. In the valley bottom in the distance there are small playa lakes glistening in the late morning light. One of the small streams from the South Snake Range makes its way across the alluvial plain to enter a farm field.



Spring Valley hay harvest near Shoshone

All the abundance in Spring Valley could disappear in just a few decades under the SNWA plan to pump and permanently remove up to 91,000 acre-feet each year from the valley. Even if less water is ultimately removed, the damage will only be slowed, but not stopped. The irony is that Spring Valley is no where near Las Vegas – it is 275 miles away.

Spring Valley lives up to its name with rich meadows and grasslands, valley bottom forests, numerous springs and the kind of hard working folk who have made these places productive despite drought and flood, heat and cold. It is simply not environmentally sound that just a life-time from now a visitor here will find that the meadows are dry or gone. The springs extinguished. The ponds a dusty memory. The trees no longer a forest just a long-distant digital image. The hearty farmers and ranchers gone; the resources Native American's depend on vanished.



Artesian flow near Shoshone Pond & Meadows

Closing

I urge you to not sacrifice Spring Valley to pumps and pipelines and permanently and irretrievably remove nearly a million acre-feet of groundwater every decade. If it is allowed virtually nothing that we see here today will be present after this unprecedented removal of groundwater is operating. The best of intentions and hoped for mitigation cannot overcome the

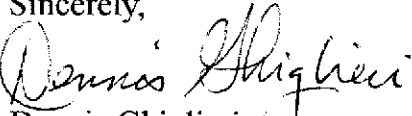
effects of removing water from an arid region. The impact to the valley extends beyond losing the springs, wetlands, meadows and forests, however. It includes the ultimate loss of existing senior water rights holders and vested water rights interests as well as to the Native Americans who rely on Spring Valley for their cultural identity. It includes the visitor who will no longer see what James Simpson did in 1859 or hear bird song from the trees.

I further urge you to recognize that basins within the carbonate province are connected and that water already allocated from one basin precludes “double dipping” to take water flowing underground to the springs already fully appropriated. Such is certainly the case, regardless of which expert is believed, in the case of applications in Cave, Dry Lake, and Delamar Valleys. It is also true that water at Big Springs in Snake Valley that comes from Spring Valley should not be allocated again to groundwater pumpers in Spring Valley. Fully appropriated surface water is a resource that already has a beneficial use and there is no denying that in this arid region the regional and local springs are the lifeline of people and wildlife.

No definition of environmentally sound can possibly support the kind of losses that would occur in Spring Valley. No definition of “reasonable” decline would support the losses faced by senior water rights holders. No definition of “unduly limit” to the viability of the basins of origin can support the elimination of future economic activity the valleys would face. No definition of public interest can support the losses faced by Native Americans, ranchers and farmers, local economies, and wildlife.

I request that the applications be denied.

Sincerely,


Dennis Ghiglieri

Attachment: Images of & comments on existing water use in Southern Nevada

Images of & Comments on of Existing Water Use in Southern Nevada



"The Lakes" fills a man-made lake with water from the municipal supply as a property amenity just 5 minutes from Lake Mead – one of the largest man-made lakes in the country. Such use of water in the most arid region of the most arid state can be easily viewed as excessive and providing little benefit to most of Las Vegas residents and visitors alike.

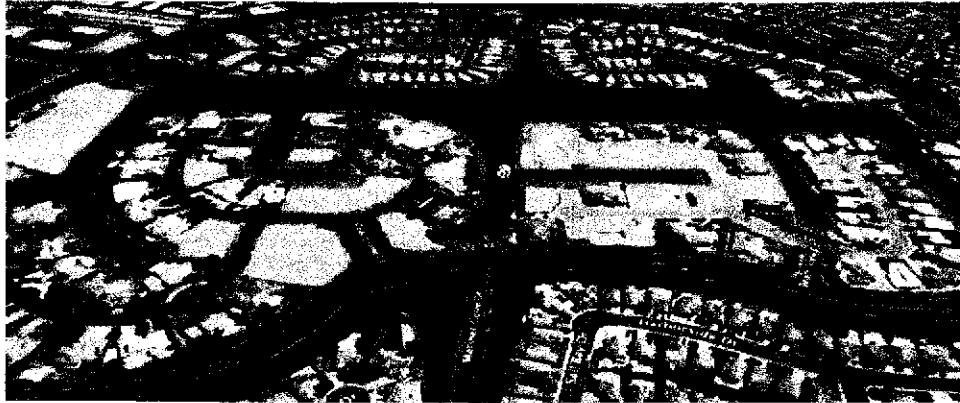


Strip lawns at commercial sites still are common.

Large lawn common areas frequently border streets or parking areas as in this gated subdivision but are rarely if ever used by residents.



Swimming pools are common in many subdivisions but are rarely covered. Personal friends in Las Vegas do have pools but say they are happy to cover them to reduce evaporation loss and save money.



The use of municipal supply to fill artificial lakes in gated communities was common (it still does occur as in new developments around Floyd Lamb Park, for example) and could become the norm once again when “new” water is found to be available. It was not an uncommon view even in the recent past that there was “excess” water available for water intensive uses that developers could use to market properties.





Landscape designs have a wide range of water conserving plants to provide unique landscape designs and suit individual tastes.



“Which future do you choose?”
Sign at the Moapa National Wildlife Refuge
Visitor Center.

